Errata

Special Publication No. 110.

Page 2, line 2: Insert a in azimuth.

Page 7, line 5 from bottom of page: Change 4 to 1 and 5 to 2.

Page 66, 1st column, line 10: Change "station value of traverse" to "value of traverse station."

Page 69, line 21: Change 9 to 11.

Page 69, line 22: Change 8 to 10.

Page 69, line 26: Change 7 to 8.

Page 119, 2nd column, line 3: Newfoundland instead of New Foundland.

Page 266, line 9: Change "west" to "east".

Page 296, columns 10 and 11, line 4 under heading "Arkansas": Interchange 137 and 108.

Page 316, column 15, lines 10 and 11: Move each of the numbers 718 and 753 up 1 line.

Page 316, column 15, lines 28 and 29: Move each of the numbers 718 and 753 up 1 line.

Page 321, 1st column, line 10: Change heading "New Jersey" to "New Mexico."

Page 336, column 7, lines 10 and 11 from bottom of page: Delete brace.

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U. S. COAST AND GEODETIC SURVEY

E. LESTER JONES, Director

ASTRONOMIC DETERMINATIONS

BY

UNITED STATES COAST AND GEODETIC SURVEY AND OTHER ORGANIZATIONS

By

SARAH BEALL
MATHEMATICIAN

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CONTENTS

	Page
Introduction	1
Chapter I.—Longitudes	3
General statement	3
Initial meridian	3
Time determinations	4
Personal equation	4
Transit micrometer	5
Time comparisons	5
Celestial signals	5
Transportation of chronometers	5
Telegraphic signals	6
Cable signals and world longitude loop	7
Wireless signals	7
Longitudes by other organizations	7
Instruments	7
Table I, instruments used in the determination of longitude	8
Tables of observed longitude differences	9
Table II, longitude differences by United States Coast and Geodetic Survey	10
Table III, rejected longitude differences by United States Coast and Geodetic Survey	25
Table IV, longitude differences by United States Lake Survey	26
Table V, rejected longitude differences by United States Lake Survey	28
Table VI, longitude differences by United States Geological Survey	29
Table VII, longitude differences by United States General Land Office	30
Table VIII, longitude differences by various institutions	30
Longitude net adjustment	31
Secondary adjustments	31
Table IX, loops adjusted to the longitude net of the United States	31
Tables of final longitude differences and resulting longitudes	33
Table X, final longitude differences and resulting longitudes, United States Coast and Geodetic Survey	34
Table XI, final longitude differences and resulting longitudes, United States Lake Survey	43
Table XII, final longitude differences and resulting longitudes, United States Geological Survey	44
Table XIII, final longitude differences and resulting longitudes, United States General Land Office	45
Table XIV, final longitude differences and resulting longitudes, various organizations	46
Chapter II.—Latitudes	47
General statement	47
Talcott method	47
Latitude determinations by other organizations	47
Instruments	48
Table XV, instruments used in the determination of latitude	48
Star catalogues	50
Variation of the pole	51
Tables of observed latitudes	51
Table XVI, latitudes determined by the United States Coast and Geodetic Survey	52
Table XVII, latitudes determined by the United States Lake Survey	64
Table XVIII, latitudes determined by the United States Geological Survey	66
Table XIX, latitudes determined by the United States General Land Office	67
Table XX, latitudes determined by the United States and Canada Boundary Commission	68
Table XXI, latitudes determined by the United States Engineers	68
Chapter III.—Azimuths	69
General statement	69
Methods of observing	69
Instruments	70
Table XXII, instruments used in the determination of azimuth	70
Observed azimuths	71
Table XXIII, azimuths determined by the United States Coast and Geodetic Survey	72
Table XXIV, azimuths determined by the United States Lake Survey	86

Page
Chapter IV.—Deflections of the vertical 87
Figure of the earth 87
North American datum 87
Computations for deflections of the vertical 89
Explanation of tables 92
Table XXV, deflections of the vertical at latitude stations 92
Table XXVI, deflections of the vertical at longitude stations 108
Table XXVII, deflections of the vertical at azimuth stations 120
Chapter V.—Descriptions of stations 130
Marking of stations 130
Standard notes on the marking of stations 130
Descriptions 131
Alabama 131
Arizona 133
Arkansas 137
California 138
Colorado 153
Connecticut 158
Delaware 159
District of Columbia 159
Florida 160
Georgia 165
Idaho 172
Illinois 173
Indiana 178
Iowa 181
Kansas 181
Kentucky 183
Louisiana 185
Maine 189
Maryland 192
Massachusetts 194
Michigan 196
Minnesota 202
Mississippi 205
Missouri 208
Montana 210
Nebraska 211
Nevada 213
New Hampshire 215
New Jersey 216
New Mexico 217
New York 219
North Carolina 224
North Dakota 229
Ohio 230
Oklahoma 232
Oregon 233
Pennsylvania 238
Rhode Island 239
South Carolina 240
South Dakota 242
Tennessee 243
Texas 244
Utah 256
Vermont 260
Virginia 260
Washington 263
West Virginia 266
Wisconsin 267
Wyoming 274
United States Islands and foreign 276

	Page
Bibliography of astronomic publications by the United States Coast and Geodetic Survey	279
Explanation of index	293
Miscellaneous publications	293
Index to stations	295

ILLUSTRATIONS

Fig. 1. Portable astronomic transit, straight-telescope type, equipped with transit micrometer	4
Fig. 2. Portable astronomic transit, broken-telescope type, equipped with transit micrometer	5
Fig. 3. Chronograph	4
Fig. 4. Transit micrometer, straight-telescope transit	5
Fig. 5. Transit micrometer, of broken-telescope transit	4
Fig. 6. Longitude net of the 1897 adjustment and additional precise longitudes	30
Fig. 7. Zenith telescope	48
Fig. 8. Meridian telescope	49
Fig. 9. Broken-telescope transit equipped for latitude observations	48
Fig. 10. Twenty-four inch theodolite	70
Fig. 11. Twelve-inch direction theodolite	71
Fig. 12. Vertical circle	70
Fig. 13. Geometrical illustration of deflection of the vertical	90
Fig. 14. United States Coast and Geodetic Survey station marks	130
Fig. 15. Astronomic stations in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island	282
Fig. 16. Astronomic stations in New York, Pennsylvania, New Jersey, Delaware, Maryland, District of Columbia, Virginia, and West Virginia	283
Fig. 17. Astronomic stations in North Carolina, South Carolina, Georgia, and Florida	284
Fig. 18. Astronomic stations in Michigan, Ohio, and Indiana	285
Fig. 19. Astronomic stations in Wisconsin, Minnesota, Illinois, and Iowa	286
Fig. 20. Astronomic stations in Kentucky, Tennessee, Alabama, Mississippi, Missouri, Arkansas, and Louisiana	287
Fig. 21. Astronomic stations in Kansas, Oklahoma, and Texas	288
Fig. 22. Astronomic stations in North Dakota, South Dakota, Nebraska, Montana, and Wyoming	289
Fig. 23. Astronomic stations in Colorado, New Mexico, Utah, and Arizona	290
Fig. 24. Astronomic stations in Idaho, Washington and Oregon	291
Fig. 25. Astronomic stations in Nevada and California	292

ASTRONOMIC DETERMINATIONS BY UNITED STATES COAST AND GEODETIC SURVEY AND OTHER ORGANIZATIONS

By Sarah Beall, *Mathematician, United States Coast and Geodetic Survey*

INTRODUCTION

A plan to have a survey made of the coast of the United States is believed to have been first suggested by Prof. Robert Patterson, of Philadelphia, in 1806, and it was probably his presentation of the plan that induced President Thomas Jefferson to make the recommendations to Congress which resulted in a law being passed in 1807 authorizing the survey.

Ferdinand R. Hassler, an eminent Swiss geodesist, was appointed superintendent of the Survey of the Coast in 1816. In 1818, due in part to lack of appreciation of the work and in part to the depleted condition of the United States Treasury on account of the war just ended, the survey was discontinued. In 1832, the law of 1807 was reenacted in revised form and put into effect. Mr. Hassler was a second time appointed superintendent and remained in office until his death in 1843. He was succeeded by Alexander Dallas Bache, an eminent mathematician and astronomer.

In 1843 a law was passed which directed the formation of a board to reorganize the work of the Coast Survey. The recommendations of this board retained and extended the scientific features of the work, defined its organization, and established in detail the methods and order of operations essentially as they are now. These recommendations were adopted in 1844.

In 1878, on account of the extended work of the Coast Survey, its name was changed to Coast and Geodetic Survey.

The purposes of the geodetic operations of the Coast and Geodetic Survey are, first, the control of the charts published by the survey; second, the furnishing of geographic positions (latitudes and longitudes), accurately determined elevations, distances, and azimuths to field parties of this bureau and to other organizations; third, the determination of the shape and size of the earth.

In order that points of a survey may be accurately located on the face of the earth by their coordinates of latitude and longitude, the astronomic latitude and longitude of occasional stations of the survey must be determined and also the astronomic azimuths of some of the lines. Accurate astronomic determinations have therefore been an important part of the geodetic operations of the Coast and Geodetic Survey, and men of the highest scientific training have been brought to the survey to aid in the development of this work.

The real astronomic work of the Coast Survey began about 1846 when instruments and methods of observing had been developed to give the desired accuracy. From that time until the present, astronomic observations for latitude, longitude, and azimuth have been made in connection with all arcs of triangulation measured by this bureau and also in connection with various state and detached surveys.

The results of many of these observations have never been published, and those which have been published are scattered through various reports of the survey, some of which are now out of print. It therefore seemed desirable at this time to collect in one volume all astronomic latitudes, longitudes, and azimuths that are of value for geographic or scientific purposes, in order to preserve these data and to make them readily available for use in geodetic surveys.

Other organizations which have made astronomic observations for latitude, longitude, and zimuth are: The United States Lake Survey, United States Geological Survey, United States General Land Office, United States and Canada Boundary Commission, Corps of Engineers, United States Army (in connection with the survey west of the one hundredth meridian), and various institutions such as permanent observatories. With the consent and hearty cooperation of these organizations, many of their results have been included in this publication.

In collecting the astronomic data and the historical facts concerning the survey and the beginning of astronomic work, free use has been made of reports of this bureau and of other Government organizations. Other publications containing articles concerning the purpose or work of the survey have also been freely used.

Dr. William Bowie, chief of the division of geodesy, gave many valuable suggestions in the preparation of this publication, and the entire force of the division gave splendid cooperation. Special mention should be made of H. C. Mitchell, H. G. Avers, O. P. Sutherland, C. H. Swick, J. W. Belcher, C. A. Bowman, W. Cole, F. W. Darling, and J. O. Hammond.

CHAPTER I.—LONGITUDES

GENERAL STATEMENT

In the early history of the Coast and Geodetic Survey, one of the most important problems which presented itself for solution was the determination of longitude. It engaged the attention of the most able and distinguished astronomers, mathematicians, and other scientists of the time, some of whom were connected with the survey and others of whom were called to the survey to aid in its solution.

Radical changes have been made from time to time in the instruments and methods used, until now the determination of the longitude differences may be very efficiently and accurately made. The methods used by the Coast and Geodetic Survey for the determination of the astronomic longitude of a station have been discussed at length in many reports of the survey. The telegraphic method is explained in detail in Special Publication No. 14, and the wireless method, which is the latest development, is discussed in Special Publication No. 109.

The astronomic longitude of a point on the earth is the angle between some initial meridian plane, arbitrarily chosen, and the meridian plane of the station. The meridian plane of the station is the plane which contains the plumb line of the station and is parallel to the earth's axis. The difference of longitude of two stations is the angle between their meridian planes as just defined.

Since the earth revolves uniformly on its axis, the difference of longitude is measured by the time required for a star to pass from the meridian of one station to that of another, or the difference of longitude is the difference of the local times, either sidereal or mean solar, of the two stations at the same instant.

INITIAL MERIDIAN

In different periods of history, various meridians have been used as the initial or zero of longitude from which other longitudes are reckoned. Hipparchus, the earliest astronomer to determine longitude by astronomical observations, used the meridian of Rhodes. Eventually each country came to have its own initial meridian, usually the meridian of its capital, the one for the United States being the meridian of the center of the dome of the old Naval Observatory, Washington, D. C., sometimes called the American meridian. Many of the State surveys are referred to the American meridian.

In 1882 the Congress of the United States, recognizing the practical benefits to be derived from having a common initial or zero of longitude for all nations, passed a joint resolution authorizing the President to call an international conference to meet in Washington to consider and to recommend a common zero of longitude or meridian of reference. This conference, in which 26 nations were represented, met in October, 1884. It recommended the adoption of the meridian of the Royal Observatory, Greenwich, England, and while the nations represented were not unanimous in this, the meridian of Greenwich is now almost universally used and to it, as the zero of longitudes, all the longitudes of the United States are now referred. It was adopted by France in 1911.

The determination of the astronomic longitude of a station, therefore, involves determining the true local time at that station and comparing that time with the local time at Greenwich or at some station the longitude of which has been determined with respect to Greenwich.

TIME DETERMINATIONS

The first part of the problem, the determination of the true local times, is simply finding the error of the chronometer or clock used at each station. For this the method used by the Coast and Geodetic Survey in all longitude work is the observation of the transit of stars with an instrument especially designed for the purpose, the astronomic transit shown in Figures 1 and 2, mounted with its telescope in the plane of the meridian of the station. A chronometer, regulated to sidereal time, is used also.

At the instant of transit of a star across the meridian of a station, the local sidereal time at the station is equal to the right ascension of the star. If the instrument could be perfectly adjusted, the line of sight of the telescope would lie exactly in the plane of the meridian of the station and the difference between the observed chronometer time of transit of the star and its right ascension would be the chronometer correction sought. Since the instrument can not be perfectly adjusted, the stars are selected and the observations made in such manner as to eliminate the errors of adjustment or to permit their determination. The right ascension of the star minus the chronometer time of transit corrected for errors of adjustment gives the correction to the chronometer.

The right ascensions of stars used for time observations may be taken from the American Ephemeris and Nautical Almanac, or some other star catalogue, which gives the apparent places of the larger stars.

The observations for time for one night by present methods consist of two time sets. A time set may consist of two half sets of six or seven stars each, the instrument being reversed between each two half sets, or it may consist of one whole set of five or six stars, the instrument being reversed during the observations on each star; that is, after the first half of the observations on the star has been made. (See Special Publications Nos. 14 and 35.)

The method of recording the chronometer time of the transit of stars has a direct and important effect upon the resulting longitude for which the time is being determined. The transits were first recorded by what is known as the "eye and ear method," the observer having to count the beats of the chronometer while his eye estimated the fraction of a second at which the transit took place.

Realizing the value of the graphic registry of time results, Sears C. Walker, of the Coast and Geodetic Survey, in cooperation with W. C. Bond, Joseph Saxton, Prof. O. M. Mitchell, and Dr. John Locke, ingeniously developed the method of registering time results on a chronograph. This method is known as the "American method" and was introduced into the Coast Survey in 1850.

The chronograph (see fig. 3) consists essentially of a cylinder which is made to revolve at a uniform speed by a system of weights and gears controlled by a governor. A pen operated by an electromagnet traces a helix on a sheet of paper wound on the cylinder, and whenever the circuit through the electromagnet is broken a jog is made in the line traced by the pen. A break-circuit device in the chronometer operates the electromagnet and records the seconds of the chronometer. If a telegrapher's key is also connected in the circuit the observer may record the instant a star crosses the middle wire of the transit.

The "key and chronograph method," described above, was a great advance over the "eye and ear method," as it gave about ten times the accuracy and, from the time of its adoption, it was used in all longitude work until about 1905.

PERSONAL EQUATION

The record of the transit of stars by either the "eye and ear method" or the "key and chronograph method" is subject to a large error known as personal equation. The interval between the actual time of transit of a star across the wire of the instrument and the time as recorded by the observer is his absolute personal equation. This interval differs for different observers, of course, and even differs for the same observer under varying conditions. The difference between the absolute personal equation of the two observers is their relative personal

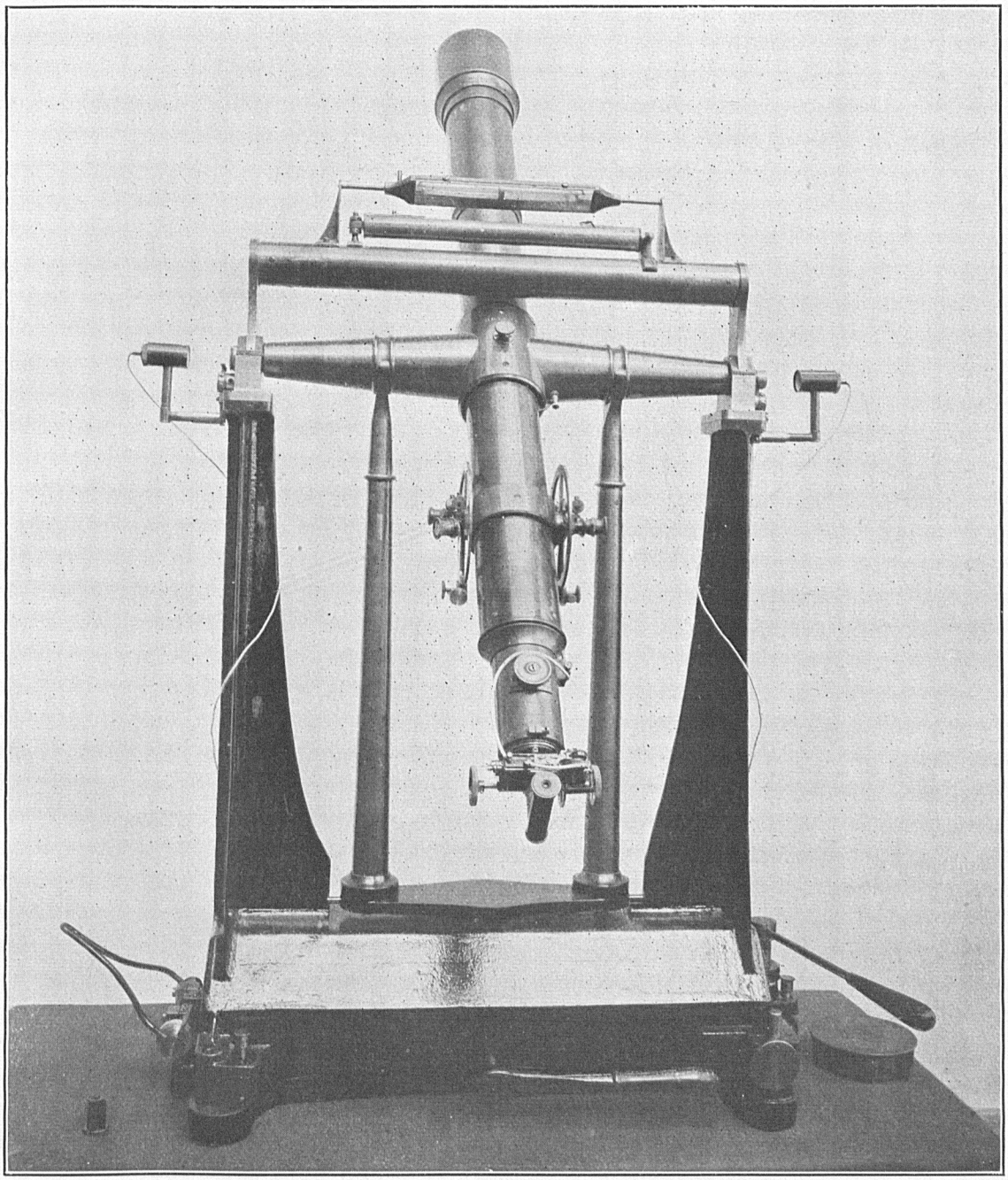


FIG. 1.—PORTABLE ASTRONOMIC TRANSIT, STRAIGHT-TELESCOPE TYPE, EQUIPPED WITH TRANSIT MICROMETER

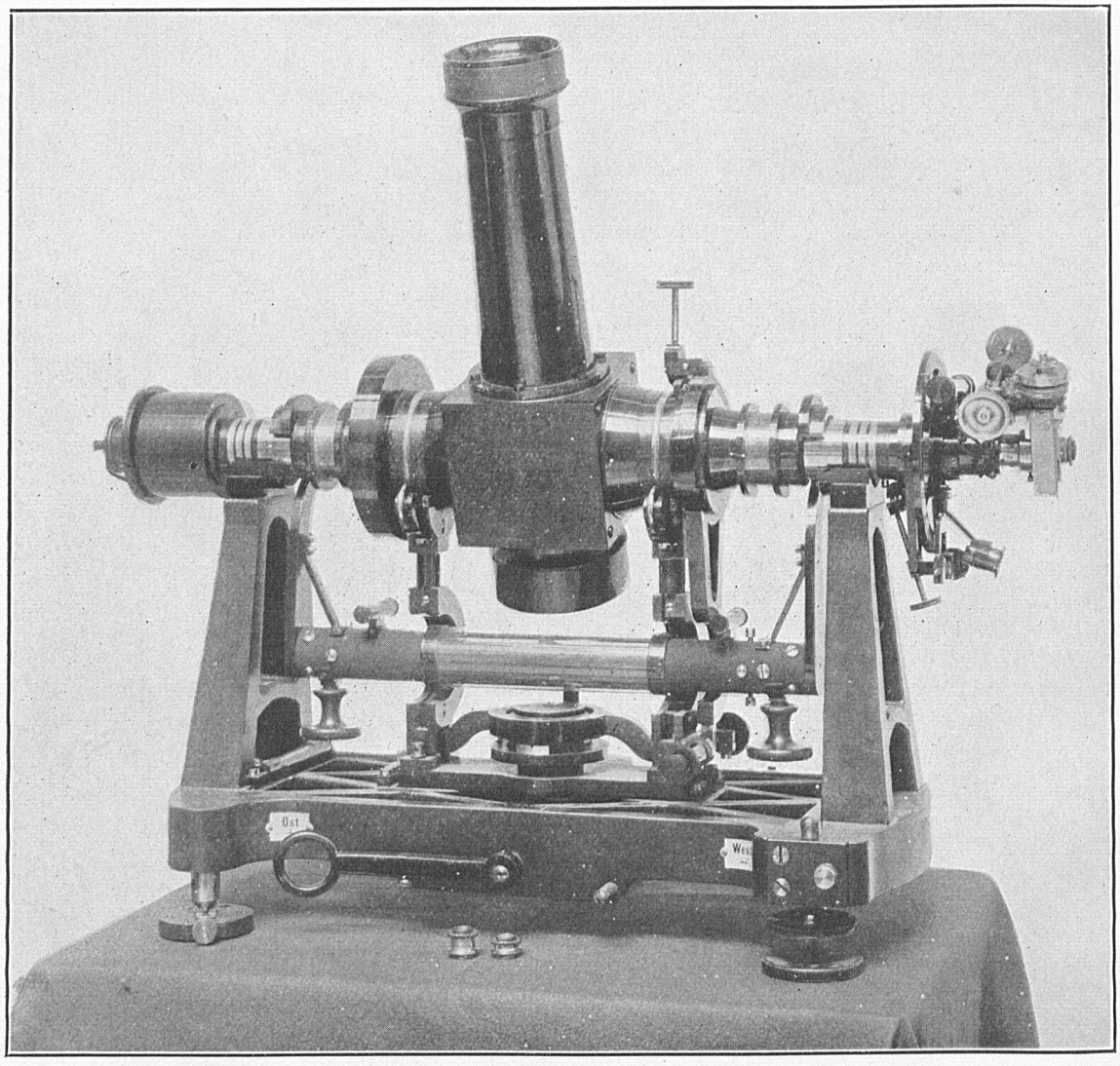


FIG. 2.—PORTABLE ASTRONOMIC TRANSIT, BROKEN-TELESCOPE TYPE, EQUIPPED WITH TRANSIT MICROMETER

This instrument is reversed on each star and thus eliminates the error of collimation. It may be adapted for latitude observations. (See fig. 9)

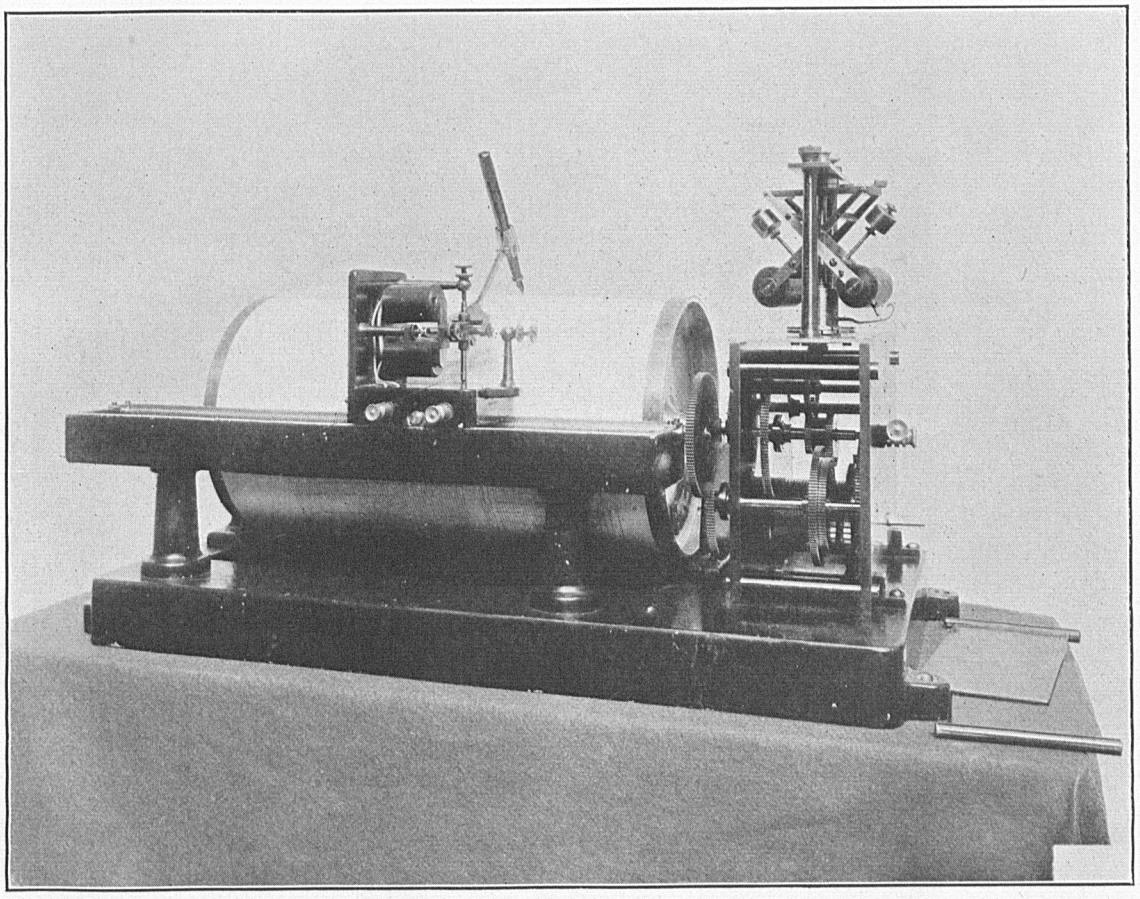


FIG. 3.—CHRONOGRAPH

This type of chronograph has been found more satisfactory for field use than the fillet or ribbon type

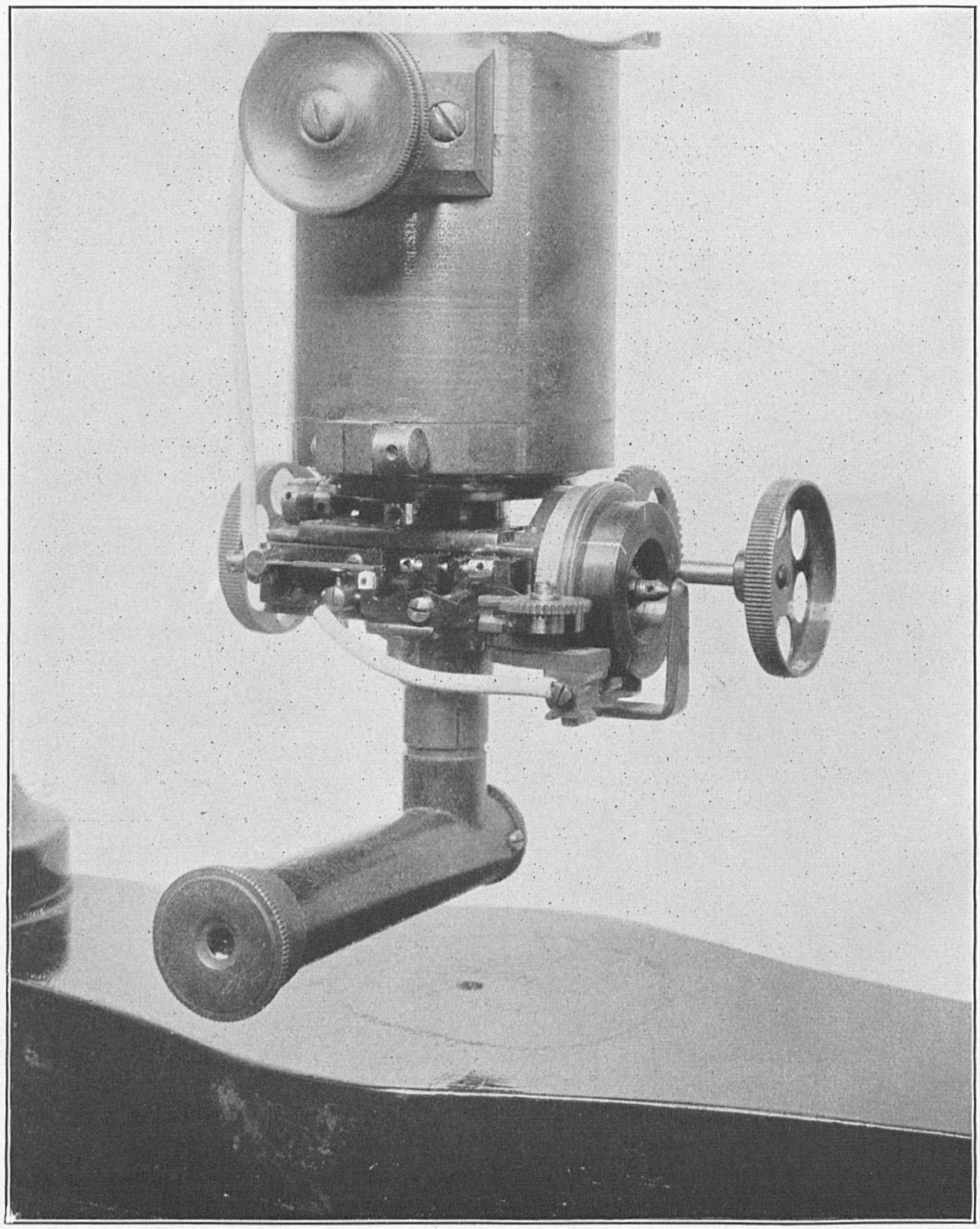


FIG. 4.—TRANSIT MICROMETER OF STRAIGHT-TELESCOPE TRANSIT

Personal equation, which is so uncertain and troublesome when either the eye-and-ear or the key method of observing is used, is almost entirely eliminated by this observing micrometer

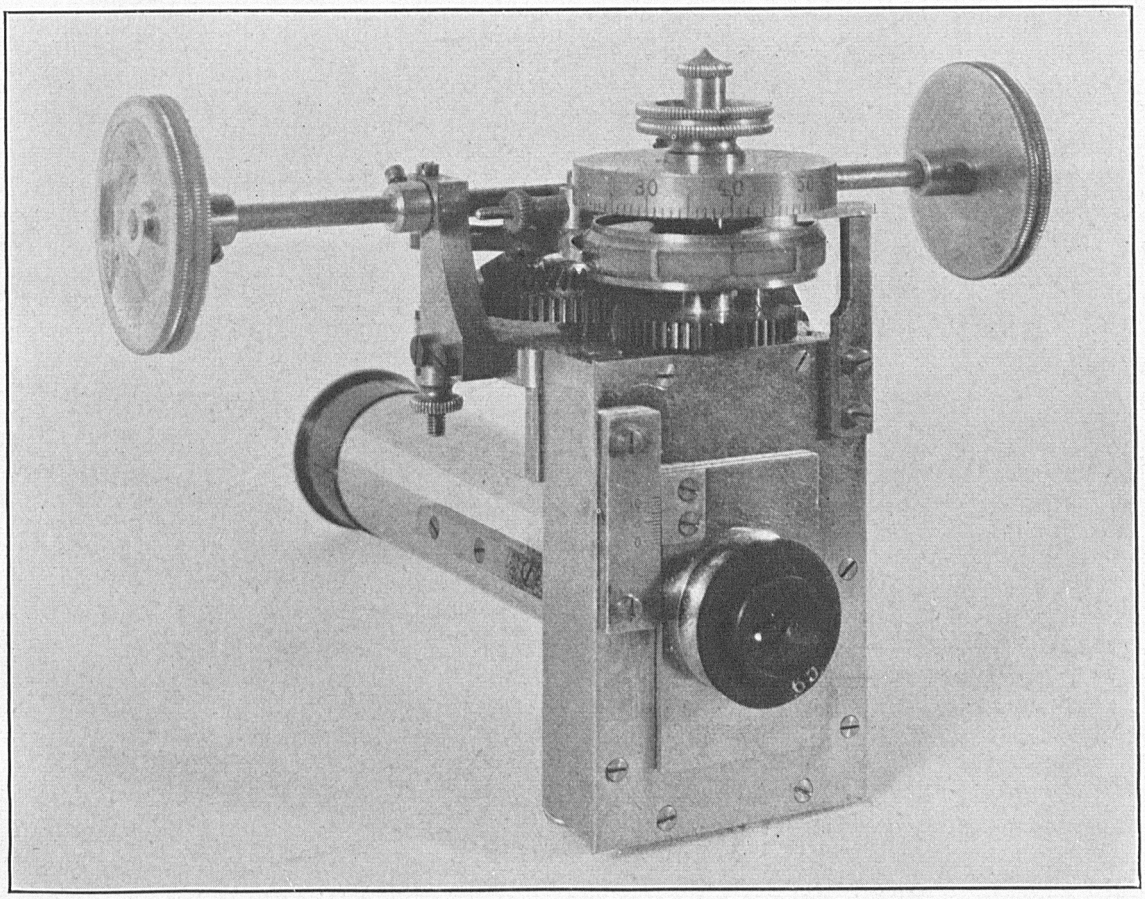


FIG. 5.—TRANSIT MICROMETER OF BROKEN-TELESCOPE TRANSIT

A somewhat different construction than the one shown in Figure 4 but equally satisfactory

equation and, since the determination of longitude depends upon the difference of the local times obtained by two observers, the result is affected directly by their relative personal equation.

The relative personal equation may be obtained by special observations, or it may be nearly eliminated from the results by the manner in which the observations are conducted. The variation in the personal equation, as obtained from a series of measures by practical observers extending over a number of years, is given in U. S. Coast and Geodetic Survey report for 1897, Appendix 2, page 246. The usual method for eliminating the relative personal equation was for the observers to exchange stations when half the observations at each station had been made. This method was used in all precise longitude work until the adoption of the transit micrometer in 1905 and has been used since that time when extreme accuracy was required such as for trans-Atlantic determinations.

TRANSIT MICROMETER

In 1903, J. F. Hayford and E. G. Fischer made a test of a method of recording the transits of stars by means of a transit micrometer, an instrument designed to eliminate personal equation. The conclusions drawn from this test were that the relative personal equation by the transit micrometer method is not more than one-tenth as large as by the "key and chronograph" method and that it is so small as to be negligible except in cases where great refinement is necessary.

As a result of the test, a transit micrometer, designed by Mr. Fischer, was adopted by the Coast and Geodetic Survey, and its successful use during nearly 20 years has fully proved its great value. A complete description and history of the transit micrometer is given in Appendix 8, report for 1904, entitled "A test of the transit micrometer," by J. F. Hayford. (See figs. 4 and 5.)

Very briefly, the transit micrometer is a registering micrometer with a movable wire in the focal plane of the telescope. The movable wire is caused to move across the field of the telescope by means of the micrometer screw which is turned by the observer. There are several contact points in the head of the micrometer and each of these closes the circuit through the chronograph and thus records the time when the wire has reached certain positions in following the star across the field of view.

TIME COMPARISONS

When the local time at each of the two stations has been determined, there must be a comparison of times by means of signals, either terrestrial or celestial, which may be observed simultaneously at both stations.

Many methods have been employed for this comparison of times. If the stations are sufficiently close, a flash of light may be used. This has been done successfully by French and Spanish officers. (See Clarke's Geodesy, pp. 262–263.)

CELESTIAL SIGNALS

One of the first methods used by the Coast and Geodetic Survey involved celestial signals, such as moon culminations or the occultation of stars. The right ascension of the moon is given in the American Ephemeris and Nautical Almanac for every hour of Greenwich time. If, at the station whose longitude is to be determined, the right ascension of the moon is determined by one of the above methods, and the local time is noted, the comparison of this time with the Greenwich time, corresponding to this right ascension as taken from the Ephemeris, will give the longitude required. The method of observation of occultations, especially of a group of stars such as the Pleiades, is about ten times as accurate as moon culminations but, in comparison with present methods, is not of a high degree of accuracy.

TRANSPORTATION OF CHRONOMETERS

Another method for comparing time is by the transportation of chronometers between stations, and is called the chronometer method. The error and rate of the chronometers used at each station are carefully determined by the usual method. The time is then carried from

one station to the other by transporting chronometers the rates of which have been carefully determined. A complete description of this method is given in United States Coast and Geodetic Survey special publication No. 14, pages 95–102.

TELEGRAPHIC SIGNALS

The invention of the electric telegraph in 1844 was destined to mark a new era in longitude determination. The first to suggest the use of the electric telegraph for time signals is said to have been Captain Wilkes, United States Navy, in 1844. The method was developed by Sears C. Walker, of the Coast and Geodetic Survey, and was put into successful operation by him on the night of October 10, 1846, when time signals were exchanged by means of the electric telegraph between the United States Naval Observatory, old site, Washington, D. C., and the old high school, Philadelphia, Pa.

When this work was undertaken by the Coast and Geodetic Survey, valuable suggestions were given by the inventor, Samuel F. B. Morse. (See U. S. Coast and Geodetic Survey Report for 1866, App. 13, reprint from Coast Survey Report of 1846.)

At first there were several methods used in sending or exchanging telegraphic signals. In 1848, Mr. Walker devised the method of "star signals." The difference of longitude between two stations, being the time required for a star to pass from the meridian of the eastern station to that of the western, may be measured by a single clock placed in the electric circuit so as to produce a record on the chronograph at both stations. The time of transit of the star at each station is also recorded on the chronograph. To obtain the required accuracy the transits of many stars must be recorded in this way, and this requires a long period of time, especially if the stations are far apart in an east and west direction.

The usual telegraphic method is for the two observers to make time observations independently of each other, and near the middle of these observations, at some predetermined time, to compare their chronometers by sending telegraphic signals which will be recorded on the chronographs at both stations. At first the chronometers themselves at the two stations were used alternately to send automatic signals, but if the two chronometers happened to be beating very nearly together there was interference, and it was very difficult to read the chronograph sheets. Arbitrary signals, sent by hand with a telegrapher's key, give much better results for, in case of interference, they can easily be retarded or advanced a small fraction of a second.

Although the lunar and the chronometric methods continued to be used in remote and out of the way places such as Alaska, as soon as the telegraphic method was introduced it at once superseded all other methods where there was wire connection.

The telegraphic method is described in detail in United States Coast and Geodetic Survey Special Publication No. 14. According to present practice, a night's observation for longitude by the telegraphic method consists in observing two time sets at each station, as described on page 4, and in sending arbitrary signals after the first time set or near the middle of the time for the two sets. The observer at the western station sends 15 or 20 signals by tapping the telegrapher's key, then the observer at the eastern station sends 30 or 40 signals in the same way, and finally the western observer sends 15 or 20 more, making 30 or 40 for each. Each signal is recorded on the chronographs at both stations at the same instant except for the transmission time, which is eliminated from the result by the manner in which the signals are sent, as described above.

The epoch or mean time of the signals and the difference of the chronometer times at the two stations are obtained from the chronographic records. The chronometer corrections are computed for these epochs from the star observations and applied to the difference in chronometer times, eastern minus western chronometer, to give the difference of longitude.

When the "key and chronograph" method was used the observations were made on five nights and then after the observers had exchanged stations were continued for five nights more. Only three or four nights of observations are required when the transit micrometer is used.

CABLE SIGNALS AND WORLD LONGITUDE LOOP

The proposed laying of the first Atlantic cable was watched with great interest by officials of the United States Coast and Geodetic Survey, for this promised the possibility of solving another important problem, the connection of American with European longitude stations, especially with the initial longitude station at Greenwich, England.

Upon the organization of the telegraphic cable expedition in 1865 the Superintendent of the Coast and Geodetic Survey obtained from the respective companies a promise of the use of the cables if successfully laid. L. F. Pourtales was sent to Hearts Content, Newfoundland, to await the arrival of the cable-laying ship, the *Great Eastern*. The rupture of the cable made his expedition unavailing, but the same steps were taken again in 1866 with success.

In each of the years 1866, 1870, and 1872, the United States Coast and Geodetic Survey determined the difference of longitude between Harvard College Observatory, Cambridge, Mass., and Greenwich, England. (See U. S. Coast and Geodetic Survey Report for 1874, App. 18, pp. 163–242, and Report for 1897, App. 2.)

In 1903–4 Edwin Smith and Fremont Morse connected San Francisco with Manila, via Honolulu, Midway, and Guam, thus completing the world longitude loop. (See Report for 1904, App. 4.)

The Hydrographic Office, Imperial Japanese Navy, Bulletin, Volume I, 1917, gives the closing error of the world longitude loop as $0^s.094$ from the best and latest determinations as follows: San Francisco–Guam, 1903–4; Guam–Tokyo, 1915; Tokyo–Nagasaki–Vladivostok, 1916–17; Vladivostok–Pulkowa, 1872–75, 1911–12; Pulkowa–Potsdam, 1901; Potsdam-Greenwich, 1903. The difference Greenwich–San Francisco is involved in the 1897 longitude net adjustment of the United States and its connection with Europe.

WIRELESS SIGNALS

The year 1922 began another epoch in longitude determinations with the introduction of wireless signals for time comparisons. A full discussion of the wireless method is given in Special Publication No. 109. This method has the great advantage in that the longitude of any point which can be reached with the required instruments may be determined with great accuracy.

LONGITUDES BY OTHER ORGANIZATIONS

Other organizations which have determined longitude telegraphically are the following: The United States Lake Survey, the United States Geological Survey, the United States General Land Office, and various observatories and institutions. Such of the results by these organizations as have an accuracy acceptable either for geographic or scientific purposes are included in this publication, except for the longitudes determined by the Corps of Engineers, United States Army, in connection with the surveys west of the one hundredth meridian, which are published in detail in the following Reports of the United States Geographical Surveys West of the One Hundredth Meridian, Lieut. George M. Wheeler, Annual Report for 1874, Appendix FF; Astronomical Report for 1874; Volume II, 1877; Annual Report for 1879, Appendix OO.

INSTRUMENTS

The instruments used in the determination of the longitudes given in this publication are the astronomical transit, the meridian telescope, and the meridian circle. The first two are field instruments. The meridian circle has been used only when the observations were made at some fixed observatory. The best types of transits used are shown in Figures 4 and 5.

Descriptions of the transits and meridian telescopes used for the longitude determinations may be found in the following publications of the Survey: Report for 1856, Appendix 21; Report for 1880, Appendix 7; Report for 1889, Appendix 9; Special Publications Nos. 14 and 35. Descriptions of United States Lake Survey instruments may be found in Professional

Papers, Corps of Engineers, United States Army, No. 24; and for the United States Geological Survey in Bulletins Nos. 49, 70, and 307.

A list of the various instruments used on longitude work is given in the following table.

TABLE I.—*Instruments used in the determination of longitude*

UNITED STATES COAST AND GEODETIC SURVEY, AND VARIOUS ORGANIZATIONS

No. of instrument	Name of instrument and maker	Year made or first used	Focal length	Remarks
	Meridian circles		*cm.*	
	Ertel	Before 1846		Meridian circle of Philadelphia (old) High School.
	Ertel & Son	Before 1846		West transit circle of U. S. Naval Observatory (old site), District of Columbia.
	Pistor & Martin	Before 1865		Do.
	Simms	Before 1847		Transit circle of Western Reserve College, Hudson, Ohio.
	Repsold			Lick Observatory.
				(See Flower Observatory, University of Pa., publications of University of Pa., Astronomical Series, vol. 1, p. 11.)
				9-inch instrument of U. S. Naval Observatory used in connection with the determination of the longitude of Flower Observatory. (See above.)
				6-inch instrument of U. S. Naval Observatory used in connection with the determination of the longitude of the eclipse station at Baker City, Oreg.
	Transits			
		Before 1847	152	Known as the Blunt transit.
	Troughton & Simms	Before 1847	107	Transit of Harvard Observatory.
	do	Before 1857	76	Transit of Toldervys Observatory, Fredericton, New Brunswick.
		Before 1870		Known as the Russian transit of Harvard Observatory.
	Fauth & Co			Transit of Chabot Observatory, Oakland, Calif.
1502	Stackpole			Transit of Mare Island Observatory, Calif.
II	Troughton	1815	152	
2	Simms	1848	115	Fitted with transit micrometer in 1904.
3	do	1848	116	
4	Troughton & Simms	1848	119	Improved in 1890. Fitted with transit micrometer in 1904.
5	Simms	1850	117	Modified in 1890.
6	Troughton & Simms	1849	117	Fitted with delicate level and eyepiece micrometer for latitude work in 1881.
7	Würdemann	1860		
8	Simms	1852	110	
11		1862	81	Known as the Perry transit.
12		1870	46	Known as the Jones transit.
18	Coast and Geodetic Survey	1887-88	94	Fitted with transit micrometer in 1905.
19	do	1887-88	94	Do.
20	Carl Bamberg	1914	67	Nos. 20, 21 used for the first time in 1914 in connection with the proposed trans-Atlantic determination of longitude, which was discontinued on account of the war.
21	do	1914	67	
	Meridian telescopes			
1	Würdemann	1869	79	
3	Kuebel	1876	81	Fitted with new micrometer in 1894.
7	Würdemann	1870	66	Fitted with new micrometer in 1901.
13	do	1871	66	
	Gambey			Large instrument of the Observatory of Paris.
1944	Fauth & Co		89	Property of U. S. Naval Observatory. Used at Baker City eclipse station in 1918.

UNITED STATES LAKE SURVEY

	Transits			
1	Pistor & Martin	1848	61	
2	do	1874	61	
2	Buff & Berger	1876	99	See Professional Papers, Corps of Engineers, U. S. Army, No. 24.
	Meridian telescopes			
1	Würdemann	1849	79	
15	do	1849	79	
	Troughton & Simms		109	

UNITED STATES GEOLOGICAL SURVEY

	Meridian telescopes			
20	Würdemann		65	See U. S. Geological Survey Bull. No. 49.
534	Saegmuller		69	See U. S. Geological Survey Bull. No. 307.

UNITED STATES GENERAL LAND OFFICE

	Meridian telescopes			
	Würdemann		65	
	Transit			
	Fauth & Co		99	

TABLES OF OBSERVED LONGITUDE DIFFERENCES

The differences of longitude observed by the United States Coast and Geodetic Survey are arranged chronologically in the following tables and numbered consecutively. Rejected differences are included. The differences observed by other organizations which are included in this publication are arranged in a similar way. Differences of longitude in Alaska, Nos. 266, 267, 268, 269, 271, 309, and 310, will be published at a later date when the precise geodetic operations in Alaska have been extended.

The stations of the longitude net (see p. 31) are printed in black-faced type in all the tables. All the remaining longitude stations are connected with the longitude net.

The tables of observed longitude differences are arranged as follows:

Table II, Longitude differences by the United States Coast and Geodetic Survey.
Table III, Rejected longitude differences by the United States Coast and Geodetic Survey.
Table IV, Longitude differences by the United States Lake Survey.
Table V, Rejected longitude differences by the United States Lake Survey.
Table VI, Longitude differences by the United States Geological Survey.
Table VII, Longitude differences by the United States General Land Office.
Table VIII, Longitude differences by various organizations.

TABLE II.—*Longitude differences by the United States Coast and Geodetic Survey*

No. of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			h. m. s.	s.
2	1847, July 19, 21, 24, 29, Aug. 3.	**Washington, D. C. (I).**	R. Keith	Tr. C	Philadelphia, Pa. (N).	E. O. Kendall	Ertel M. C.	0 07 33.64	**U. S. Naval Observatory, old site, dome.**	Central (old) High School observatory, M. C. 1847.	0 07 33.61	±0.10
3	1847, July 19, 24, 27, 28, 29, Aug. 3, 10, 11.	Philadelphia, Pa. (I).	E. O. Kendall	Ertel M. C.	Jersey City, N. J. (N).	E. Loomis	Blunt Tr.	4 29.89	Central (old) High School observatory, M. C. 1847.	Loomis Observatory, Tr. 1847.	4 29.89	±.09
4	1847, July 29, Aug. 3.	**Washington, D. C. (I).**	R. Keith	Tr. C	do	do	do	12 03.53	**U. S. Naval Observatory, old site, dome.**	do	12 03.50	±.23
6	1848, Oct. 7, 9, 12, 14, 20, 26.	Cincinnati, Ohio (N).	O. M. Mitchell	Troughton Tr. of 1815, No. II.	Philadelphia, Pa. (I).	E. O. Kendall	Ertel M. C.	37 20.586	Mount Adams Observatory, Tr. 1848.	Central (old) High School, observatory, M. C. pier.	37 20.586	±.060
7	1849, Aug. 1, 2, 10	Hudson, Ohio (N)	E. Loomis	Simms Tr.	do	do A. Mason.	do	25 05.696	Western Reserve College Observatory, Tr. 1849.	Central (old) High School observatory, M. C. 1847–1849.	25 05.696	±.045
10	1851, Feb. 18, Mar. 3, 24.	Savannah, Ga. (N).	C. O. Boutelle	T. & S. Tr. No. 4.	**Charleston, S. C. (I).**	J. C. Langton L. R. Gibbes.	T. & S. Tr. (1815) No. II.	4 37.15	Tr. 1851	**Tr. 1880–1896**	4 37.55	±.10
12	1851, Dec. 16	**Cambridge, Mass. (I).**	W. C. Bond	T. & S. Tr.	Halifax, N. S. (N)	Capt. Shortland R. N.	T. & S. Tr. No. 4.	30 09.48	**Harvard College Observatory, dome.**	Naval yard observatory, Tr. 1851.	30 09.44	±.13
13	1851, Dec. 16, 17, 19, 22.	Bangor, Me. (I)	S. C. Walker	Simms Tr. No. 5.	do	do	do	20 46.557	Tr. 1851	do	20 46.557	±.067
14	1852, July 7, 9, 21, 22, Aug. 2, 7.	Petersburg (Roslyn) Va., (N).	A. D. Bache G. W. Dean.	Simms Tr No. 8.	Washington, Seaton station, D. C. (I).	L. F. Pourtales.	T. & S. Tr. No. 6.	1 35.591	Tr. 1852	Tr. 1852	1 35.591	±.022
15	1853, Apr. 21, 26, 28, 30.	Raleigh, N. C. (N).	B. A. Gould	Simms Tr. No. 3.	do	do	do	6 32.873	Tr. 1853	Tr. 1852–53	6 32.873	±.044
16	1853, Apr. 29, May 6, 14.	**Charleston, S. C. (I).**	L. R. Gibbes	Simms Tr. No. 8.	Raleigh, N. C. (N).	B. A. Gould	Simms Tr. No. 3.	5 12.08	**Tr. 1880–1896**	Tr. 1853	5 11.684	±.150
17	1854, Jan. 21, Feb. 5, 21, Mar. 12.	Columbia, S. C. (N).	B. A. Gould G. W. Dean.	do	Raleigh, N. C. (I)	G. W. Dean B. A. Gould.	T. & S. Tr. No. 6.	9 35.862	Tr. 1854	Tr. 1853–54	9 35.862	±.041
18	1854, May 8, 27, June 5, 14, 17, 20, 23.	Wilmington, De-Rosset station, N. C. (N).	do A. D. Bache. L. F. Pourtales.	do	Petersburg (Roslyn), Va. (I).	do L. F. Pourtales. G. W. Dean.	do	2 11.340	do	Tr. 1852–1854	2 11.340	±.033
19	1855, Jan. 16, 18, Feb. 8, 14, 22, 28, Mar. 9.	Macon, Ga. (N)	G. W. Dean E. Goodfellow.	T. & S. Tr. No. 6.	Columbia, S. C. (I).	E. Goodfellow G. W. Dean.	Simms Tr. No. 8.	10 22.250	Tr. 1855	Tr. 1854–55	10 22.250	±.051
20	1856, Jan. 9, 10, 15, 16, Feb. 10, 17.	Columbia, S. C. (I).	G. W. Dean E. Goodfellow.	do	Wilmington, (De Rosset), N.C. (N)	do E. Goodfellow.	do	12 21.731	Tr. 1854–1856	Tr. 1854–1856	12 21.731	±.028
21	1856, Mar. 23, Apr. 3, 7, 8, 12, 18, 21, 24.	Montgomery, Ala. (N).	G. W. Dean E. Goodfellow.	do	Macon, Ga. (I)	do G. W. Dean.	do	10 41.570	Tr. 1856	Tr. 1855–56	10 41.570	±.015
22	1857, Apr. 2, 6, 7, 10, 19, 20, 23, 28.	Lower Peach Tree, Ala. (N).	G. W. Dean E. Goodfellow.	Simms Tr. No. 8.	Montgomery, Ala. (I).	E. Goodfellow G. W. Dean.	T. & S. Tr. No. 6.	4 58.789	Tr. 1857	Tr. 1856–57	4 58.789	±.016
23	1857, May 21, 24, 25, 26, June 2, 6, 7.	Mobile, Ala. (N)	G. W. Dean E. Goodfellow.	T. & S. Tr. No. 6.	Lower Peach Tree, Ala. (I).	E. Goodfellow G. W. Dean.	Simms Tr. No. 8.	1 59.768	do	Tr. 1857	1 59.768	±.016
24	1857, Sept. 18, 23, 25, 26, Oct. 10, 12, 17.	Bangor, Me. (N)	do G. W. Dean.	do	**Calais, Me. (I)**	do E. Goodfellow.	Simms Tr. No. 3.	6 00.316	Tr. 1851–1857	**Tr. 1857**	6 00.316	±.015
25	1857, Oct. 23	**Calais, Me. (I)**	E. Goodfellow	Simms Tr. No. 3.	Fredericton, N. B. (N).	J. Toldervy	T. & S. Tr. No. 4	2 34.73	**Tr. 1857**	Toldervy's observatory, Tr. 1857.	2 34.73	±.5
27	1858, Jan. 19, Feb. 8, 15, 16, 17, 19, Mar. 1, 26, Apr. 2.	**New Orleans, La. (I).**	do G. W. Dean.	T. & S. Tr. No. 6.	Mobile, Ala. (N)	G. W. Dean A. T. Mosman. E. Goodfellow.	Simms Tr. No. 8.	8 07.147	**Tr. 1880–1895**	Tr. 1857–58	8 06.281	±.022
28	1858, May 24, 28, June 2, 8, 17, 18.	New York, N. Y. (N).	E. Goodfellow G. W. Dean.	do	**Albany, N. Y. (I)**	G. W. Dean E. Goodfellow.	T. & S. Tr. No. 4.	0 57.448	Rutherford's Observatory, Tr. 1858.	**Dudley Observatory (old site, dome).**	0 57.393	±.012
29	1860, Feb. 25, 26, Mar. 19, 21, 28.	Eufaula, Ala. (I)	E. Goodfellow G. W. Dean.	T. & S. Tr. No. 8.	Apalachicola, Fla. (N).	G. W. Dean E. Goodfellow.	T. & S. Tr. No. 6	0 36.671	Tr. 1860	Tr. 1860	0 36.671	±.010
30	1860, Apr. 17, 20, 21, 22, May 3.	Eufaula, Ala. (N)	do E. Goodfellow	do	Macon, Ga. (I)	do G. W. Dean.	do	6 02.986	do	Tr. 1855–1860	6 02.986	±.031
31	1861, Jan. 20, 26, 27, Feb. 5, 6.	Mobile, Ala. (I)	do G. W. Dean.	T. & S. Tr. No. 6.	Pensacola, Fla. (N).	do E. Goodfellow.	T. & S. Tr. No. 4.	3 20.316	Tr. 1857–1861	Tr. 1861	3 20.316	±.022
32	1863–4, Dec. 30, Jan. 7.	Clarksburg, W. Va. (N).	A. T. Mosman.	Gambey V. C. No. 57.	**Washington, D. C. (I).**	G. W. Dean	P. & M. Tr. C.	13 09.40	V. C. 1863–64	**U. S. Naval Observatory, old site, dome.**	13 09.43	±.5
33	1864, Jan. 7, 11	Grafton, W. Va. (N).	do	do	do	do	do	11 54.65	V. C. 1864	do	11 54.68	±.5
34	1864, Jan. 16	Cameron, W. Va. (N).	do	do	do	do	do	14 05.43	do	do	14 05.46	±.5
35	1864, Jan. 22, 23	Wheeling, W. Va. (N).	do	do	do	do	do	14 42.37	do	do	14 42.40	±.5
36	1864, Jan. 25, 26	Parkersburg, W. Va. (N).	do	do	do	do	do	18 04.65	do	do	18 04.68	±.5
37	1864, Feb. 9	Point Pleasant W. Va. (N).	do	do	do	do	do	20 22.95	do	do	20 22.98	±.5
38	1864, Feb. 19, 20	South Point, Ohio (N).	do	do	do	do	do	22 09.67	do	do	22 09.70	±.5
39	1864, Feb. 27	Gauley Bridge, W. Va. (N).	do	do	do	do	Tr.	16 39.76	do	do	16 39.79	±.5
40	1864, Feb. 27, Mar. 21, 23.	Cumberland, Md. (N).	do	do	do	do	do	6 49.54	do	do	6 49.57	±.5
41	1864, Mar. 24	Martinsburg, W. Va. (N).	do	do	do	do	do	3 37.43	do	do	3 37.46	±.5
42	**1866, Oct. 25, 28, Nov. 5, 6, 9.**	**Hearts Content, N. F. (N).**	**G. W. Dean E. Goodfellow.**	**T. & S. Tr. No. 6.**	**Follhommerum, Ireland, (I).**	**B. A. Gould A. T. Mosman.**	**T. & S. Tr. No. 4.**	**2 51 56.364**	**Tr. 1866**	**Tr. 1866**	**2 51 56.364**	**±.029**
43	**1866, Nov. 5, 13**	**Follhommerum, Ireland (N).**	**B. A. Gould A. T. Mosman.**	**T. & S. Tr. No. 4.**	**Greenwich, England (I).**	**Various**	**Tr. Circle**	**41 33.34**	**do**	**Tr. C**	**41 33.34**	**±.06**
44	**1866, Dec. 11, 12, 14, 16.**	**Calais, Me. (N)**	**C. O. Boutelle. S. C. Chandler**	**Simms Tr. No. 8.**	**Hearts Content, N. F. (I).**	**E. Goodfellow.**	**T. & S. Tr. No. 6.**	**55 38.00**	**do**	**Tr. 1866**	**55 38.00**	**±.06**
47	1867, June 4, 6, 10, 11, 21, 29.	**Washington, U. S. Naval Observatory, D.C. (I)**	Prof. S. Newcomb, Prof. A. Hall, and others.	P. & M. Tr. C.	Washington, Seaton station, D.C. (N).	do G. W. Dean.	T. & S. Tr. No. 4.	0 12.667	**U.S. Naval Observatory, old site, dome.**	Tr. 1852–1867	0 12.634	±.013
50	**1869, Feb. 9, 14, 15, 17, 18, 22, 24, 25, 26, 27, 28.**	**Salt Lake City, Utah (N).**	**G. W. Dean**	**T. & S. Tr. No. 4.**	**Omaha, Nebr. (I)**	**E. Goodfellow.**	**T. & S. Tr. No. 6.**	**1 03 49.113**	**Tr. 1869**	**Tr. 1869**	**1 03 49.113**	**±.016**
55	1869, Mar. 6, 13, 15, 16, 18.	Allegheny, Pa. (N)	S. P. Langley	Obs. Tr	**Cambridge, Mass. (I).**	J. Winlock and others.	T. & S. Tr. No. 5.	35 31.87	Allegheny Observatory, old site, dome.	**Harvard College Observatory, dome.**	35 31.88	±.04
56	1869, April 7	Staunton, Va. (N)	A. T. Mosman	M. T. No. 1	**Washington, D. C. (I).**	B. F. Sands	Tr. C	8 04.90	M. T. 1869	**U.S. Naval Observatory, old site, dome.**	8 04.93	
57	1869, Apr. 23, 27, May 2, 3	**Omaha, Nebr. (I)**	E. Goodfellow	T. & S. Tr. No. 6.	Mattoon, Ill. (N)	E. P. Austin	Würdemann Tr. No. 6.	30 13.54	**Tr. 1869**	Tr. 1869	30 13.54	±.10
58	1869, May 22, June 2, 4.	do	do	do	Springfield, Ill. (N).	do	do	25 08.70	do	do	25 08.70	±.11
59	1869, June 17, 21, 22	do	do	do	Burlington, Iowa (N).	do	do	19 20.38	do	do	19 20.38	±.10
60	1869, July 8, 9, 10	do	do	do	Des Moines, Iowa, (N).	do	do	9 16.96	do	do	9 16.96	±.12
63	1869, July 29, 31, Aug. 7.	Goodson, Va. (N)	R. D. Cutts	Würdemann Tr. No. 7.	**Washington, D. C. (I).**	B. F. Sands	Tr. C	20 32.77	Tr. 1869	**U.S. Naval Observatory, old site, dome.**	20 32.84	±.06
65	**1869–70, Dec. 14, 15, 23, 31, Jan. 3, 26, 28, Feb. 11.**	**Cambridge, Mass. (I).**	**E. P. Austin**	**Simms Tr. No. 5.**	**Duxbury, Mass. (N).**	**E. Goodfellow.**	**T. & S. Tr. No. 6.**	**1 50.230**	**Harvard College Observatory, dome.**	**Tr. 1869–70**	**1 50.191**	**±.022**

TABLE II.—*Longitude differences by the United States Coast and Geodetic Survey*—Continued

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			h. m. s.	s.
66	**1870, Jan. 5, 8, 9, 10, 17, 23, 24, 26, 28 Feb. 9, 10.**	**Duxbury, Mass. (N).**	**E. Goodfellow.**	**T. & S. Tr. No. 6.**	**Brest, France (I).**	**G. W. Dean.**	**T. & S. Tr. No. 4.**	**4 24 42.867**	**Tr. 1869-70.**	**Tower of St. Louis.**	**4 24 43.276**	**±0.047**
68	1870, Apr. 5, 6, 21, May 4.	San Francisco, Calif. (I).	G. Davidson.	Simms Tr. No. 3.	Buena Vista, Calif. (N).	S. R. Throckmorton, jr.	M. T. No. 1	16 39.69	Washington Square. Tr. 1869-70.	M. T. 1870.	16 39.69	±.06
70	1871, May 7, 8, 10, 11, 18, 19, 21, 22, 25, 27.	do.	S. R. Throckmorton, jr.	do.	San Diego, Calif. (N).	G. Davidson.	Würdemann M. T. No 1.	20 59.62	Washington Square, Tr. 1869-1871.	Tr. 1871.	20 59.62	±.03
71	1871, July 7, 8, 12.	Chetopah, Kans. (N)	R Keith.	Jones Tr. No. 12.	**St. Louis, Mo. (I).**	W. Eimbeck.	Perry, Tr. No. 11.	19 35.56	Tr. 1871.	**Tr. 1881-82.**	19 35.44	±.10
73	1871, Sept. 29, 30, Oct. 2, 3, 5.	Allegheny, Pa. (N)	S. P. Langley.	Obs. Tr.	**Cambridge, Mass. (I).**	H. Gannett.	Russian Tr.	35 32.00	Allegheny Observatory, old site, dome.	**Harvard College Observatory, dome.**	35 32.01	±.054
74	1871, Sept. 29, 30, Oct. 2, 4, 5, 14.	Columbus, Ohio (N).	G. W. Dean.	T. & S. Tr. No. 6.	do.	do.	do.	47 27.674	Tr. 1871.	do.	47 27.713	±.035
75	1871, Oct. 2, 5.	Columbus, Ohio (I).	do.	do.	Cleveland, Ohio (N).	E. Goodfellow.	Würdemann M. T. No. 13.	5 12.929	do.	M. T. 1871.	5 12.929	±.045
76	1871, Oct. 18, 20, 21.	Cleveland, Ohio (N).	E. Goodfellow.	Würdemann M. T. No. 13.	**Cambridge, Mass. (I).**	H. Gannett.	Russian Tr.	42 14.836	do.	**Harvard College Observatory, dome.**	42 14.875	±.038
77	1871, Nov. 4, 5, 6, 11.	Oakland, Ky. (N)	A. T. Mosman.	T. & S. Tr. No. 6.	do.	J. Winlock.	do.	1 00 30.19	do.	do.	1 00 30.23	±.04
78	1871, Nov. 29, Dec. 1, 2, 3, 5, 6.	Shelbyville, Ky. (N).	G. W Dean.	do.	do.	do.	do.	56 22.01	do.	do.	56 22.05	±.05
79	1871, Dec. 4, 20, 27.	Falmouth, Ky. (N).	E. Goodfellow.	Würdemann M. T. No. 13.	**Cambridge, Mass. (I).**	J. Winlock.	Russian Tr.	52 49.56	M. T. 1871.	**Harvard College observatory, dome.**	52 49.60	±.13
80	1872, Apr. 23, 24, 25.	**Austin, Tex. (I).**	W. Eimbeck.	do.	Allegheny, Pa. (N)	S. P. Langley.	W. Tr.	1 10 53.84	**Tr. 1895.**	Allegheny observatory, old site, dome.	1 10 53.86	±.06
81	1872, June 14, 15, 18, 19, 20, 22.	San Francisco, Calif. (I).	G. Davidson.	Simms Tr. No. 3.	Verdi, east base, Nev. (N).	S. R. Throckmorton, jr.	Würdemann M. T. No. 1.	9 47.333	Washington Square, Tr. 1869-1872.	Tr. 1872.	9 47.333	±.025
82	1872, June 28, July 3, 5, 8, 13, 20, 21, 23.	**Salt Lake City, Utah (I).**	A. T. Mosman.	Würdemann Tr. No. 19.	Sherman, Wyo. (N).	R. D. Cutts.	Würdemann M. T. No. 13	26 00.93	**Tr. 1869-1872.**	M. T. 1872.	26 00.93	±.04
83	**1872, July 1, 3, 4, 5, 11.**	**Brest, France, (N).**	**F. Blake, jr.**	**T. & S. Tr. No. 4.**	**Greenwich, England (I).**	**J. S. Criswick.**	**Tr. C.**	**17 57.154**	**Tower of St. Louis.**	**Royal Observatory, Tr. C.**	**17 57.598**	**±.022**
84	**1872, July 1, 3, 4, 5, 9, 19, 20, 21, 22.**	do.	do.	do.	**Paris, France (I).**	**L. F. Folain.**	**M. T.**	**27 18.209**	do.	**Observatory of Paris, meridian of France.**	**27 18.533**	**±.038**
85	**1872, July 9, 12, 14, 17, 18, 21, 23.**	**St. Pierre Island (N).**	**E. Goodfellow.**	**T. & S. Tr. No. 6.**	**Brest, France (I).**	**F. Blake, jr.**	**T. & S. Tr. No. 4.**	**3 26 45.254**	**Tr. 1872.**	**Tower of St. Louis.**	**3 26 44.810**	**±.027**
88	**1872, July 21, 23, 28, 29, Aug. 1, 6, 9.**	**Cambridge, Mass. (N).**	**E. Smith.**	**Simms Tr. No. 5.**	**St. Pierre Island (I).**	**E. Goodfellow.**	**T. & S. Tr. No. 6.**	**59 48.704**	**Harvard College observatory, dome.**	**Tr. 1872.**	**59 48.608**	**±.021**
89	**1872, Aug. 28, 31, Sept. 7, 9, 10.**	**Greenwich, England (I).**	**F. Blake, jr.**	**T. & S. Tr.**	**Paris, France (N).**	**L. F. Folain.**	**M. T.**	**9 20.940**	**Royal Observatory, Tr. C.**	**Observatory of Paris, Meridian of France.**	**9 21.000**	**±.038**
90	1873, May 26, 27, 28, 29, 30, 31, June 1, 2.	Carpenters Point, N. Y. (N).	E. Smith.	Simms Tr. No. 5.	**Cambridge, Mass. (I).**	W. A. Rogers.	M. C.	14 15.64	Tr. 1873.	**Harvard College observatory, dome.**	14 15.67	±.10
92	1873, July 23, 26, 29, Aug. 1.	Denver Colo. (N).	do.	Würdemann M. T. No. 13.	**Omaha, Nebr. (I).**	E. Goodfellow.	T. & S. Tr. No. 6.	36 12.20	M. T. 1873.	**Tr. 1869-1873.**	36 12.20	±.04
95	1873, Sept. 8, 13, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28.	Kalama, Wash. (N).	W. Eimbeck.	Würdemann M. T. No. 1.	San Francisco, Calif. (I).	G. Davidson.	Simms, Tr. No. 3.	1 43.88	do.	Washington Square, Tr. 1869.	1 43.88	±.026
96	1873, Sept. 18, 25, 29, 30.	**Omaha, Nebr. (I).**	E. Goodfellow.	T. & S. Tr. No. 6.	La Crosse, Wis. (N).	F. Blake, jr.	T. & S. Tr. No. 4.	18 46.850	**Tr. 1869-1873.**	Tr. 1873.	18 46.850	±.021
97	1873, Sept. 26, 29, 30	Trinidad, Colo. (N).	E. Smith.	Würdemann M. T. No. 13.	**Omaha, Nebr. (I).**	E. Goodfellow.	T. & S. Tr. No. 6.	34 14.20	M. T. 1873.	**Tr. 1869-1873.**	34 14.20	±.03
99	1874, Feb. 9, 10, 11, 16.	Punta Rasa, Fla. (N).	do.	do.	Savannah, Ga. (I).	F. Blake, jr.	Simms, Tr. No. 5.	3 41.45	M. T. 1874.	Tr. 1851-1874.	3 41.45	±.04
100	1874, Feb. 21, 26, Mar. 2, 11, 12, 13, 19.	Savannah, Ga. (N).	F. Blake, jr.	Simms, Tr. No. 5	**Washington, D. C. (I).**	W. Harkness. J. R. Eastman.	P. & M. Tr. C.	16 09.23	Tr. 1851-1874.	**U. S. Naval Observatory, old site, dome.**	16 09.30	±.07
101	1874, Mar. 2, 3, 4, 7, 8.	Cedar Keys, Fla. (N).	E. Smith.	Würdemann M. T. No. 13.	Savannah, Ga. (I).	F. Blake, jr.	Simms Tr. No. 5.	7 45.95	M. T. 1874.	Tr. 1851-1874.	7 45.95	±.04
102	1874, Mar. 24, 26, 30.	**Atlanta, Ga. (I).**	do.	do.	Savannah, Ga. (N).	do.	do.	13 11.96	**Tr. 1896.**	do.	13 11.96	±.046
103	1877, July 31, Aug. 1, 2, 3, 4, 8, 14, 16, 24, 25.	**Nashville, Tenn. (I).**	G. W. Dean.	T. & S. Tr. No. 4.	Columbus, Ohio (N).	W. Eimbeck.	Würdemann M. T. No. 3.	15 09.125	**Tr. 1877.**	Tr. 1871-1877.	15 09.125	±.025
104	1877, July 13, 14, 16.	**Washington, D. C. (I).**	J. R. Eastman.	P. & M. Tr. C.	Travis, N. Y. (N).	E. Smith.	Würdemann M. T. No. 13.	6 46.61	**U. S. Naval Observatory, old site, dome.**	Tr. 1877.	6 46.54	±.06
105	1877, Aug. 20, 21.	do.	do.	do.	Burt, Pa. (N)	do.	do.	1 17.50	do.	do.	1 17.43	±.05
106	1877, Aug. 30, Sept. 1, 3, 4.	do.	do.	do.	Finn, N. Y. (N)	do.	do.	5 10.02	do.	do.	5 09.95	±.03
107	1877, Aug. 10, 17, 18, 20, 21, 27.	Columbus, Ohio (N).	W. Eimback.	Würdemann M. T. No. 3.	**Washington, D. C. (I).**	J. R. Eastman.	P. & M. Tr. C.	23 46.750	M. T. 1871-1877.	**U. S. Naval Observatory, old site, dome.**	23 46.816	±.038
109	1877, Sept. 18, 21, 22, 24, 25.	**Washington, D. C. (I).**	E. Frisby.	P. & M. Tr. C.	Harrisburg, Pa. (N)	E. Smith.	Würdemann Tr. No. 13.	0 40.860	**U. S. Naval Observatory, old site, dome.**	M. T. 1877.	0 40.794	±.026
110	1877, Sept. 12, 13, 14.	Paducah, Ky. (N).	W. Eimbeck.	Kuebels M. T. No. 3.	**Nashville, Tenn. (I)**	G. W. Dean.	T. & S. Tr. No. 4.	7 15.77	M. T. 1877.	**Tr. 1877.**	7 15.77	±.03
111	1877, Oct. 11, 12, 15.	Cairo, Ill. (N)	do.	do.	do.	do.	do.	9 33.05	do.	do.	9 33.05	±.03
112	1877, Oct. 22, 23, 27.	Hickman, Ky. (N)	do.	do.	do.	do.	do.	9 38.72	do.	do.	9 38.72	±.03
113	1877, Mar. 6, 12, 13, 15, 16.	Memphis, Tenn. (N).	do.	do.	do.	do.	do.	13 05.06	do.	do.	13 05.06	±.03
114	1878, May 3, 4, 6, 7.	Summit, Calif. (N)	B. A. Colonna.	Würdemann M. T. No. 1.	**Washington, D. C. (I).**	C. H. Davis.	P. & M. Tr. C.	2 53 07.50	M. T. 1878.	**U. S. Naval Observatory, old site, dome.**	2 53 07.57	±.16
115	1878, May 27, 28, 29.	Helena, Ark. (N).	E. Smith.	Würdemann M. T. No. 13.	**Nashville, Tenn. (I).**	G. W. Dean.	T. & S. Tr. No. 4.	15 13.59	do.	**Tr. 1877-78.**	15 13.59	±.02
116	1878, Mar. 17, 24, 26, 28, 29, June 1.	San Francisco, Calif. (I).	J. F. Pratt.	T. & S. Tr. No. 3.	Summit, Calif. (N)	B. A. Colonna.	Würdemann M. T. No. 1.	8 19.01	Washington Square, Tr. 1869-1878.	M. T. 1878.	8 19.01	±.06
117	1878, June 19, 20, 21.	Natchez, Miss. (N)	E. Smith.	Würdemann M. T. No. 13.	**Nashville, Tenn. (I).**	G. W. Dean.	T. & S. Tr. No. 4.	18 28.24	M. T. 1878.	**Tr. 1877-78.**	18 28.24	±.05
118	1878, July 8, 10, 11.	Vicksburg, Miss. (N).	do.	do.	do.	do.	do.	16 24.15	do.	do.	16 24.15	±.05
119	1878, July 16, 17, 19.	Greenville, Miss. (N).	do.	do.	do.	do.	do.	17 07.43	do.	do.	17 07.43	±.03
120	1878-79, Dec. 19, 23, 24, 25, Jan. 2, 3, 10.	Statesville, N. C. (N).	do. G. W. Dean.	T. & S. Tr. No. 6.	**Washington, D. C. (I).**	do. E. Smith.	Simms, Tr. No. 8.	15 22.477	Tr. 1878-79.	**U. S. Naval Observatory, old site, dome.**	15 22.601	±.016
121	**1879, Jan. 25, 29, Feb. 1, 7, 8, 15, 28, Mar. 1, 5, 7, 8.**	**Atlanta, Ga. (N).**	do. **E. Smith.**	do.	do.	do. **G. W. Dean.**	do.	**29 21.069**	**Tr. 1896.**	do.	**29 21.192**	**±.016**
122	**1879, Nov. 29, Dec. 1, 6, 11, 12, 13.**	**Nashville, Tenn. (I).**	**G. W. Dean. E. Smith.**	**T. & S. Tr. No. 4.**	**Louisville, Ky. (N).**	**E. Smith. G. W. Dean.**	**T. & S. Tr. No. 6.**	**4 04.451**	**Tr. 1877-1879.**	**Tr. 1879.**	**4 04.451**	**±.013**
123	**1879-80, Dec. 26, 27, Jan. 3, 13, 14, 20, 22, 23, 24, 27.**	do.	do. **G. W. Dean.**	do.	**Atlanta, Ga. (N).**	do. **E. Smith.**	do.	**9 34.759**	**Tr. 1877-1880.**	**Tr. 1896.**	**9 34.760**	**±.012**
124	**1880, Feb. 16, 19, 21, 23, 24, Mar. 2, 17, 23, 24, 27.**	**New Orleans, La. (N).**	**E. Smith. G. W. Dean.**	**Simms Tr. No. 8.**	**Nashville, Tenn. (I).**	**G. W. Dean. E. Smith.**	**T. & S. Tr. No. 4.**	**13 08.677**	**Tr. 1880.**	**Tr. 1877-1880.**	**13 08.677**	**±.009**
125	**1880, Mar. 30, 31, Apr. 5, 6, 10, 12, 13, 14, 16.**	do.	do. **E. Smith.**	do.	**Atlanta, Ga. (I).**	do. **G. W. Dean.**	**T. & S. Tr. No. 6.**	**22 43.370**	do.	**Tr. 1896.**	**22 43.371**	**±.013**

TABLE II.—*Longitude differences by the United States Coast and Geodetic Survey*—Continued

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			h. m. s.	s.
126	1880, Apr. 24, 26, 29, 30.	Baton Rouge, La. (N).	E. Smith	Würdemann M. T. No. 13.	**Atlanta, Ga. (I).**	G. W. Dean	T. & S. Tr. No. 6.	0 27 11.909	M. T. 1880	**Tr. 1896**	0 27 11.910	±0.032
127	**1880, May 13, 14, 15, 16, 17, 19, 20, 22, 23, 24.**	**Atlanta, Ga. (I)**	**do** **G. W. Dean.**	**T. & S. Tr. No. 6.**	**Charleston, S.C. (N).**	**do** **E. Smith.**	**Simms Tr. No. 8.**	**17 49.223**	**Tr. 1896**	**Tr. 1880**	**17 49.222**	**±.010**
128	**1881, May 4, 7, 9, 10, 11, 20, 24, 25, 26, 27.**	**Washington, D. C. (I).**	**do** **E. Smith.**	**Simms Tr. No. 8.**	**Cape May, N. J. (N).**	**do** **G. W. Dean.**	**T. & S. Tr. No. 6.**	**8 29.198**	**U.S.Naval Observatory, old site, dome.**	**Tr. 1881**	**8 29.074**	**±.009**
129	1881, June 14, 15, 16, 18, 19, 21.	Strasburg, Va. (N)	do G. W. Dean.	T. & S. Tr. No. 4.	**Washington, D. C. (I).**	do E. Smith.	Simms Tr. No. 8.	5 14.103	Tr. 1881	**U.S.Naval Observatory, old site, dome.**	5 14.227	±.008
130	**1881, July 18, 19, 24, 25, Aug. 2, 3, 4, 5, 8.**	**Cincinnati, Ohio (N).**	**do** **E. Smith.**	**do**	**do**	**do** **G. W. Dean.**	**do**	**29 29.172**	**Mount Lookout Observatory, dome.**	**do**	**29 29.259**	**±.01**
131	**1881, Aug. 25, 26, 27, 29, Sept. 1, 3, 5, 6.**	**Nashville, Tenn. (I).**	**C.H.Sinclair. E. Smith.**	**Simms Tr. No. 8.**	**Cincinnati, Ohio (N).**	**E. Smith C.H.Sinclair.**	**T. & S. Tr. No. 4.**	**9 26.645**	**Tr. 1877-1881**	**Mount Lookout Observatory, dome.**	**9 26.682**	**±.006**
132	**1881, Sept. 12, 13, 19, 21, 23, 24, 29, Oct. 5.**	**St. Louis, Mo. (N).**	**do** **G. W. Dean.**	**T. & S. Tr. No. 6.**	**Cincinnati, Ohio (I).**	**G. W. Dean. E. Smith.**	**do**	**23 07.857**	**Tr. 1881-82**	**do**	**23 07.894**	**±.015**
133	**1881, Oct. 10, 12, 20, 21, 26, 31, Nov. 1.**	**do**	**do** **E. Smith.**	**do**	**Nashville, Tenn. (I).**	**do** **G. W. Dean.**	**Simms Tr. No. 8.**	**13 41.207**	**do**	**Tr. 1877-1881**	**13 41.207**	**±.013**
134	1881, Nov. 12, 13, 14, 16, 19, 24.	Vincennes, Ind. (N).	do G. W. Dean	T. & S. Tr. No. 4.	**do**	do E. Smith.	do	2 57.891	Tr. 1881	**do**	2 57.891	±.018
135	1881, Nov. 28, Dec. 7, 8, 9, 14, 16, 23.	**St. Louis, Mo. (I).**	E. Smith C.H.Sinclair.	T. & S. Tr. No. 6.	Vincennes, Ind. (N).	C.H.Sinclair. E. Smith.	T. & S. Tr. No. 4.	10 43.235	**Tr. 1881-82**	Tr. 1881	10 43.235	±.006
136	1882, July 15, 24, 25, 27, Aug. 7, 10, 11.	Charlottesville, Va. (N).	do F. H. Parsons.	T. & S. Tr. No. 4.	**Washington, D. C. (I).**	F. H. Parsons. C.H.Sinclair.	Simms Tr. No. 8.	5 53.063	Tr. 1882	**U. S. Naval Observatory, old site, dome.**	5 53.187	±.014
137	**1882, Sept. 21, 22, 23, 26, 29, Oct. 3, 5, 6, 11, 13.**	**Kansas City, Mo. (N).**	**C.H.Sinclair. C. Terry.**	**do**	**St. Louis, Mo. (I).**	**C. Terry C.H.Sinclair.**	**T. & S. Tr. No. 6.**	**17 32.183**	**do**	**Tr. 1881-82**	**17 32.183**	**±.011**
138	1882, Sept. 23, Oct. 4, 5.	**St. Louis, Mo. (I).**	do	T. & S. Tr. No. 6.	London, Ky. (N)	F. H. Parsons.	Simms Tr. No. 2.	24 27.82	**Tr. 1881-82**	Tr. 1882	24 27.82	±.09
139	1882, Oct. 13, 14, 15.	**do**	C. H. Sinclair	do	Guthrie, Ky. (N)	do	do	12 10.73	**do**	do	12 10.73	±.18
140	1882, Oct. 20, 21, 23	**do**	do	do	Henderson, Ky. (N).	do	do	10 27.39	**do**	do	10 27.39	±.03
141	**1882, Oct. 20, 21, 23, 26, 27, Nov. 6, 7, 12, 20, 21.**	**Omaha, Nebr. (N).**	**C. Terry C.H.Sinclair.**	**T. & S. Tr. No. 4.**	**St. Louis, Mo. (I).**	**C.H.Sinclair. C. Terry.**	**T. & S. Tr. No. 6.**	**22 56.831**	**Tr. 1869-1882**	**Tr. 1881-82**	**22 56.831**	**±.010**
143	1882, Nov. 20, 21	**St. Louis, Mo. (I).**	C. Terry	T. & S. Tr. No. 6.	Springfield, Ill. (N).	F. H. Parsons.	Simms Tr. No. 2.	2 11.87	**Tr. 1881-82**	Tr. 1869-1882	2 11.87	±.04
144	1882, Nov. 23	**Omaha, Nebr. (I).**	C. H. Sinclair.	T. & S. Tr. No. 4.	do	do	do	25 08.76	**Tr. 1869-1882**	do	25 08.76	±.15
145	1882, Nov. 30, Dec. 1, 3, 16, 17, 18.	St. Augustine, Fla. (N).	Capt. Desforges. E. D. Preston.	C. M. Simms Tr. No. 5.	Savannah, Ga. (I).	E. D. Preston. Capt. Desforges.	Simms Tr. No. 5, C. M.	0 53.021	C. M. 1882	Tr. 1851-1882	0 53.021	±.027
146	1882, Nov. 30, Dec. 1, 2.	**Kansas City, Mo. (I).**	C. Terry	T. & S. Tr. No. 6.	Indianapolis, Ind. (N).	F. H. Parsons.	Simms Tr. No. 2.	33 42.86	**Tr. 1882**	Tr. 1882	33 42.86	±.06
147	1882, Dec. 13, 14, 15, 16, 17.	**San Francisco, Calif. (I).**	J. J. Gilbert	Simms Tr. No. 3.	Fort Selden, N. Mex. (N).	G. Davidson	Würdemann M. T. No. 1.	1 02 01.85	**Lafayette Park, west pier, Tr. 1882.**	M. T. 1882	1 02 01.85	±.03
148	**1882-83 Nov. 26, 29, 30, Dec. 1, 2, 10, 13, 22, 27, Jan. 1.**	**Omaha, Nebr. (N).**	**C.H.Sinclair. C. Terry.**	**T. & S. Tr. No. 4.**	**Kansas City, Mo. (I).**	**C. Terry C.H.Sinclair.**	**T. & S. Tr. No. 6.**	**5 24.626**	**Tr. 1869-1883**	**Tr. 1882-83**	**5 24.626**	**±.016**
149	1883, May 24, 25, 28	**Louisville, Ky. (I).**	do	Simms Tr. No. 8.	Lexington, Ky. (N).	F. H. Parsons.	do	5 02.08	**Tr. 1879-1883**	Tr. 1883	5 02.08	±.05
150	1883, June 11, 14, 15	**do**	do	do	Louisa, Ky. (N)	do	do	12 39.10	**do**	do	12 39.10	±.03
151	1883, June 22, 23, 25	**do**	do	do	Greensburg, Ky. (N).	do	do	1 03.75	**do**	do	1 03.75	±.03
152	1883, July 1, 2, 3	**do**	do	do	Jellico, Tenn. (N)	do	do	6 33.59	**do**	do	6 33.59	±.03
153	1883, July 10, 17, 18	**do**	do	do	Richmond, Ky. (N)	do	do	5 52.10	**do**	do	5 52.10	±.03
154	1883, July 17, 18	**do**	do	do	Smiths Ferry, Pa. (I).	C. H. Sinclair.	Simms Tr. No. 5.	21 03.39	**do**	do	21 03.39	±.07
155	1883, Aug. 16, 17, 21, 24, 25, 29, 30, 31, Sept. 3, 5.	**do**	do F. H. Parsons.	do	Charleston, W. Va. (N).	F. H. Parsons. C. Terry.	T. & S. Tr. No. 6.	16 31.506	**do**	do	16 31.506	±.015
156	1883, Sept. 14, 15, 20.	Logansport, Ind. (N).	do	T. & S. Tr. No. 6.	**Louisville, Ky. (I).**	do	do	2 20.85	Tr. 1883	**Tr. 1879-1883**	2 20.85	±.04
157	**1883, Sept. 25, 26, Oct. 2, 8, 10, 18, 29, 31, Nov. 1, 2, 6, 11.**	**Chicago, Ill. (N)**	**do** **C. Terry.**	**do**	**do**	**do** **F.H.Parsons.**	**Simms Tr. No. 8**	**7 23.556**	**Tr. 1891**	**Tr. 1879-1883**	**7 25.808**	**±.010**
158	1883-84, Dec. 28, Jan. 3, 5.	Covington, Va. (N).	C. H. Sinclair.	Würdemann M. T. No. 13.	**Washington, D. C. (I).**	do	T. & S. Tr. No. 6.	11 46.40	M. T. 1883-84	**U. S. Naval Observatory, old site, dome.**	11 46.52	±.07
159	1885, Mar. 6, 12, 13, 14.	Brownsville, Tex. (N).	E. D. Preston.	Würdemann M. T. No. 7.	**Galveston, Tex. (I).**	E. Smith C. H. Sinclair.	Simms Tr. No. 8.	10 48.27	M. T. 1885	**Tr. 1895**	10 48.32	±.05
160	**1885, Apr. 28, 30, May 3, 4, 6, 9, 12, 14, 15, 21.**	**Galveston, Tex. (N).**	**E. Smith C.H.Sinclair.**	**Simms Tr. No. 8.**	**Little Rock, Ark. (I).**	**do E. Smith**	**T. & S. Tr. No. 6.**	**10 04.244**	**Tr. 1895**	**Tr. 1885**	**10 04.192**	**±.011**
161	1885, May 30, 31, June 1, 2.	Texarkana, Ark. (N).	E. D. Preston.	Würdemann M. T. No. 7.	**do**	do	do	7 04.69	M. T. 1885	**do**	7 04.69	±.04
162	**1885, May 28, 30, 31, June 1, 4, 11, 12, 18, 19.**	**Kansas City, Mo. (I).**	**C.H.Sinclair. E.Smith.**	**Simms Tr. No. 8.**	**Little Rock, Ark. (N).**	**do C.H.Sinclair.**	**do**	**9 15.644**	**Tr. 1882-1885**	**do**	**9 15.644**	**±.003**
163	1885, June 12, 18, 19, 20.	Fort Smith, Ark. (N).	E. D. Preston.	Würdemann M. T. No. 7.	**Little Rock, Ark. (I).**	do	do	8 37.96	M. T. 1885	**do**	8 37.96	±.04
164	**1885, July 28, Aug. 2, 4, 5, 7, 12, 13, 14, 15.**	**Colorado Springs, Colo. (N).**	**E. Smith C.H.Sinclair.**	**T. & S. Tr. No. 6.**	**Kansas City, Mo. (I).**	**do E. Smith.**	**Simms Tr. No. 8.**	**40 55.327**	**Tr. 1885**	**Tr. 1882-1885**	**40 55.327**	**±.011**
165	1885, Sept. 10, 13, 14, 15, 16, 17, 18, 19.	Ellsworth, Kans. (N).	F. H. Parsons. E. Smith.	T. & S. Tr. No. 4.	**do**	do F. H. Parsons.	do	14 32.980	do	**do**	14 32.980	±.011
166	1885, Sept. 24, 25, 26, 29, Oct. 1, 3, 4, 5, 6.	Wallace, Kans. (N).	F. H. Parsons. E. Smith.	T. & S. Tr. No. 6.	Ellsworth, Kans. (I).	E. Smith F. H. Parsons.	T. & S. Tr. No. 4.	13 27.268	do	Tr. 1885	13 27.268	±.009
167	1885, Oct. 9, 12, 13, 14, 15, 20, 21, 22, 23.	**Colorado Springs, Colo. (I).**	F. H. Parsons. E. Smith.	do	Wallace, Kans. (N).	E. Smith F. H. Parsons.	do	12 54.822	**do**	do	12 54.822	±.020
168	**1886, May 7, 8, 14, 17, 18, 21, 27, 28, 31, June 9.**	**Santa Fe, N. Mex. (N).**	**C.H.Sinclair. E. Smith.**	**T. &. S Tr. No. 4.**	**Colorado Springs, Colo. (I).**	**E. Smith C.H.Sinclair.**	**T. & S. Tr. No. 6.**	**4 30.107**	**Tr. 1873-1886**	**Tr. 1885-86**	**4 30.107**	**±.012**
170	1886, June 17, 18, 23, 26, 30, July 2, 3, 8.	Gunnison, Colo. (N).	do C. H. Sinclair.	do	**do**	do E. Smith.	do	8 25.335	Tr. 1886	**do**	8 25.335	±.007
171	1886, July 15, 24, 26, 27, 30, 31, Aug. 4, 5.	Grand Junction, Colo. (N).	do E. Smith.	do	**do**	do C. H. Sinclair.	do	14 58.891	do	**do**	14 58.891	±.013
172	**1886, Aug. 19, 21, 24, 26, 28, Sept. 2, 3, 4, 5, 6.**	**Salt Lake City, Utah (I).**	**do C. H. Sinclair.**	**do**	**Colorado Springs, Colo. (N).**	**do E. Smith.**	**do**	**28 18.471**	**Tr. 1869-1886**	**do**	**28 18.471**	**±.008**
173	1886, Sept. 12, 13, 14, 15, 16, 17, 18, 19, 20, 21.	Ogden, Utah (N)	R. A. Marr. C. H. Sinclair.	T. & S. Tr. No. 6.	**Salt Lake City, Utah (I).**	C. H. Sinclair. R. A. Marr.	T. & S. Tr. No. 4.	0 24.533	Tr. 1886, east pier of U. S. Engineers' Observatory.	**Tr. 1869-1886**	0 24.533	±.011
174	**1887, May 4, 7, 9, 10, 12, 20, 25, 26, 27, June 6.**	**San Francisco, Calif. (N).**	**E. Smith C. H. Sinclair.**	**Simms Tr. No. 3.**	do	**C.H.Sinclair. E. Smith.**	do	**42 07.696**	**Lafayette Park, west pier, Tr. 1882-1887.**	**Tr. 1869-1887**	**42 07.696**	**±.011**

TABLE II.—*Longitude differences by the United States Coast and Geodetic Survey*—Continued

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			*h. m. s.*	*s.*
175	1887, May 26, 27, June 3, 4, 6, 7, 9, 10, 12, 13.	**San Francisco, Lafayette Park, Calif. (I).**	C. H. Sinclair. P. A. Welker.	Simms Tr. No. 3.	San Francisco, Washington Square, Calif. (N).	P. A. Welker. C. H. Sinclair.	T. & S. Tr. No. 6.	0 00 04.421	**Lafayette Park, west pier, Tr. 1882-1887.**	Washington Square, Tr. 1869.	0 00 04.420	±0.006
176	**1887, June 20, 27, 28, July 5, 8, 19, Aug. 12, 16, 18, 19.**	**Portland, Oreg. (N).**	**E. Smith. C. H. Sinclair.**	**T. & S. Tr. No. 4.**	**San Francisco, Calif. (I).**	**do. E. Smith.**	**Simms Tr. No. 3.**	0 59.983	**Tr. 1887.**	**Lafayette Park, west pier, Tr. 1882-1887.**	0 59.983	±.015
177	**1887, Sept. 5, 6, 9, 10, 13, 15, 16, 19, 21, 22.**	**Portland, Oreg. (I).**	**E. Smith. C. H. Sinclair.**	**do.**	**Walla Walla, Wash. (N).**	**C. H. Sinclair. E. Smith.**	**T. & S. Tr. No. 6.**	17 19.503	**do.**	**Tr. 1887.**	17 19.503	±.011
178	**1887, Sept. 28, Oct. 1, 4, 11, 12, 16, 17, 19, 20, 22.**	**Walla Walla, Wash. (N).**	**do. E. Smith.**	**T. & S. Tr. No. 6.**	**Salt Lake City, Utah (I).**	**do. C. H. Sinclair.**	**T. & S. Tr. No. 4.**	25 48.186	**do.**	**Tr. 1869-1887.**	25 48.186	±.009
179	1888, May 21, 27, June 4.	Yaquina, Oreg. (N).	R. A. Marr.	C. & G. S. Tr. No. 18.	**Portland, Oreg. (I).**	E. Smith.	C. & G. S. Tr. No. 19.	5 20.905	Tr. 1888.	**Tr. 1887-88.**	5 20.905	±.012
180	**1888, June 12, 21, 22, 24, 26, 28, 29, July 5.**	**Portland, Oreg. (I).**	**do. E. Smith.**	**C. & G. S. Tr. No. 19.**	**Seattle, Wash. (N).**	**do. R. A. Marr.**	**C. & G. S. Tr. No. 18.**	1 22.486	**Tr. 1887-88.**	**Tr. 1886-1888.**	1 22.486	±.026
181	1888, July 14, 15, 16, 17, 18, 19, 20.	Port Townsend, Wash. (N).	R. A. Marr. E. Smith.	do.	**Seattle, Wash. (I).**	E. Smith. R. A. Marr.	do.	1 40.108	Tr. 1888.	**do.**	1 40.108	±.012
182	**1888, Aug. 9, 10, 11, 12, 13, 15, 16, 17, 18.**	**Seattle, Wash. (I).**	**R. A. Marr. E. Smith.**	**C. & G. S. Tr. No. 18.**	**Walla Walla, Wash. (N).**	**E. Smith. R. A. Marr.**	**C. & G. S. Tr. No. 19.**	15 57.028	**Tr. 1886-1888.**	**Tr. 1887-88.**	15 57.028	±.009
183	**1888, Aug. 25, 26, 27, 28, 29, Sept. 1, 2, 5, 6, 7.**	**Walla Walla, Wash. (I).**	**do. R. A. Marr.**	**C. & G. S. Tr. No. 19.**	**Helena, Mont. (N).**	**do. E. Smith.**	**C. & G. S. Tr. No. 18.**	25 14.510	**Tr. 1887-88.**	**Tr. 1888.**	25 14.510	±.006
184	1888, Sept. 13, 15, 22, 24, 26, 27, 28, 29.	Spokane, Wash. (N).	do. C. H. Sinclair.	do.	**Helena, Mont. (I).**	C. H. Sinclair. R. A. Marr.	do.	21 34.437	Tr. 1888.	**do.**	21 34.437	±.009
185	1888, Oct. 23, 30, 31, Nov. 1, 2, 5, 23, 24, 26, 27, 28.	**San Francisco, Calif. (I).**	do. R. A. Marr.	C. & G. S. Tr. No. 18.	Mount Hamilton, Calif. (N).	do. C. H. Sinclair.	C. & G. S. Tr. No. 19.	3 09.047	**Lafayette Park, west pier, Tr. 1882-1887.**	Lick Observatory meridian.	3 07.966	±.013
186	**1888-89, Dec. 18, 27, 28, Jan. 4, 6, 7, 11, 12.**	**do.**	**do. C. H. Sinclair.**	**do.**	**Sacramento, Calif. (N).**	**do. R. A. Marr.**	**do.**	3 44.483	**do.**	**Tr. 1888-89.**	3 44.487	±.008
187	1889, Jan. 16, 18, 19, 21, 22, 25, 26, 27, 28, 29.	Point Arena, Calif. (N).	R. A. Marr. C. H. Sinclair.	C. & G. S. Tr. No. 19.	**San Francisco, Calif. (I).**	C. H. Sinclair. R. A. Marr.	C. & G. S. Tr. No. 18.	5 04.250	Tr. 1889.	**Lafayette park, west pier, Tr. 1882-1887.**	5 04.246	±.008
188	1889, Jan. 31, Feb. 1, 2, 3, 7, 8, 9, 12.	do.	do. R. A. Marr.	do.	**Sacramento, Calif. (I).**	do. C. H. Sinclair.	do.	8 48.675	do.	**Tr. 1888-89.**	8 48.675	±.007
189	**1889, Mar. 18, 20, 21, 22, 29, 30, Apr. 3, 6.**	**Sacramento, Calif. (I).**	**C. H. Sinclair. R. A. Marr.**	**C. & C. S. Tr. No. 18.**	**Los Angeles, Calif. (N).**	**R. A. Marr. C. H. Sinclair.**	**C. & G. S. Tr. No. 19.**	12 56.812	**Tr. 1888-89.**	**Tr. 1892.**	12 56.840	±.010
190	1889, Feb. 26, 27, 28, Mar. 1, 2, 3, 4, 5, 6.	Marysville, Calif. (N).	do. C. H. Sinclair.	C. & G. S. Tr. No. 19.	**Sacramento, Calif. (I).**	do. R. A. Marr.	C. & G. S. Tr. No. 18.	0 22.799	Tr. 1889.	**Tr. 1888-89.**	0 22.799	±.007
191	**1889, Apr. 15, 16, 17, 18, 22, 27, 29, Mar. 3, 9, 13.**	**San Francisco, Calif. (I).**	**R. A. Marr. C. H. Sinclair.**	**C. & G. S. Tr. No. 18.**	**Los Angeles, Calif. (N).**	**C. H. Sinclair. R. A. Marr.**	**C. & G. S. Tr. No. 19.**	16 41.250	**Lafayette Park, west pier, Tr. 1882-1887.**	**Tr. 1892.**	16 41.282	±.009
192	1889, Apr. 16, 17, 18, 27, 29, May 3.	do.	do. R. A. Marr.	do.	Oakland, Calif. (N).	G. Davidson.	Fauth Tr.	0 36.218	**Lafayette Park, west pier, Tr. 1882-1887.**	Tr. 1889.	0 36.222	±.012
193	**1889, May 22, 23, 24, June 1, 5, 7, 8, 12, 13, 15, 16.**	**Los Angeles, Calif. (I).**	**do. C. H. Sinclair.**	**C. & G. S. Tr. No. 19.**	**Needles, Calif. (N).**	**C. H. Sinclair. R. A. Marr.**	**C. & G. S. Tr. No. 18.**	14 36.756	**Tr. 1892.**	**do.**	14 36.728	±.016
194	1889, June 24, 25, 28, 29, July 1, 2, 3, 4.	**Sacramento, Calif. (I).**	do. R. A. Marr.	C. & G. S. Tr. No. 18.	Verdi, Nev. (N).	do. C. H. Sinclair.	C. & G. S. Tr. No. 19.	6 02.866	**Tr. 1888-89.**	do.	6 02.866	±.007
195	1889, July 6, 7, 9, 10, 11, 12, 13, 14, 16.	Verdi, Nev. (I).	do. C. H. Sinclair.	C. & G. S. Tr. No. 19.	Carson City, Nev. (N).	do. R. A. Marr.	C. & G. S. Tr. No. 18.	0 52.560	Tr. 1889.	Friend's Observatory Tr. 1889.	0 52.560	±.008
196	1889, July 19, 20, 21, 22, 23, 24, 25, 26.	Carson City, Nev. (I).	do. R. A. Marr.	C. & G. S. Tr. No. 18.	Virginia City, Nev. (N).	do. C. H. Sinclair.	C. & G. S. Tr. No. 19.	0 28.168	Friend's Observatory Tr. 1889.	Tr. 1889.	0 28.168	±.006
197	1889, July 30, 31, Aug. 1, 2, 3, 4, 5, 10.	Genoa, Nev. (N).	C. H. Sinclair. R. A. Marr.	C. & G. S. Tr. No. 19.	Carson City, Nev. (I).	R. A. Marr. C. H. Sinclair.	C. & G. S. Tr. No. 18.	0 18.516	Tr. 1889.	Friend's Observatory Tr. 1889.	0 18.516	±.012
198	1889, Aug. 18, 19, 20, 21, 24, 25, 26.	Carson City, Nev. (I).	C. H. Sinclair. R. A. Marr.	C. & G. S. Tr. No. 18.	Austin, Nev. (N).	R. A. Marr. C. H. Sinclair.	C. & G. S. Tr. No. 19.	10 45.168	Friend's Observatory Tr. 1889.	Tr. 1889.	10 45.168	±.014
199	1889, Aug. 30, Sept. 1, 2, 3, 5, 6, 7, 8.	Austin, Nev. (I).	C. H. Sinclair. R. A. Marr.	C. & G. S. Tr. No. 19.	Eureka, Nev. (N).	R. A. Marr. C. H. Sinclair.	C. & G. S. Tr. No. 18.	4 27.318	Tr. 1889.	do.	4 27.318	±.006
200	1889, Sept. 10, 11, 12, 14, 21, 23, 24, 25.	Eureka, Nev. (N).	C. H. Sinclair. R. A. Marr.	C. & G. S. Tr. No. 18.	**Salt Lake City, Utah (I).**	R. A. Marr. C. H. Sinclair.	C. & G. S. Tr. No. 19.	16 15.337	do.	**Tr. 1869-1889.**	16 15.337	±.009
201	1890, May 28, 29, 31, June 3, 4, 8.	Altoona, Pa. (N).	C. H. Sinclair. R. A. Marr.	T. & S. Tr. No. 4.	**Washington, D. C. (I).**	R. A. Marr. C. H. Sinclair.	Simms Tr. No. 5.	5 20.690	Tr. 1890.	**U. S. Naval Observatory, old site, dome.**	5 20.814	±.014
202	**1890, July 2, 3, 6, 7, 10, 12, 13, 15, 21, 22.**	**Helena, Mont. (N).**	**do. C. H. Sinclair.**	**C. & G. S. Tr. No. 18.**	**Salt Lake City, Utah (I).**	**do. R. A. Marr.**	**C. & G. S. Tr. No. 19.**	0 33.577	**Tr. 1888-1890.**	**Tr. 1869-1890.**	0 33.577	±.013
203	**1890, July 28, 30, Aug. 1, 3, 4, 6, 8, 12, 13, 16.**	**Helena, Mont. (I).**	**do. R. A. Marr.**	**do.**	**Bismarck, N. Dak. (N).**	**do. C. H. Sinclair.**	**do.**	45 00.839	**do.**	**Tr. 1890.**	45 00.839	±.012
204	**1890, Aug. 20, 21, 25, 26, 27, 28, 29, 30, 31.**	**Bismarck, N. Dak. (I).**	**C. H. Sinclair. R. A. Marr.**	**C. & G. S. Tr. No. 19.**	**Minneapolis, Minn. (N).**	**R. A. Marr. C. H. Sinclair.**	**C. & G. S. Tr. No. 18.**	30 11.080	**Tr. 1890.**	**Tr. 1873-1890.**	30 11.080	±.006
205	1890, Oct. 3, 4, 5.	Augusta, Ga. (N).	C. H. Sinclair.	C. & G. S. Tr. No. 18.	**Washington, D. C. (I).**	G. R. Putnam	C. & G. S. Tr. No. 19.	19 39.532	do.	**U. S. Naval Observatory, old site, dome.**	19 39.656	±.013
206	1890, Oct. 8, 9, 15.	Gainesville, Fla. (N).	do.	do.	**do.**	do.	do.	21 05.220	do.	**do.**	21 05.344	±.032
208	1890, Nov. 12, 13, 18.	Ironton, Mo. (N).	do.	do.	**St. Louis, Mo. (I).**	H. S. Pritchett.	Fauth Tr.	1 41.530	do.	**Tr. 1881-82.**	1 41.535	±.030
209	1890, Nov. 20, 23, 24.	Potosi, Mo. (N).	do.	do.	**do.**	do.	do.	2 20.089	do.	**do.**	2 20.094	±.018
210	**1891, May 5, 7, 9, 10, 18, June 1, 8, 9, 10, 11.**	**Cape May, N. J. (I).**	**C. H. Sinclair. G. R. Putnam.**	**C. & G. S. Tr. No. 19.**	**Albany, N. Y. (N).**	**G. R. Putnam. C. H. Sinclair.**	**C. & G. S. Tr. No. 18.**	4 43.075	**Tr. 1881-1891.**	**Dudley Observatory, old site, dome.**	4 43.020	±.010
211	**1891, June 23, 24, 25, 26, 27, 29, July 4, 9, 10, 11.**	**Detroit, Mich. (N).**	**do. C. H. Sinclair.**	**do.**	**Albany, N. Y. (I).**	**do. G. R. Putnam.**	**do.**	37 11.900	**Tr. 1891.**	**do.**	37 11.845	±.005
212	**1891, July 16, 18, 19, 20, 22, 23, 24, 25, 27, 28.**	**Chicago, Ill. (I).**	**G. R. Putnam. C. H. Sinclair.**	**C. & G. S. Tr. No. 18.**	**Detroit, Mich. (N).**	**C. H. Sinclair. G. R. Putnam.**	**C. & G. S. Tr. No. 19.**	18 17.634	**do.**	**Tr. 1891.**	18 17.634	±.006
213	**1891, Aug. 3, 5, 6, 7, 14, 16, 18, 20, 24, 25.**	**Minneapolis, Minn. (N).**	**G. R. Putnam. C. H. Sinclair.**	**C. & G. S. Tr. No. 19.**	**Chicago, Ill. (I).**	**C. H. Sinclair. G. R. Putnam.**	**C. & G. S. Tr. No. 18.**	22 27.414	**Tr. 1873-1891.**	**do.**	22 27.414	±.010
214	**1891, Aug. 29, 30, 31, Sept. 3, 4, 8, 10, 12, 13, 14.**	**Omaha, Nebr. (I).**	**G. R. Putnam. C. H. Sinclair.**	**C. & G. S. Tr. No. 18.**	**Minneapolis, Minn. (N).**	**C. H. Sinclair. G. R. Putnam.**	**C. & G. S. Tr. No. 19.**	10 49.269	**Tr. 1869-1891.**	**Tr. 1873-1891.**	10 49.269	±.010
215	1891, Oct. 14, 16, 17.	**St. Louis, Mo. (I).**	G. R. Putnam.	T. & S. Tr. No. 4.	Elizabethtown, Ohio (N).	C. H. Sinclair.	do.	21 35.762	**Tr. 1881-82.**	Tr. 1891.	21 35.757	±.020
216	1891, Oct. 22, 24, 25.	**do.**	do.	do.	Union City, Ind. (N).	do.	do.	21 35.485	**do.**	do.	21 35.484	±.013
217	1891, Oct. 28, 29, 31.	**do.**	do.	do.	Butler, Ind. (N).	do.	do.	21 19.610	**do.**	do.	21 19.609	±.033
218	1892, Jan. 14, 15, 16.	Macon Mo. (N).	C. H. Sinclair.	C. & G. S. Tr. No. 19.	**St. Louis, Mo. (I).**	H. S. Pritchett.	Fauth Tr.	9 04.047	**Tr. 1892.**	**Tr. 1881-82.**	9 04.052	±.028
219	**1892, Feb. 9, 10, 11, 14, 15, 16, 26, Mar. 2, 3, 5.**	**Los Angeles, Calif. (I).**	**do. G. R. Putnam.**	**do.**	**San Diego, Calif. (N).**	**G. R. Putnam. C. H. Sinclair.**	**C. & G. S. Tr. No. 18.**	4 22.786	**do.**	**Tr. 1892.**	4 22.786	±.010
220	**1892, Mar. 15, 16, 17, 19, 20, 21, 23, 24, 25, 26, 29.**	**San Diego, Calif. (I).**	**C. H. Sinclair. G. R. Putnam.**	**C. & G. S. Tr. No. 18.**	**Yuma, Ariz. (N).**	**G. R. Putnam. C. H. Sinclair.**	**C. & G. S. Tr. No. 19.**	10 09.114	**do.**	**do.**	10 09.114	±.005
221	**1892, Mar. 31, Apr. 2, 3, 4, 6, 7, 8, 9.**	**Los Angeles, Calif. (I).**	**do. C. H. Sinclair.**	**do.**	**do.**	**do. G. R. Putnam.**	**do.**	14 31.974	**do.**	**do.**	14 31.974	±.006

TABLE II.—*Longitude differences by the United States Coast and Geodetic Survey*—Continued

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			h. m. s.	s.
222	1892, Apr. 13, 14, 15, 16, 17, 19, 20, 21, 22, 23.	Yuma, Ariz. (I)	C. H. Sinclair. G. R. Putnam.	C. & G. S. Tr. No. 19.	Nogales, Ariz. (N).	G. R. Putnam. C. H. Sinclair.	C. & G. S. Tr. No. 18.	0 14 43.690	Tr. 1892	Tr. 1892	0 14 43.690	±0.007
223	1892, Apr. 29, 30, May 1, 2, 4, 6, 7, 8, 9, 10.	Nogales, Ariz. (I)	C. H. Sinclair. G. R. Putnam.	C. & G. S. Tr. No. 18.	El Paso, Tex. (N).	G. R. Putnam. C. H. Sinclair.	C. & G. S. Tr. No. 19.	17 48.520	do	do	17 48.520	±.009
224	1892, May 14, 15, 16, 17.	Corner boundary (United States and Mexico), N. Mex. (N).	do	do	El Paso, Tex. (I)	do	do	6 52.626	do	do	6 52.626	±.013
225	1892, June 23, 25, 27, 28, 29, July 17, 18, 21, 23, 24.	Helena, Mont. (I).	C. H. Sinclair. G. R. Putnam.	do	Yellowstone Lake, Wyo. (I).	G. R. Putnam. C. H. Sinclair.	do	6 33.835	Tr. 1888-1892	do	6 33.835	±.009
226	1893, Feb. 25, 27, Mar. 4, 5, 8, 11, 12, 13, 15, 18.	El Paso, Tex. (N)	do C. H. Sinclair.	do	Little Rock, Ark. (I).	do G. R. Putnam.	do	56 51.681	Tr. 1892-93	Tr. 1885-1893	56 51.681	±.009
227	1893 Aug. 3, 4, 6, 7, 8, 9, 10, 11, 12.	Lake Tahoe, Calif. (N).	do G. Davidson.	do	Carson City, Nev. (I).	G. Davidson C. H. Sinclair.	do	0 44.109	Tr. 1893	Friend's Observatory Tr. 1889.	0 44.087	±.006
228	1894, May 21, 22, 23, 24, 25, 28, 31, June 1, 11, 13.	Seattle, Wash. (I).	do C. H. Sinclair.	do	Tacoma, Wash. (N)	do G. Davidson.	do	0 27.159	Tr. 1886-1894	Tr. 1894	0 27.159	±.010
229	1895, Feb. 8, 17, 18, 22, 27, Mar. 4, 7, 8, 9, 10.	Needles, Calif. (I).	do E. Smith.	do	Santa Fe, N. Mex. (N).	E. Smith C. H. Sinclair.	do	34 38.032	Tr. 1889-1895	Tr. 1873-1895	34 38.032	±.013
230	1895, Mar. 15, 16, 19, 21, 22, 24, 25, 26, 27, 28.	El Paso, Tex. (I)	do C. H. Sinclair.	do	do	do E. Smith.	do	2 10.593	Tr. 1892-1895	do	2 10.593	±.009
231	1895, May 29, 30, Apr. 1, 2, 6, 7, 8, 9, 10.	do	do	do	Tacubaya, Mex. (N).	C. A. Gonzales.	M. C	29 10.400	do	Observatory, M. C	29 10.400	±.022
232	1895, Apr. 7, 8, 9, 10, 11, 16, 17, 18, 20, 21.	El Paso, Tex. (N)	E. Smith C. H. Sinclair.	do	Austin, Tex. (I)	C. H. Sinclair. E. Smith.	C. & G. S. Tr. No. 19.	35 00.322	do	Tr. 1895	35 00.322	±.004
233	1895, Apr. 29, May 1, 2, 6, 7, 9, 10, 12, 14, 17.	Laredo, Tex. (N)	E. Smith G. R. Putnam.	do	do	G. R. Putnam E. Smith.	do	7 07.148	Tr. 1895	do	7 07.148	±.006
234	1895, May 26, 31, June 1, 2, 3, 5, 6, 12, 13, 16.	Austin, Tex. (N)	E. Smith G. R. Putnam.	C. & G. S. Tr. No. 19.	Galveston, Tex. (I).	G. R. Putnam. E. Smith.	C. & G. S. Tr. No. 18.	11 47.087	do	do	11 47.087	±.004
235	1895, June 23, 25, 27, July 8, 10, 13, 14, 15, 23, 24, 27, 28.	do	do A. T. Mosman.	do	New Orleans, La. (I).	do A. T. Mosman. G. R. Putnam.	do	30 40.230	do	Tr. 1880-1895	30 40.230	±.010
236	1895, Aug. 21, 25, 27, 30, Sept. 1, 2, 5, 8, 10, 13, 14.	Cambridge, Mass. (N).	do G. R. Putnam.	do	Calais, Me. (I)	do A. T. Mosman.	do	15 23.283	Harvard College Observatory, dome.	Tr. 1857-1895	15 23.187	±.007
237	1896, Feb. 11, 12, 18, 19, 20, 25, 26, 27, 29, Mar. 1.	Key West, Fla. (N).	do C. H. Sinclair.	C. & G. S. Tr. No. 18.	Charleston, S. C. (I).	C. H. Sinclair. G. R. Putnam.	C. & G. S. Tr. No. 19.	7 29.509	Tr. 1896	Tr. 1880-1896	7 29.509	±.093
238	1896, Mar. 7, 8, 9, 13, 14, 20, 21, 25, 26, 27.	Atlanta, Ga. (I)	G. R. Putnam. C. H. Sinclair.	C. & G. S. Tr. No. 19.	Key West, Fla. (N).	C. H. Sinclair. G. R. Putnam.	C. & G. S. Tr. No. 18.	10 19.765	do	Tr. 1898	10 19.765	±.097
239	1896, Apr. 2, 4, 5, 7, 10, 11, 13, 14.	Little Rock, Ark. (N).	G. R. Putnam. C. H. Sinclair.	C. & G. S. Tr. No. 18.	Atlanta, Ga. (I)	C. H. Sinclair. G. R. Putnam.	C. & G. S. Tr. No. 19.	31 32.369	Tr. 1885-1896	do	31 32.369	±.005
240	1896, Apr. 21, 22, 26, 28, May 3, 4, 6, 7.	Charleston, S. C. (N).	G. R. Putnam. C. H. Sinclair.	C. & G. S. Tr. No. 19.	Washington, D. C. (I).	C. H. Sinclair. G. R. Putnam.	C. & G. S. Tr. No. 18.	11 31.764	Tr. 1888-1896	U. S. Naval Observatory, old site, dome.	11 31.888	±.005
241	1896, May 15, 16, 17, 27, June 1, 2.	Washington, D. C. (I).	G. R. Putnam. C. H. Sinclair.	C. & G. S. Tr. No. 18	Ithaca, N. Y. (N)	J. F. Hayford	T. & S. Tr	2 15.863	U. S. Naval Observatory, old site, dome.	Tr. 1896	2 15.739	±.030
242	1896, May 16, 17, 19, 22, 23, 27, June 1, 2, 3.	Ithaca, N. Y. (N)	J. F. Hayford	T. & S. Tr.	Cambridge, Mass. (I).	C. H. Sinclair. G. R. Putnam.	C. & G. S. Tr. No. 19.	21 25.348	College of Engineering Observatory, Tr. 1896.	Harvard College Observatory, dome.	21 25.444	±.017
243	1896, May 14, 16, 17, 27, 29, June 1, 2, 5, 10, 12, 17.	Washington, D. C. (N).	G. R. Putnam. C. H. Sinclair.	C. & G. S. Tr. No. 18.	do	C. H. Sinclair. G. R. Putnam.	do	23 41.166	U. S. Naval Observatory, old site, dome	do	23 41.138	±.014
244	1896, June 22,[1] 26, 28,[1] 29, 30, July 1, June 26, 29,[1] 30,[1] July 1.	Washington, U. S. Naval Observatory, old site, D. C. (I).	do G. R. Putnam.	do	Washington Coast and Geodetic Survey Office, D. C. (N).	do C. H. Sinclair.	do	0 10.586	do	Tr. 1896	0 10.462	±.008
245	1896, Aug. 25, 26, 28, 29, 30, 31, Sept. 1, 4, 7, 8.	Albany, N. Y. (N).	C. H. Sinclair. R. L. Faris.	do	Cambridge, Mass. (I).	R. L. Faris C. H. Sinclair.	do	10 28.775	Dudley Observatory, old site, dome.	Harvard College Observatory, dome.	10 28.926	±.008
246	1896, Sept. 16, 20, 24, 28, Oct. 9, 10, 15, 19, 21, 26.	do	do C. H. Sinclair.	do	Montreal, Canada. (I).	do R. L. Faris.	do	0 41.297	do	McGill College Observatory, Tr. 1892-1896.	0 41.352	±.097
247	1896, Oct. 29, 31, Nov. 2, 9; Oct. 30, Nov. 1, 7, 10.	do	R. L. Faris C. H. Sinclair.	C. & G. S. Tr. No. 19.	Albany, N. Y. (I)	C. H. Sinclair R. L. Faris.	C. & G. S. Tr. No. 18.	0 07.187	Dudley Observatory new site, meridian.	Dudley Observatory, old site, dome.	0 07.132	±.007
248	1896, Nov. 11, 12, 13, 14, 20, 25, 27, 28, 29, 30.	San Francisco, Presidio, Calif. (N).	O. B. French F. Morse.	Simms Tr. No. 3.	San Francisco, Lafayette Park Calif. (I).	F. Morse O. B. French.	T. & S. Tr. No. 4.	0 05.952	Tr. 1896	Lafayette Park, west pier, Tr. 1882-1896.	0 05.952	±.007
249	1897, May 7, 8, 9, 15, 17, 18, 19, 20.	Washington, D. C. (I).	C. H. Sinclair O. B. French.	C. & G. S. Tr. No. 19.	Dover, Del. (N)	do C. H. Sinclair.	C. & G. S. Tr. No. 18.	5 56.479	Coast and Geodetic Survey Office, Tr. 1896-97.	Tr. 1897	5 56.479	±.009
250	1897, May 25, 26, 27, 29, June 1, 2, 5.	Washington, U. S. Naval Observatory, new site, D. C. (N).	C. H. Sinclair O. B. French.	C. & G. S. Tr. No. 18.	Washington U. S. Coast and Geodetic Survey Office, D. C. (I).	O. B. French C. H. Sinclair.	C. & G. S. Tr. No. 19.	0 13.996	U. S. Naval Observatory, new site, center of clock room.	Tr. 1896-97	0 14.065	±.006
251	1897, Nov. 17, 23, 25, 27, Dec. 1, 2, 3.	Ukiah, Calif. (N)	C. H. Sinclair H. P. Ritter.	T. & S. Tr. No. 4.	San Francisco, Presidio, Calif. (I).	H. P. Ritter C. H. Sinclair.	Simms Tr. No. 3.	3 01.421	Tr. 1897	Presidio, Tr. 1896-97	3 01.421	±.013
252	1898, Aug. 1, 2, 8, 9, 13, 14, 16, 17.	Salt Lake City, Utah (I).	F. Morse C. H. Sinclair.	C. & G. S. Tr. No. 18.	Green River, Utah (N).	do F. Morse.	C. & G. S. Tr. No. 19.	6 55.634	Tr. 1869-1898	Tr. 1898	6 55.634	±.006
253	1898, Aug. 1, 28, 31, Sept. 1, 2, 3, 4.	Oasis, Utah (N)	F. Morse C. H. Sinclair.	C. & G. S. Tr. No. 19.	Salt Lake City, Utah (I).	C. H. Sinclair F. Morse.	C. & G. S. Tr. No. 18.	2 56.521	Tr. 1898	Tr. 1869-1898	2 56.521	±.006
254	1899, May 13, 14, 19, 20, June 3, 8, 10, 11.	Marlow, Okla. (N)	E. Smith J. E. McGrath.	C. & G. S. Tr. No. 18.	Austin, Tex. (I)	J. E. McGrath E. Smith.	C. & G. S. Tr. No. 19.	0 53.682	Tr. 1899	Tr. 1895-1899	0 53.682	±.005
255	1899, Aug. 19, 22, 25, 29, 31, Sept. 1, 4.	Gaithersburg, Md. (N).	E. Smith J. E. McGrath.	do	Washington, D. C. (I).	J. E. McGrath E. Smith.	do	0 46.02	Tr. 1899, latitude pier.	Coast and Geodetic Survey Office, Tr. 1896-1899.	0 46.02	±.007
256	1899, Oct. 20, 21, 22, 24, 25, 26.	Maricopa, Ariz. (N).	do C. H. Sinclair.	do	El Paso, Tex. (I)	C. H. Sinclair J. E. McGrath	do	22 14.896	Tr. 1899	Tr. 1892-1899	22 14.896	±.005
257	1900, Oct. 8, 9, 10, 12, 13, 14, 15, 16.	St. Louis, Mo. (I)	O. B. French C. H. Sinclair.	C. & G. S. Tr. No. 19.	Yerkes Observatory, Wis. (N).	C. H. Sinclair O. B. French.	C. & G. S. Tr. No. 18	6 36.249	Tr. 1881-82	Yerkes Observatory Tr.	6 36.248	±.009
258	1901, Aug. 26, 27, 28, 29, Sept. 4, 5, 6.	Cambridge, Mass. (I).	E. Smith W. B. Fairfield.	C. & G. S. Tr. No. 18.	Provincetown, Mass. (N).	W. B. Fairfield. E. Smith.	C. & G. S. Tr. No. 19.	3 45.920	Harvard College Observatory, dome.	Tr. 1901	3 45.881	±.012
259	1901, Sept. 23, 24, 30, Oct 4, 12, 14.	Omaha, Nebr. (I)	E. Smith W. B. Fairfield.	C. & G. S. Tr. No. 19.	Fennimore, Wis. (N).	W. B. Fairfield. E. Smith.	C. & G. S. Tr. No. 18.	21 09.45	Tr. 1869-1891	do	21 09.17	±.01

[1] Two determinations on this date without change of observers.

TABLE II.—*Longitude differences by the United States Coast and Geodetic Survey*—Continued

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			h. m. s.	s.
260	1902, Aug. 24, 26, 27, 30, 31, Sept. 1.	Carson City, Nev. (I).	C. W. Friend.	C. & G. S. Tr. No. 18.	Tonopah, Nev. (N).	C. H. Sinclair.	C. & G. S. Tr. No. 19.	0 10 06.691	Tr. 1889-1902	Tr. 1902	0 10 06.691	±0.029
261	1903, Apr. 20, 22, 26, 27, 29, June 2, 4, 6, 11, 12, 13.	Honolulu, Hawaii (N).	E. Smith. F. Morse.	do	San Francisco, Calif. (I).	F. Morse. E. Smith.	do	2 21 38.923	Tr. 1903	Presidio Tr. 1896-97.	2 21 38.919	±.008
262	1903, Sept. 8, 12, 14, 15, 16.	Manila, P. I. (N).	do	do	Guam Island (I).	do	do	1 34 43.264	do	Tr. 1903	1 34 43.264	±.010
263	1903, Sept. 30, Oct. 3, 7, 14, 15.	**Helena, Mont. (I).**	W. Eimbeck. E. D. Preston.	T. & S. Tr. No. 4.	Chinook, Mont. (N).	E. D. Preston W. Eimbeck.	T. & S. Tr. No. 2.	11 13.905	**Tr. 1888-1903**	do	11 13.905	±.018
264	1903, Nov. 16, 17, 18, 22, 23, 26, Dec. 1, 3, 4, 5.	Guam Island (N).	E. Smith	C. & G. S. Tr. No. 19.	Midway Island (I).	F. Morse	C. & G. S. Tr. No. 18.	2 31 53.582	Tr. 1903	do	2 31 53.582	±.010
265	1904, Feb. 22, 25, Mar. 2, 8, 9, 10, 19, 24.	Midway Island, (N).	F. Morse	C. & G. S. Tr. No. 18.	Honolulu, Hawaii (I).	E. Smith	C. & G. S. Tr. No. 19.	1 18 03.220	Tr. 1903-4	Tr. 1903-4	1 18 03.220	±.015
270	1905-6, Dec. 31, Jan. 2, 3, 4, 7, 8.	**Los Angeles, Calif. (I).**	J. E. McGrath.	C. & G. S. Tr. No. 19.	Wilson Peak, Calif. (N).	do	C. & G. S. Tr. No. 18.	0 47.571	**Tr. 1892**	Solar Observatory pier.	0 47.235	±.008
272	1906, Feb. 15, 20, 23, 24.	Alice, Tex. (N)	E. Smith	C. & G. S. Tr. No. 18.	**Austin, Tex. (I).**	J. E. McGrath.	C. & G. S. Tr. No. 19.	1 20.878	Tr. 1906	**Tr. 1895-1906**	1 20.878	±.012
273	1906, Mar. 14, 19, 20.	do	J. E. McGrath.	do	Point Isabel, Tex. (N).	E. Smith	do	3 28.140	do	Tr. 1906	3 28.140	±.005
274	1906, Mar. 29, 30, 31.	**Austin, Tex. (I).**	E. Smith	do	do	J. E. McGrath.	do	2 07.300	**Tr. 1895-1906**	do	2 07.300	±.012
275	1907, Feb. 14, 15, 16.	Key West, Fla. (I).	J. S. Hill	T. & S. Tr. No. 2.	Miami, Fla. (N).	W. Bowie	T. & S. Tr. No. 4.	6 27.363	Tr. 1896	Tr. 1907	6 27.365	±.017
276	1907, Feb. 23, 25, 26.	Miami, Fla. (I)	do	T. & S. Tr. No. 4.	Jupiter Inlet, Fla. (N).	do	T. & S. Tr. No. 2.	0 27.404	Tr. 1907	do	0 27.404	±.016
277	1907, Mar. 5, 7, 8.	Sebastian, Fla. (N).	W. Bowie	do	Jupiter Inlet, Fla. (I).	J. S. Hill	do	1 33.654	do	do	1 33.654	±.022
278	1907, Mar. 19, 20, 21, 22.	Daytona, Fla. (N).	do	T. & S. Tr. No. 2.	Sebastian, Fla. (I).	do	T. & S. Tr. No. 4.	2 11.332	do	do	2 11.332	±.026
279	1907, Mar. 27, 28, 29.	Fernandina, Fla. (N).	do	T. & S. Tr. No. 4.	Daytona, Fla. (I)	do	T. & S. Tr. No. 2.	1 46.878	do	do	1 46.878	±.007
280	1907, Apr. 9, 10, 12.	**Atlanta, Ga. (I)**	do	T. & S. Tr. No. 2.	Fernandina, Fla. (N).	do	T. & S. Tr. No. 4.	11 42.609	**Tr. 1896-1907**	do	11 42.609	±.008
281	1907, Apr. 19, 23, 27.	Fernandina, Fla. (I).	J. S. Hill	T. & S. Tr. No. 4.	Darien, Ga. (N)	W. Bowie	T. & S. Tr. No. 2.	0 07.208	Tr. 1907	do	0 07.208	±.011
282	1907, May 1, 2, 4.	Darien, Ga. (I)	do	T. & S. Tr. No. 2.	Allendale, S. C. (N).	do	T. & S. Tr. No. 4.	0 29.255	do	do	0 29.255	±.022
283	1907, May 13, 16, 17.	Doraville, Ga. (N).	W. Bowie	do	Allendale, S. C. (I).	J. S. Hill	do	11 52.285	do	do	11 52.285	±.018
284	1907, May 27, 28, June 3.	**Atlanta, Ga. (I)**	do	T. & S. Tr. No. 4.	Doraville, Ga. (N)	do	T. & S. Tr. No. 2.	0 26.794	**Tr. 1896**	do	0 26.764	±.008
285	1907, July 11, 16, 17.	Stephen, Minn. (N).	E. Smith	do	**Minneapolis, Minn. (I).**	O. B. French	C. & G. S. Tr. No. 19.	14 28.504	Tr. 1907	**Tr. 1873-1907**	[1] 14 28.504	±.012
286	1907, June 8, 14, 15, 17, 20.	Allegheny, Pa. (N).	F. Schlesinger.	C. & G. S. Tr. No. 19.	Washington, D. C. (I).	W. Bowie	T. & S. Tr. No. 4.	12 03.683	Allegheny Observatory, new site, Tr. 1907.	U. S. Coast and Geodetic Survey Office, Tr. 1896-1907.	12 03.683	±.010
287	1907, June 14, 15, 17.	Mount Weather, Va. (N).	E. Smith	T. & S. Tr. No. 2.	do	do	do	3 31.663	Tr. 1907	do	3 31.663	± (?)
288	1907, July 23, 25, 26.	Stephen, Minn. (I).	O. B. French.	T. & S. Tr. No. 4.	Dalton, Minn. (N).	E. Smith	C. & G. S. Tr. No. 19.	3 45.133	do	Tr. 1907	3 45.133	±.011
289	1907, Aug. 3, 4, 6.	Howard, S. Dak. (N).	E. Smith	do	Dalton, Minn. (I)	O. B. French	do	6 26.387	do	do	6 26.387	±.012
290	1907, Aug. 29, 30, Sept. 2, 3.	Page, Nebr. (N)	O. B. French.	C. & G. S. Tr. No. 19.	**Omaha, Nebr. (I).**	E. Smith	T. & S. Tr. No. 4.	9 57.126	do	**Tr. 1869-1891**	9 57.383	±.010
291	1907, Sept. 13, 14, 15, 16.	**Omaha, Nebr. (I).**	do	T. & S. Tr. No. 4.	Berger, Mo. (N)	do	C. & G. S. Tr. No. 19.	18 36.300	**Tr. 1869-1891**	Tr. 1907	18 36.043	±.008
292	1907, Sept. 22, 23, 24, 28.	do	do	do	Knob Noster, Mo. (N).	do	do	9 33.846	do	do	9 33.589	±.021
293	1907, Oct. 4, 5, 7.	Howard, S. Dak. (N).	do	C. & G. S. Tr. No. 19	**Omaha, Nebr. (I).**	do	T. & S. Tr. No. 4.	6 20.015	Tr. 1907	**Tr. 1869-1891**	6 20.272	±.009
294	1907, Oct. 13, 15, 16.	Salina, west base, Kans. (N).	do	do	do	do	do	6 38.280	do	do	6 38.537	±.010
295	1907, Oct. 16, 17, 19, 21.	Page, Nebr. (N)	E. Smith	do	Howard, S. Dak. (I).	O. B. French.	do	3 37.040	do	Tr. 1907	3 37.040	±.018
296	1907, Oct. 22, 23, 26, 27.	Marlow, Okla. (I).	do	do	Pond Creek, Okla. (N).	do	do	0 39.437	Tr. 1899-1907	do	0 39.437	±.005
297	1907, Nov. 2, 3, 4.	Bowie, northwest base, Tex. (N).	O. B. French.	T. & S. Tr. No. 4.	Marlow, Okla. (I)	E. Smith	C. & G. S. Tr. No. 19.	0 10.630	Tr. 1907	Tr. 1899-1907	0 10.630	±.008
298	1907, Nov. 13, 14, 15.	**Atlanta, Ga. (I)**	do	do	Knoxville, Tenn. (N).	do	do	1 51.081	**Tr. 1896**	Tr. 1907	1 51.051	±.007
299	1907, Nov. 29, 30, Dec. 1.	Mobile, Ala. (I)	E. Smith	C. & G. S. Tr. No. 19.	Fort Morgan, Ala. (N).	O. B. French	C. & G. S. Tr. No. 4.	0 04.625	Tr. 1856-1858	do	0 04.758	±.010
300	1907, Dec. 14, 16, 23.	St. Marks, Fla. (N).	do	do	Daytona, Fla. (I)	do	T. & S. Tr. No. 4.	12 45.355	Tr. 1907	do	12 45.355	±.007
301	1907-8, Dec. 31, Jan. 1, 3.	Belleview, Fla. (N).	O. B. French	do	do	E. Smith	do	7 10.731	do	do	7 10.731	±.012
302	1908, Apr. 18, 24, 25.	Gazelle, Calif. (N).	E. Smith	C. & G. S. Tr. No. 18.	**Sacramento, Calif. (I).**	O. B. French	C. & G. S. Tr. No. 19.	4 05.438	Tr. 1908	**Tr. 1888-1908**	4 05.438	±.007
303	1908, May 13, 22, 26, 16, 25, 27.	**Seattle, Wash. (I).**	O. B. French E. Smith.	C. & G. S. Tr. No. 19.	Seattle, University, Wash. (N)	E. Smith O. B. French.	C. & G. S. Tr. No. 18.	0 06.184	**Tr. 1886-1894**	University of Washington, new site, Tr. 1908.	0 06.268	±.007
304	1908, June 6, 8, 9.	Blaine, Wash. (N)	do	C. & G. S. Tr. No. 18.	**Seattle, Wash. (I).**	do	C. & G. S. Tr. No. 19.	1 40.446	Tr. 1908	**Tr. 1886-1894**	1 40.362	±.006
305	1908, June 21, 23, 24.	**Bismarck, N. Dak. (I).**	O. B. French	C. & G. S. Tr. No. 19.	Stephen, Minn. (N).	E. Smith	C. & G. S. Tr. No. 18.	15 42.759	**Tr. 1890**	Tr. 1907-8	15 42.779	±.010
306	1908, July, 2, 3, 6.	do	do	do	Dalton, Minn. (N)	do	do	19 27.922	do	do	19 27.942	±.012
307	1908, July 22, 25, 26.	Bunday, Mich. (N).	E. Smith	C. & G. S. Tr. No. 18.	**Detroit, Mich. (I).**	O. B. French	C. & G. S. Tr. No. 19.	5 38.322	Tr. 1908	**Tr. 1891**	5 38.505	±.002
308	1908, Aug. 8, 11, 14.	Kit, N. Y. (N)	do	do	Albany, N. Y. (I)	do	do	0 49.270	do	Dudley Observatory, new site, meridian.	0 49.270	±.011
311	1911, June 20, 21, 28, 29.	Washington, D. C. (I).	A. M. Sobieralski.	T. & S. Tr. No. 2.	New York City, N. Y. (N).	E. Smith	do	12 07.280	U. S. Coast and Geodetic Survey Office, Tr. 1896-1911.	Manhattan Square, Tr. 1911.	12 07.280	±.039
313	1911, Sept. 17, 18, 23, 24.	Fort Stevens, Oreg. (N).	C. V. Hodgson.	do	Seattle, Wash. (I)	do	do	6 38.246	Tr. 1911	University of Washington, new site, Tr. 1908.	6 38.246	±.019
314	1911, Oct. 10, 11, 12, 13.	**El Paso, Tex (I)**	do	do	Jarilla, N. Mex. (N).	do	do	1 30.004	**Tr. 1892-1895**	Tr. 1911	1 29.838	±.013
315	1911, Oct. 21, 22, 23, 24.	do	E. Smith	do	Boracho, Tex. (N).	C. V. Hodgson.	do	8 23.779	do	do	8 23.613	±.022
316	1911, Oct. 30, 31, Nov. 5.	Boracho, Tex. (I)	C. V. Hodgson.	C. & G. S. Tr. No. 19.	Stanton, Tex. (N)	E. Smith	T. & S. Tr. No. 2.	10 28.427	Tr. 1911	do	10 28.427	±.020
317	1911, Nov. 14, 19, 20.	**Austin, Tex. (I)**	E. Smith	do	Matagorda, Tex. (N).	C. V. Hodgson.	do	7 04.410	**Tr. 1895-1906**	do	7 04.381	±.016
318	1911, Nov. 29, 30, Dec. 1, 2.	do	do	do	Sabine Pass, Tex. (N).	do	do	15 23.744	do	do	15 23.715	±.012
319	1912, July 19, 22, 23, 24.	Mondak, Mont. (N).	H. A. Seran	C. & G. S. Tr. No. 18.	**Omaha, Nebr. (I).**	G. D. Cowie	C. & G. S. Tr. No. 19.	32 24.795	Tr. 1912	**Tr. 1869-1891**	32 25.052	±.012
320	1912, Sept. 18, 28, 29, 30.	Bowman, N. Dak. (N).	do	do	do	do	do	29 50.096	do	do	29 50.353	±.012
321	1912, Oct. 11, 12, 13.	Provo, S. Dak. (N)	do	do	do	do	do	31 32.172	do	do	31 32.429	±.016
322	1912, Oct. 19, 22, 24, 25.	Wheatland, Wyo. (N).	do	do	do	do	do	36 02.305	do	do	36 02.562	±.021
323	1912, Nov. 1, 7, 8.	Watkins, Colo. (N)	do	do	do	do	do	34 38.563	do	do	34 38.820	±.022
324	1913, May 30, 31, June 1.	Donna, Tex. (N)	C. V. Hodgson.	do	**Austin Tex. (I)**	do	do	1 34.310	do	**Tr. 1895-1906**	1 14.339	±.006

[1] The loop closure indicates an error in this observed difference the cause of which has not been discovered. The difference has not been used in the adjustment.

TABLE II.—*Longitude differences by the United States Coast and Geodetic Survey*—Continued

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			*h. m. s.*	*s.*
325	1914, Aug. 7, 8, 13, 14, 15, 22, 30, 31, Sept. 2, 4.	Washington, D. C. (I).	O. B. French. F. Morse.	Bamberg Trs. Nos. 20 and 21.	Far Rockaway, N. Y. (I).	F. Morse. O. B. French.	Bamberg Trs. Nos. 21 and 20.	0 13 15.648	U. S. Naval Observatory, new site, center of clock room.	Tr. 1914	0 13 15.704	±0.003
326	1914, Sept. 12, 13, 14, 15, 16, 20, 21, 22, 23.	Far Rockaway, N. Y. (N).	O. B. French. F. Morse.	do	**Cambridge, Mass. (I).**	F. Morse. O. B. French.	do	10 28.921	Tr. 1914	**Harvard College Observatory, dome.**	10 29.031	±.003
327	1914, Oct. 1, 2, 5, 9, 11, 21, 22, 23.	Washington, D.C. (N).	do. O. B. French.	Bamberg Trs. Nos. 21 and 20.	**do**	do. F. Morse.	Bamberg Trs. Nos. 20 and 21.	23 44.571	U. S. Naval Observatory, new site, center of clock room.	**do**	23 44.738	±.002
328	1914, Nov. 16, 17, 18, 19.	**Little Rock, Ark. (I).**	F. Morse	Bamberg Tr. No. 21.	Martin, Tenn. (N).	O. B. French	Bamberg Tr. No. 20.	9 54.251	**Tr. 1885-1896**	Tr. 1914	9 54.275	±.004
329	1914, Nov. 23, 24, 25	Martin, Tenn. (I)	do	Bamberg Tr. No. 20.	Strickland, Miss. (N).	do	Bamberg Tr. No. 21.	5 28.314	Tr. 1914	do	5 28.314	±.009
330	1914, Dec. 1, 14, 15	Strickland, Miss. (I).	do	Bamberg Tr. No. 21.	Madison, Ala. (N).	do	Bamberg Tr. No. 20.	6 44.894	do	do	6 44.894	±.007
331	1914-15, Dec. 27, 31, Jan. 1.	**Nashville, Tenn. (I).**	O. B. French	do	do	F. Morse	do	0 09.903	**Tr. 1877-1914**	do	0 09.903	±.002
332	1915, Jan. 7, 9, 13	**do**	F. Morse	do	O and M, Ind. (N).	O. B. French	do	4 27.319	**Tr. 1877-1915**	Tr. 1915	4 27.319	±.008
333	1915, July 19, 21, 22, 25.	Warroad, Minn. (N).	O. B. French	Bamberg Tr. No. 20.	**Minneapolis, Minn. (I).**	C. H. Sinclair.	C. & G. S. Tr. No. 19.	8 21.333	Tr. 1915	**Tr. 1873-1915**	8 21.333	±.018
334	1915, Aug. 6, 7, 8, 9	**Omaha, Nebr. (I)**	do	do	**Minneapolis, Minn. (N).**	do	do	[1] 10 49.544	**Tr. 1869-1891**	**do**	10 49.287	±.010
335	1915, Nov. 17, 21, 24, 25.	Rochester, N. Y. (N).	C. H. Sinclair.	do	Washington, D.C. (I).	C. H. Swick	do	2 27.878	Bausch and Lomb Observatory, M. C. 1915.	U. S. Coast and Geodetic Survey Office, Tr. 1896.	2 27.930	±.020
336	1916, Aug. 2, 3	Echo, Oreg. (N)	W. B. Fairfield.	Bamberg Tr. No. 21.	**Walla Walla, Wash. (I).**	J. E. McGrath	Bamberg Tr. No. 20.	3 23.211	Tr. 1916	**Tr. 1887-88**	3 22.628	±.005
337	1916, Aug. 19, 20, 21	Echo, Oreg. (I)	do	do	La Grande, Oreg. (N).	do	do	4 23.459	do	Tr. 1916	4 23.459	±.009
338	1916, Sept. 1, 5, 6	La Grande, Oreg. (I).	J. E. McGrath	Bamberg Tr. No. 20.	Mountain Home, Idaho (N).	W. B. Fairfield.	Bamberg Tr. No. 21.	9 35.793	do	do	9 35.793	±.006
339	1916, Sept. 20, 21, 24	Mountain Home, Idaho (I).	W. B. Fairfield.	Bamberg Tr. No. 21.	Blackfoot, Idaho (N).	J. E. McGrath	Bamberg Tr. No. 20.	13 21.925	do	do	13 21.925	±.003
340	1916, Oct. 16, 18, 19, 20.	Blackfoot, Idaho (I).	J. E. McGrath	Bamberg Tr. No. 20.	**Salt Lake City, Utah (I).**	W. B. Fairfield.	Bamberg Tr. No. 21.	1 49.579	do	**Tr. 1869-1916**	1 49.579	±.015
341	1916, Nov. 2, 3, 9	Lund, Utah (N)	do	do	**do**	do	do	6 09.007	do	**do**	6 09.007	±.013
342	1916, Nov. 27, 28, 29	Moapa, Nev. (N)	W. B. Fairfield.	Bamberg Tr. No. 21.	Lund, Utah (I)	J. E. McGrath	Bamberg Tr. No. 20.	4 45.729	do	Tr. 1916	4 45.729	±.022
343	1916, Dec. 12, 13, 14	do	do	do	**Needles, Calif. (I)**	do	do	0 05.119	do	**Tr. 1889-1916**	0 05.119	±.008
344	1917, Aug. 26, Sept. 5, 7, 11.	**Atlanta, Ga. (I)**	do	do	Hump, Ga. (N)	do	do	2 59.002	**Tr. 1896**	Tr. 1917	2 59.001	±.002
345	1917, Sept. 18, 19, 20	Valley, Ga. (N)	do	do	Hump, Ga. (I)	do	do	0 58.795	Tr. 1917	do	0 58.795	±.015
346	1917, Oct. 1, 2, 3, 4	Hump, Ga. (I)	J.E.McGrath.	Bamberg Tr. No. 20.	Cochran, Ga. (N).	W.B.Fairfield.	Bamberg Tr. No. 21.	1 08.276	do	do	1 08.276	±.020
347	1917, Oct. 12, 13	Cochran, Ga. (I)	W.B.Fairfield.	Bamberg Tr. No. 21.	Mud, Ga. (N)	J.E.McGrath.	Bamberg Tr. No. 20.	0 45.134	do	do	0 45.134	±.015
348	1917, Oct. 23, 24, 25	Mud, Ga. (I)	J.E.McGrath.	Bamberg Tr. No. 20.	Joint, Ga. (N)	W.B.Fairfield.	Bamberg Tr. No. 21.	2 17.270	do	do	2 17.270	±.010
349	1917, Nov. 1, 2, 3, 4	Joint, Ga. (I)	W.B.Fairfield.	Bamberg Tr. No. 21.	Jesup, Ga. (N)	J.E.McGrath.	Bamberg Tr. No. 20.	2 53.403	do	do	2 53.403	±.018
350	1917, Nov. 16, 17, 18	Jesup, Ga. (I)	J.E.McGrath.	Bamberg Tr. No. 20.	Brunswick, southeast base, Ga. (N).	W.B.Fairfield.	Bamberg Tr. No. 21.	1 30.839	do	do	1 30.839	±.020
351	1917, Nov. 27, Dec. 1, 2.	Brunswick, southeast base, Ga. (N).	W.B.Fairfield.	Bamberg Tr. No. 21.	Fernandina, Fla. (I)	J.E.McGrath.	Bamberg Tr. No. 20.	0 08.770	do	Tr. 1907-1917	0 08.770	±.018
352	1917, Dec. 22, 28, 30	Lancaster 2 (U. S. E.), Fla. (N).	do	do	do	do	do	0 51.603	do	do	0 51.603	±.015
353	1918, Jan. 25, 26, 28, 29.	Folkston, Ga. (N).	J.E.McGrath.	Bamberg Tr. No. 20.	Lancaster 2 (U. S. E.), Fla. (I).	W.B.Fairfield.	Bamberg Tr. No. 21.	1 19.986	Tr. 1918	Tr. 1917-18	1 19.986	±.006
354	1918, Feb. 7, 8, 9, 10	Waresboro, Ga. (N).	W.B.Fairfield.	Bamberg Tr. No. 21.	Folkston, Ga. (I)	J.E.McGrath.	Bamberg Tr. No. 20.	1 52.334	do	Tr. 1918	1 52.334	±.002
355	1918, Feb. 23, 24, 25	Willacoochee, Ga. (N).	J.E.McGrath.	Bamberg Tr. No. 20.	Waresboro, Ga. (I).	W.B.Fairfield.	Bamberg Tr. No. 21.	2 17.420	do	do	2 17.420	±.008
356	1918, Mar. 13, 14, 15	Valdosta, Ga. (N)	W.B.Fairfield.	Bamberg Tr. No. 21.	Willacoochee, Ga. (I).	J.E.McGrath.	Bamberg Tr. No. 20.	0 54.547	do	do	0 54.547	±.004
357	1918, Mar. 25, 26, 27	Jones, Ga. (N)	do	do	do	do	do	2 44.980	do	do	2 44.980	±.012
358	1918, Apr. 13, 15, 16	Sylvester D, Ga. (N).	J.E.McGrath.	Bamberg Tr. No. 20.	Jones, Ga. (I)	W.B.Fairfield.	Bamberg Tr. No. 21.	0 39.860	do	do	0 39.860	±.018
359	1918, Apr. 28, May 1, 2.	Kimbrough, Ga. (N).	W.B.Fairfield.	Bamberg Tr. No. 21.	Sylvester D, Ga. (I).	J.E.McGrath.	Bamberg Tr. No. 20.	2 58.995	do	do	2 58.995	±.023
360	1918, May 8, 9, 10, 11	Columbus E, Ga. (N).	J.E.McGrath.	Bamberg Tr. No. 20.	Kimbrough, Ga. (I).	W.B.Fairfield.	Bamberg Tr. No. 21.	1 20.001	do	do	1 20.001	±.004
361	1918, May 21, 22, 24	Columbus E, Ga. (I).	do	do	Butler, Ga. (N)	do	do	3 00.605	do	do	3 00.605	±.020
362	1918, May 31, June 1, 13.	Butler, Ga. (I)	W.B.Fairfield.	Bamberg Tr. No. 21.	Harmon, Ga. (N)	J.E.McGrath.	Bamberg Tr. No. 20.	0 02.050	do	do	0 02.050	±.022
363	1918, June 16, 18, 19	Harmon, Ga. (I)	J. E. McGrath	Bamberg Tr. No. 20.	Riley, Ga. (N)	W. B. Fairfield.	Bamberg Tr. No. 21.	0 05.153	do	do	0 05.153	±.003
364	1918, July 5, 11, 13	Riley, Ga. (N)	W. B. Fairfield.	Bamberg Tr. No. 21.	Valley, Ga. (I)	J. E. McGrath	Bamberg Tr. No. 20.	1 15.231	do	Tr. 1917-18	1 15.231	±.013
365	1918, Aug. 8, 12, 14	Valley, Ga. (I)	J. E. McGrath	Bamberg Tr. No. 20.	Norris, Ga. (N)	W. B. Fairfield.	Bamberg Tr. No. 21.	5 32.740	Tr. 1917-18	Tr. 1918	5 32.740	±.017
366	1918, Sept. 14, 15, 17	Norris, Ga. (I)	W. B. Fairfield.	Bamberg Tr. No. 21.	Turner, Ga. (N.)	J. E. McGrath	Bamberg Tr. No. 20.	2 52.440	Tr. 1918	do	2 52.440	±.015
367	1918, Oct. 10, 11	Turner, Ga. (I)	J. E. McGrath	Bamberg Tr. No. 20.	Bethune I, S. C. (N).	W. B. Fairfield.	Bamberg Tr. No. 21.	6 06.358	do	do	6 06.358	±.022
368	1918, Nov. 3, 4, 5, 6	Bethune I, S. C. (I).	W. B. Fairfield.	Bamberg Tr. No. 21.	Lee, N. C. (N)	J. E. McGrath	Bamberg Tr. No. 20.	4 19.622	do	do	4 19.622	±.019
369	1918, Nov. 20, 23, 25	Lee, N. C. (I)	J. E. McGrath	Bamberg Tr. No. 20.	Littleton, N. C. (N).	W. B. Fairfield.	Bamberg Tr. No. 21.	5 02.353	do	do	5 02.353	±.015
370	1918, Dec. 12, 19, 26, 27.	Littleton, N. C. (I).	W. B. Fairfield.	Bamberg Tr. No. 21.	Suffolk, Va. (N)	J. E. McGrath	Bamberg Tr. No. 20.	5 21.750	do	do	5 21.750	±.010
371	1919, Jan. 11, 15	Washington, D. C. (I).	do	do	do	do	do	1 43.878	U. S. Coast & Geodetic Survey Office Tr. 1896-1911.	do	1 43.826	±.010
372	1919, June 4, 11, 12	Laplace, Tex. (N)	do	do	Laredo, Tex. (I)	do	do	3 54.037	Tr. 1919	Tr. 1895-1919	3 54.037	±.006
373	1919, July 10, 11, 12, 13.	Johnstone, Tex. (N).	J. E. McGrath	Bamberg Tr. No. 20.	Laplace, Tex. (I)	W. B. Fairfield.	Bamberg Tr. No. 21.	1 06.534	do	Tr. 1919	1 06.534	±.012
374	1919, Aug. 8, 10, 11	Dryden east base, Tex. (N).	W. B. Fairfield.	Bamberg Tr. No. 21.	Johnstone, Tex. (I).	J. E. McGrath	Bamberg Tr. No. 20.	5 18.685	do	do	5 18.685	±.002
375	1919, Sept. 2, 4, 5, 6	do	do	do	Stanton, Tex. (I)	do	do	1 18.028	do	Tr. 1911-1919	1 18.028	±.007
376	1919, Nov. 3, 5, 13	**Austin, Tex. (I)**	J. E. McGrath	Bamberg Tr. No. 20.	Tehuacana, Tex. (N).	W. B. Fairfield.	Bamberg Tr. No. 21.	4 45.081	**Tr. 1895-1906**	Tr. 1919	4 45.052	±.006
377	1919, Nov. 29, 30, Dec. 15.	Tehuacana, Tex. (I).	W. B. Fairfield.	Bamberg Tr. No. 21.	Jacksonville, Tex. (N).	J. E. McGrath	Bamberg Tr. No. 20.	5 04.649	Tr. 1919	do	5 04.649	±.004
378	1920, Jan. 16, 18, 19	Jacksonville, Tex. (I).	J. E. McGrath	Bamberg Tr. No. 20.	Man, La. (N)	W. B. Fairfield.	Bamberg Tr. No. 21.	6 15.310	Tr. 1919-20	Tr. 1920	6 15.310	±.004
379	1920, Feb. 16, 18, 19	Man, La. (I)	W. B. Fairfield.	Bamberg Tr. No. 21.	Boyce, La. (N)	J. E. McGrath	Bamberg Tr. No. 20.	4 15.394	Tr. 1920	do	4 15.394	±.019
380	1920, Mar. 20, 21, 22.	Boyce, La. (I)	J. E. McGrath	Bamberg Tr. No. 20.	Torras, La. (N)	W. B. Fairfield.	Bamberg Tr. No. 21.	3 53.686	do	do	3 53.686	±.010
381	1920, Apr. 10, 13, 16	**Little Rock, Ark. (I).**	do	do	do	do	do	2 22.602	**Tr. 1885-1896**	do	2 22.619	±.017

[1] Redetermination. See difference No. 214 of this publication. See also Report 1897, app. 2, p. 234.

TABLE II.—*Longitude differences by the United States Coast and Geodetic Survey*—Continued

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			h. m. s.	s.
382	1920, Sept. 3, 4, 5	Hartford, Ark. (N).	W. B. Fairfield.	Bamberg Tr. No. 21.	**Little Rock, Ark. (I).**	G. D. Cowie	Bamberg Tr. No. 20.	0 08 27.419	Tr. 1920	**Tr. 1885-1896**	0 08 27.402	±0.008
383	1920, Sept. 18, 19, 20	Allen, Okla. (N)	G. D. Cowie	Bamberg Tr. No. 20.	Hartford, Ark. (I)	W. B. Fairfield.	Bamberg Tr. No. 21.	8 06.518	do	Tr. 1920	8 06.518	±.003
384	1920, Sept. 30, Oct. 1, 2.	Pond Creek, Okla. (I).	W. B. Fairfield.	Bamberg Tr. No. 21.	Allen, Okla. (N)	G. D. Cowie	Bamberg Tr. No. 20.	5 31.593	Tr. 1907-1920	do	5 31.593	±.010
385	1920, Oct. 10, 11, 12	Dill, Okla. (N)	G. D. Cowie	Bamberg Tr. No. 20.	Pond Creek, Okla. (I).	W. B. Fairfield.	Bamberg Tr. No. 21.	5 19.607	Tr. 1920	Tr. 1907-1920	5 19.607	±.006
386	1920, Oct. 20, Nov. 1, 3.	Conway, Tex. (N).	W. B. Fairfield.	Bamberg Tr. No. 21.	Dill, Okla. (I)	G. D. Cowie	Bamberg Tr. No. 20.	9 00.858	do	Tr. 1920	9 00.858	±.003
387	1920, Nov. 14, 16, 17	Glen Rio, N. Mex. (N).	G. D. Cowie	Bamberg Tr. No. 20.	Conway, Tex. (I)	W. B. Fairfield.	Bamberg Tr. No. 21.	6 38.264	do	do	6 38.264	±.006
388	1920, Dec. 4, 8, 9	Los Lunas, N. Mex. (N).	W. B. Fairfield.	Bamberg Tr. No. 21.	Glen Rio, N. Mex. (I).	G. D. Cowie	Bamberg Tr. No. 20.	14 46.823	do	do	14 46.823	±.004
389	1920, Dec. 15, 17, 18	Williams Laplace, Ariz. (N).	G. D. Cowie	Bamberg Tr. No. 20.	Los Lunas, N. Mex. (I).	W. B. Fairfield.	Bamberg Tr. No. 21.	21 49.635	do	do	21 49.635	±.010
390	1920, Dec. 29, 30, 31	**Needles, Calif. (I).**	W. B. Fairfield.	Bamberg Tr. No. 21.	Williams Laplace, Ariz. (N).	G. D. Cowie	Bamberg Tr. No. 20.	9 38.406	**Tr. 1889-1920**	do	9 38.406	±.012

TABLE III.—*Rejected longitude differences by the United States Coast and Geodetic Survey*

Number of difference.	Dates	Number of nights	Western station		Eastern station		Mean observed difference of longitude of reference points	Probable error
			Name	Reference	Name	Reference		
							h. m. s.	*s.*
1	1846, Oct	1	Washington, D. C. (I)	U. S. Naval Observatory, old site, dome	Philadelphia, Pa. (N)	Central (old) High School, M. C.	0 07 34.14	±0.50
5	1848, July, Aug	5	New York, N. Y. (N)	Rutherford's Observatory, Tr. 1848	Cambridge, Mass. (I)	Harvard College Observatory, dome.	11 26.044	±.042
8	1849, Oct	1	Washington, D. C. (N)	Seaton station, Tr. 1849	Philadelphia, Pa. (I)	Central (old) High School, M. C.	7 20.81	±.20
9	1850, Feb	1	Charleston, S. C. (N)	Gibbes Observatory, Tr. 1850	Washington, D. C. (I)	Seaton station, Tr. 1849-50	11 45.27	±.11
11	1851, Nov., Dec	4	Cambridge, Mass. (I)	Harvard College Observatory, dome	Bangor, Me. (N)	Tr. 1851	9 23.080	±.043
26	1858, Jan., Feb	3	New Orleans, La. (I)	Basin Street station, Tr. 1858	Head of Passes, Mississippi Delta, La. (N).	Tr. 1858	3 17.74	±.3
45	1867, June	6	Washington, D. C. (N)	Seaton station, Tr. 1849-1867	Cambridge, Mass. (I)	Harvard College Observatory, dome.	23 28.474	±.023
46	do	5	Washington, D. C. (I)	U. S. Naval Observatory, old site, dome.	Cambridge, Mass. (N)	do	23 41.116	±.031
48	1868, Feb	6	Galveston, Tex. (N)	Tr. 1868	New Orleans, La. (I)	Basin Street station, Tr. 1858-1868	18 51.85	±.037
49	1869, Feb	6	Omaha, Nebr (N)	Tr. 1869-1891	Cambridge, Mass. (I)	Harvard College Observatory, dome	1 39 15.065	±.023
51	do	6	San Francisco, Calif. (N)	Washington Square, Tr. 1869	Omaha, Nebr. (I)	Tr. 1869	1 45 52.307	±.014
52	1869, Feb., Mar	10	do	do	Salt Lake City, Utah (I)	do	42 03.196	±.011
53	1869, Feb	8	Salt Lake City, Utah (N)	Tr. 1869	Cambridge, Mass. (I)	Harvard College Observatory, dome.	2 43 04.177	±.021
54	do	9	San Francisco, Calif. (N)	Washington Square, Tr. 1869	do	do	3 25 07.372	±.022
61	do	1	Bushnell, Nebr. (N)	(Unknown)	Omaha, Nebr. (I)	Tr. 1869-1891	31 45.75	-------
62	do	1	Julesburg, Colo. (N)	do	do	do	25 39.38	-------
64	1869, Oct	2	Cedar Falls, Iowa (N)	Tr. 1869	Chicago, Ill. (I)	Dearborn University Observatory	19 20.8	±.5
67	1870, Apr	4	St. Louis, Mo. (N)	Washington University, Tr. 1870	Washington, D. C. (I)	U. S. Naval Observatory, old site, dome.	52 36.901	±.026
69	1870, Sept., Oct	3	Burlington, Vt. (N)	Tr. 1870	Cambridge, Mass. (I)	Harvard College Observatory, dome.	8 18.6	±.1
72	1871, Sept., Oct	13	San Francisco, Calif. (I)	Washington Square, Tr. 1869-1871	Seattle, Wash. (N)	Tr. 1871	0 18.42	±.02
86	1872, July, Aug	11	Washington, D. C. (I)	U. S. Naval Observatory, old site, dome.	Cambridge, Mass. (N)	Harvard College Observatory, dome.	23 40.967	±.019
87	do	9	do	do	St. Pierre Island, Gulf of St. Lawrence (N).	Tr. 1872	1 23 29.553	±.027
91	1873, July	6	Omaha, Nebr. (I)	Tr. 1869-1873	Madison, Wis. (N)	Washburn Observatory, M. C.	26 08.172	±.024
93	1873, Aug	4	do	do	Minneapolis, Minn. (N)	Tr. 1873-1891	10 49.567	±.063
94	do	4	Colorado Springs, Colo. (N)	Tr. 1873	Omaha, Nebr. (I)	Tr. 1869-1891	35 30.45	±.02
98	1873, Dec., 1874, Jan.	4	Key West, Fla. (N)	M. T. 1873-74	Washington, D. C. (I)	U. S. Naval Observatory, old site, dome.	19 01.554	±.017
108	1877, Aug., Oct	13	Nashville, Tenn. (N)	Tr. 1877	do	do	38 55.988	±.040
142	1882, Nov	3	Little Rock, Ark. (N)	Tr. 1882	St. Louis, Mo. (I)	Washington University, Tr. 1882	8 16.42	±.02
207	1890, Oct	3	Jacksonville, Tex. (N)	Tr. 1890	Washington, D. C. (I)	U. S. Naval Observatory, old site, dome.	1 12 53.088	±.034

TABLE IV.—*Longitude differences by the United States Lake Survey*

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial N=new)	Observers	Instrument (see Table I)	Name (I=initial, N=new)	Observers	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			*h. m. s.*	*s.*
1	1859, Jan. 18, 19, 24, 26, 31, Feb. 7.	**Detroit, Mich. (I).**	Lieut. C. N. Turnbull.	Würdemann Tr. No. 15.	Hudson, Ohio (N)	Prof. C. A. Young.	Würdemann Tr. No. 1.	0 06 26.99	**C. and G. S. Tr. 1891.**	Western Reserve College, observatory, pier.	[1] 0 06 26.751	-------
2	1860, Apr. 17, 18, 27, 28.	do	James Carr	Würdemann Tr. No. 1.	Goderich, Ontario (N).	Lieut. O. M. Poe.	Würdemann Tr. No. 15.	5 20.97	do	Tr. 1860	[1] 5 20.731	-------
3	1860, Nov. 12, 13, 1861, Jan. 22.	Grand Haven, Mich. (N).	do	do	**Detroit, Mich. (I).**	do	do	12 45.85	Tr. 1860	**C. and G. S. Tr. 1891.**	[1] 12 46.089	-------
4	1861 (6 nights)	Ann Arbor, Mich. (N).	Prof. Brünow		do	do		2 43.30	M. C. of Observatory.	do	2 43.466	-------
5	1864 (3 nights)	do			do	James Carr. Col. W. F. Reynolds. S. W. Robinson.		2 43.17				
6	1864, Aug. 8, 10, 13	Chicago, Ill. (N)	O. B. Wheeler	T. & S. Tr.	do	Col. W. F. Reynolds. S. W. Robinson.	Würdemann Tr. No. 1.	18 17.52	Tr. 1864	do	18 17.759	-------
7	1864, Aug. 8, 10, 13	Fort Howard, Wis. (N).	Prof. C. A. Young.	Würdemann Tr. No. 15.	do	Col. W. F. Reynolds. S. W. Robinson.	T. & S. Tr.	19 51.80	do	do	19 52.039	-------
8	1865, July 20, 21, 22, 27, 29, 31.	Thones Hill (Marquette), Mich. (N).	O. B. Wheeler. S. W. Robinson.	Würdemann Tr. No. 1.	Escanaba, Mich. (I).	do O. B. Wheeler.	Würdemann Tr. No. 15.	1 35.23	Tr. 1865	Tr. 1865	1 35.23	-------
9	1865, Aug. 11, 12, 14, 16, 17, 18, 22.	Fort Howard, Wis. (I).	Prof. C. A. Young. O. B. Wheeler.	do	Escanaba, Mich. (N).	do Prof. C. A. Young.	do	3 51.81	Tr. 1864–5	do	3 51.81	-------
10	1865, Aug. 11, 12, 14, 16, 17, 18, 22.	do	Prof. C. A. Young. O. B. Wheeler.	do	Menominee, Wis. (N).	S. W. Robinson.	P. & M. Tr. No. 1.	1 34.52	do	do	1 34.52	-------
11	1868, July 10, 11, 13	Oswego, N. Y. (I)	do	P. & M. Tr. No. 1.	Ogdensburg, N. Y. (N).	Lieut. E. H. Ruffner.	Würdemann Tr. No. 15.	4 02.19	Tr. 1868	Tr. 1868	4 02.19	-------
12	1868, July 10, 11, 13, 14, 16, 17.	do	do	do	Watertown, N. Y. (N).	G. Y. Wisner	Würdemann Tr. No. 1.	2 21.94	do	do	2 21.94	-------
13	1868, Aug. 12, 13, 16, 17, 20, 21.	Buffalo, N. Y. (I)	Lieut. E. H. Ruffner.	Würdemann Tr. No. 15.	Oswego, N. Y. (N)	O. B. Wheeler	P. & M. Tr. No. 1.	9 26.53	do	do	[1] 9 26.53	-------
14	1868, Aug. 12, 16, 17, 20, 21, 31.	do	do	do	Rochester, N. Y. (N).	G. Y. Wisner	Würdemann Tr. No. 1.	4 57.46	do	do	[1] 4 57.46	-------
15	1868, Sept. 2, 4, 7, 13	Dunkirk, N. Y. (N).	G. Y. Wisner	do	Buffalo, N. Y. (I)	Lieut. E. H. Ruffner.	do	1 49.90	do	do	[1] 1 49.90	-------
16	1868, Sept. 2, 4, 7, 13	Erie, Pa. (N)	O. B. Wheeler	P. & M. Tr. No. 1.	do	do	Würdemann Tr. No. 15	4 53.17	do	do	[1] 4 53.17	-------
17	1868, Sept. 18, 21, 23, 29, Oct. 3.	Ashtabula, Ohio (N).	G. Y. Wisner	Würdemann Tr. No. 15.	do	do	Würdemann Tr. No. 1.	7 42.47	do	do	[1] 7 42.47	-------
18	1868, Sept. 18, 21, 23, 29, Oct. 3.	Cleveland, Ohio (I).	O. B. Wheeler	P. & M. Tr. No. 1.	Buffalo, N. Y. (N).	do	Würdemann Tr. No. 15.	11 19.73	do	do	11 19.73	-------
19	1868, Oct. 11, 12, 17, 25.	**Detroit, Mich. (I)**	Lieut. E. H. Ruffner.	Würdemann Tr. No. 15.	Sandusky, Ohio (N).	G. Y. Wisner	Würdemann Tr. No. 1.	1 18.65	**C. & G. S. Tr. 1891**	do	[1] 1 18.411	-------
20	1868, Oct. 11, 12, 17, 25.	do	do	do	Cleveland, Ohio (N).	O. B. Wheeler	P. & M. Tr. No. 1.	5 2 .26	do	do	[1] 5 24.021	-------
21	1868, Nov. 2, 13, 14	Monroe, Mich. (N).	G. Y. Wisner	do	**Detroit, Mich. (I)**	Lieut. E. H. Ruffner.	Würdemann Tr. No. 1.	1 21.80	Tr. 1868	**C. & G. S. Tr. 1891**	[1] 1 22.039	-------
[2] 24	1871, June 14, 15	St. Paul, Minn. (N).	A. R. Flint	Würdemann Tr. No. 1.	Minnesota Point (Duluth), Minn. (I).	Gen. C. B. Comstock.	Würdemann Tr. No. 15.	4 03.79	Tr. 1871	Tr. 1871	4 03.79	-------
25	1871, June 15, 26, July 11.	Minnesota Point (Duluth), Minn. (N).	Gen. C. B. Comstock G. Y. Wisner.	Würdemann Tr. No. 15.	**Detroit, Mich. (I)**	O. B. Wheeler	T. & S. Tr.	36 05.82	do	**C. & G. S. Tr. 1891**	36 06.186	-------
26	1871, Sept. 1, 2, 7, 20	Fort Leavenworth, Kans. (N).	Lieut. E. H. Ruffner.	Würdemann Tr. No. 12.	do	do	do	47 27.11	Observatory, Tr. 1871	do	[1] 47 27.476	-------
27	1873, July 11, 12, 21, 22.	Galena, Ill. (N)	S. W. Robinson.	P. & M. Tr. No. 1.	do	do	do	29 31.23	Tr. 1873	do	29 31.596	-------
28	1873, Aug. 6, 8	Valley Junction Wis. (N).	do	do	do	do	do	29 26.38	do	do	29 26.746	-------
30	1874, May 26, June 11, 17.	Pontiac, Mich. (N).	Lieut. C. F. Powell.	Würdemann Tr. No. 15.	do	Lieut. E. Maguire.	Würdemann Tr. No. 1.	0 57.15	Tr. 1874	do	0 57.516	-------
31	1874, June 24, 26	Lapeer, Mich. (N)	do	P. & M. Tr. No. 1.	do	do	do	1 03.42	do	do	1 03.786	-------
32	1874, July 14, 16	Flint, Mich. (N)	do	do	do	do	do	2 32.21	do	do	2 32.576	-------
33	1874, Aug. 1, 4, 8	St. Johns, Mich. (N).	do	do	do	do	do	6 02.25	do	do	6 02.616	-------
34	1874, Aug. 4, 8	Corunna, Mich. (N).	Capt. H. M. Adams.	Würdemann Tr. No. 15.	do	do	do	4 16.06	do	do	4 16.426	-------
35	1874, Aug. 15, 25	Ionia, Mich. (N)	Lieut. C. F. Powell.	P. & M. Tr. No. 1.	do	do	do	8 03.04	do	do	8 03.406	-------
36	1874, Sept. 9, 12, 29	Grand Rapids, Mich. (N).	do	do	do	do	do	10 27.87	do	do	10 28.236	-------
37	1875, June 18, 19	Howell, Mich. (N).	Lieut. T. N. Bailey.	P. & M. Tr. No. 2.	do	Lieut. D. W. Lockwood.	do	3 30.71	Tr. 1875	do	3 31.076	-------
38	1875, July 13, 19, 26	Lansing, Mich. (N).	do	do	do	do	do	6 01.07	do	do	6 01.436	-------
39	1875, July 20, 24	Charlotte, Mich. (N).	Lieut. P. M. Price.	Würdemann Tr. No. 15.	do	do	do	7 07.86	do	do	7 08.226	-------
40	1875, Sept. 23, 24, Oct. 2, 8, 13.	Detroit, Mich. (I)	Lieut. D. W. Lockwood.	Würdemann Tr. No. 1.	Tonawanda, N. Y. (N).	A. R. Flint	T. & S. Tr. No. 2.	16 38.857	do	Tr. 1875	16 38.491	±0.013
41	1875, July 30, Aug. 7, 12.	Hastings, Mich. (N).	Lieut. T. N. Bailey.	P. & M. Tr. No. 2	**Detroit, Mich. (I).**	Lieut. D. W. Lockwood.	Würdemann Tr. No. 1.	8 56.98	Tr. 1875	**C. & G. S. Tr. 1891**	8 57.346	-------
42	1875, Aug. 13, 24	Marshall, Mich. (N).	Lieut. P. M. Price.	Würdemann Tr. No. 15.	do	do	do	7 39.03	do	do	7 39.396	-------
43	1875, Aug. 28, 30	Jackson, Mich. (N).	Lieut. T. N. Bailey.	P. & M. Tr. No. 2.	do	do	do	5 25.88	do	do	5 26.246	-------
44	1875, Aug. 30, 31	Kalamazoo, Mich. (N).	Lieut. P. M. Price.	Würdemann Tr. No. 15.	do	do	do	10 08.13	do	do	10 08.496	-------
45	1875, Sept. 23, 24	Allegan, Mich. (N).	Lieut. T. N. Bailey.	P. & M. Tr. No. 2.	do	do	do	11 12.35	do	do	11 12.716	-------
46	1875, Sept. 23, 24	Paw Paw, Mich. (N).	Lieut. P. M. Price.	Würdemann Tr. No. 15.	do	do	do	11 20.09	do	do	11 20.456	-------
47	1875, Oct. 13, 30	Stanton, Mich. (N).	do	P. & M. Tr. No. 1.	do	do	do	8 07.68	do	do	8 08.046	-------
48	1875, Nov. 6, 8, 11, 12.	**Detroit, Mich. (I).**	Lieut. D. W. Lockwood.	Würdemann Tr. No. 1.	Mannsville, N. Y.	A. R. Flint	T. & S. Tr. No. 2.	27 56.709	**C. & G. S. Tr. 1891**	Tr. 1875	27 56.343	±.023
49	1875, Nov. 8, 18	Newaygo, Mich. (N).	Lieut. T. N. Bailey.	P. & M. Tr. No. 2.	**Detroit, Mich. (I).**	Lieut. D. W. Lockwood.	Würdemann Tr. No. 1.	11 00.01	Tr. 1875	**C. & G. S. Tr. 1891**	11 00.376	-------
50	1876, Aug. 17, 23, 25, 26.	Willow Springs, Ill. (N).	Lieut. D. W. Lockwood.	Würdemann Tr. No. 1.	do	Capt. H. M. Adams.	Buff & Berger Tr. No. 2.	19 15.315	Tr. 1876	do	19 15.681	±.026
51	1876, Sept. 12, 16	Saginaw, Mich. (N).	do	do	do	do	do	3 38.97	do	do	3 39.336	-------
52	1876, Oct. 11, 12	St. Louis, Mich. (N).	do	do	do	do	do	6 12.57	do	do	6 12.936	-------
53	1876, Dec. 5, 19	Cairo, Ill. (N)	do	do	do	do	do	24 25.87	do	do	24 26.236	-------
54	1877, June 22, 23	Memphis, Tenn. (N).	Lieut. C. F. Powell.	do	do	do	do	28 01.03	Tr. 1877	do	28 01.396	-------

[1] Personal equation not eliminated.

[2] Number 22 omitted.

TABLE IV.—*Longitude differences by the United States Lake Survey*—Continued

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			h. m. s.	s.
55	1878, Sept. 26, 30	Rock Island, Ill. (N).	Lieut. C. F. Powell.	Würdemann Tr. No. 1.	**Detroit, Mich. (I).**	Capt. H. M. Adams.	Buff & Berger. Tr. No. 2.	0 30 02.43	Tr. 1878	**C. & G. S. Tr. 1891**	0 30 02.796	
56	1878, Oct. 24, 31	Red Wing, Minn. (N).	do	do	do	do	do	37 55.71	do	**do**	37 56.076	
57	1878, Nov. 13, 19	Louisiana, Mo. (N).	do	do	do	A. R. Flint. Capt. H. M. Adams.	do	32 00.18	do	**do**	32 00.546	
58	1879, July 26, 28, 29, 30.	Parkersburg (Olney), Ill. (N).	Lieut. P. M. Price.	do	**do**	Capt. D. W. Lockwood.	do	20 08.485	Tr. 1879	**do**	20 08.851	
59	1880, Nov. 22, 24, 25	Fort McDermit, Nev. (N).	Capt. W. A. Jones.	Würdemann Tr. No. 22.	**do**	A. R. Flint	do	2 18 17.94	Tr. 1880	**do**	[1]2 18 18.306	
[2]60	**1881, May 13, 23, 24, 26, June 4, 11, 21, 22, 23, 24, 29.**	**Detroit, Mich. (I)**	**A. R. Flint. O. B. Wheeler.**	**Würdemann Tr. No. 1. Würdemann Tr. No. 15.**	**Cambridge, Mass. (I).**	**O. B. Wheeler A. R. Flint.**	**Würdemann Tr. No. 15. Würdemann Tr. No. 1.**	**47 41.080**	**C. & G. S. Tr. 1891**	**Harvard College Observatory dome.**	**47 40.806**	**±0.013**
61	1881, June 23, 24, 28, 29, July 1, 2, 4, 5.	Toledo, Ohio (N.)	T. Russell. O. B. Wheeler.	T. & S. Tr. No. 2. Würdemann Tr. No. 15.	**Detroit, Mich. (I).**	O. B. Wheeler. T. Russell.	Würdemann Tr. No. 15. T. & S. Tr. No. 2.	1 57.796	Tr. 1881	**C. & G. S. Tr. 1891**	1 53.166	±.016
62	1893, July 10, 15, 19, 20, 26, Aug. 6, 7, 8, 9, 12.	Sault Ste. Marie, Mich. (N).	Chas. S. Riché Prof. Asaph Hall, jr.	Würdemann Tr. No. 1.	Ann Arbor, Mich. (I).	Prof. Asaph Hall, jr. Chas. S. Riché.	P. & M. M. C.	2 27.995	Tr. 1893	Ann Arbor Observatory M. C.	2 27.995	±.036

[1] Personal equation not eliminated.
[2] No. 60=No. 130a of Table X. See p. 36. See also U. S. Coast and Geodetic Survey Report for 1897, App. 2, p. 215.

TABLE V.—*Rejected longitude differences by the United States Lake Survey*

Number of difference	Dates	Number of nights	Western station		Eastern station		Mean observed difference of longitude of reference points	Probable error
			Name (I=initial, N=new)	Reference	Name (I=initial, N=new)	Reference		
							h. m. s.	s.
23	1871, May	3	Detroit, Mich. (N)	East transit pier, U. S. Lake Survey observatory, 1871–1882.	Washington, D. C.	U. S. Naval Observatory, old site, dome	0 24 00.15	±0.06
29	1873, Sept., Oct.	5	Ogden, Utah (N)	East transit pier, U. S. Engineers' observatory, 1873–1886.	Detroit, Mich.	East transit pier, U. S. Lake Survey observatory, 1871–1882.	[1]1 55 47.50	

[1] See also United States Geographical Surveys west of One Hundredth Meridian, Vol. II, pp. 7–54.

TABLE VI.—*Longitude differences by the United States Geological Survey*

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			*h. m. s.*	*s.*
1	1884, Aug. 29, 30, 31, Sept. 1.	Oswego, Kans. (N)	R. S. Woodward.	Würdemann M. T. No. 20.	**St. Louis, Mo. (I)**	H. S. Pritchett	Fauth M. T.	0 19 36.481	Tr. 1884	**C. & G. S. Tr. 1881–82.**	0 19 36.481	±0.054
2	1884, Sept. 25, 28, Oct. 2, 6.	Elk Falls, Kans. (N).	do	do	**do**	do	do	23 55.801	do	**do**	23 55.801	±.054
3	1884, Oct. 17, 18, 19, 22, 23.	Fort Scott, Kans. (N).	do	do	**do**	do	do	18 00.620	do	**do**	18 00.620	±.053
4	1884, Nov. 13, 14, 15, 16.	Springfield, Mo. (N).	do	do	**do**	do	do	12 20.009	do	**do**	12 20.009	±.054
5	1884, Dec. 15, 18	Bolivar, Mo. (N)	do	do	**do**	do	do	12 50.016	do	**do**	12 50.016	±.067
6	1885, July 2, 6, 7, 8, 14, 15, 19.	Albuquerque, N. Mex. (N).	do	do	**do**	do	do	1 05 47.663	Tr. 1885	**do**	1 05 47.668	±.042
7	1889, Oct. 27, 28, Nov. 2.	Spearville, Kans. (N).	do	do	**do**	do	do	38 11.502	Tr. 1889	**do**	38 11.507	±.035
8	1889, Nov. 15, 23, 24	Boise, Idaho (N)	do	do	**do**	do	do	1 44 03.101	do	**do**	1 44 03.106	±.039
9	1889, Dec. 8, 10, 11	Cisco, Tex. (N)	do	do	**do**	do	do	35 06.536	do	**do**	35 06.541	±.037
10	1890, May 16, 25, 28, 29.	Sierra Blanca, Tex. (N).	do	do	**do**	do	do	1 00 36.500	Tr. 1890	**do**	1 00 36.501	±.022
11	1890, Oct., Nov., 6 nights.	Rapid City, S. Dak. (N).	S. S. Gannett	Fauth M.T. No. 534.	**do**	do	do	52 02.784	do	**do**	52 02.789	±.028
12	1892, Oct. 15–29, 5 nights.	Jamestown, N. Dak. (N).	do	do	**do**	do	do	33 59.513	Tr. 1892	**do**	33 59.518	±.03
13	1892, Nov., 4 nights	Guthrie, Okla. (N)	do	do	**do**	do	do	28 53.035	do	**do**	28 53.040	±.04
14	1894, June 30, July 7, 8, 9, 10, 13.	Eugene, Oreg. (N)	do	do	San Francisco, Calif. (I).	G. Davidson	Simms Tr. No. 3.	2 39.114	Tr. 1894	**Lafayette Park C. & G. S. Tr. 1882–1896.**	2 39.114	±.034
15	1895, Apr., 5 nights	Savanna, Okla. (N)	do	do	**St. Louis, Mo. (I).**	A. Ramel	Fauth	22 32.179	Tr. 1895	**C. & G. S. Tr. 1881–82.**	22 32.179	±.017
16	1895, July, Aug., 5 nights.	**San Francisco, Calif. (I).**	F. Morse		Ellensberg, Wash. (N).	S. S. Gannett	Fauth M.T. No. 534.	7 33.087	**Lafayette Park C. & G. S. Tr. 1882–1896.**	Tr. 1895	7 33.087	±.02
17	1895, Nov., Dec., 3 nights.	**St. Louis, Mo. (I)**	H. S. Pritchett	Fauth Tr.	Tuscaloosa, Ala. (N).	do	do	10 37.428	**C. & G. S. Tr. 1881–82.**	do	10 37.428	±.044
18	1896, July, 4 nights	Sheridan, Wyo. (N).	S. S. Gannett	Fauth M. T. No. 534	**St. Louis, Mo. (I)**	A. Ramel	Fauth Tr.	1 06 57.847	Tr. 1896	**C. & G. S. Tr., 1881–82.**	1 06 57.852	±.08
19	1896, Oct., 3 nights	Sioux Falls, S. Dak. (N).	do	do	**do**	H. S. Pritchett	do	26 04.743	do	**do**	26 04.748	±.045
20	1896	Spofford, Tex. (N)	do	do	**do**	do	do	40 49.238	do	**do**	40 49.243	±.028
21	1897, July	Hamilton, Mont. (N).	do	do	**do**	do	do	1 35 47.365	Tr. 1897	**do**	1 35 47.370	±.007
22	1897, Aug. 23, 25, 26, 27.	Baker, Oreg. (N)	do	do	**do**	do	do	1 50 31.384	do	**do**	1 50 31.389	
23	1898, May, 4 nights	**St. Louis, Mo. (I)**	A. Ramel	Fauth Tr.	Waverly, Tenn. (N).	S. S. Gannett	Fauth Tr. No. 534.	9 38.803	**C. & G. S. Tr., 1881–82.**	Tr. 1898	9 38.798	

TABLE VII.—*Longitude differences by the United States General Land Office*

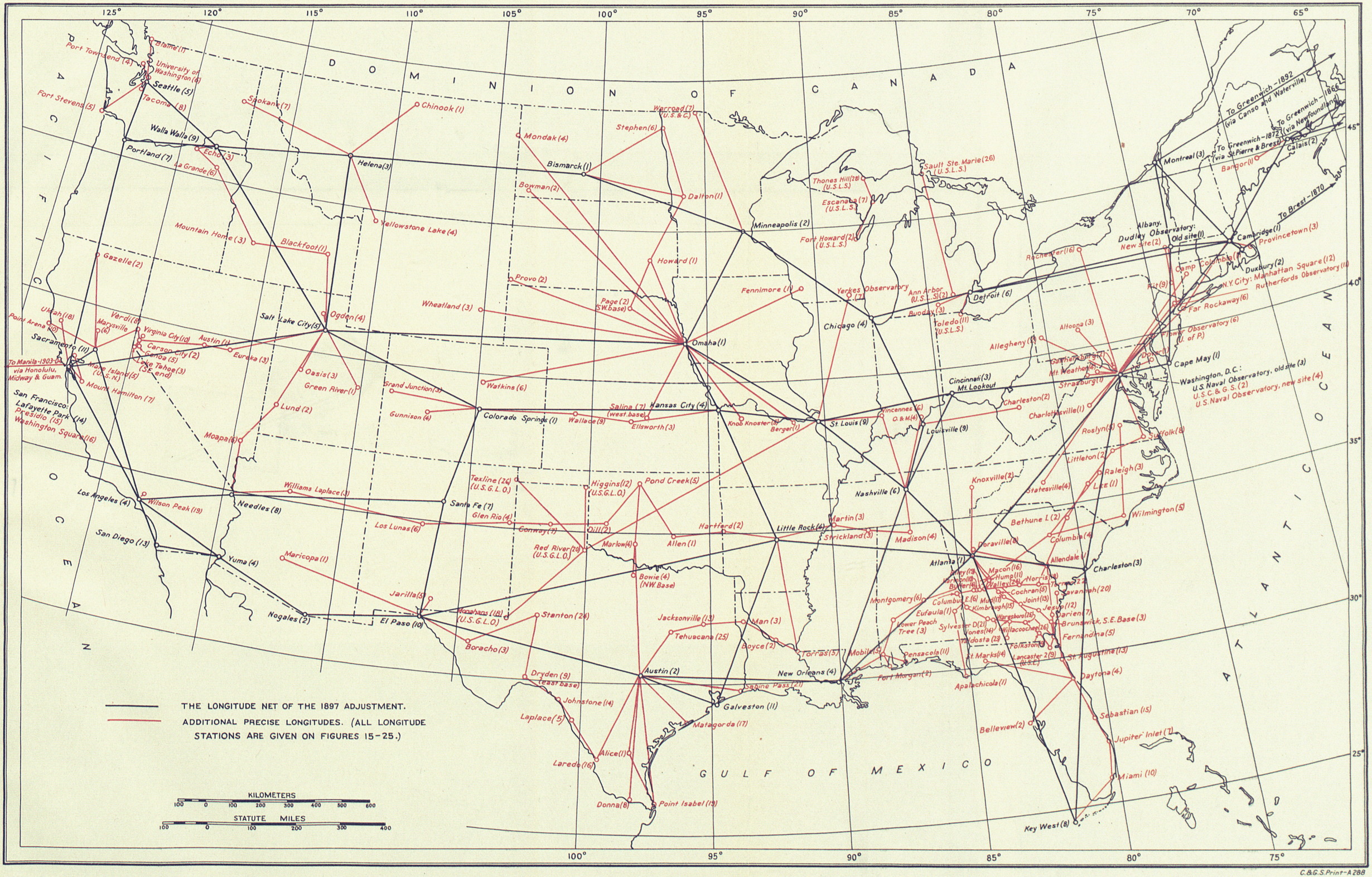
Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			*h. m. s.*	*s.*
1	1902, Mar. 5, 14, 16, 17, 18, 26, 30, Apr. 4, 6, 7.	Red River, Tex. (N).	A. MacConnel A. D. Kidder.	Würdemann M. T.	**St. Louis, Mo. (I)**	A. D. Kidder. A.MacConnel.	Fauth Tr.	0 39 11.983	Tr. 1902	**C. & G. S. Tr. 1881–82.**	0 39 11.988	±0.022
2	1903, June 17, 20, 22, 23, 25, 28, 29, 30, July 1, 2.	Higgins, Tex. (N).	A. MacConnel A. D. Kidder.	do	Red River, Tex. (I)	A. D. Kidder. A.MacConnel.	Würdemann M. T.	0 04.288	Tr. 1903	Tr. 1902-3	0 04.288	±.009
3	1903, July 10, 11, 13, 14, 15, 20, 21, 22, 23, 24.	Monahans, Tex. (N).	A. MacConnel A. D. Kidder.	do	do	A. D. Kidder. A.MacConnel.	do	11 33.644	do	do	11 33.644	±.014
4	1903, July 31, Aug. 1, 3, 4, 5, 10, 15, 16, 18, 19.	Texline, Tex. (N).	A. MacConnel A. D. Kidder.	do	do	A. D. Kidder. A.MacConnel.	do	12 03.128	do	do	12 03.128	±.009

TABLE VIII.—*Longitude differences by various institutions*

Number of difference	Dates	Western station			Eastern station			Mean observed difference of longitude	Reference points		Mean observed difference of longitude of reference points	Probable error
		Name (I=initial, N=new)	Observer	Instrument (see Table I)	Name (I=initial, N=new)	Observer	Instrument (see Table I)		Western station	Eastern station		
								h. m. s.			*h. m. s.*	*s.*
[1] 1	**1883, June 2, 4, 5, 20, 21, 23.**	**Montreal, Canada (N).**	**C.H.McCleod W. A. Rogers.**		**Cambridge, Mass. (I).**	**W. A. Rogers. C.H.McCleod.**	**Russian Tr.**	**0 09 47.510**	**McGill College Observatory, Tr.**	**Harvard College Observatory dome.**	**0 09 47.549**	**±0.019**
2	1893, Mar. 9, 13, 16, 28, 31, Apr. 4, 5, 21, 24, 27, 28.	Washington, D. C., U. S. Naval Observatory, new site (N.)	J. R. Eastman. A. N. Skinner.		**Washington, D. C., U. S. Naval Observatory. old site (I).**	A. N. Skinner. J. R. Eastman.		0 03.674	U. S. Naval Observatory, new site, center of clock room.	**U. S. Naval Observatory, old site, dome.**	0 03.670	±.012
3	1895, July 19, 22, 24, 25, 31.	**Minneapolis, Minn. (I).**	Prof. F. P. Leavenworth.	Fauth Tr.	Madison, Wis. (N)	Prof. G. C. Comstock.	Bamberg Tr.	15 19.134	**Tr. 1873–1895**	Washburn Observatory, meridian circle.	15 18.760	±.016
4	1898, June 28 to July 9, 5 nights.	Madison, Wis. (I)	Prof. G. C. Comstock.		Urbana, Ill. (N)	G. W. Meyers		4 43.840	Washburn Observatory, meridian circle 1873–1898.	University of Illinois 3-inch Tr. pier.	4 44.018	±.019
5	1908, Apr. 8, 9, 16, 17.	Mare Island, Calif. (N).	R. H. Tucker. R. F. Sanford.	Stackpole Tr. 1502.	Mount Hamilton, Calif. (I).	R. F. Sanford. R. H. Tucker.	Repsold M. C.	2 30.74	Mare Island Naval Observatory, Tr. 1908.	Lick Observatory meridian.	2 30.74	±.01
6	1912, July 19, 22, 23, 24.	Washington, D.C. (I.)			Camp Columbia (C. U.), Conn. (N).	W. Bowie	C. & G. S. Tr. No. 19.	15 21.748	U. S. Naval Observatory, new site, center of clock room.	East pier, Tr. 1912	15 21.748	±.010
7	1912, Aug. 23, 24, 25, 27, Sept. 9, 10, 12, 14, 17, 20.	do	Eric Doolittle. Jesse Pawling.	9-inch M. C.	Flower Observatory, Penn. (N).	Jesse Pawling. Eric Doolittle.	M. C.	7 08.80	do	Flower Observatory, dome.	7 08.96	±.02
8	1918, May 16, 17, 22, 23.	Baker, Oreg. (N)	J. C. Hammond.	Fauth Tr.	Washington, D.C. (I).	M. Frederickson.	6-inch Tr. C.	2 43 07.23	Tr. 1918	U. S. Naval Observatory, new site, center of clock room.	[2] 43 07.23	±.01

[1] Not corrected for personal equation. Signals reduced to center of clock room, U. S. Naval Observatory.

[2] No. 1=No. 148a of Table X. See p. 37.



C.&G.S. Print-A 288

LONGITUDE NET ADJUSTMENT

In 1897, the telegraphic longitude work had progressed to the extent that there were a number of stations well distributed over the United States. This was the result of a definite plan to secure a network of stations covering the country and then later to adjust this net to the initial or zero of longitude, Greenwich.

Forty-five stations, connected by 72 differences, were selected for this net adjustment. Thirty-eight of these stations are in the United States and the other seven are in Montreal, Canada; St. Pierre, St. Pierre Island, Gulf of St. Lawrence; Hearts Content, New Foundland; Foilhommerum, Ireland; Brest and Paris, France; and Greenwich, England.

In selecting the links or longitude differences for the net, only those were accepted from which the personal equation had been largely eliminated. All differences, except two in the United States, were observed by exchange of observers. Three of the links were determined by observers of other organizations, namely, Cambridge–Detroit, by the United States Lake Survey; Cambridge–Montreal, by the respective directors of the observatories at those two places; and Montreal–Greenwich, by English observers.

The adjustment was made by the method of least squares. (For a full discussion, see United States Coast and Geodetic Survey Report for 1897, Appendix 2.)

SECONDARY ADJUSTMENT

All loops of longitude differences observed since the net adjustment have been adjusted in the same manner as the net, by giving each observed difference a weight inversely proportional to the square of its probable error. During recent years, all differences have been determined with about the same number of nights of observation with the same type of instrument and by the same methods, so the probable errors do not differ materially and each difference was given unit weight in the adjustments.

In the following table are given the loop adjustments necessary to bring all differences occurring in the loops into accord with the longitude net. Adjustment No. 3 is given in detail in Special Publication No. 7, The Eastern Oblique Arc, pages 320–325. Adjustments Nos. 9, 10, 11, and 12 are given in detail in Special Publication No. 4. The Transcontinental Triangulation, pages 824–825.

TABLE IX.—*Loops adjusted to the longitude net of the United States*

No. of adjustment	No. of difference	Western station	Eastern station	Observed difference	Reciprocal of weight	Correction	Adjusted difference
				h. m. s.		*s.*	*h. m. s.*
1	2	**Washington, U. S. Naval Observatory, old site, D. C.**	Philadelphia, Pa	0 07 33.61		0.000	0 07 33.61
	3	Philadelphia, Pa	Jersey City, N. J	4 29.89		.000	4 29.89
	4	**Washington, U. S. Naval Observatory, old site, D. C.**	do	12 03.50		.000	12 03.50
2	12	**Cambridge, Mass**	Halifax, Nova Scotia	30 09.44	17	−.008	30 09.432
	13	Bangor, Me	do	20 46.557	5	+.002	20 46.559
3	27	**New Orleans, La**	Mobile, Ala	8 06.281	5	−.010	8 06.271
	23	Mobile, Ala	Lower Peach Tree, Ala	1 59.768	3	−.006	1 59.762
	22	Lower Peach Tree, Ala	Montgomery, Ala	4 58.789	3	−.006	4 58.783
	21	Montgomery, Ala	Macon, Ga	10 41.570	2	−.004	10 41.566
	19	Macon, Ga	Columbia, S. C	10 22.250	26	−.050	10 22.200
	17	Columbia, S. C	Raleigh, N. C	9 35.862	17	−.035	9 35.827
	15	Raleigh, N. C	Seaton, D. C	6 32.873	19	−.035	6 32.838
	47	**Washington, U. S. Naval Observatory, old site, D. C.**	do	0 12.634	2	+.003	0 12.637
	20	Columbia, S. C	Wilmington, N. C	12 21.731	8	+.001	12 21.732
	18	Wilmington, N. C	Petersburg (Roslyn), Va	2 11.340	11	+.001	2 11.341
	14	Petersburg (Roslyn), Va	Seaton, D. C	1 35.591	5	+.001	1 35.592
	15	Raleigh, N. C	do	6 32.873	19	−.035	6 32.838
	17	Columbia, S. C	Raleigh, N. C	9 35.862	17	−.035	9 35.827
	16	**Charleston, S. C**	do	5 11.684	225	+.038	5 11.722
	15	Raleigh, N. C	Seaton, D. C	6 32.873	19	−.035	6 32.838
	47	**Washington, U. S. Naval Observatory, old site, D. C.**	do	0 12.634	2	+.003	0 12.637
4	55	Allegheny Observatory, Pa	**Cambridge, Mass**	35 31.88	45	+.096	35 32.041
	73	do	do	35 32.01			
	80	**Austin, Tex**	Allegheny Observatory, Pa	1 10 53.86	36	+.077	1 10 53.937

TABLE IX.—*Loops adjusted to the longitude net of the United States*—Continued

No. of adjustment	No. of difference	Western station	Eastern station	Observed difference	Reciprocal of weight	Correction	Adjusted difference
				h. m. s.		*s.*	*h. m. s.*
5	103	**Nashville, Tenn**	Columbus, Ohio	0 15 09.125	6	+0.054	0 15 09.179
	107	Columbus, Ohio	**Washington, U. S. Naval Observatory, old site, D. C.**	23 46.816	14	−.065	23 46.751
	74	do	**Cambridge, Mass**	47 27.713	12	+.145	47 27.858
	75	do	Cleveland, Ohio	5 12 929	20	+.032	5 12.961
	76	Cleveland, Ohio	**Cambridge, Mass**	42 14.875	14	+.022	42 14.897
6	100	Savannah, Ga	**Washington, U. S. Naval Observatory, old site, D. C.**	16 09.30	49	−.026	16 09.274
	102	**Atlanta, Ga**	Savannah, Ga	13 11.96	21	−.049	13 11.911
	10	Savannah, Ga	**Charleston, S. C**	4 37.55	110	−.199	4 37.351
	100	do	**Washington, U. S. Naval Observatory, old site, D. C.**	16 09.30	49	−.026	16 09.274
7	58	**Omaha, Nebr**	Springfield, Ill	25 08.70	90	−.028	25 08.702
	144	do	do	25 08.76			
	143	**St. Louis, Mo**	do	2 11.87	4	+.001	2 11.871
8	114	Summit, Calif	**Washington, U. S. Naval Observatory, old site, D. C.**	2 53 07.57	26	−.253	2 53 07.317
	116	San Francisco, Washington Square, Calif.	Summit, Calif	8 19.01	4	−.039	8 18.971
9	134	Vincennes, Ind	**Nashville, Tenn**	2 57.891	3	+.035	2 57.926
	135	**St. Louis, Mo**	Vincennes, Ind	10 43.235	1	+. 12	10 43.247
10	165	Ellsworth, Kans	**Kansas City, Mo**	14 32.980	1	+.040	14 33.020
	166	Wallace, Kans	Ellsworth, Kans	13 27.268	1	+.039	13 27.307
	167	**Colorado Springs, Colo**	Wallace, Kans	12 54.822	4	+.157	12 54.979
11	187	Point Arena, Calif	**San Francisco, Lafayette Park, Calif.**	5 04.246	1	−.023	5 04.223
	188	do	**Sacramento, Calif**	8 48.675	1	+.022	8 48.697
12	194	**Sacramento, Calif**	Verdi, Nev	6 02.866	1	−.006	6 02.860
	195	Verdi, Nev	Carson City, Nev	0 52.560	1	−.006	0 52.554
	198	Carson City, Nev	Austin, Nev	10 45.168	2	−.011	10 45.157
	199	Austin, Nev	Eureka, Nev	4 27.318	1	−.006	4 27.312
	200	Eureka, Nev	**Salt Lake City, Utah**	16 15.337	1	−.006	16 15.331
13	241	**Washington, U. S. Naval Observatory, old site, D. C.**	Ithaca, N. Y	2 15.739	9	−.057	2 15.682
	242	Ithaca, N. Y	**Cambridge, Mass**	21 25.444	3	−.019	21 25.425
14	244	**Washington, U. S. Naval Observatory, old site, D. C.**	Washington, U. S. Coast and Geodetic Survey office, D. C.	0 10.462	64	−.018	0 10.444
	250	Washington, U. S. Naval Observatory, new site, D. C.	do	0 14.065	36	+.010	0 14.075
	[1] 2	do	**Washington, U. S. Naval Observatory, old site, D. C.**	0 03.670	144	−.039	0 03.631
15	272	Alice, Tex	**Austin, Tex**	1 20.878		−.013	1 20.865
	273	do	Point Isabel, Tex	3 28.140		+.012	3 28.152
	274	**Austin, Tex**	do	2 07.300		−.013	2 07.287
16	275	**Key West, Fla**	Miami, Fla	6 27.365		−.009	6 27.356
	276	Miami, Fla	Jupiter Inlet, Fla	0 27.404		−.009	0 27.395
	277	Sebastian, Fla	do	1 33.654		+.009	1 33.663
	278	Daytona, Fla	Sebastian, Fla	2 11.332		+.009	2 11.341
	279	Fernandina, Fla	Daytona, Fla	1 46.878		+.009	1 46.887
	280	**Atlanta, Ga**	Fernandina, Fla	11 42.609		+.010	11 42.619
17	281	Fernandina, Fla	Darien, Ga	0 07.208		−.008	0 07.200
	282	Darien, Ga	Allendale, S. C	0 29.255		−.008	0 29.247
	283	Doraville, Ga	do	11 52.285		+.008	11 52.293
	284	**Atlanta, Ga**	Doraville, Ga	0 26.764		+.009	0 26.773
18	305	**Bismarck, N. Dak**	Stephen, Minn	15 42.779		+.012	15 42.791
	288	Stephen, Minn	Dalton, Minn	3 45.133		+.011	3 45.144
	306	**Bismarck, N. Dak**	do	19 27.942		−.007	19 27.935
	306	**do**	do	19 27.942		−.007	19 27.935
	289	Howard, S. Dak	do	6 26.387		−.004	6 26.383
	293	do	**Omaha, Nebr**	6 20.272		+.027	6 20.299
	295	Page, Nebr	Howard, S. Dak	3 37.040		+.022	3 37.062
	293	Howard, S. Dak	**Omaha, Nebr**	6 20.272		+.027	6 20.299
	290	Page, Nebr	**do**	9 57.383		−.022	9 57.361
19	325	*Washington, U. S. Naval Observatory, new site, D. C.*	*Far Rockaway, N. Y*	13 15.704		+.002	13 15.706
	326	Far Rockaway, N. Y	**Cambridge, Mass**	10 29.031		+.001	10 29.032
	327	Washington, U. S. Naval Observatory, new site, D. C.	**do**	[2] 23 44.738		.000	23 44.738
20	328	**Little Rock, Ark**	Martin, Tenn	9 54.275		+.016	9 54.291
	329	Martin, Tenn	Strickland, Miss	5 28.314		+.016	5 28.330
	330	Strickland, Miss	Madison, Ala	6 44.894		+.016	6 44.910
	331	**Nashville, Tenn**	do	0 09.903		−.016	0 09.887
21	336	Echo, Oreg	**Walla Walla, Wash**	3 22.628		−.006	3 22.622
	337	do	La Grande, Oreg	4 23.459		+.006	4 23.465
	338	La Grande, Oreg	Mountain Home, Idaho	9 35.793		+.006	9 35.799
	339	Mountain Home, Idaho	Blackfoot, Idaho	13 21.925		+.006	13 21.931
	340	Blackfoot, Idaho	**Salt Lake City, Utah**	1 49.579		+.006	1 49.585

[1] *No. 2 of* Table VIII, *on p. 30.*

[2] A redetermination agreeing exactly with the adjusted value. See U. S. Coast and Geodetic Survey Report for 1897, App. 2, pp. 253 and 260, and U. S. Coast and Geodetic Survey Special Publication No. 35, Determination of the Difference in Longitude Between Each Two of the stations. Washington, Cambridge, and Far Rockaway, 1916.

TABLE IX.—*Loops adjusted to the longitude net of the of United States*—Continued

No. of adjustment	No. of difference	Western station	Eastern station	Observed difference	Reciprocal of weight	Correction	Adjusted difference
				h. m. s.		s.	h. m. s.
22	341	Lund, Utah	**Salt Lake City, Utah**	0 6 09.007		+0.016	0 6 09.023
	342	Moapa, Nev	Lund, Utah	4 45.729		+.015	4 45.744
	343	do	**Needles, Calif**	0 05.119		−.015	0 05.104
23	344	**Atlanta, Ga**	Hump, Ga	2 59.001		+.004	2 59.005
	346	Hump, Ga	Cochran, Ga	1 08.276		−.013	1 08.263
	347	Cochran, Ga	Mud, Ga	0 45.134		−.013	0 45.121
	348	Mud, Ga	Joint, Ga	2 17.270		−.013	2 17.257
	349	Joint, Ga	Jesup, Ga	2 53.403		−.013	2 53.390
	350	Jesup, Ga	Brunswick southeast base, Ga	1 30.839		−.013	1 30.826
	351	Brunswick southeast base, Ga	Fernandina, Fla	0 08.770		−.013	0 08.757
	352	Lancaster 2, Fla	do	0 51.603		+.022	0 51.625
	353	Folkston, Ga	Lancaster 2, Fla	1 19.986		+.021	1 20.007
	354	Waresboro, Ga	Folkston, Ga	1 52.334		+.021	1 52.355
	355	Willacoochee, Ga	Waresboro, Ga	2 17.420		+.021	2 17.441
	357	Jones, Ga	Willacoochee, Ga	2 44.980		+.021	2 45.001
	358	Sylvester D, Ga	Jones, Ga	0 39.860		+.021	0 39.881
	359	Kimbrough, Ga	Sylvester D, Ga	2 58.995		+.021	2 59.016
	360	Columbus E, Ga	Kimbrough, Ga	1 20.001		+.021	1 20.022
	361	do	Butler, Ga	3 00.605		−.021	3 00.584
	362	Butler, Ga	Harmon, Ga	0 02.050		−.021	0 02.029
	363	Harmon, Ga	Riley, Ga	0 05.153		−.021	0 05.132
	364	Riley, Ga	Valley, Ga	1 15.231		−.021	1 15.210
	345	Valley, Ga	Hump, Ga	0 58.795		−.016	0 58.779
	344	**Atlanta, Ga**	do	2 59.001		+.004	2 59.005
24	344	**do**	do	2 59.001		+.004	2 59.005
	345	Valley, Ga	do	0 58.795		−.016	0 58.779
	365	do	Norris, Ga	5 32.740		−.004	5 32.736
	366	Norris, Ga	Turner, Ga	2 52.440		−.005	2 52.435
	367	Turner, Ga	Bethune I, S. C	6 06.358		−.005	6 06.353
	368	Bethune I, S. C	Lee, N. C	4 19.622		−.005	4 19.617
	369	Lee, N. C	Littleton, N. C	5 02.353		−.005	5 02.348
	370	Littleton, N. C	Suffolk, Va	5 21.750		−.005	5 21.745
	371	Washington, U. S. Coast and Geodetic Survey Office, D. C.	do	1 43.826		+.005	1 43.831
25	233	Laredo, Tex	**Austin, Tex**	7 07.148		−.008	7 07.140
	372	Laplace, Tex	Laredo, Tex	3 54.037		−.008	3 54.029
	373	Johnstone, Tex	Laplace, Tex	1 06.534		−.007	1 06.527
	374	Dryden east base, Tex	Johnstone, Tex	5 18.685		−.008	5 18.677
	375	do	Stanton, Tex	1 18.028		+.007	1 18.035
	316	Boracho, Tex	do	10 28.427		−.008	10 28.419
	315	**El Paso, Tex**	Boracho, Tex	8 23.613		−.008	8 23.605
26	376	**Austin, Tex**	Tehuacana, Tex	4 45.052		−.029	4 45.023
	377	Tehuacana, Tex	Jacksonville, Tex	5 04.649		−.029	5 04.620
	378	Jacksonville, Tex	Man, La	6 15.310		−.029	6 15.281
	379	Man, La	Boyce, La	4 15.394		−.029	4 15.365
	380	Boyce, La	Torras, La	3 53.686		−.029	3 53.657
	381	**Little Rock, Ark**	do	2 22.619		+.030	2 22.649
	382	Hartford, Ark	**Little Rock, Ark**	8 27.402		+.005	8 27.407
	383	Allen, Okla	Hartford, Ark	8 06.518		+.005	8 06.523
	384	Pond Creek, Okla	Allen, Okla	5 31.593		+.005	5 31.598
	296	Marlow, Okla	Pond Creek, Okla	0 39.437		+.007	0 39.444
	254	do	**Austin, Tex**	0 53.682		−.007	0 53.675
	382	Hartford, Ark	**Little Rock, Ark**	8 27.402		+.005	8 27.407
	383	Allen, Okla	Hartford, Ark	8 06.518		+.005	8 06.523
	384	Pond Creek, Okla	Allen, Okla	5 31.593		+.005	5 31.598
	385	Dill, Okla	Pond Creek, Okla	5 19.607		−.002	5 19.605
	386	Conway, Tex	Dill, Okla	9 00.858		−.002	9 00.856
	387	Glen Rio, N. Mex	Conway, Tex	6 38.264		−.002	6 38.262
	388	Los Lunas, N. Mex	Glen Rio, N. Mex	14 46.823		−.002	14 46.821
	389	Williams Laplace, Ariz	Los Lunas, N. Mex	21 49.635		−.002	21 49.633
	390	**Needles, Calif**	Williams Laplace, Ariz	9 38.406		−.002	9 38.404

TABLES OF FINAL LONGITUDE DIFFERENCES AND RESULTING LONGITUDES

The following tables give the final corrected differences of longitude and the resulting longitudes of the stations. The adjustment corrections for the stations of the longitude net were taken from the report for 1897, Appendix 2, pages 252–254, and for the remaining stations from Table IX, page 31. No corrections were applied for variation of the pole. For a discussion of this correction, see page 51. Each station is designated as initial (I) or new (N), and the longitude of each is given for every difference. As in all previous tables, the stations of the longitude net are printed in black-faced type.

The tables are arranged in the same order as Tables Nos. II to VIII; that is, Table X is for United States Coast and Geodetic Survey stations, Table XI for United States Lake Survey stations, Table XII for United States Geological Survey stations, Table XIII for United States General Land Office stations, and Table XIV for stations of various organizations.

TABLE X.—*Final longitude differences and resulting longitudes, United States Coast and Geodetic Survey*

No. of difference	Year	Western station: Name (I=initial, N=new)	Western station: Reference point	Eastern station: Name (I=initial, N=new)	Eastern station: Reference point	Mean observed difference of longitude of reference points	Probable error	Correction for adjustment	Adjusted difference of longitude of reference points	Longitude of initial station (I)	Longitude of new station (N)
						h. m. s.	s.	s	h. m. s.	h. m. s.	h. m. s.
2	1847	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	Philadelphia, Pa. (N)	Central (old) High School, M. C. 1847-1849.	0 07 33.61	±0.10	0.000	0 07 33.61	**5 08 12.153**	5 00 38.543
3	1847	Philadelphia, Pa. (I)	Central (old) High School, M. C. 1847-1849.	Jersey City, N. J. (N)	Loomis's Observatory, Tr. 1847.	4 29.89	±.09	.000	4 29.89	5 00 38.543	4 56 08.653
4	1847	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	do	do	12 03.50	±.23	.000	12 03.50	**5 08 12.153**	4 56 08.653
6	1848	Cincinnati, Ohio (N)	Mount Adams Observatory, Tr. 1848.	Philadelphia, Pa. (I)	Central (old) High School, M. C. 1847-1849.	37 20.586	±.060			5 00 38.543	5 37 59.129
7	1849	Hudson (Cleveland), Ohio (N).	Western Reserve College, Tr. 1849.	do	do	25 05.696	±.045			5 00 38.543	5 25 44.239
10	1851	Savannah, Ga. (N)	Tr. 1851-1882	**Charleston, S. C. (I)**	**Tr. 1880-1896**	4 37.55	±.10	−.199	4 37.351	**5 19 44.076**	5 24 21.427
12	1851	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	Halifax, N. S. (N)	Naval Yard Observatory, Tr. 1851.	30 09.44	±.13	−.008	30 09.432	**4 44 31.046**	4 14 21.614
13	1851	Bangor, Me. (I)	Tr. 1851-1857	do	do	20 46.557	±.067	+.002	20 46.559	4 35 08.173	4 14 21.614
14	1852	Petersburg, Roslyn station, Va. (N).	Tr. 1852-1854	Washington, Seaton station, D. C. (I).	Tr. 1852-1867	1 35.591	±.022	+.001	1 35.592	5 07 59.516	5 09 35.108
15	1853	Raleigh, N. C. (N)	Tr. 1853-54	do	do	6 32.873	±.044	−.035	6 32.838	5 07 59.516	5 14 32.354
16	1853	**Charleston, S. C. (I)**	**Tr. 1880-1896**	Raleigh, N. C. (N)	Tr. 1853-54	5 11.684	±.15	+.038	5 11.722	**5 19 44.076**	5 14 32.354
17	1854	Columbia, S. C. (N)	Tr. 1854-1856	Raleigh, N. C. (I)	do	9 35.862	±.041	−.035	9 35.827	5 14 32.354	5 24 08.181
18	1854	Wilmington (De Rosset station), N. C. (N)	do	Petersburg, Roslyn station, Va. (I).	Tr. 1852-1854	2 11.340	±.033	+.001	2 11.341	5 09 35.108	5 11 46.449
19	1855	Macon, Ga. (N)	Tr. 1855-1860	Columbia, S. C. (I)	Tr. 1854-1856	10 22.250	±.051	−.050	10 22.200	5 24 08.181	5 34 30.381
20	1856	Columbia, S. C. (I)	Tr. 1854-1856	Wilmington, (De Rosset), N. C. (N).	do	12 21.731	±.028	+.001	12 21.732	5 24 08.181	5 11 46.449
21	1856	Montgomery, Ala. (N)	Tr. 1856-57	Macon, Ga (I)	Tr. 1855-1860	10 41.570	±.015	−.004	10 41.566	5 34 30.381	5 45 11.947
22	1857	Lower Peach Tree, Ala. (N).	Tr. 1857	Montgomery, Ala. (I)	Tr. 1856-57	4 58.789	±.016	−.006	4 58.783	5 45 11.947	5 50 10.730
23	1857	Mobile, Ala. (N)	Tr. 1857-1861	Lower Peach Tree, Ala. (I)	Tr. 1857	1 59.768	±.016	−.006	1 59.762	5 50 10.730	5 52 10.492
24	1857	Bangor, Me. (N)	Tr. 1851-1857	**Calais, Me. (I)**	**Tr. 1857-1895**	6 00.316	±.015			**4 29 07.857**	4 35 08.173
25	1857	**Calais, Me (I)**	**Tr. 1857-1895**	Fredericton, New Brunswick (N).	Toldervy's Observatory, Tr. 1857.	2 34.73	±.5			**4 29 07.857**	4 26 33.127
27	1858	**New Orleans, La. (I)**	**Tr. 1880-1895**	Mobile, Ala. (N)	Tr. 1857-1861	8 06.281	±.022	−.010	8 06.271	6 00 16.763	5 52 10.492
28	1858	New York, N. Y. (N)	Rutherford's Observatory, Tr. 1858.	**Albany, N. Y. (I)**	**Dudley Observatory, old site, dome.**	0 57.393	±.012			**4 54 59.992**	4 55 57.385
29	1860	Eufaula, Ala. (I)	Tr. 1860	Apalachicola, Fla. (N)	Tr. 1860	0 36.671	±.010			5 40 33.367	5 39 56.696
30	1860	Eufaula, Ala. (N)	do	Macon, Ga (I)	Tr. 1855-1860	6 02.986	±.031			5 34 30.381	5 40 33.367
31	1861	Mobile, Ala. (I)	Tr. 1857-1861	Pensacola, Fla. (N)	Tr. 1861	3 20.316	±.022			5 52 10.492	5 48 50.176
32	1863-64	Clarksburg, W. Va. (N)	V. C. 1863-64	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	13 09.43	±.5			**5 08 12.153**	5 21 21.583
33	1864	Grafton, W. Va. (N)	V. C. 1864	do	do	11 54.68	±.5			**5 08 12.153**	5 20 06.833
34	1864	Cameron, W. Va. (N)	do	do	do	14 05.46	±.5			**5 08 12.153**	5 22 17.613
35	1864	Wheeling, W. Va. (N)	do	do	do	14 42.40	±.5			**5 08 12.153**	5 22 54.553
36	1864	Parkersburg, W. Va. (N)	do	do	do	18 04.68	±.5			**5 08 12.153**	5 26 16.833
37	1864	Point Pleasant, W. Va. (N).	do	do	do	20 22.98	±.5			**5 08 12.153**	5 28 35.133
38	1864	South Point, Ohio (N)	do	do	do	22 09.70	±.5			**5 08 12.153**	5 30 21.853
39	1864	Gauley Bridge, W. Va. (N).	do	do	do	16 39.79	±.5			**5 08 12.153**	5 24 51.943
40	1864	Cumberland, Md. (N)	do	do	do	6 49.57	±.5			**5 08 12.153**	5 15 01.723
41	1864	Martinsburg, W. Va. (N).	do	do	do	3 37.46	±.5			**5 08 12.153**	5 11 49.613
42	1866	**Hearts Content, Newfoundland (N).**	**Tr. 1866**	**Follhommerum, Ireland (I).**	**Tr. 1866**	**2 51 56.364**	**±.029**	**+.015**	**2 51 53.379**	**41 33.409**	**3 33 29.788**
43	1866	**Follhommerum, Ireland (N).**	do	**Greenwich, England (I)**	**Royal Observatory, Tr. C.**	**41 33.34**	**±.060**	**+.069**	**41 33.409**	**0 00.000**	**41 33.409**
44	1866	**Calais, Me. (N)**	**Tr. 1857-1895**	**Hearts Content, Newfoundland (I).**	**Tr. 1866**	**55 38.00**	**±.060**	**+.069**	**55 38.069**	**3 33 29.788**	**4 29 07.857**
47	1867	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	Washington, Seaton station, D. C. (N).	Tr. 1852-1867	0 12.634	±.015	+.003	0 12.637	**5 08 12.153**	5 07 59.516
50	**1869**	**Salt Lake City, Utah (N).**	**Tr. 1869-1916**	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	**1 03 49.113**	**±.016**	**−.027**	**1 03 49.086**	**6 23 46.087**	**7 27 35.173**
55	1869	Allegheny, Pa. (N)	Allegheny Observatory, old site, dome.	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	35 31.88	±.04	+.161	35 32.041	**4 44 31.046**	5 20 03.087
56	1869	Staunton, Va. (N)	Tr. 1869	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	8 04.93				**5 08 12.153**	5 16 17.083
57	1869	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	Mattoon, Ill. (N)	Tr. 1869	30 13.54	±.10			**6 23 46.087**	5 53 32.547
58	1869	do	do	Springfield, Ill. (N)	Tr. 1869-1882	25 08.70	±.11	+.002	25 08.702	**6 23 46.087**	5 58 37.385
59	1869	do	do	Burlington, Iowa (N)	Tr. 1869	19 20.38	±.10			**6 23 46.087**	6 04 25.707
60	1869	do	do	Des Moines, Iowa (N)	do	9 16.96	±.12			**6 23 46.087**	6 14 29.127
63	1869	Goodson, Va. (N)	Tr. 1869	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	20 32.84	±.06			**5 08 12.153**	5 28 44.993
65	**1869-70**	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	**Duxbury, Mass. (N)**	**Tr. 1869-70**	**1 50.191**	**±.022**	**−.003**	**1 50.188**	**4 44 31.046**	**4 42 40.858**
66	**1870**	**Duxbury, Mass. (N)**	**Tr. 1869-70**	**Brest, France (I)**	**Tower of St. Louis**	**4 24 43.276**	**±.047**	**−.015**	**4 24 43.261**	**17 57.597**	**4 42 40.858**
68	1870	San Francisco, Calif. (I)	Washington Square, Tr. 1869-1878.	Los Angeles (Buenavista), Calif. (N).	Tr. 1870	16 39.69	±.06			8 09 38.441	7 52 58.751
70	1871	do	Washington Square, Tr. 1869-1871.	San Diego, Calif. (N)	Tr. 1871	20 59.62	±.03			8 09 38.441	7 48 38.821
71	1871	Chetopah, Kans. (N)	Tr. 1871	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881-82.**	19 35.44	±.10			**6 00 49.256**	6 20 24.696
73	1871	Allegheny, Pa. (N)	Allegheny Observatory, old site, dome.	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	35 32.01	±.054	+.031	35 32.041	**4 44 31.046**	5 20 03.087
74	1871	Columbus, Ohio (N)	Tr. 1871	do	do	47 27.713	±.035	+.145	47 27.858	**4 44 31.046**	5 31 58.904
75	1871	Columbus, Ohio (I)	do	Cleveland, Ohio (N)	Tr. 1871	5 12.929	±.045	+.032	5 12.961	5 31 58.904	5 26 45.943
76	1871	Cleveland, Ohio (N)	do	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	42 14.875	±.038	+.022	42 14.897	**4 44 31.046**	5 26 45.943
77	1871	Oakland, Ky. (N)	do	do	do	1 00 30.23	±.04			**4 44 31.046**	5 45 01.276
78	1871	Shelbyville, Ky. (N)	do	do	do	56 22.05	±.05			**4 44 31.046**	5 40 53.096
79	1871	Falmouth, Ky. (N)	do	do	do	52 49.60	±.13			**4 44 31.046**	5 37 20.646
80	1872	**Austin, Tex. (I)**	**Tr. 1895-1906**	Allegheny, Pa. (N)	Allegheny Observatory, old site, dome.	1 10 53.86	±.06	+.077	1 10 53.937	**6 30 57.024**	5 20 03.087
81	1872	San Francisco, Calif. (I)	Washington Square, Tr. 1869-1878.	Verdi east base, Nev. (N)	Tr. 1872	9 47.333	±.025			8 09 38.441	7 59 51.108
82	**1872**	**Salt Lake City, Utah (I).**	**Tr. 1869-1916**	Sherman, Wyo. (N)	do	26 00.93	±.04			**7 27 35.173**	7 01 34.243
83	**1872**	**Brest, France (N)**	**Tower of St. Louis**	**Greenwich, England (I)**	**Royal Observatory, Tr. C**	**17 57.598**	**±.022**	**−.001**	**17 57.597**	**0 00.000**	**17 57.597**
84	**1872**	**do**	**do**	**Paris, France (I)**	**Observatory of Paris, meridian of France.**	**27 18.533**	**±.038**	**+.032**	**27 18.565**	**9 20.968E**	**17 57.597**
85	**1872**	**St. Pierre Island, Gulf of St. Lawrence (N).**	**Tr. 1872**	**Brest, France (I)**	**Tower of St. Louis**	**3 26 44.810**	**±.027**	**+.020**	**3 26 44.830**	**17 57.597**	**3 44 42.427**
88	**1872**	**Cambridge, Mass. (N)**	**Harvard College Observatory, dome.**	**St. Pierre Island, Gulf of St. Lawrence (I).**	**Tr. 1872**	**59 48.608**	**±.021**	**+.011**	**59 48.619**	**3 44 42.427**	**4 44 31.046**
89	**1872**	**Greenwich, England (I).**	**Royal Observatory, Tr. C**	**Paris, France (N)**	**Observatory of Paris, meridian of France.**	**9 21.000**	**±.038**	**−.032**	**9 20.968**	**0 00.000**	**9 20.968E**
90	1873	Carpenters Point, N. Y. (N).	Tr. 1873	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	14 15.67	±.10			**4 44 31.046**	4 58 46.716
92	1873	Denver, Colo. (N)	do	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	36 12.20	±.04			**6 23 46.087**	6 59 58.287
95	1873	Kalama, Wash. (N)	do	San Francisco, Calif. (I)	Washington Square, Tr. 1869-1878.	1 43.88	±.026			8 09 38.441	8 11 22.321
96	1873	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	La Crosse, Wis. (N)	Tr. 1873	18 46.850	±.021			**6 23 46.087**	6 04 59.237
97	1873	Trinidad, Colo. (N)	Tr. 1873	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	34 14.20	±.03			**6 23 46.087**	6 58 00.287
99	1874	Punta Rassa, Fla. (N)	Tr. 1874	Savannah, Ga. (I)	Tr. 1851-1874	4 41.45	±.04			5 24 21.427	5 28 02.877
100	1874	Savannah, Ga. (N)	Tr. 1851-1882	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	16 09.30	±.07	−.026	16 09.274	**5 08 12.153**	5 24 21.427
101	1874	Cedar Keys, Fla. (N)	Tr. 1874	Savannah, Ga. (I)	Tr. 1851-1882	7 45.95	±.04			5 24 21.427	5 32 07.377

TABLE X.—*Final longitude differences and resulting longitudes, United States Coast and Geodetic Survey*—Continued

No. of difference	Year	Western station: Name (I=initial, N=new)	Western station: Reference point	Eastern station: Name (I=initial, N=new)	Eastern station: Reference point	Mean observed difference of longitude of reference points	Probable error	Correction for adjustment	Adjusted difference of longitude of reference points	Longitude of initial station (I)	Longitude of new station (N)
						h. m. s.	s.	s.	h. m. s.	h. m. s.	h. m. s.
102	1874	**Atlanta, Ga. (I)**	**Tr. 1896**	Savannah, Ga. (N)	Tr. 1851–1882	0 13 11.96	±0.046	−0.049	0 13 11.911	5 37 33.338	5 24 21.427
103	1877	**Nashville, Tenn. (I)**	**Tr. 1877–1915**	Columbus, Ohio (N)	Tr. 1871–1877	15 09.125	±.025	+.054	15 09.179	5 47 08.083	5 31 58.904
104	1877	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	Travis, N. Y. (N)	Tr. 1877	6 46.54	±.06			5 08 12.153	5 01 25.613
105	1877	do	do	Burt, Pa. (N)	do	1 17.43	±.05			5 08 12.153	5 06 54.723
106	1877	do	do	Finn, N. Y. (N)	do	5 09.95	±.03			5 08 12.153	5 03 02.203
107	1877	Columbus, Ohio (N)	Tr. 1871–1877	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	23 46.816	±.038	−.065	23 46.751	5 08 12.153	5 31 58.904
109	1877	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	Harrisburg, Pa. (N)	Tr. 1877	0 40.794	±.026			5 08 12.153	5 07 31.359
110	1877	Paducah, Ky. (N)	Tr. 1877	**Nashville, Tenn. (I)**	**Tr. 1877–1915**	7 15.77	±.03			5 47 08.083	5 54 23.853
111	1877	Cairo, Ill. (N)	do	do	do	9 33.05	±.03			5 47 08.083	5 56 41.133
112	1877	Hickman, Ky. (N)	do	do	do	9 38.72	±.03			5 47 08.083	5 56 46.803
113	1877	Memphis, Tenn. (N)	do	do	do	13 05.06	±.03			5 47 08.083	6 00 13.143
114	1878	Summit, Calif. (N)	Tr. 1878	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	2 53 07.57	±.16	−.253	2 53 07.317	5 08 12.153	8 01 19.470
115	1878	Helena, Ark. (N)	do	**Nashville, Tenn. (I)**	**Tr. 1877–1915**	15 13.59	±.02			5 47 08.083	6 02 21.673
116	1878	San Francisco, Calif. (I)	Washington Square, Tr. 1869–1878.	Summit, Calif. (N)	Tr. 1878	8 19.01	±.06	−.039	8 18.971	8 09 38.441	8 01 19.470
117	1878	Natchez, Miss. (N)	Tr. 1878	**Nashville, Tenn. (I)**	**Tr. 1877–1915**	18 28.24	±.05			5 47 08.083	6 05 36.323
118	1878	Vicksburg (Fort), Miss. (N).	do	do	do	16 24.15	±.05			5 47 08.083	6 03 32.233
119	1878	Greenville, Miss. (N)	do	do	do	17 07.43	±.03			5 47 08.083	6 04 15.513
120	1878–79	Statesville, N. C. (N)	Tr. 1878–79	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	15 22.601	±.016			5 08 12.153	5 23 34.754
121	1879	**Atlanta, Ga. (N)**	**Tr. 1896**	do	do	29 21.192	±.016	−.007	29 21.185	5 08 12.153	5 37 33.338
122	1879	**Nashville, Tenn. (I)**	**Tr. 1877–1915**	**Louisville, Ky. (N)**	**Tr. 1879–1883**	4 04.451	±.013	−.004	4 04.447	5 47 08.083	5 43 03.636
123	1879–80	do	do	**Atlanta, Ga. (N)**	**Tr. 1896**	9 34.760	±.012	−.015	9 34.745	5 47 08.083	5 37 33.338
124	1880	**New Orleans, La. (N)**	**Tr. 1880–1895**	**Nashville, Tenn. (I)**	**Tr. 1877–1915**	13 08.677	±.009	+.003	13 08.680	5 47 08.083	6 00 16.763
125	1880	do	do	**Atlanta, Ga. (I)**	**Tr. 1896**	22 43.371	±.013	+.054	22 43.425	5 37 33.338	6 00 16.763
126	1880	Baton Rouge, La. (N)	Tr. 1880	do	do	27 11.910	±.032			5 37 33.338	6 04 45.248
127	1880	**Atlanta, Ga. (I)**	**Tr. 1896**	**Charleston, S. C. (N)**	**Tr. 1880–1896**	17 49.222	±.010	+.040	17 49.262	5 37 33.338	5 19 44.076
128	1881	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	**Cape May, N. J. (N)**	**Tr. 1881–1891**	8 29.074	±.009	+.034	8 29.108	5 08 12.153	4 59 43.045
129	1881	Strasburg, Va. (N)	Tr. 1881	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	5 14.227	±.008			5 08 12.153	5 13 26.380
130	1881	**Cincinnati, Ohio (N)**	**Mount Lookout Observatory, dome.**	do	do	29 29.259	±.011	−.014	29 29.245	5 08 12.153	5 37 41.398
[1] 130a	1881	**Detroit, Mich. (N)**	**Tr. 1891**	**Cambridge, Mass. (I)**	**Harvard College observatory, dome.**	47 40.806	±.013	−.022	47 40.784	4 44 31.046	5 32 11.830
131	1881	**Nashville, Tenn. (I)**	**Tr. 1877–1915**	**Cincinnati, Ohio (N)**	**Mount Lookout observatory, dome.**	9 26.682	±.006	+.003	9 26.685	5 47 08.083	5 37 41.398
132	1881	**St. Louis, Mo. (N)**	**Washington University, Tr. 1881–82.**	**Cincinnati, Ohio (I)**	do	23 07.894	±.015	−.036	23 07.858	5 37 41.398	6 00 49.256
133	1881	do	do	**Nashville, Tenn. (I)**	**Tr. 1877–1915**	13 41.207	±.013	−.034	13 41.173	5 47 08.083	6 00 49.256
134	1881	Vincennes, Ind. (N)	Tr. 1881	do	do	2 57.891	±.018	+.035	2 57.926	5 47 08.083	5 50 06.009
135	1881	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881–82.**	Vincennes, Ind. (N)	Tr. 1881	10 43.235	±.006	+.012	10 43.247	6 00 49.256	5 50 06.009
136	1882	Charlottesville, Va. (N)	McCormick Observatory, Tr. 1882.	**Washington, D. C. (I)**	**U. S. Naval Observatory, (old site), dome.**	5 53.187	±.014			5 08 12.153	5 14 05.340
137	1882	**Kansas City, Mo. (N)**	**Tr. 1882–1885**	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881–82.**	17 32.183	±.011	−.035	17 32.148	6 00 49.256	6 18 21.404
138	1882	**St. Louis Mo. (I)**	**Washington University, Tr. 1881–82.**	London, Ky. (N)	Tr. 1882	24 27.82	±.09			6 00 49.256	5 36 21.436
139	1882	do	do	Guthrie, Ky. (N)	do	12 10.73	±.18			6 00 49.256	5 48 38.526
140	1882	do	do	Henderson, Ky. (N)	do	10 27.39	±.03			6 00 49.256	5 50 21.866
141	1882	**Omaha, Nebr. (N)**	**Tr. 1869–1891**	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881–82.**	22 56.831	±.010	.000	22 56.831	6 00 49.256	6 23 46.087
143	1882	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881–82.**	Springfield, Ill. (N)	Tr. 1869–1882	2 11.87	±.04	+.001	2 11.871	6 00 49.256	5 58 37.385
144	1882	**Omaha, Nebr. (I)**	**Tr. 1869–1891**	do	do	25 08.76	±.15	−.058	25 08.702	6 23 46.087	5 58 37.385
145	1882	St. Augustine, Fla. (N)	Tr. 1882	Savannah, Ga. (I)	Tr. 1851–1882	0 53.021	±.027			5 24 21.427	5 25 14.448
146	1882	**Kansas City, Mo. (I)**	**Tr. 1882–1885**	Indianapolis, Ind. (N)	Tr. 1882	33 42.86	±.06			6 18 21.404	5 44 38.544
147	1882	**San Francisco, Calif. (I).**	**Lafayette Park, west pier, Tr. 1882–1896.**	Fort Selden, N. Mex. (N)	do	1 02 01.85	±.04			8 09 42.861	7 07 41.011
148	1882–83	**Omaha, Neb. (N.)**	**Tr. 1869–1891**	**Kansas City, Mo. (I.)**	**Tr. 1882–1885**	5 24.626	±.016	+.057	5 24.683	6 18 21.404	6 23 46.087
[2] 148a	1883	**Montreal, Canada (N)**	**McGill College Observatory, Tr.**	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	9 47.549	±.019	+.039	9 47.588	4 44 31.046	4 54 18.634
149	1883	**Louisville, Ky. (I)**	**Tr. 1879–1883**	Lexington, Ky. (N)	Tr. 1883	5 02.08	±.05			5 43 03.636	5 38 01.556
150	1883	do	do	Louisa, Ky. (N)	do	12 39.10	±.03			5 43 03.636	5 30 24.536
151	1883	do	do	Greensburg, Ky. (N)	do	1 03.75	±.03			5 43 03.636	5 41 59.886
152	1883	do	do	Jellico, Tenn. (N)	do	6 33.59	±.03			5 43 03.636	5 36 30.046
153	1883	do	do	Richmond, Ky. (N)	do	5 52.10	±.03			5 43 03.636	5 37 11.536
154	1883	do	do	Smiths Ferry, Pa. (N)	do	21 03.39	±.07			5 43 03.636	5 22 00.246
155	1883	do	do	Charleston, W. Va. (N)	do	16 31.506	±.015			5 43 03.636	5 26 32.130
156	1883	Logansport, Ind. (N)	Tr. 1883	**Louisville, Ky. (I)**	**Tr. 1879–1883**	2 20.85	±.04			5 43 03.636	5 45 24.486
157	1883	**Chicago, Ill. (N)**	**Tr. 1891**	do	do	7 25.808	±.010	+.002	7 25.810	5 43 03.636	5 50 29.446
158	1883–84	Covington, Va. (N)	Tr. 1883–84	**Washington, D. C. (I)**	**U. S. Naval Observatory, (old site), dome.**	11 46.52	±.07			5 08 12.153	5 19 58.673
159	1885	Brownsville, Tex. (N)	Tr. 1885	**Galveston, Tex. (I)**	**Tr. 1895**	10 48.32	±.05			6 19 09.928	6 29 58.248
160	1885	**Galveston, Tex. (N)**	**Tr. 1895**	**Little Rock, Ark. (I)**	**Tr. 1885–1896**	10 04.192	±.011	+.009	10 04.201	6 09 05.727	6 19 09.928
161	1885	Texarkana, Ark. (N)	Tr. 1885	do	do	7 04.69	±.04			6 09 05.727	6 16 10.417
162	1885	**Kansas City, Mo. (I)**	**Tr. 1882–1885**	**Little Rock, Ark. (N)**	do	9 15.644	±.003	+.033	9 15.677	6 18 21.404	6 09 05.727
163	1885	Fort Smith, Ark. (N)	Tr. 1885	**Little Rock, Ark. (I)**	do	8 37.96	±.04			6 09 05.727	6 17 43.687
164	1885	**Colorado Springs, Colo. (N).**	**Tr. 1885–86**	**Kansas City, Mo. (I)**	**Tr. 1882–1885**	40 55.327	±.011	−.021	40 55.306	6 18 21.404	6 59 16.710
165	1885	Ellsworth, Kans. (N)	Tr. 1885	do	do	14 32.980	±.011	+.040	14 33.020	6 18 21.404	6 32 54.424
166	1885	Wallace, Kans. (N)	do	Ellsworth, Kans. (I)	Tr. 1885	13 27.268	±.009	+.039	13 27.307	6 32 54.424	6 46 21.731
167	1885	**Colorado Springs, Colo. (I).**	**Tr. 1885–86**	Wallace, Kans. (N)	do	12 54.822	±.020	+.157	12 54.979	6 59 16.710	6 46 21.731
168	1885	**Santa Fe, N. Mex. (N)**	**Tr. 1872–1895**	**Colorado Springs, Colo. (I)**	**Tr. 1885–86**	4 30.107	±.012	−.012	4 30.095	6 59 16.710	7 03 46.805
170	1886	Gunnison, Colo. (N)	Tr. 1886	do	do	8 25.335	±.007			6 59 16.710	7 07 42.045
171	1886	Grand Junction, Colo. (N).	do	do	do	14 58.891	±.013			6 59 16.710	7 14 15.601
172	1886	**Salt Lake City, Utah (I).**	**Tr. 1869–1916**	**Colorado Springs, Colo. (N).**	do	28 18.471	±.008	−.008	28 18.463	7 27 35.173	6 59 16.710
173	1886	Ogden, Utah (N)	U. S. E. Observatory, Tr. 1873–1886.	**Salt Lake City, Utah (I)**	**Tr. 1869–1916**	0 24.533	±.011			7 27 35.173	7 27 59.706
174	1887	**San Francisco, Calif. (N).**	**Lafayette Park, west pier, Tr. 1882–1896.**	do	do	42 07.696	±.011	−.008	42 07.688	7 27 35.173	8 09 42.861
175	1887	**San Francisco, Calif. (I).**	do	San Francisco, Calif. (N)	Washington Square, Tr. 1869–1878.	0 04.420	±.006			8 09 42.861	8 09 38.441
176	1887	**Portland, Oreg. (N)**	**Tr. 1887–88**	**San Francisco, Calif. (I)**	**Lafayette Park, west pier, Tr. 1882–1896.**	0 59.983	±.015	−.006	0 59.977	8 09 42.861	8 10 42.838
177	1887	**Portland, Oreg. (I)**	do	**Walla Walla, Wash. (N)**	**Tr. 1887–88**	17 19.503	±.011	+.004	17 19.507	8 10 42.838	7 53 23.331
178	1887	**Walla Walla, Wash. (N).**	do	**Salt Lake City, Utah (I)**	**Tr. 1869–1916**	25 48.186	±.009	−.028	25 48.158	7 27 35.173	7 53 23.331
179	1888	Yaquina, Oreg. (N)	Tr. 1888	**Portland, Oreg. (I)**	**Tr. 1887–88**	5 20.905	±.012			8 10 42.838	8 16 03.743
180	1888	**Portland, Oreg. (I)**	**Tr. 1887–88**	**Seattle, Wash. (N)**	**Tr. 1886–1894**	1 22.486	±.026	−.006	1 22.480	8 10 42.838	8 09 20.358
181	1888	Port Townsend, Wash. (N).	Tr. 1888	**Seattle, Wash. (I)**	do	1 40.108	±.012			8 09 20.358	8 11 00.466
182	1888	**Seattle, Wash. (I)**	**Tr. 1886–1894**	**Walla Walla, Wash. (N)**	**Tr. 1887–88**	15 57.028	±.009	−.001	15 57.027	8 09 20.358	7 53 23.331

[1] No. 130a=No. 60 U. S. L. S. of Tables IV and XI. See pp. 28 and 44.
[2] 148a=No. 1 of Tables VIII and XIV. See pp. 30 and 46.

TABLE X.—*Final longitude differences and resulting longitudes, United States Coast and Geodetic Survey*—Continued

No. of difference	Year	Western station: Name (I=initial, N=new)	Western station: Reference point	Eastern station: Name (I=initial, N=new)	Eastern station: Reference point	Mean observed difference of longitude of reference points	Probable error	Correction for adjustment	Adjusted difference of longitude of reference points	Longitude of initial station (I)	Longitude of new station (N)
						h. m. s.	s.	s.	h. m. s.	h. m. s.	h. m. s.
183	1888	**Walla Walla, Wash. (I).**	**Tr. 1887-88**	**Helena, Mont. (N)**	**Tr. 1888-1903**	0 25 14.510	±0.006	+0.032	0 25 14.542	7 53 23.331	7 28 08.789
184	1888	Spokane, Wash. (N)	Tr. 1888	**Helena, Mont. (I)**	do	21 34.437	±.009			7 28 08.789	7 49 43.226
185	1888	**San Francisco, Calif. (I).**	**Lafayette Park, west pier, Tr. 1882-1896.**	Mount Hamilton, Calif. (N)	Meridian of Lick Observatory	3 07.966	±.013			8 09 42.861	8 06 34.895
186	1888-89	do	do	**Sacramento, Calif. (N)**	**Tr. 1888-1908**	3 44.487	±.008	−.013	3 44.474	8 09 42.861	8 05 58.387
187	1889	Point Arena, Calif. (N)	Tr. 1889	**San Francisco, Calif. (I)**	**Lafayette Park, west pier, Tr. 1882-1896.**	5 04.246	±.008	−.023	5 04.223	8 09 42.861	8 14 47.084
188	1889	do	do	**Sacramento, Calif. (I)**	**Tr. 1888-1908**	8 48.675	±.007	+.022	8 48.697	8 05 58.387	8 14 47.084
189	1889	**Sacramento, Calif. (I).**	**Tr. 1888-1908**	**Los Angeles, Calif. (N)**	**Tr. 1892**	12 56.840	±.010	−.014	12 56.826	8 05 58.387	7 53 01.561
190	1889	Marysville, Calif. (N)	Tr. 1889	**Sacramento, Calif. (I)**	**Tr. 1888-1908**	0 22.799	±.007			8 05 58.387	8 06 21.186
191	1889	**San Francisco, Calif. (I).**	**Lafayette Park, west pier, Tr. 1882-1896.**	**Los Angeles, Calif. (N)**	**Tr. 1892**	16 41.282	±.009	+.018	16 41.300	8 09 42.861	7 53 01.561
192	1889	do	do	Oakland, Calif. (N)	Chabot Observatory, Tr. 1889	0 36.222	±.012			8 09 42.861	8 09 06.639
193	1889	**Los Angeles, Calif. (I)**	**Tr. 1892**	**Needles, Calif. (N)**	**Tr. 1889-1920**	14 36.728	±.016	−.003	14 36.725	7 53 01.561	7 38 24.836
194	1889	**Sacramento, Calif. (I).**	**Tr. 1888-1908**	Verdi, Nev. (N)	Tr. 1889	6 02.866	±.007	−.006	6 02.860	8 05 58.387	7 59 55.527
195	1889	Verdi, Nev. (I)	T. 1889	Carson City, Nev. (N)	Friend's Observatory, Tr. 1889	0 52.560	±.008	−.006	0 52.554	7 59 55.527	7 59 02.973
196	1889	Carson City, Nev. (I)	Friend's Observatory, Tr. 1889-1902.	Virginia City, Nev. (N)	Tr. 1889	0 28.168	±.006			7 59 02.973	7 58 34.805
197	1889	Genoa, Nev. (N)	Tr. 1889	Carson City, Nev. (I)	Friend's Observatory, Tr. 1889-1902.	0 18.516	±.012			7 59 02.973	7 59 21.489
198	1889	Carson City, Nev. (I)	Friend's Observatory, Tr. 1889-1902.	Austin, Nev. (N)	Tr. 1889	10 45.168	±.014	−.011	10 45.157	7 59 02.973	7 48 17.816
199	1889	Austin, Nev. (I)	Tr. 1889	Eureka, Nev. (N)	do	4 27.318	±.006	−.006	4 27.312	7 48 17.816	7 43 50.504
200	1889	Eureka, Nev. (N)	do	**Salt Lake City, Utah (I)**	**Tr. 1869-1916**	16 15.337	±.009	−.006	16 15.331	7 27 35.173	7 43 50.504
201	1890	Altoona, Pa. (N)	Tr. 1890	**Washington, D. C. (I)**	**U. S. Naval Observatory (old site), dome.**	5 20.814	±.014			5 08 12.153	5 13 32.967
202	1890	**Helena, Mont. (N)**	**Tr. 1888-1903**	**Salt Lake City, Utah (I)**	**Tr. 1869-1916**	0 33.577	±.013	+.039	0 33.616	7 27 35.173	7 28 08.789
203	1890	**Helena, Mont. (I)**	do	**Bismarck, N. Dak. (N)**	**Tr. 1890**	45 00.839	±.012	+.012	45 00.851	7 28 08.789	6 43 07.938
204	1890	**Bismarck, N. Dak. (I)**	**Tr. 1890**	**Minneapolis, Minn. (N)**	**Tr. 1873-1915**	30 11.080	±.006	+.013	30 11.093	6 43 07.938	6 12 56.845
205	1890	Augusta, Ga. (N)	do	**Washington, D. C. (I)**	**U. S. Naval Observatory (old site), dome.**	19 39.656	±.013			5 08 12.153	5 27 51.809
206	1890	Gainesville, Fla. (N)	do	do	do	21 05.344	±.032			5 08 12.153	5 29 17.497
208	1890	Ironton, Mo. (N)	do	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881-82.**	1 41.535	±.030			6 00 49.256	6 02 30.791
209	1890	Potosi, Mo. (N)	do	do	do	2 20.094	±.018			6 00 49.256	6 03 09.350
210	1891	**Cape May, N. J. (I)**	**Tr. 1881-1891**	**Albany, N. Y. (N)**	**Dudley Observatory (old site), dome.**	4 43.020	±.010	+.033	4 43.053	4 59 43.045	4 54 59.992
211	1891	**Detroit, Mich. (N)**	**Tr. 1891**	**Albany, N. Y. (I)**	do	37 11.845	±.005	−.007	37 11.838	4 54 59.992	5 32 11.830
212	1891	**Chicago, Ill. (I)**	do	**Detroit, Mich. (N)**	**Tr. 1891**	18 17.634	±.006	−.018	18 17.616	5 50 29.446	5 32 11.830
213	1891	**Minneapolis, Minn. (N).**	**Tr. 1873-1915**	**Chicago, Ill. (I)**	do	22 27.414	±.010	−.015	22 27.399	5 50 29.446	6 12 56.845
214	1891	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	**Minneapolis, Minn. (N)**	**Tr. 1873-1915**	10 49.269	±.010	−.027	10 49.242	6 23 46.087	6 12 56.845
215	1891	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881-82.**	Elizabethtown, Ohio (N)	Tr. 1891	21 35.757	±.020			6 00 49.256	5 39 13.499
216	1891	do	do	Union City, Ind. (N)	do	21 35.484	±.013			6 00 49.256	5 39 13.772
217	1891	do	do	Butler, Ind. (N)	do	21 19.609	±.033			6 00 49.256	5 39 29.647
218	1892	Macon, Mo. (N)	Tr. 1892	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881-82.**	9 04.052	±.028			6 00 49.256	6 09 53.308
219	1892	**Los Angeles, Calif. (I)**	do	**San Diego, Calif. (N)**	**Tr. 1892**	4 22.786	±.010	+.027	4 22.813	7 53 01.561	7 48 38.748
220	1892	**San Diego, Calif. (I)**	do	**Yuma, Ariz. (N)**	do	10 09.114	±.005	+.026	10 09.140	7 48 38.748	7 38 29.608
221	1892	***Los Angeles, Calif. (I)***	do	do	do	14 31.974	±.006	−.021	14 31.953	7 53 01.561	7 38 29.608
222	1892	**Yuma, Ariz. (I)**	do	**Nogales, Ariz. (N)**	do	14 43.690	±.007	+.006	14 43.696	7 38 29.608	7 23 45.912
223	1892	**Nogales, Ariz. (I)**	do	**El Paso, Tex. (N)**	**Tr. 1892-1899**	17 48.520	±.009	+.006	17 48.526	7 23 45.912	7 05 57.386
[3] 223a	1892	**Montreal, Canada (N).**	**McGill College Observatory, McGill College Tr.**	**Greenwich, England (I)**	**Royal Observatory, Tr. C**	4 54 18.67		−.036	4 54 18.634	0 00.000	4 54 18.634
224	1892	Corner boundary, New Mexico (United States and Mexico). (N)	Near Mon. No. 40, Tr. 1892	**El Paso, Tex. (I)**	**Tr. 1892-1899**	6 52.626	±.013			7 05 57.386	7 12 50.012
225	1892	**Helena, Mont. (I)**	**Tr. 1888-1903**	Yellowstone Lake, Wyo. (N)	Tr. 1892	6 33.835	±.009			7 28 08.789	7 21 34.954
226	1893	**El Paso, Tex. (N)**	**Tr. 1892-1899**	***Little Rock, Ark. (I)***	**Tr. 1885-1896**	56 51.681	±.009	−.022	56 51.659	6 09 05.727	7 05 57.386
227	1893	Lake Tahoe, southeast end, Calif. (N).	Tr. 1893	Carson City, Nev. (I)	Friend's Observatory, Tr. 1889	0 44.087	±.006			7 59 02.973	7 59 47.060
228	1894	Tacoma, Wash. (N)	Tr. 1892-1894	**Seattle, Wash. (I)**	**Tr. 1886-1894**	0 27.159	±.010			8 09 20.358	8 09 47.517
229	1895	**Needles, Calif. (I)**	**Tr. 1889-1920**	**Santa Fe, N. Mex. (N)**	**Tr. 1873-1895**	34 38.032	±.013	−.001	34 38.031	7 38 24.836	7 03 46.805
230	1895	**El Paso, Tex. (I)**	**Tr. 1892-1899**	do	do	2 10.593	±.009	−.012	2 10.581	7 05 57.386	7 03 46.805
231	1895	do	do	Tacubaya, Mexico (N)	Tacubaya Observatory, M. C.	29 10.400	±.022			7 05 57.386	6 36 46.986
232	1895	**El Paso, Tex. (N)**	do	**Austin, Tex. (I)**	**Tr. 1895-1906**	35 00.322	±.004	+.040	35 00.362	6 30 57.024	7 05 57.386
233	1895	Laredo, Tex. (N)	Fort McIntosh, Tr. 1895-1919	do	do	7 07.148	±.006	−.008	7 07.140	6 30 57.024	6 38 04.164
234	1895	**Austin, Tex. (N)**	**Tr. 1895-1906**	**Galveston, Tex. (I)**	**Tr. 1895**	11 47.087	±.004	+.009	11 47.096	6 19 09.928	6 30 57.024
235	1895	do	do	**New Orleans, La. (I)**	**Lafayette Square, Tr. 1880-1895.**	30 40.230	±.010	+.031	30 40.261	6 00 16.763	6 30 57.024
236	1895	**Cambridge, Mass. (N)**	**Harvard College Observatory, dome.**	**Calais, Me. (I)**	**Tr. 1857-1895**	15 23.187	±.007	+.002	15 23.189	4 29 07.857	4 44 31.046
237	1896	**Key West, Fla. (N)**	**Tr. 1896**	**Charleston, S. C. (I)**	**Citadel Square, Tr. 1880-1896**	7 29.509	±.003	−.006	7 29.503	5 19 44.076	5 27 13.579
238	1896	**Atlanta, Ga. (I)**	do	**Key West, Fla. (N)**	**Tr. 1896**	10 19.765	±.007	−.006	10 19.759	5 37 33.338	5 27 13.579
239	1896	**Little Rock, Ark. (N)**	**Tr. 1885-1896**	**Atlanta, Ga. (I)**	do	31 32.369	±.005	+.020	31 32.389	5 37 33.338	6 09 05.727
240	1896	**Charleston, S. C. (N)**	**Citadel Square, Tr. 1880-1896**	**Washington, D. C. (I)**	**U. S. Naval Observatory (old site), dome.**	11 31.888	±.005	+.035	11 31.923	5 08 12.153	5 19 44.076
241	1896	**Washington, D. C. (I)**	**U. S. Naval Observatory (old site), dome,**	Ithaca, N. Y. (N)	College of Engineering Observatory, Tr. 1896.	2 15.739	±.030	−.057	2 15.682	5 08 12.153	5 05 56.471
242	1896	Ithaca, N. Y. (N)	College of Engineering Observatory, Tr. 1896.	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	21 25.444	±.017	−.019	21 25.425	4 44 31.046	5 05 56.471
243	1896	**Washington, D. C. (N)**	**U. S. Naval Observatory, (old site), dome.**	do	do	23 41.138	±.014	−.031	23 41.107	4 44 31.046	5 08 12.153
244	1896	**Washington, D. C. (I)**	do	Washington, D. C. (N)	U. S. Coast and Geodetic Survey Office, Tr. 1896-1911.	0 10.462	±.008	−.018	0 10.444	5 08 12.153	5 08 01.709
245	1896	**Albany, N. Y. (N)**	**Dudley Observatory, old site, dome.**	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	10 28.926	±.008	+.020	10 28.946	4 44 31.046	4 54 59.992
246	1896	do	do	**Montreal, Canada (I)**	**McGill College Observatory, Tr. 1892-1896.**	0 41.352	±.007	+.006	0 41.358	4 54 18.634	4 54 59.992
247	1896	do	Dudley Observatory, new site, meridian.	**Albany, N. Y. (I)**	**Dudley Observatory, old site, dome.**	0 07.132	±.007			4 54 59.992	4 55 07.124
248	1896	San Francisco, Calif. (N).	Presidio (new), Tr. 1896-97	**San Francisco, Calif. (I)**	**Lafayette Park, west pier, Tr. 1882-1896.**	0 05.952	±.007			8 09 42.861	8 09 48.813
249	1897	Washington, D. C. (I)	U. S. Coast and Geodetic Survey Office, Tr. 1896-1907.	Dover, Del. (N)	Tr. 1897	5 56.479	±.009			5 08 01.709	5 02 05.230
250	1897	Washington, D. C. (N)	U. S. Naval Observatory, new site, center of clock room.	Washington, D. C. (I)	U. S. Coast and Geodetic Survey Office, Tr. 1896-1911.	0 14.065	±.006	+.010	0 14.075	5 08 01.709	5 08 15.784
251	1897	Ukiah, Calif. (N)	Tr. 1887	San Francisco, Calif. (I)	Presidio, Tr. 1896-97	3 01.421	±.013			8 09 48.813	8 12 50.234
252	1898	**Salt Lake City, Utah (I).**	**Tr. 1869-1916**	Green River, Utah (N)	Tr. 1898	6 55.634	±.006			7 27 35.173	7 20 39.539
253	1898	Oasis, Utah (N)	Tr. 1898	**Salt Lake City, Utah (I)**	**Tr. 1869-1916**	2 56.521	±.006			7 27 35.173	7 30 31.694
254	1899	Marlow, Okla. (N)	Tr. 1899-1907	**Austin, Tex. (I)**	**Tr. 1895-1906**	0 53.682	±.005	−.007	0 53.675	6 30 57.024	6 31 50.699
255	1899	Gaithersburg, Md. (N)	Tr. 1899	Washington, D. C. (I)	U. S. Coast and Geodetic Survey Office, Tr. 1896-1911.	0 46.02	±.007			5 08 01.709	5 08 47.729
256	1899	Maricopa, Ariz. (N)	do	**El Paso, Tex. (I)**	**Tr. 1892-1899**	22 14.896	±.005			7 05 57.386	7 28 12.282
257	1900	**St. Louis, Mo. (I)**	**Washington University, Tr. 1881-1882.**	Yerkes Observatory, Wis. (N)	M. C. 1900	6 36.248	±.009			6 00 49.256	5 54 13.008

[3] Determined by the English. See report for 1897, App. 2, p. 237.

TABLE X.—*Final longitude differences and resulting longitudes, United States Coast and Geodetic Survey*—Continued

No. of difference	Year	Western station: Name (I=initial, N=new)	Western station: Reference point	Eastern station: Name (I=initial, N=new)	Eastern station: Reference point	Mean observed difference of longitude of reference points	Probable error	Correction for adjustment	Adjusted difference of longitude of reference points	Longitude of initial station (I)	Longitude of new station (N)
						h. m. s.	s.	s.	h. m. s.	h. m. s.	h. m. s.
258	1901	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	Provincetown, Mass. (N)	Tr. 1901	0 03 45.881	±0.012			**4 44 31.046**	4 40 45.165
259	1901	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	Fennimore, Wis. (N)	do	21 09.17	±.01			**6 23 46.087**	6 02 36.917
260	1902	Carson City, Nev. (I)	Friend's Observatory, Tr. 1889-1902.	Tonopah, Nev. (N)	Tr. 1902	10 06.691	±.029			7 59 02.973	7 48 56.282
261	1903	Honolulu, Hawaii (N)	Tr. 1903	San Francisco, Calif. (I)	Presidio (new), Tr. 1896-97	2 21 38.919	±.008			8 09 48.813	10 31 27.732
262	1903	Manila, P. I. (N)	do	Guam Island (I)	Tr. 1903	1 34 43.264	±.010			14 21 24.534	15 56 07.798
263	1903	**Helena, Mont. (I)**	**Tr. 1888-1903**	Chinook, Mont. (N)	do	11 13.905	±.018			**7 28 08.789**	7 16 54.884
264	1903	Guam Island (N)	Tr. 1903	Midway Island (I)	do	2 31 53.582	±.010			11 49 30.952	14 21 24.534
265	1904	Midway Island (N)	Tr. 1903-4	Honolulu, Hawaii (I)	Tr. 1903-4	1 18 03.220	±.015			10 31 27.732	11 49 30.952
270	1905-6	**Los Angeles, Calif. (I)**	**Tr. 1892**	Mount Wilson, Calif. (N)	Solar Observatory, pier	0 47.235	±.008			**7 53 01.561**	7 52 14.326
272	1906	Alice, Tex. (N)	Tr. 1906	**Austin, Tex. (I)**	**Tr. 1895-1906**	1 20.878	±.012	−0.013	1 20.865	**6 30 57.024**	6 32 17.889
273	1906	Alice, Tex. (I)	do	Point Isabel, Tex. (N)	Tr. 1906	3 28.140	±.005	+.012	3 28.152	6 32 17.889	6 28 49.737
274	1906	**Austin, Tex. (I)**	**Tr. 1895-1906**	do	do	2 07.300	±.012	−.013	2 07.287	**6 30 57.024**	6 28 49.737
275	1907	**Key West, Fla. (I)**	**Tr. 1896**	Miami, Fla. (N)	Tr. 1907	6 27.365	±.017	−.009	6 27.356	**5 27 13.579**	5 20 46.223
276	1907	Miami, Fla. (I)	Tr. 1907	Jupiter Inlet, Fla. (N)	do	0 27.404	±.016	−.009	0 27.395	5 20 46.223	5 20 18.828
277	1907	Sebastian, Fla. (N)	do	Jupiter Inlet, Fla. (I)	do	1 33.654	±.022	+.009	1 33.663	5 20 18.828	7 21 52.491
278	1907	Daytona, Fla. (N)	do	Sebastian, Fla. (I)	do	2 11.332	±.026	+.009	2 11.341	5 21 52.491	5 24 03.832
279	1907	Fernandina, Fla. (N)	Tr. 1907-1917	Daytona, Fla. (I)	do	1 46.878	±.007	+.009	1 46.887	5 24 03.832	5 25 50.719
280	1907	**Atlanta, Ga. (I)**	**Tr. 1896**	Fernandina, Fla. (N)	Tr. 1907-1917	11 42.609	±.008	+.010	11 42.619	**5 37 33.338**	5 25 50.719
281	1907	Fernandina, Fla. (I)	Tr. 1907	Darien, Ga. (N)	Tr. 1907	0 07.208	±.011	−.008	0 07.200	5 25 50.719	5 25 43.519
282	1907	Darien, Ga. (I)	do	Allendale, S. C. (N)	do	0 29.255	±.022	−.008	0 29.247	5 25 43.519	5 25 14.272
283	1907	Doraville, Ga. (N)	do	Allendale, S.C. (I)	do	11 52.285	±.018	+.008	11 52.293	5 25 14.272	5 37 06.565
284	1907	**Atlanta, Ga. (I)**	**Tr. 1896**	Doraville, Ga. (N)	do	0 26.764	±.008	+.009	0 26.773	**5 37 33.338**	5 37 06.565
286	1907	Allegheny, Pa. (N)	Allegheny Obervatory, (new site) Tr. 1907.	Washington, D. C. (I)	U. S. Coast and Geodetic Survey, office, Tr. 1896-1911.	12 03.683	±.010			5 08 01.709	5 20 05.392
287	1907	Mount Weather, Va. (N)	Tr. 1907	do	do	3 31.663				5 08 01.709	5 11 33.372
288	1907	Stephen, Minn. (I)	do	Dalton, Minn. (N)	Tr. 1907	3 45.133	±.011	+.011	3 45.144	6 27 25.147	6 23 40.003
289	1907	Howard, S. Dak. (N)	do	Dalton, Minn. (I)	do	6 26.387	±.012	−.004	6 26.383	6 23 40.003	6 30 06.386
290	1907	Page, Nebr. (N)	do	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	9 57.383	±.010	−.022	9 57.361	**6 23 46.087**	6 33 43.448
291	1907	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	Berger, Mo. (N)	Tr. 1907	18 36.043	±.008			**6 23 46.087**	6 05 10.044
292	1907	**do**	**do**	Knob Noster, Mo. (N)	do	9 33.589	±.021			**6 23 46.087**	6 14 12.498
293	1907	Howard, S. Dak. (N)	Tr. 1907	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	6 20.272	±.009	+.027	6 20.299	**6 23 46.087**	6 30 06.386
294	1907	Salina west base, Kans. (N).	do	**do**	**do**	6 38.537	±.010			**6 23 46.087**	6 30 24.624
295	1907	Page, Nebr. (I)	do	Howard, S. Dak. (N)	Tr. 1907	3 37.040	±.018	+.022	3 37.062	6 33 43.448	6 30 06.386
296	1907	Marlow, Okla. (I)	Tr. 1899-1907	Pond Creek, Okla. (N)	do	0 39.437	±.003	+.007	0 39.444	6 31 50.699	6 31 11.255
297	1907	Bowie northwest base, Tex. (N).	Tr. 1907	Marlow, Okla. (I)	Tr. 1899-1907	0 10.630	±.008			6 31 50.699	6 32 01.329
298	1907	**Atlanta, Ga. (I)**	**Tr. 1896**	Knoxville, Tenn. (N)	Tr. 1907	1 51.051	±.007			**5 37 33.338**	5 35 42.287
299	1907	Mobile, Ala. (I)	Tr. 1857-1861	Fort Morgan, Ala. (N)	do	0 04.758	±.010			5 52 10.492	5 52 05.734
300	1907	St. Marks, Fla. (N)	Tr. 1907	Daytona, Fla. (I)	do	12 45.355	±.007			5 24 03.832	5 36 49.187
301	1907-8	Belleview, Fla. (N)	Tr. 1907-08	do	Tr. 1907-08	7 10.731	±.012			5 24 03.832	5 31 14.563
302	1908	Gazelle, Calif. (N)	Tr. 1908	**Sacramento, Calif. (I)**	**Tr. 1888-1908**	4 05.438	±.007			**8 05 58.387**	8 10 03.825
303	1908	**Seattle, Wash. (I)**	**Tr. 1886-1894**	Seattle, Wash. (N)	University of Washington, new site, Tr. pier.	0 06.268	±.007			**8 09 20.358**	8 09 14.090
304	1908	Blaine, Wash. (N)	Tr. 1908	**Seattle, Wash. (I)**	**Tr. 1886-1894**	1 40.362	±.006			**8 09 20.358**	8 11 00.720
305	1908	**Bismarck, N. Dak. (I)**	**Tr. 1890**	Stephen, Minn. (N)	Tr. 1907-08	15 42.779	±.010	+.012	15 42.791	**6 43 07.938**	6 27 25.147
306	1908	**do**	**do**	Dalton, Minn. (N)	do	19 27.942	±.012	−.007	19 27.935	**6 43 07.938**	6 23 40.003
307	1908	Bunday, Mich. (N)	Tr. 1908	**Detroit, Mich. (I)**	**Tr. 1891**	5 38.505	±.002			**5 32 11.830**	5 37 50.335
308	1908	Kit, N.Y. (N)	do	Albany, N. Y. (I)	Dudley Observatory (new site) Tr. 1896.	0 49.270	±.011			4 55 07.124	4 55 56.394
311	1911	Washington. D. C. (I)	U. S. Coast and Geodetic Survey Office, Tr. 1896-1911.	New York, N. Y. (N)	Manhattan Square, Tr. 1911	12 07.280	±.039			5 08 01.709	4 55 54.429
313	1911	Fort Stevens, Oreg. (N).	Tr. 1911	Seattle, Wash. (I)	University of Washington, new site, Tr. pier, 1908.	6 38.246	±.019			8 09 14.090	8 15 52.336
314	1911	**El Paso, Tex. (I)**	**Tr. 1892-1899**	Jarilla, N. Mex. (N)	Tr. 1911	1 29.838	±.013			**7 05 57.386**	7 04 27.548
315	1911	**do**	**do**	Boracho, Tex (N)	do	8 23.613	±.022	−.008	8 23.605	**7 05 57.386**	6 57 33.781
316	1911	Boracho, Tex. (I)	Tr. 1911	Stanton, Tex. (N)	Tr. 1911-1919	10 28.427	±.020	−.008	10 28.419	6 57 33.781	6 47 05.362
317	1911	**Austin, Tex. (I)**	**Tr. 1895-1906**	Matagorda, Tex. (N)	Tr. 1911	7 04.381	±.016			**6 30 57.024**	6 23 52.643
318	1911	**do**	**do**	Sabine Pass, Tex. (N).	do	15 23.715	±.012			**6 30 57.024**	6 15 33.309
319	1912	Mondak, Mont. (N)	Tr. 1912	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	32 25.052	±.012			**6 23 46.087**	6 56 11.139
320	1912	Bowman, N. Dak. (N)	do	**do**	**do**	29 50.353	±.012			**6 23 46.087**	6 53 36.440
321	1912	Provo, S. Dak. (N)	do	**do**	**do**	31 32.429	±.016			**6 23 46.087**	6 55 18.516
322	1912	Wheatland, Wyo. (N)	do	**do**	**do**	36 02.562	±.022			**6 23 46.087**	6 59 48.649
323	1912	Watkins, Colo. (N)	do	**do**	**do**	34 38.820	±.022			**6 23 46.087**	6 58 24.907
324	1913	Donna, Tex. (N)	Tr. 1913	**Austin, Tex. (I)**	**Tr. 1895-1906**	1 14.339	±.006			**6 30 57.024**	6 32 11.363
325	1914	Washington, D. C. (I)	U. S. Naval Observatory, (new site) center of clock room.	Far Rockaway, N. Y. (N)	Tr. 1914	13 15.704	±.003	+.002	13 15.706	5 08 15.784	4 55 00.078
326	1914	Far Rockaway, N. Y. (N).	Tr. 1914	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome**	10 29.031	±.003	+.001	10 29.032	**4 44 31.046**	4 55 00.078
327	1914	Washington, D. C. (N).	U. S. Naval Observatory, (new site) center of clock room	**do**	**do**	23 44.738	±.002	.000	23 44.738	**4 44 31.046**	5 08 15.784
328	1914	**Little Rock, Ark. (I)**	**Tr. 1885-1896**	Martin, Tenn. (N)	Tr. 1914	9 54.275	±.004	+.016	9 54.291	**6 09 05.727**	5 59 11.436
329	1914	Martin, Tenn. (I)	Tr. 1914	Strickland, Miss. (N)	do	5 28.314	±.009	+.016	5 28.330	5 59 11.436	5 53 43.106
330	1914	Strickland, Miss. (I)	do	Madison, Ala. (N)	do	6 44.894	±.007	+.016	6 44.910	5 53 43.106	5 46 58.196
331	1914-15	**Nashville, Tenn. (I)**	**Tr. 1877-1915**	do	Tr. 1914-15	0 09.903	±.002	−.016	0 09.887	**5 47 08.083**	5 46 58.196
332	1915	**do**	**do**	O. and M., Ind. (N)	Tr. 1915	4 27.319	±.008			**5 47 08.083**	5 42 40.764
333	1915	Warroad, Minn. (N)	Tr. 1915	**Minneapolis, Minn. (I)**	Tr. 1873-1915	8 21.333	±.018			**6 12 56.845**	6 21 18.178
334	1915	**Omaha, Nebr. (I)**	**Tr. 1869-1891**	**Minneapolis, Minn. (N)**	**do**	[3] 10 49.287	±.010	−.045	[4] 10 49.242	**6 23 46.087**	6 12 56.845
335	1915	Rochester, N. Y. (N)	Bausch & Lomb Observatory, Meridian Circle pier.	Washington, D. C. (I)	U. S. Coast and Geodetic Survey, Office, Tr. 1896-1911	2 27.930	±.020			5 08 01.709	5 10 29.639
336	1916	Echo, Oreg. (N)	Tr. 1916	**Walla Walla, Wash. (I)**	**Tr. 1887-88**	3 22.628	±.005	−.006	3 22.622	**7 53 23.331**	7 56 45.953
337	1916	Echo, Oreg. (I)	do	La Grande, Oreg. (N)	Tr. 1916	4 23.459	±.009	+.006	4 23.465	7 56 45.953	7 52 22.488
338	1916	La Grande, Oreg. (I)	do	Mountain Home, Idaho (N)	do	9 35.793	±.006	+.006	9 35.799	7 52 22.488	7 42 46.689
339	1916	Mountain Home, Idaho (I).	do	Blackfoot, Idaho (N)	do	13 21.925	±.003	+.006	13 21.931	7 42 46.689	7 29 24.758
340	1916	Blackfoot, Idaho (N)	do	**Salt Lake City, Utah (I)**	**Tr. 1869-1916**	1 49.579	±.015	+.006	1 49.585	**7 27 35.173**	7 29 24.758
341	1916	Lund, Utah (N)	do	**do**	**do**	6 09.007	±.013	+.016	6 09.023	**7 27 35.173**	7 33 44.196
342	1916	Moapa, Nev. (N)	do	Lund, Utah (I)	Tr. 1916	4 45.729	±.022	+.015	4 45.744	7 33 44.196	7 38 29.940
343	1916	do	do	**Needles, Calif. (I)**	**Tr. 1889-1920**	0 05.119	±.008	−.015	0 05.104	**7 38 24.836**	7 38 29.940
344	1917	**Atlanta, Ga. (I)**	**Tr. 1896**	Hump, Ga. (N)	Tr. 1917	2 59.001	±.002	+.004	2 59.005	**5 37 33.338**	5 34 34.333
345	1917	Valley, Ga. (N)	Tr. 1917	Hump, Ga. (I)	do	0 58.795	±.015	−.016	0 58.779	5 34 34.333	5 35 33.112
346	1917	Hump, Ga. (I)	do	Cochran, Ga. (N)	do	1 08.276	±.020	−.013	1 08.263	5 34 34.333	5 33 26.070
347	1917	Cochran, Ga. (I)	do	Mud, Ga. (N)	do	0 45.134	±.015	−.013	0 45.121	5 33 26.070	5 32 40.949
348	1917	Mud, Ga. (I)	do	Joint, Ga. (N)	do	2 17.270	±.010	−.013	2 17.257	5 32 40.949	5 30 23.692
349	1917	Joint, Ga. (I)	do	Jesup, Ga. (N)	do	2 53.403	±.018	−.013	2 53.390	5 30 23.692	5 27 30.302
350	1917	Jesup, Ga. (I)	do	Brunswick southeast base, Ga. (N).	do	1 30.839	±.020	−.013	1 30.826	5 27 30.302	5 25 59.476
351	1917	Brunswick southeast base, Ga. (N).	do	Fernandina, Fla. (I)	Tr. 1907-1917	0 08.770	±.018	−.013	0 08.757	5 25 50.719	5 25 59.476
352	1917	Lancaster 2 (U. S. E.), Fla. (N).	do	do	do	0 51.603	±.015	+.022	0 51.625	5 25 50.719	5 26 42.344
353	1918	Folkston, Ga. (N)	Tr. 1918	Lancaster 2 (U. S. E.), Fla. (I)	Tr. 1917-18	1 19.986	±.006	+.021	1 20.007	5 26 42.344	5 28 02.351
354	1918	Waresboro, Ga. (N)	do	Folkston, Ga. (I)	Tr. 1918	1 52.334	±.002	+.021	1 52.355	5 28 02.351	5 29 54.706
355	1918	Willacoochee, Ga. (N)	do	Waresboro, Ga. (I)	do	2 17.420	±.008	+.021	2 17.441	5 29 54.706	5 32 12.147
356	1918	Valdosta, Ga. (N)	do	Willacoochee, Ga. (I)	do	0 54.547	±.004			5 32 12.147	5 33 06.694
357	1918	Jones, Ga. (N)	do	do	do	2 44.980	±.012	+.021	2 45.001	5 32 12.147	5 34 57.148
358	1918	Sylvester D, Ga. (N)	do	Jones, Ga. (I)	do	0 39.860	±.018	+.021	0 39.881	5 34 57.148	5 35 37.029
359	1918	Kimbrough, Ga. (N)	do	Sylvester D, Ga. (I)	do	2 58.995	±.023	+.021	2 59.016	5 35 37.029	5 38 36.045
360	1918	Columbus E, Ga. (N)	do	Kimbrough, Ga. (I)	do	1 20.001	±.004	+.021	1 20.022	5 38 36.045	5 39 56.067
361	1918	Columbus E, Ga. (I)	do	Butler, Ga. (N)	do	3 00.605	±.020	−.021	3 00.584	5 39 56.067	5 36 55.483

[3] A redetermination. See also Report for 1897, App. 2, p. 234.

[4] See difference No. 214 of this publication, p. 38. See also report for 1897, App. 2, p. 253.

TABLE X.—*Final longitude differences and resulting longitudes, United States Coast and Geodetic Survey*—Continued

No. of difference	Year	Western station		Eastern station		Mean observed difference of longitude of reference points	Probable error	Correction for adjustment	Adjusted difference of longitude of reference points	Longitude of initial station (I)	Longitude of new station (N)
		Name (I=initial, N=new)	Reference point	Name (I=initial, N=new)	Reference point						
						h. m. s.	s.	s.	h. m. s.	h. m. s.	h. m. s.
362	1918	Butler, Ga. (I)	Tr. 1918	Harmon, Ga. (N)	Tr. 1918	0 00 02.050	±0.022	−0.021	0 00 02.029	5 36 55.483	5 36 53.454
363	1918	Harmon, Ga. (I)	do	Riley, Ga. (N)	do	0 05.153	±.003	−.021	0 05.132	5 36 53.454	5 36 48.322
364	1918	Riley, Ga. (N)	do	Valley, Ga. (I)	do	1 15.231	±.013	−.021	1 15.210	5 35 33.112	5 36 48.322
365	1918	Valley, Ga. (I)	do	Norris, Ga. (N)	do	5 32.740	±.017	−.004	5 32.736	5 35 33.112	5 30 00.376
366	1918	Norris, Ga. (I)	do	Turner, Ga. (N)	do	2 52.440	±.015	−.005	2 52.435	5 30 00.376	5 27 07.941
367	1918	Turner, Ga. (I)	do	Bethune I, S. C. (N)	do	6 06.358	±.022	−.005	6 06.353	5 27 07.941	5 21 01.588
368	1918	Bethune I, S. C. (I)	do	Lee, N. C. (N)	do	4 19.622	±.019	−.005	4 19.617	5 21 01.588	5 16 41.971
369	1918	Lee, N. C. (I)	do	Littleton, N. C. (N)	do	5 02.353	±.015	−.005	5 02.348	5 16 41.971	5 11 39.623
370	1918	Littleton, N. C. (I)	do	Suffolk, Va. (N)	do	5 21.750	±.010	−.005	5 21.745	5 11 39.623	5 06 17.878
371	1919	Washington, D. C. (I)	U. S. Coast and Geodetic Survey, office, Tr. 1896–1911.	do	Tr. 1918–1919	1 43.826	±.010	+.005	1 43.831	5 08 01.709	5 06 17.878
372	1919	Laplace, Tex. (N)	Tr. 1919	Laredo, Tex. (I)	Tr. 1895–1919	3 54.037	±.006	−.008	3 54.029	6 38 04.164	6 41 58.193
373	1919	Johnstone, Tex. (N)	do	Laplace, Tex. (I)	Tr. 1919	1 06.534	±.012	−.007	1 06.527	6 41 58.193	6 43 04.720
374	1919	Dryden east base, Tex. (N).	do	Johnstone, Tex. (I)	do	5 18.685	±.002	−.008	5 18.677	6 43 04.720	6 48 23.397
375	1919	do	do	Stanton, Tex. (I)	Tr. 1911–1919	1 18.028	±.007	+.007	1 18.035	6 47 05.362	6 48 23.397
376	1919	**Austin, Tex. (I)**	**Tr. 1895–1906**	Tehuacana, Tex. (N)	Tr. 1919	4 45.052	±.006	−.029	4 45.023	**6 30 57.024**	6 26 12.001
377	1919	Tehuacana, Tex. (I)	Tr. 1919	Jacksonville, Tex. (N)	do	5 04.649	±.004	−.029	5 04.620	6 26 12.001	6 21 07.381
378	1920	Jacksonville, Tex. (I)	Tr. 1919–20	Man, La. (N)	Tr. 1920	6 15.310	±.004	−.029	6 15.281	6 21 07.381	6 14 52.100
379	1920	Man, La. (I)	Tr. 1920	Boyce, La. (N)	do	4 15.394	±.019	−.029	4 15.365	6 14 52.100	6 10 36.735
380	1920	Boyce, La. (I)	do	Torras, La. (N)	do	3 53.686	±.010	−.029	3 53.657	6 10 36.735	6 06 43.078
381	1920	**Little Rock, Ark. (I)**	**Tr. 1885–1896**	do	do	2 22.619	±.017	+.030	2 22.649	**6 09 05.727**	6 06 43.078
382	1920	Hartford, Ark. (N)	Tr. 1920	**Little Rock, Ark. (I)**	**Tr. 1885–1896**	8 27.402	±.008	+.005	8 27.407	**6 09 05.727**	6 17 33.134
383	1920	Allen, Okla. (N)	do	Hartford, Ark. (I)	Tr. 1920	8 06.518	±.003	+.005	8 06.523	6 17 33.134	6 25 39.657
384	1920	Pond Creek, Okla. (I)	Tr. 1907–1920	Allen, Okla. (N)	do	5 31.593	±.010	+.005	5 31.598	6 31 11.255	6 25 39.657
385	1920	Dill, Okla. (N)	Tr. 1920	Pond Creek, Okla. (I)	Tr. 1907–1920	5 19.607	±.006	−.002	5 19.605	6 31 11.255	6 36 30.860
386	1920	Conway, Tex. (N)	do	Dill, Okla. (I)	Tr. 1920	9 00.858	±.003	−.002	9 00.856	6 36 30.860	6 45 31.716
387	1920	Glen Rio, N. Mex. (N)	do	Conway, Tex. (I)	do	6 38.264	±.006	−.002	6 38.262	6 45 31.716	6 52 09.978
388	1920	Los Lunas, N. Mex. (N).	do	Glen Rio, N. Mex. (I)	do	14 46.823	±.004	−.002	14 46.821	6 52 09.978	7 06 56.799
389	1920	Williams Laplace, Ariz. (N).	do	Los Lunas, N. Mex. (I)	do	21 49.635	±.010	−.002	21 49.633	7 06 56.799	7 28 46.432
390	1920	**Needles, Calif. (I)**	**Tr. 1889–1920**	Williams Laplace, Ariz. (N)	do	9 38.406	±.012	−.002	9 38.404	**7 38 24.836**	7 28 46.432

TABLE XI.—*Final longitude differences and resulting longitudes, United States Lake Survey*

No. of difference	Year	Western station		Eastern station		Mean observed difference of longitude of reference points	Longitude of initial station (I)	Longitude of new station (N)
		Name (I=initial, N=new)	Reference point	Name (I=initial, N=new)	Reference point			
						h. m. s.	h. m. s.	h. m. s.
1	1859	**Detroit, Mich. (I).**	**Coast and Geodetic Survey Tr. 1891.**	Hudson, Western Reserve College Observatory, Ohio (N).	Tr. pier	0 06 26.751	5 32 11.830	5 25 45.079
2	1860	do	do	Goderich, Canada (N).	Tr. 1860	5 20.731	5 32 11.830	5 26 51.099
3	1860	Grand Haven, Mich. (N).	Tr. 1860	**Detroit, Mich. (I).**	**Coast and Geodetic Survey Tr. 1891.**	12 46.089	5 32 11.830	5 44 57.919
4-5	1861-1864	Ann Arbor, Mich. (N).	M. C. 1861	do	do	2 43.466	5 32 11.830	5 34 55.296
6	1864	Chicago, Ill. (N)	Tr. 1864	do	do	18 17.759	5 32 11.830	5 50 29.589
7	1864	Fort Howard, Wis. (N).	do	do	do	19 52.039	5 32 11.830	5 52 03.869
8	1865	Thones Hill (Marquette), Mich. (N).	Tr. 1865	Escanaba, Mich. (I).	Tr. 1865	1 35.23	5 48 12.059	5 49 47.289
9	1865	Fort Howard, Wis. (I).	Tr. 1864-65	Escanaba, Mich. (N).	do	3 51.81	5 52 03.869	5 48 12.059
10	1865	do	do	Menomonee, Wis. (N).	do	1 34.52	5 52 03.869	5 50 29.349
11	1868	Oswego, N. Y. (I).	Tr. 1868	Ogdensburg, N.Y. (N).	Tr. 1868	4 02.19	5 06 01.549	5 01 59.359
12	1868	do	do	Watertown, N. Y. (N).	do	2 21.94	5 06 01.549	5 03 39.609
13	1868	Buffalo, N. Y. (I).	do	Oswego, N. Y. (N)	do	[1] 9 26.53	5 15 28.079	5 06 01.549
14	1868	do	do	Rochester, N. Y. (N).	do	[1] 4 57.46	5 15 28.079	5 10 30.619
15	1868	Dunkirk, N.Y.(N)	do	Buffalo, N. Y. (I).	do	[1] 1 49.90	5 15 28.079	5 17 17.979
16	1868	Erie, Pa. (N)	do	do	do	[1] 4 53.17	5 15 28.079	5 20 21.249
17	1868	Ashtabula, Ohio (N).	do	do	do	[1] 7 42.47	5 15 28.079	5 23 10.549
18	1868	Cleveland, Ohio (I).	do	Buffalo, N. Y. (N).	do	11 19.73	5 26 47.809	5 15 28.079
19	1868	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	Sandusky, Ohio (N).	do	[1] 1 18.411	5 32 11.830	5 30 53.419
20	1868	do	do	Cleveland, Ohio (N).	do	[1] 5 24.021	5 32 11.830	5 26 47.809
21	1868	Monroe, Mich. (N)	Tr. 1868	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	1 22.039	5 32 11.830	5 33 33.869
[2]24	1871	St. Paul, Minn. (N).	Tr. 1871	Minnesota Point (Duluth), Minn. (I).	Tr. 1871	4 03.79	6 08 18.016	6 12 21.806
25	1871	Minnesota Point (Duluth), Minn. (N).	do	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	36 06.186	5 32 11.830	6 08 18.016
26	1871	Fort Leavenworth, Kans. (N).	do	do	do	[1] 47 27.476	5 32 11.830	6 19 39.306
27	1873	Galena, Ill. (N)	Tr. 1873	do	do	29 31.596	5 32 11.830	6 01 43.426
28	1873	Valley Junction, Wis. (N).	do	do	do	29 26.746	5 32 11.830	6 01 38.576
30	1874	Pontiac, Mich. (N)	Tr. 1874	do	do	0 57.516	5 32 11.830	5 33 09.346
31	1874	Sapier, Mich. (N)	do	do	do	1 03.786	5 32 11.830	5 33 15.616
32	1874	Flint, Mich. (N)	do	do	do	2 32.576	5 32 11.830	5 34 44.406
33	1874	St. Johns, Mich. (N).	do	do	do	6 02.616	5 32 11.830	5 38 14.446
34	1874	Corunna, Mich. (N).	do	do	do	4 16.426	5 32 11.830	5 36 28.256
35	1874	Ionia, Mich. (N)	do	do	do	8 03.406	5 32 11.830	5 40 15.236
36	1874	Grand Rapids, Mich. (N).	do	do	do	10 28.236	5 32 11.830	5 42 40.066
37	1875	Howell, Mich. (N)	Tr. 1875	do	do	3 31.076	5 32 11.830	5 35 42.906
38	1875	Lansing, Mich. (N).	do	do	do	6 01.436	5 32 11.830	5 38 13.266
39	1875	Charlotte, Mich. (N).	do	do	do	7 08.226	5 32 11.830	5 39 20.056
40	1875	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	Tonawanda, N.Y. (N).	Tr. 1875	16 38.491	5 32 11.830	5 15 33.339
41	1875	Hastings, Mich. (N).	Tr. 1875	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	8 57.346	5 32 11.830	5 41 09.176
42	1875	Marshall, Mich. (N).	do	do	do	7 39.396	5 32 11.830	5 39 51.226
43	1875	Jackson, Mich. (N)	do	do	do	5 26.246	5 32 11.830	5 37 38.076
44	1875	Kalamazoo, Mich. (N).	do	do	do	10 08.496	5 32 11.830	5 42 20.326
45	1875	Allegan, Mich. (N)	do	do	do	11 12.716	5 32 11.830	5 43 24.546
46	1875	Paw Paw, Mich. (N).	do	do	do	11 20.456	5 32 11.830	5 43 32.286
47	1875	Stanton, Mich. (N)	do	do	do	8 08.046	5 32 11.830	5 40 19.876
48	1875	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	Mannsville, N. Y. (N.)	Tr. 1875	27 56.343	5 32 11.830	5 04 15.487
49	1875	Newaygo, Mich. (N).	do	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	11 00.376	5 32 11.830	5 43 12.206

[1] Personal equation not eliminated.

[2] There is no No. 22.

TABLE XI.—*Final longitude differences and resulting longitudes, United States Lake Survey*—Continued

No. of difference	Year	Western station		Eastern station		Mean observed difference of longitude of reference points	Longitude of initial station (I)	Longitude of new station (N)
		Name (I=initial, N=new)	Reference point	Name (I=initial, N=new)	Reference point			
						h. m. s.	h. m. s.	h. m. s.
50	1876	Willow Springs, Ill. (N).	Tr. 1876	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	0 19 15.681	5 32 11.830	5 51 27.511
51	1876	Saginaw, Mich. (N).	do	do	do	3 39.336	5 32 11.830	5 35 51.166
52	1876	St. Louis, Mich. (N).	do	do	do	6 12.936	5 32 11.830	5 38 24.766
53	1876	Cairo, Ill. (N)	do	do	do	24 26.236	5 32 11.830	5 56 38.066
54	1877	Memphis, Tenn. (N).	Tr. 1877	do	do	28 01.396	5 32 11.830	6 00 13.226
55	1878	Rock Island, Ill. (N).	Tr. 1878	do	do	30 02.796	5 32 11.830	6 02 14.626
56	1878	Red Wing, Minn. (N).	do	do	do	37 56.076	5 32 11.830	6 10 07.906
57	1878	Louisiana, Mo. (N)	do	do	do	32 00.546	5 32 11.830	6 04 12.376
58	1879	Parkersburg (Olney), Ill. (N).	Tr. 1879	do	do	20 08.851	5 32 11.830	5 52 20.681
59	1880	Fort McDermit, Nev. (N).	Tr. 1880	do	do	[1]2 18 18.306	5 32 11.830	7 50 30.136
[2]60	1881	**Detroit, Mich. (N).**	**Coast and Geodetic Survey Tr. 1891.**	**Cambridge, Mass. (I).**	**Harvard College Observatory, dome.**	[4]47 46.784	4 44 31.046	5 32 11.830
61	1881	Toledo, Ohio (N)	Tr. 1881	**Detroit, Mich. (I)**	**Coast and Geodetic Survey Tr. 1891.**	1 58.166	5 32 11.830	5 34 09.996
62	1893	Sault Ste. Marie, Mich. (N).	Tr. 1893	Ann Arbor, Mich. (I).	M. C. 1861-1893	2 27.995	5 34 55.296	5 37 23.291

[1] Personal equation not eliminated. [2] No. 60=No. 130a. See Table X, p. 36. [4] Adjusted. See p. 36.

TABLE XII.—*Final longitude differences and resulting longitudes, United States Geological Survey*

No. of difference	Year	Western station		Eastern station		Mean observed difference of longitude of reference points	Probable error	Longitude of initial station (I)	Longitude of new station (N)
		Name (I=initial, N=new)	Reference point	Name (I=initial, N=new)	Reference point				
						h. m. s.	s.	h. m. s.	h. m. s.
1	1884	Oswego, Kans. (N)	Tr. 1884	**St. Louis, Mo. (I)**	**Coast and Geodetic Survey Tr. 1881-82.**	0 19 36.481	±0.054	6 00 49.256	6 20 25.737
2	1884	Elk Falls, Kans. (N).	do	do	do	23 55.801	±.054	6 00 49.256	6 24 45.057
3	1884	Fort Scott, Kans. (N).	do	do	do	18 00.620	±.053	6 00 49.256	6 18 49.876
4	1884	Springfield, Mo. (N).	do	do	do	12 20.009	±.054	6 00 49.256	6 13 09.265
5	1884	Bolivar, Mo. (N).	do	do	do	12 50.016	±.067	6 00 49.256	6 13 39.272
6	1885	Albuquerque, N. Mex. (N).	Tr. 1885	do	do	1 05 47.668	±.042	6 00 49.256	7 06 36.924
7	1889	Spearville, Kans. (N).	Tr. 1889	do	do	38 11.507	±.035	6 00 49.256	6 39 00.763
8	1889	Boise, Idaho (N)	do	do	do	1 44 03.106	±.039	6 00 49.256	7 44 52.362
9	1889	Cisco, Tex. (N)	do	do	do	35 06.541	±.037	6 00 49.256	6 35 55.797
10	1890	Sierra Blanca, Tex. (N).	Tr. 1890	do	do	1 00 36.501	±.022	6 00 49.256	7 01 25.757
11	1890	Rapid City, S. Dak. (N).	do	do	do	52 02.789	±.028	6 00 49.256	6 52 52.045
12	1892	Jamestown, N. Dak. (N).	Tr. 1892	do	do	33 59.518	±.03	6 00 49.256	6 34 48.774
13	1892	Guthrie, Okla. (N)	do	do	do	28 53.040	±.04	6 00 49.256	6 29 42.296
14	1894	Eugene, Oreg. (N)	Tr. 1894	**San Francisco, Calif. (I)**	**Lafayette Park, Coast and Geodetic Survey, Tr. 1882-1896.**	2 39.114	±.034	8 09 42.861	8 12 21.975
15	1895	Savanna, Okla. (N).	Tr. 1895	**St. Louis, Mo. (I)**	**Coast and Geodetic Survey Tr. 1881-82.**	22 32.179	±.017	6 00 49.256	6 23 21.435
16	1895	**San Francisco, Calif. (I).**	**Lafayette Park Coast and Geodetic Survey Tr. 1882-1896.**	Ellensburg, Wash. (N).	Tr. 1895	7 38.087	±.02	8 09 42.861	8 02 09.774
17	1895	**St. Louis, Mo. (I)**	**Coast and Geodetic Survey Tr. 1881-82.**	Tuscaloosa, Ala. (N).	do	10 37.428	±.044	6 00 49.256	5 50 11.828
18	1896	Sheridan, Wyo. (N).	Tr. 1896	**St. Louis, Mo. (I)**	**Coast and Geodetic Survey Tr. 1881-82.**	1 06 57.852	±.08	6 00 49.256	7 07 47.108
19	1896	Sioux Falls, S. Dak. (N).	do	do	do	26 04.748	±.04	6 00 49.256	6 26 54.004
20	1896	Spofford, Tex. (N)	do	do	do	40 49.243	±.028	6 00 49.256	6 41 38.499
21	1897	Hamilton, Mont. (N).	Tr. 1897	do	do	1 35 47.370	±.007	6 00 49.256	7 36 36.626
22	1897	Baker, Oreg. (N)	do	do	do	1 50 31.389	-------	6 00 49.256	7 51 20.645
23	1898	**St. Louis, Mo. (I)**	**Coast and Geodetic Survey Tr. 1881-82.**	Waverly, Tenn. (N).	Tr. 1898	9 38.798	-------	6 00 49.256	5 51 10.458

TABLE XIII.—*Final longitude differences and resulting longitudes, United States General Land Office*

No. of difference	Year	Western station		Eastern station		Mean observed difference of longitude of reference points	Probable error	Longitude of initial station (I)	Longitude of new station (N)
		Name (I=initial, N=new)	Reference point	Name (I=initial, N=new)	Reference point				
						h. m. s.	s.	h. m. s.	h. m. s.
1	1902	Red River, Tex. (N).	Tr. 1902	St. Louis, Mo. (I)	Coast and Geodetic Survey Tr. 1881-82.	0 39 11.988	±0.022	6 00 49.256	6 40 01.244
2	1903	Higgins, Tex. (N).	Tr. 1903	Red River, Tex. (I)	Tr. 1902-3	4.288	±.009	6 40 01.244	6 40 05.532
3	1903	Monahans, Tex. (N).	do	do	do	11 33.644	±.014	6 40 01.244	6 51 34.888
4	1903	Texline, Tex. (N).	do	do	do	12 03.128	±.009	6 40 01.244	6 52 04.372

TABLE XIV.—*Final longitude differences and resulting longitudes, various institutions*

No. of difference	Year	Western station		Eastern station		Mean observed difference of longitude of reference points	Probable error	Correction for adjustment	Adjusted difference of longitude of reference points	Longitude of initial station (I)	Longitude of new station (N)
		Name (I=initial, N=new)	Reference point	Name (I=initial, N=new)	Reference point						
						h. m. s.	s.	s.	h. m. s.	h. m. s.	h. m. s.
[1] 1	1883	**Montreal, Canada (N)**	**McGill College Observatory, Tr.**	**Cambridge, Mass. (I)**	**Harvard College Observatory, dome.**	0 09 47.549	±0.019	+0.039	0 09 47.588	4 44 31.046	[2] 4 54 18.634
2	1893	Washington, D. C. (N)	U. S. Naval Observatory, new site, center of clock room.	**Washington, D. C. (I)**	**U. S. Naval Observatory, old site, dome.**	0 03.670	±.012	−.039	0 03.631	5 08 12.153	5 08 15.784
3	1895	**Minneapolis, Minn. (I)**	**Tr. 1873–1915**	Madison, Wis. (N)	Washburn Observatory, M. C.	15 18.760	±.016			6 12 56.845	5 57 38.085
4	1898	Madison, Wis. (I)	Washburn Observatory, M. C.	Urbana, Ill. (N)	University of Illinois, 3-inch Tr. pier.	4 44.018	±.019			5 57 38.085	5 52 54.067
5	1908	Mare Island, Calif. (N)	Mare Island Naval Observatory, east pier, Tr. 1908.	Mount Hamilton, Calif. (I)	Lick Observatory meridian	2 30.74	±.01			8 06 34.895	8 09 05.635
6	1912	Washington, D. C. (I)	U. S. Naval Observatory, new site, center of clock room.	Camp Columbia (C. U.), Conn. (N).	East pier, Tr. 1912	15 21.748	±.010			5 08 15.784	4 52 54.036
7	1912	Washington, D. C. (I)	U. S. Naval Observatory, new site, center of clock room.	Flower Observatory, Pa. (N).	Flower Observatory, dome	7 08.96	±.02			5 08 15.784	[4] 5 01 06.824
8	1918	Baker, Oreg. (N)	Tr. 1918	Washington, D. C. (I)	U. S. Naval Observatory, new site, center of clock room.	[3] 2 43 07.23	±.01			5 08 15.784	7 51 23.014

[1] No. 1=No. 148a of Table X. See p. 37.
[2] See p. 37 of this publication. See also report for 1897, App. 2, pp. 219, 253, and 254.
[3] Not corrected for personal equation.
[4] From telegraphic signals only.

CHAPTER II.—LATITUDES

GENERAL STATEMENT

The astronomic latitude of a station is the angle between the plumb line and the plane of the Equator. It may also be defined as the declination of the zenith, or the elevation of the pole above the horizon of the station.

The zenith distance of a star when on the meridian is the difference between the latitude of the station of observation and the declination of the star. Therefore, the latitude of a station may be determined by measuring the absolute zenith distance of a star or by the measurement of the difference of the zenith distances of two stars.

A method of determining latitude by observations of transits of stars over the prime vertical with a prime vertical transit, first used by Bessel, is one of great accuracy but impracticable for field operations on account of the great loss of time occasioned by clouds interfering with obtaining corresponding sets of eastern and western transits. This method is explained in Chauvenet's Spherical and Practical Astronomy, Volume II, pages 238–271, and in Doolittle's Practical Astronomy, pages 348–377.

TALCOTT METHOD [1]

The method of determining latitude by the micrometer measurement with a zenith telescope of the small difference of zenith distances of two stars culminating on opposite sides of the zenith at about the same altitude and not far apart in time was developed by Capt. Andrew Talcott about 1834 and was introduced into the United States Coast and Geodetic Survey in 1846.

The Talcott method superseded all other methods for observing latitude. It is described in detail as developed and used by the United States Coast and Geodetic Survey in Special Publication No. 14. The present practice is to observe for latitude on one night only, using from 12 to 20 pairs of stars. A resulting probable error of $\pm 0''.10$ is considered as the standard to be attained.

The stars are in general not observed when off the meridian, but in case they are the correct sidereal time must be known in order that the observation may be reduced to the meridian. Any method of determining the local sidereal time described in this publication may be used for this purpose.

LATITUDE DETERMINATIONS BY OTHER ORGANIZATIONS

Other organizations which have determined latitude by the Talcott method and whose results are contained in this publication are: The United States Lake Survey, the United States Geological Survey, the United States General Land Office, the United States and Canada Boundary Commission, the Corps of Engineers of the United States Army (in connection with the survey west of the one hundredth meridian), and various institutions such as permanent observatories. Latitude determinations, which have not been included but to which it is thought desirable to call attention, are: determinations on the northern boundary of the United States, made between the years 1857 and 1861, referred to in United States Geological Survey Bulletin No. 174, page 27; determinations on the northern boundary of the United States, given in "Survey of the Northern Boundary of the United States, Lake of the Woods to the Summit of the Rocky Mountains," by the United States Northern Boundary Commission, pages 95–169; 20 determinations on the United States and Mexican boundary, published in the report of the International Boundary Commission, United States and Mexico, west of the Rio Grande, 1891–1896.

[1] See A question of priority in originating a very important astronomical method by John E. McGrath Jour. Royal Astro. Soc. of Canada, Jan.-Feb. 1914.

INSTRUMENTS

The United States Coast and Geodetic Survey has used a number of instruments for the determination of latitude. Among the first may be mentioned a 2-foot vertical circle, several 12-inch repeating, reflecting circles made by Troughton & Simms, and 6-inch and 10-inch repeating theodolites made by Gambey. The results with these instruments were not of an acceptable degree of accuracy.

A zenith sector constructed according to the design of G. B. Airy, astronomer royal of England, was used by the Coast and Geodetic Survey at 6 stations during the years 1847 to 1851 in the measurement of the absolute zenith distances of stars. Although the instrument gave the desired accuracy, it was impracticable for field observations on account of its great size, and it was not used after 1851. A description of a zenith sector may be found in Clarke's Geodesy, pages 182–185. Details of the latitude observations with this instrument are given in the United States Coast and Geodetic Survey Special Publication No. 4.

One of the best types of zenith telescopes used for latitude work by the Coast and Geodetic Survey is shown in Figure 7 and is described in Special Publication No. 14, page 104.

The first instruments used for latitude work by the Talcott method were a 45-inch zenith telescope together with a 26-inch Würdemann transit for the time observations. As rapidity as well as accuracy was required, the necessity for an instrument which could be used both for the determination of clock corrections and for latitude observations soon became apparent, and in 1858 George Davidson designed a modified transit. This instrument was adopted by the United States Coast and Geodetic Survey in 1867 and was known as the Davidson meridian telescope. It is described in the report for 1879, Appendix 7. A later type of this instrument is shown in Figure 8 and is described in Special Publication No. 14, page 8.

The meridian telescope was used for awhile as it combined all the essentials of a transit and a zenith telescope, affording a means for the accurate determination of clock corrections, the determination of latitude by the Talcott method, and the determination of the astronomic azimuth of a mark by observations on a close circumpolar star at any hour angle.

The transit instrument has also been used in latitude determinations by attaching to it a delicate level and an eyepiece micrometer. The Bamberg broken telescope transit in use since 1914 for latitude work is shown in Figure 9 and is described in Special Publication No. 35. The field practice with this instrument is further described in Special Publication No. 109.

TABLE XV.—*Instruments used in the determination of latitude*

UNITED STATES COAST AND GEODETIC SURVEY

No. of instrument	Name of instrument and maker	Year made or first used	Focal length	Approximate value of one turn of micrometer	Remarks
	Zenith telescopes				
			cm.	*″*	
1	Troughton & Simms	1847	117	46,47	]
2	do	1848	116	45,46	] ons at Honolulu.
3	do	1848	117	47,48	Remodeled in 1891 in Coast and Geodetic Survey shop.
4	do	1849	117	44,45	New micrometer in 1878. Reconstructed in 1891.
5	Würdemann	1850	118	41	
6	do	1854	66	76	
10	do	1855		40	
	Wanschaff				Property of Columbia University civil engineering department. Used at Camp Columbia, Conn.
		Before 1846		45	Property of Military Academy at West Point.
	Meridian telescopes				
1	Würdemann	1869	79	65	Furnished with new objective in 1878.
				64,66	Remodeled in 1893 in Coast and Geodetic Survey shop.
2	do	1874	79	64,66	New micrometer in 1894.
3	Kuebel	1876	80	64,65	Do.
7	Würdemann	1870	66	77,79,78	Constructed from old transit No. 7, in 1870. Three objectives. New micrometer in 1901.

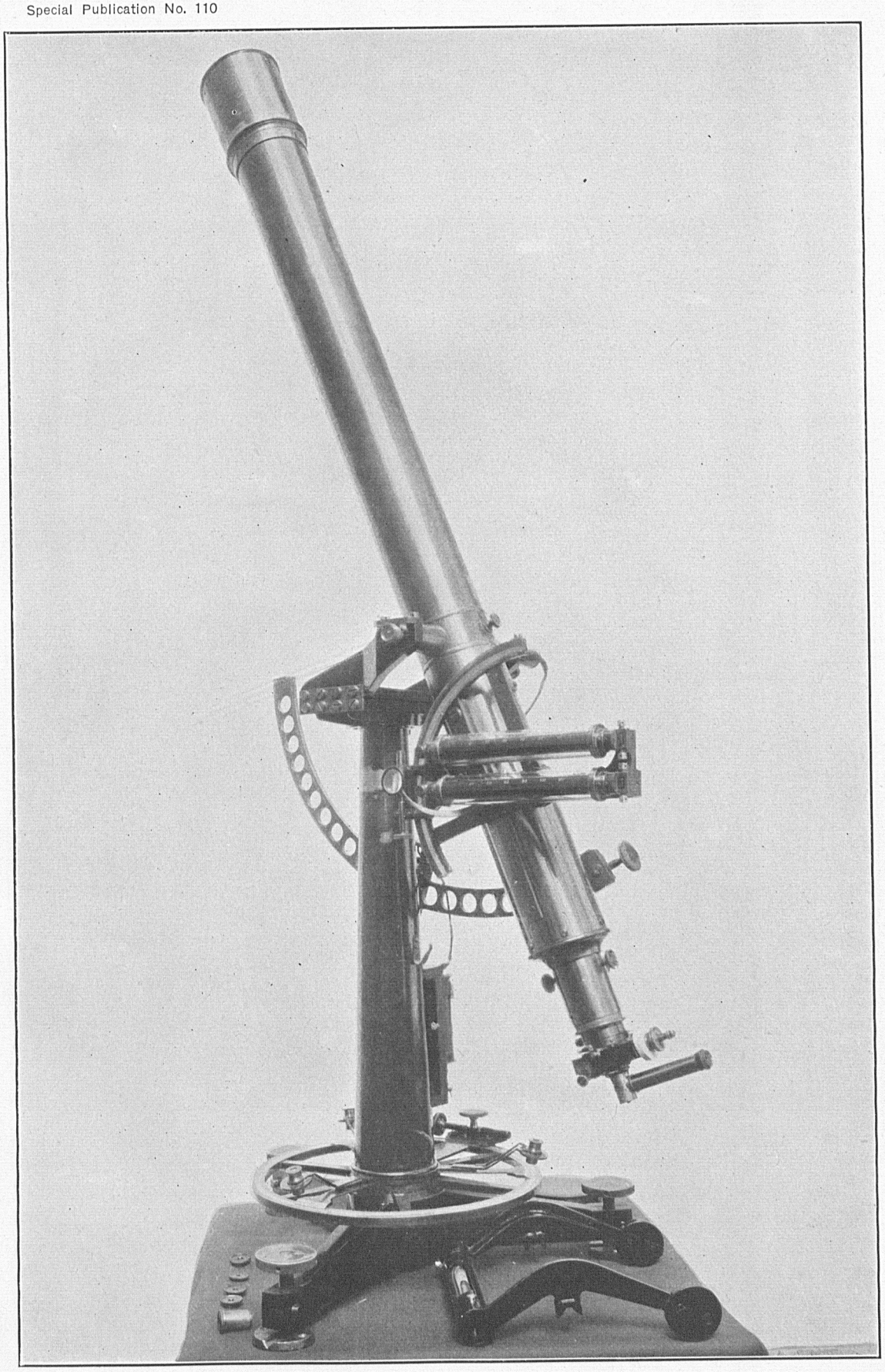


FIG. 7.—ZENITH TELESCOPE

This instrument was designed especially for the Talcott method of observing latitude

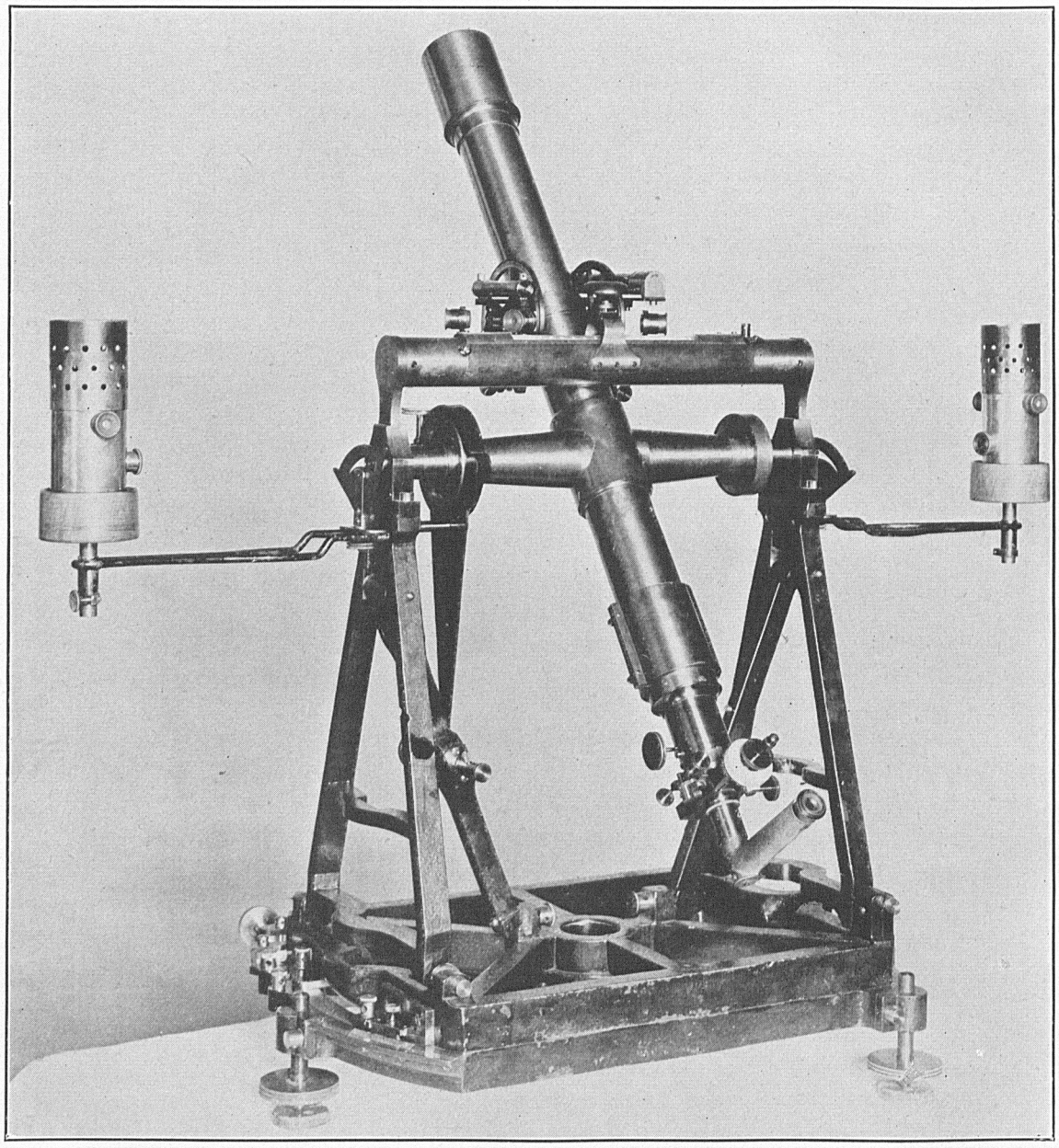


FIG. 8.—MERIDIAN TELESCOPE

This is one of the smaller instruments used for making time observations. It can also be used for latitude observations. The frame may be folded up for convenience in transportation

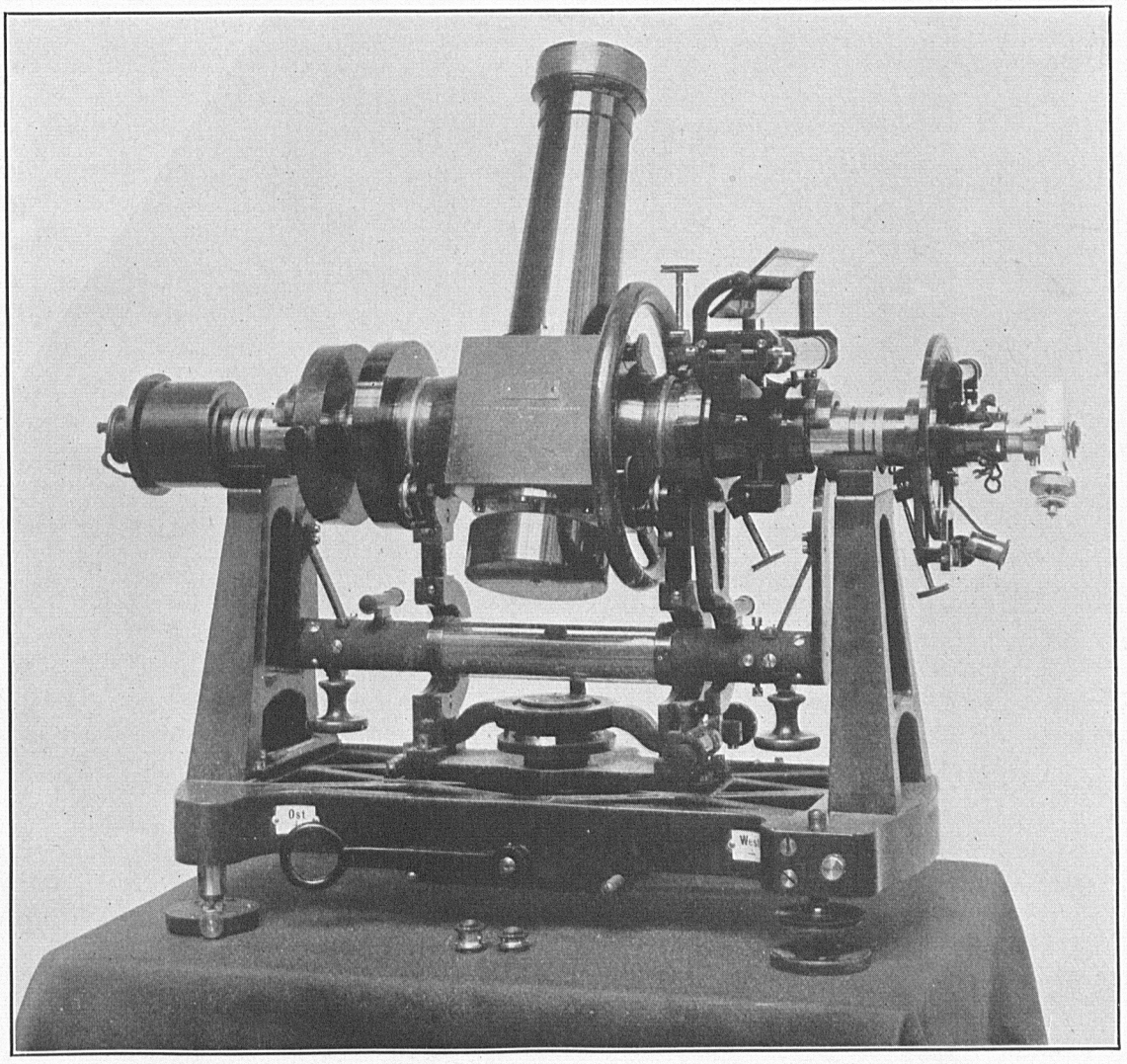


FIG. 9.—BROKEN-TELESCOPE TRANSIT EQUIPPED FOR LATITUDE OBSERVATIONS

The instrument is arranged for latitude observations by substituting a latitude micrometer for the longitude micrometer eyepiece and adding a level attachment and counterweight to the horizonal axis of the telescope. (Compare fig. 2)

TABLE XV.—*Instruments used in the determination of latitude*—Continued

UNITED STATES COAST AND GEODETIC SURVEY—Continued

No. of instrument	Name of instrument and maker	Year made or first used	Focal length	Approximate value of one turn of micrometer	Remarks
	Meredian telescopes—Contd.		*cm.*	"	
9	Würdemann	1870	64	101	
				81	New micrometer in 1893.
13	do	Before 1871	66	78	
16	Fauth & Co	Before 1881	78	67	
1944	do		89		Property of U. S. Naval Observatory. Used in eclipse expedition of 1918.
	Zenith sector				
	Troughton & Simms	Before 1850	117		For a detailed description, see Clarke's Geodesy, pp. 182-185.
	Prime vertical transit and Zenith telescope [1]				
	Transits				
2	Simms	1848	115	44	
4	Troughton & Simms	1848	119	41	Fitted for latitude observations in 1881; modified in 1890 in the Coast & Geodetic Survey shop.
6	do	1849	117	44	Fitted with delicate level and micrometer eyepiece for latitude work in 1881 in the Coast & Geodetic Survey shop.
20	Carl Bamberg	1914	67	79	Broken telescope transit.
21	do	1914	67	79	Do.
	UNITED STATES LAKE SURVEY				
	Zenith telescopes				
1	Würdemann	1852	61	69	
12	do	1858	81	64	See Professional Papers, Corps of Engineers, U. S. Army, No. 24, for a more detailed description of instruments.
18	do	1870		63	
19	do	1876	81	62	
	Transits				
1	Pistor & Martin	1848	61	85	
2	do	1874	61	83	
3					Property of U. S. Coast and Geodetic Survey. See longitude instruments, U. S. Coast and Geodetic Survey.
	UNITED STATES GEOLOGICAL SURVEY				
	Meridian telescopes				
20	Würdemann		65	81	See U. S. Geological Survey Bull. No. 49.
534	Saegmuller		69		See U. S. Geological Survey Bull. No. 307.
	UNITED STATES GENERAL LAND OFFICE				
	Zenith telescope				
	Würdemann		64	66	
	Meridian telescope				
	Würdemann		65	66	
	UNITED STATES AND CANADA BOUNDARY COMMISSION				
	Zenith telescope				
6					Property of U. S. Coast and Geodetic Survey. See Coast and Geodetic Survey Instruments.
	UNITED STATES ENGINEERS				
	Meridian telescopes				
16	Würdemann		66		
27	do		71		
28	do		91	40	

[1] Property of U. S. Naval Observatory. Used in determining the latitude of the new observatory in 1893-1896.

STAR CATALOGUES

It has been the practice of the United States Coast and Geodetic Survey in computing the mean places of stars in connection with latitude computations to use the best available star catalogues. For many latitudes observed between the years 1846 and 1871, improved star places were computed in 1869, 1870, and 1871, and introduced into the old computations. In 1898, 1899, and 1900, in connection with the preparation for publication of the Transcontinental Arc of Triangulation, Special Publication No. 4, and the Eastern Oblique Arc, Special Publication No. 7, the computations of all latitudes connected with these arcs were examined, and wherever based on the older catalogues and less accurate methods of computing, new star places were introduced for all pairs of stars, where the residuals indicated an error in the mean places. The mean places of 106 stars were thus revised. In 56 cases the required correction was found to be positive and in 50 cases negative. The largest plus correction was 7.″7 and the largest minus 5.″9; the mean of all corrections without regard to sign was 1.″01 and the mean with regard to sign was +0.″18. The above facts indicate that the defects in the old north polar distances are in the main accidental. See Special Publication No. 4, pp. 622–625.

The following catalogues have been used by the United States Coast and Geodetic Survey. The date given is that to which observations in the catalogue are reduced.

1755. Auwers's Bradley.
1790. Fedorenko.
1800. D'Agelet (Gould).
1800. Bailey's Lalande.
1800. Piazzi.
1810. Groombridge.
1825. Weisse's Bessel.
1830. Cambridge.
1830. Pond.
1830. Struve.
1830. Argelander, Abo.
1836.–1850. Rümker.
1840. Armagh.
1840. Cape.
1840.–1845. Greenwich, 12-year.
1845. Pulkowa
1845. Radcliffe.
1845.–1860.–1875. Paris.
1850. Greenwich, 6-year.
1850. Cape.
1855. Bonn.
1855. Pulkowa.
1860. Cape.
1860. Greenwich, 7-year.
1860. Radcliffe.
1860. Washington, Frisby's Yarnall.
1862.–1863.–1864. Radcliffe.
1864. Greenwich, 7-year.
1865. Brussels.
1865. Pulkowa.
1870. Glasgow.
1870. Melbourne.
1870. Leiden.
1872. Greenwich, 9-year.
1875. Auwers's Fundamental.
1875. Armagh.
1875. Cordoba.
1875. Rome.
1875. Romberg.
1875. Harvard.
1880. Cape.
1880. Greenwich, 10-year.
1880. Ann Arbor (M. S.)
1885. Pulkowa.
1890. Greenwich, 5-year.
1890. Radcliffe.
1890. Glasgow.
1890. Cincinnati.

Greenwich annual volumes, 1887 to 1895, inclusive, and Edinburgh observations by Henderson and Smyth of various epochs.

For latitudes observed in 1908 and 1909 the Boss Preliminary General Catalogue of 6,188 stars for the epoch 1900 was largely used. From 1910 to the present time the Boss catalogue has superseded all others.

The following are catalogues used by other organizations:

United States Lake Survey and the Corps of Engineers, United States Army:
- Safford catalogue of 981 stars.
- Safford catalogue of 2,018 stars.
- British Association catalogue.
- Coast and Geodetic Survey catalogue, 1878.
- German catalogue of 539 stars.
- American Ephemeris and Nautical Almanac.

United States Geological Survey:
- Safford catalogue of 2,018 stars.
- Coast and Geodetic Survey catalogue, 1878.
- Berliner Jahrbüch.
- American Ephemeris and Nautical Almanac.

United States General Land Office:
- Safford, 1875.
- Safford, 1892.
- Berliner Jahrbüch, 1901.
- American Ephemeris and Nautical Almanac.

VARIATION OF THE POLE

A correction is necessary to reduce each observed astronomic longitude, latitude, and azimuth to the mean position of the pole.

The correction to a difference of longitude for variation of the pole is quite small, as the corrections at the two stations between which the difference is determined are in general about the same. For 84 differences determined in the United States between the years 1890 and 1912, the largest correction to any one difference is +0.″06 and the mean of the corrections to all differences is 0.″00. Since the corrections are so small they have not been applied to observed differences of longitude.

It has been found that the correction to an observed latitude for variation of the pole is often several times the probable error of a precise measure and therefore can not be neglected where great refinement is required. For geodetic purposes it is thought that this correction might be neglected, but it has been computed and applied for many of the United States Coast and Geodetic Survey stations and for a few of those of other organizations if connected with a precise arc of triangulation such as the transcontinental or oblique arc.

The corrections for variation of the pole, which were computed for latitudes observed before 1890, were derived by means of Doctor Chandler's expressions contained in Gould's Astronomical Journal, No. 446, October, 1898. (See the Transcontinental Triangulation, Special Publication No. 4, pp. 733–734). For latitudes observed between the years 1890 and 1912, the corrections were derived from the coordinates of the instantaneous pole of rotation with reference to the average pole as published in the following, the best available data for a given date being used: Doctor Albrecht's report for 1898 (see Bericht über den Stand der Erforschung der Breiten-Variation, Zentral Bureau der Internationalen Erdmessung, Berlin, 1898, and The Transcontinental Triangulation, pp. 733–734) and definitive values of the coordinates of the pole as given in Resultate des Internationalen Breitendienstes, Bände III, IV, V, Zentral Bureau der Internationalen Erdmessung, by Th. Albrecht and B. Wanach. No corrections to latitudes observed later than 1912 have been computed.

The correction to an observed astronomic azimuth due to the variation of the pole is generally less than the probable error of observation and is therefore not so important. This correction has, however, been computed for many azimuth stations. The same data were used as for the latitudes described above.

TABLES OF OBSERVED LATITUDES

All latitudes included in this publication were determined by the Talcott method, except at six stations where the zenith sector was used and at two stations where the latitude was determined by the method of prime vertical transits.

The latitudes at three stations have been rejected on account of defects in the observations. They are as follows: Fort Smith, Ark., Texarkana, Ark., and Jellico, Tenn.

In the following tables Nos. XVI to XXI contain the data for the latitudes determined by the United States Coast and Geodetic Survey, the United States Lake Survey, the United States Geological Survey, the United States General Land Office, the United States and Canada Boundary Commission, and the Corps of Engineers, United States Army, respectively.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [2]
ALABAMA						° ′ ″	″	″	″	° ′ ″	
Aurora	F. P. Webber	1877, May 28–June 20.	Z. T. No. 2	133	26	34 08 47.45	±0.12	−0.07	+0.25	34 08 47.63	1879, 1898
Coon	O. B. French	1898, May 21–26	do	61	14	31 14 47.82	±.05	−.01	−.07	31 14 47.74	1900
Eufaula	E. Goodfellow	1860, January, February.	Z. T. No. 5	162	33	31 53 40.91	±.08				1873
Fort Morgan	R. H. Fauntleroy	1847, Mar. 23–Apr. 30.	Z. T. No. 1	166	19	30 13 47.89	±.03	.00	−.01	30 13 47.88	1871, 1898
Kahatchee	O. B. French	1898, June 3–9	Z. T. No. 2	71	19	33 13 39.90	±.06	−.06	−.10	33 13 39.74	1900
Lower Peach Tree	E. Goodfellow	1857, Apr. 4–16	Z. T. No. 5	95	22	31 50 21.19	±.10	−.02	−.17	31 50 21.00	1874, 1898
Madison	O. B. French	1914, Dec. 1, 7	Tr. No. 20	15	15	34 42 08.95	±.07	−.03		34 42 08.92	1914
Mobile	E. Goodfellow	1856–57, Dec. 11–Jan. 3.	Z. T. No. 5	258	43	30 41 33.42	±.06	.00	+.10	30 41 33.52	1872, 1898
Montgomery	G. W. Dean	1856, Mar. 22, 28	do	181	40	32 22 45.41	±.04	−.01	−.16	32 22 45.24	1873, 1898
Perry	W. H. Burger	1907, Jan. 7, 8	Z. T. No. 2	15	15	32 45 34.96	±.06	−.03	−.12	32 45 34.81	1907
Smithers	do	1907, Mar. 4	do	10	10	34 48 54.80	±.13	−.07	.00	34 48 54.73	1907
Tanyard	J. B. Boutelle; C. O. Boutelle	1878, December	Z. T. No. 5	139	29	34 39 13.49	±.11	−.06		34 39 13.43	1881
ARIZONA											
Azimuth (U. S. G. S.)	C. V. Hodgson	1914, Aug. 1	Z. T. No. 4	18	18	33 22 08.37	±.05	−.19		33 22 08.18	1914
Ehrenberg (U. S. G. S.)	do	1914, Aug. 14	do	18	18	33 36 11.20	±.07	−.02		33 36 11.18	1914
Harquahalla	do	1914, Aug. 10	do	19	19	33 48 38.17	±.05	−.27		33 48 37.90	1914
Kofa	do	1914, Aug. 17	do	18	18	33 21 27.18	±.06	−.23		33 21 26.95	1914
Maricopa	C. H. Sinclair	1899, Oct. 24, 25, 26	Z. T. No. 6	50	18	33 03 29.06	±.13	−.06	−.09	33 03 28.91	1899
Mohawk	do	1914, Aug. 20	do	14	14	32 35 17.34	±.08	−.13		32 35 17.21	1914
Nogales	G. R. Putnam; O. B. French	1892, April	Z. T. No. 6	86	19	31 20 04.53	±.05	−.18	−.08	31 20 04.27	1894
Number Three (U. S. G. S.)	C. V. Hodgson	1914, July 28, 30	Z. T. No. 4	17	17	33 26 14.78	±.06	−.08		33 26 14.70	1914
Pantano railroad station (U. S. G. S.).	C. V. Hodgson	1914, July 9	Z. T. No. 4	17	17	31 59 58.92	±.08	−.16		31 59 58.76	1914
Parker School (U. S. G. S.)	do	1914, Aug. 12	do	18	18	34 08 58.05	±.07	−.02		34 08 58.03	1914
Pima Church (U.S.G.S.)	do	1914, June 26	do	18	18	32 53 30.04	±.10	−.14		32 53 29.90	1914
Pine	do	1914, Oct. 16	do	18	18	34 45 58.25	±.07	−.35		34 45 57.90	1914
Pusch (U. S. G. S.)	do	1914, July 19, 21	do	19	19	32 22 16.34	±.08	−.25		32 22 16.09	1914
Sawmill (U. S. G. S.)	do	1914, July 4	do	17	17	31 55 03.30	±.08	−.42		31 55 02.88	1914
Whitetank	C. V. Hodgson	1914, Aug. 6	Z. T. No. 4	19	19	33 33 57.10	±.07	−.19		33 33 56.91	1914
Williams Laplace	G. D. Cowie	1920, Dec. 22	Tr. No. 20	14	14	35 15 07.05	±.06	−.33		35 15 06.72	1920
Yuma	O. B. French; G. R. Putnam	1892, March, April	Z. T. No. 6	206	34	32 43 34.75	±.05	−.01	−.06	32 43 34.68	1892
ARKANSAS											
Hartford	W. B. Fairfield	1920, Sept. 10	Tr. No. 21	15	15	35 01 10.99	±.06	−.03		35 01 10.96	1920
Helena	E. Smith; C. Tappan	1878, May	M. T. No. 13.	42	13	34 31 50.83	±.07				1880
Little Rock	F. H. Parsons	1882, October, November.	Z. T. No. 2	71	15	34 44 56.61	±.10	−.01		34 44 56.60	1887
Do	C. H. Sinclair	1893, Feb. 25–Mar. 5	Z. T. No. 6	16	16	34 44 56.20	±.09	−.01	+.10	34 44 56.29	1917
CALIFORNIA											
Arguello	O. H. Tittmann	1876, January	M. T. No. 2	106	23	34 34 53.55	±.12	−.11		34 34 53.44	1877
Avila	G. Davidson	1874, Mar. 16	Z. T. No. 1	13	13	35 10 32.74	±.30	−.01		35 10 32.73	1875
Bodega	do	1853, July 9	Z. T. No. 3	12	12	38 18 20.21	±.21	−.04	−.06	38 18 20.11	1870, 1898
Bucksport	do	1863, July, August	do	18	18	40 46 37.62	±.21				1870
Butte	C. V. Hodgson	1914, Sept. 11	Z. T. No. 4	17	17	33 33 38.70	±.08	−.21		33 33 38.49	1914
Calexico (U. S. G. S.)	do	1914, Aug. 31	do	18	18	32 39 56.06	±.06	.00		32 39 56.06	1914
Cape Mendocino	G. Davidson	1869, Apr. 26	Z. T. No. 1	11	11	40 26 16.21	±.18	−.03		40 26 16.18	1871
Castle Mount	P. A. Welker	1885, Oct. 6–13	M. T. No. 16.	221	31	35 56 19.79	±.09	−.22		35 56 19.57	1905
Colorado River, Von Schmidt's east latitude post.	C. H. Sinclair	1893, May	Z. T. No. 6	87	18	35 00 15.02	±.08				1893
Corning	W. H. Burger	1908, May 16	Z. T. No. 2	11	11	39 55 38.16	±.12	−.02	+.09	39 55 38.23	1908
Crescent City	G. Davidson	1853, Aug. 5	Z. T. No. 3	17	17	41 44 43.27	±.29	.00		41 44 43.27	1870
Cuyamaca	C. V. Hodgson	1914, Sept. 2	Z. T. No. 4	18	18	32 56 44.86	±.07	−.31		32 56 44.55	1914
Dominguez Hill	G. Davidson	1870, February, March.	Z. T. No. 1	218	39	33 51 54.98	±.08				
Do	do	do	M. T. No. 1	149	37	33 51 55.36	±.08				
Dominguez Hill, adopted value.						33 51 55.18	±.15	.00		33 51 55.18	1875
Gaviota	O. H. Tittmann	1875, October	M. T. No. 2	110	21	34 29 55.90	±.09	−.12		34 29 55.78	1877
Gazelle	W. H. Burger	1908, May 29, June 3.	Z. T. No. 2	11	11	41 31 41.13	±.09	−.14	+.13	41 31 41.12	1908
Harbor	do	1908, Mar. 7, 8	do	15	15	32 59 57.79	±.07	.00	−.13	32 59 57.66	1908
Haven's Anchorage	G. Davidson	1853, July 10	Z. T. No. 3	15	15	38 47 59.57	±.12				1870
Hepsedam	P. A. Welker	1885, Dec. 12–23	M. T. No. 16.	228	30	36 18 42.38	±.07	−.22		36 18 42.16	1905

[1] A few of these latitudes have been determined by other organizations or institutions.
[2] The latitude of each station depends upon the best available catalogues at the date given. See p. 50.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey*[1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year[1]
CALIFORNIA—continued						° ′ ″	″	″	″	° ′ ″	
Lake Tahoe, southeast end.	C. H. Sinclair	1893, Aug. 16-20	Z. T. No. 6	108	22	38 57 19.76	±0.06	−0.32	−0.07	38 57 19.37	1894
Los Angeles	do	1892, Feb. 5-11	do	64	15	34 02 44.21	±.09	.00	+.04	34 02 44.25	1901
Los Angeles northwest base.	J. J. Gilbert	1890, June 11-14	M. T. No. 1	30	11	33 54 58.11	±.48	.00	−.10	33 54 58.01	1909
Lospe	P. A. Welker	1883, May 18-26	M. T. No. 16.	199	29	34 53 32.89	±.08	−.08		34 53 32.81	1901
Marysville	C. H. Sinclair	1898, May 28, June 2.	M. T. No. 1	61	14	39 08 12.48	±.06	.00	−.21	39 08 12.27	1898
Mendocino City	G. Davidson	1853, July 11	Z. T. No. 3	17	17	39 18 05.56	±.12	.00	−.06	39 18 05.50	1870, 1898
Mocho	P. A. Welker	1887, Sept. 18-26	M. T. No. 16.	188	27	37 28 36.94	±.05	−.21	−.02	37 28 36.71	1892
Monticello	J. S. Lawson	1880, Oct. 3-13	Z. T. No. 1	195	31	38 39 46.46	±.09	−.16	−.04	38 39 46.26	1886, 1898
Monument No. 28, California-Nevada boundary.	C. V. Hodgson	1914, Sept. 26	Z. T. No. 4	17	17	38 37 46.27	±.06	−.26		38 37 46.01	1914
Monument No. 41, California-Nevada boundary.	do	1914, Sept. 28	do	18	18	38 16 25.30	±.04	−.41		38 16 24.89	1914
Monument No. 59, California-Nevada boundary.	do	1914, Oct. 1	do	17	17	37 54 13.78	±.05	−.30		37 54 13.48	1914
Monument No. 74, California-Nevada boundary.	do	1914, Oct. 3	do	18	18	37 29 39.89	±.08	−.24		37 29 39.65	1914
Monument No. 88, California-Nevada boundary.	do	1914, Oct. 6	do	18	18	37 03 12.04	±.07	−.22		37 03 11.82	1914
Monument No. 97, California-Nevada boundary.	do	1914, Oct. 8	do	16	16	36 36 38.37	±.10	−.16		36 36 38.21	1914
Monument No. 120, California-Nevada boundary.	do	1914, Oct. 11	do	17	17	35 47 07.12	±.10	−.13		35 47 06.99	1914
Monument No. 129, California-Nevada boundary.	do	1914, Oct. 12	do	17	17	35 26 35.94	±.09	−.25		35 26 35.69	1914
Mount Conness	F. Morse, J. J. Gilbert, I. Winston	1890, Aug. 13-Sept. 5.	Z. T. No. 1	288	31	37 57 56.44	±.06	−.64	+.18	37 57 55.98	1894
Mount Diablo	W. Eimbeck	1876, July 27-Aug. 6.	do	120	22	37 52 49.63	±.06	−.20	+.17	37 52 49.60	1886, 1898
Mount Hamilton	C. H. Sinclair	1888, Nov. 21-28	M. T. No. 2	74	27	37 20 29.10	±.17	−.21	−.04	37 20 28.85	1890
Mount Helena	W. Eimbeck	1876, Nov. 7-20	Z. T. No. 1	123	23	38 40 01.05	±.07	−.22	+.22	38 40 01.05	1886, 1898
Mount Lola	B. A. Colonna	1879, July 3-9	do	155	25	39 25 58.00	±.07	−.47	−.16	39 25 57.37	1886, 1898
Mount Tamalpais	J. F. Pratt	1882, Sept. 12-26	do	189	28	37 55 19.08	±.08	−.13	+.23	37 55 19.18	1886, 1898
Mount Toro	F. Morse	1885, January, February.	do	194	32	36 31 0.52	±.08	−.18		36 31 40.34	1886
Needles	C. H. Sinclair	1889, June	M. T. No. 2	69	21	34 50 17.90	±.14	−.03		34 50 17.87	1890
Do	do	1895, Feb. 8-15	Z. T. No. 6	66	14	34 50 18.51	±.09	−.02	−.10	34 50 18.39	1920
Needles, adopted value of longitude station.										34 50 18.39	
New San Miguel	O. H. Tittmann	1873, October, November.	M. T. No. 1	182	32	34 02 21.59	±.08	−.04		34 02 21.55	1875
Pine Hill	W. H. Burger	1908, May 8	Z. T. No. 2	11	11	38 43 04.61	±.06	−.10	+.06	38 43 04.57	1908
Point Arena	G. Davidson	1870, May 26	M. T. No. 1	10	10	38 55 10.34	±.19	.00	−.18	38 55 10.16	1872, 1898
Point Conception	do	1850, August, September.	Z. T. No. 3	306	49	34 26 56.34	±.05	.00		34 26 56.34	1870
Point Pinos	J. Rockwell	1851, February	do	230	48	36 37 59.48	±.06	.00		36 37 59.48	1870
Point Reyes	G. Davidson	1853, Feb. 6-8	do	24	17	37 59 33.62	±.13	−.07	+.07	37 59 33.62	1870, 1898
Prisoners Harbor	do	1852, Apr. 2	do	7	7	34 01 09.43	±.24				1870
Red Bluff	do	1854, March, April, May.	do	281	84	40 44 40.16	±.05	.00		40 44 40.16	1870
Redding	W. H. Burger	1908, May 25	Z. T. No. 2	12	12	40 34 07.91	±.00	−.03	+.12	40 34 08.00	1908
Rocky Butte	P. A. Welker	1885, Jan. 22-31	M. T. No. 16	196	29	35 39 44.12	±.06	−.17		35 39 43.95	1905
Ross Mountain	A. T. Mosman	1859-60, Dec. 27-Jan. 28.	Z. T. No. 3	437	53	38 30 10.00	±.04	−.11	+.07	38 30 09.96	1872, 1898
Round Top	B. A. Colonna	1879, Aug. 23-29	Z. T. No. 1	140	24	38 39 46.89	±.08	−.53	−.09	38 39 46.27	1886, 1898
San Buenaventura	G. Davidson	1870, Jan. 7-22	do	323	51	34 15 48.27	±.08	.00		34 15 48.27	1875
San Diego	do	1851, March, April, May.	Z. T. No. 3	302	57	32 41 57.65	±.05	−.01		32 41 57.64	1870
Do	O. B. French	1892, March	Z. T. No. 6	103	26	32 43 20.80	±.06	−.01	−.05	32 43 20.74	1894
San Francisco, Lafayette Park.	G. Davidson	1888, Jan. 6-Feb. 24.	Z. T. No. 1	310	38	37 47 28.08	±.04	−.02	−.06	37 47 28.00	1891
Do	do	1891-92, May, 1891-August, 1892.	Z. T. Nos. 1 and 3.	6,768		37 47 28.33	±.01	−.02		37 47 28.31	1894
San Francisco, Presidio (old).	do, J. Rockwell	1852, Jan. 28-Feb. 10.	Z. T. No. 3	336	68	37 47 35.98	±.04	−.02	.00	37 47 35.96	1870, 1898
San Francisco, Presidio (new).	O. B. French	1896, Nov. 5-13	do	155	27	37 47 48.22	±.05	−.02	+.15	37 47 48.35	1898

[1] See footnotes on p. 52.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
CALIFORNIA—continued						° ′ ″	″	″	″	° ′ ″	
San Francisco, Washington Square.	W. Eimbeck	1873, July 1	M.T.No.1	5	5	37 47 56.97	±0.66	0.00	−0.07	37 47 56.90	1873, 1898
San Jacinto	C. V. Hodgson	1914, Sept. 7	Z. T. No. 4	16	16	33 49 05.92	±.04	−.52		33 49 05.40	1914
San Luis Obispo	G. Davidson	1852, Apr. 15	Z. T. No. 3	12	12	35 10 37.25	±.28	.00		35 10 37.25	1870
San Nicolas	do	1852, June 11	do	7	7	33 14 12.27	±.24				1870
Do	W. H. Burger	1908, Mar. 12	Z. T. No. 2	13	13	33 16 26.24	±.06	.00	−.13	33 16 26.11	1908
San Pedro	G. Davidson	1852, Apr. 23	Z. T. No. 3	13	13	33 43 18.80	±.15	.00		33 43 18.80	1870
San Simeon	do	1852, Apr. 14	do	6	6	35 38 24.38	±.48	.00		35 38 24.38	1875
Do	do	1874, Mar. 12	Z. T. No. 1	9	9	35 38 19.59	±.22	−.01		35 38 19.58	1875
Santa Anna	F. Morse	1885, Nov. 26–Dec. 5.	do	107	26	36 54 15.84	±.04	−.18		36 54 15.66	1905
Santa Barbara	G. Davidson	1852, Apr. 18	Z. T. No. 3	9	9	34 24 24.69	±.35				1870
Do	do	1869, October, November.	Z. T. No. 1	336	46	34 23 59.30	±.06	−.02		34 23 59.28	1870
Santa Catalina Island	do	1852, June 18	Z. T. No. 3	9	9	33 26 35.19	±.22	.00		33 26 35.19	1870
Santa Cruz	do	1852, Apr. 10	do	7	7	36 57 27.24	±.25	−.02		36 57 27.22	1870
Santa Cruz west	O. H. Tittmann	1874, January	M.T.No.1	189	35	34 04 28.07	±.09	−.03		34 04 28.04	1876
Santa Lucia	B. A. Colonna	1880, January	do	14	7	36 08 41.01	±.25	−.28		36 08 40.73	1881
Do	F. Morse	1885, Oct. 16–22	Z. T. No. 1	192	38	36 08 38.08	±.04	−.28		36 08 37.80	1901
Santa Lucia, adopted value.										36 08 37.80	
Shelter Cove	G. Davidson	1853, July 15	Z. T. No. 3	13	13	40 01 15.06	±.24				1870
Soledad	F. Morse	1899, Jan. 14–20	M.T.No.1	107	20	32 50 21.82	±.06	−.04	+.13	32 50 21.91	1905
Sulphur Peak	G. Davidson	1859, Sept. 8–28	Z. T. No. 3	341	48	38 45 44.57	±.04	−.18	+.03	38 45 44.42	1872, 1898
Summit	B. A. Colonna	1878, June	M.T.No.1	94	21	39 19 00.12	±.15	−.36		39 18 59.76	1878
Tepusquet	P. A. Welker	1882, Dec. 5–11	M. T. No. 16.	124	18	34 54 26.85	±.05	−.16		34 54 26.69	1901
Trinidad	G. Davidson	1853, Aug. 3	Z. T. No. 3	13	13	41 03 20.03	±.17				1870
Ukiah	C. H. Sinclair	1897, Nov. 10–14	M.T.No.1	85	18	39 08 54.40	±.05	−.04	+.23	39 08 54.59	1898
Vaca	J. S. Lawson	1880, Nov. 4–11	Z. T. No. 1	221	32	38 22 23.43	±.06	−.12	−.04	38 22 23.27	1886, 1898
Wilson Peak	E. Smith	1905, Dec. 24–29	M.T.No.3	46	16	34 12 55.07	±.06	−.28	+.02	34 12 54.81	1906
Yolo northwest base	E. F. Dickins	1880, Aug. 28–Sept. 3.	Z. T. No. 1	186	27	38 40 37.29	±.07	−.01	−.03	38 40 37.25	1886, 1898
Yolo southeast base	J. J. Gilbert	1880, July 24–30	do	181	26	38 31 34.58	±.07	.00	−.03	38 31 34.55	1886, 1898
COLORADO											
Adobe	O. H. Tittmann	1881, July 28–Aug. 4.	Z. T. No. 4	82	20	38 40 37.53	±.07	−.26	+.15	38 40 37.42	1886, 1898
Brighton	C. V. Hodgson	1913, Aug. 17	do	18	18	40 00 03.20	±.06	−.26		40 00 02.94	1913
Colorado Springs	E. Smith	1873, Aug. 30–Sept. 11.	M. T. No. 13.	68	14	38 50 00.34	±.12	−.31	−.05	38 49 59.98	1875, 1898
Denver	do	1873, August	do	68	14	39 45 21.71	±.12				1875
Dewey	C. V. Hodgson	1913, Aug. 20	Z. T. No. 4	18	18	40 30 19.78	±.08	−.25		40 30 19.53	1913
Elbert	do	1913, July 30, 31	do	17	17	39 14 02.76	±.10	−.30		39 14 02.40	1913
El Paso east base	O. H. Tittmann	1879, Sept. 25–Oct. 3.	M. T. No. 3.	73	15	38 57 16.90	±.10	−.34	−.06	38 57 16.50	1881, 1898
Grand Junction	C. H. Sinclair	1886, July 18–27	Tr. No. 4	68	22	39 03 59.30	±.07	−.24	−.11	39 03 59.04	1895
Gunnison	J. Nelson	1893, Oct. 9–11	M. T. No. 3.	44	15	38 32 44.86	±.10	−.39	−.08	38 32 44.39	1896
Loveland	C. V. Hodgson	1913, Aug. 14, 15	Z. T. No. 4	15	15	40 24 11.05	±.11	−.26		40 24 10.79	1913
Morrison	do	1913, Aug. 2, 3	do	18	18	39 40 12.08	±.07	−.41		39 40 11.67	1913
Mount Ouray	R. L. Faris	1894, July 7–23	M. T. No. 3.	84	22	38 25 18.65	±.08	−.71	+.06	38 25 18.00	1896
Pikes Peak	do	1895, July 19–Aug. 4.	Z. T. No. 6	88	20	38 50 27.89	±.09	−.72	+.11	38 50 27.28	1896
Tavaputs	P. A. Welker	1891, Oct. 4–9	M. T. No. 3.	154	26	39 32 17.35	±.03	−.45	+.22	39 32 17.12	1896
Treasury Mountain	J. Nelson	1893, Sept. 4–10	do	93	19	39 00 48.01	±.08	−.69	−.07	39 00 47.25	1896
Trinidad	E. Smith	1873, August, September.	M. T. No. 13.	88	19	37 10 13.78	±.08				1875
Uncompahgre	J. Nelson; R. L. Faris	1895, Sept. 5–11	M. T. No. 3.	88	18	38 04 16.39	±.08	−.73	+.08	38 04 15.74	1896
CONNECTICUT											
Camp Columbia (C. U.)	W. Bowie; C. A. Mourhess	1913, July 31, Aug. 4, 5.	Wanschaff Z. T.	25	25	41 40 38.93	±.07	−.06		41 40 38.87	1913
Sandford	E. Goodfellow	1862, Sept. 11–Oct. 8.	Z. T. No. 5	161	35	41 27 40.47	±.08	−.05	+.15	41 27 40.57	1871, 1898
DELAWARE											
Cape Henlopen	O. B. French	1897, Sept. 6–10	M.T.No.9.	64	20	38 46 40.00	±.05	.00	+.07	38 46 40.07	1897
Dover	C. H. Sinclair	1897, May 17–22	Z. T. No. 6	67	17	39 09 13.62	±.06	.00	−.15	39 09 13.47	1898
DISTRICT OF COLUMBIA											
Causten	G. W. Dean	1851, May 6–June 13.	Z. S. No. 1	366	[2] 70	38 55 32.18	±.06	−.02	−.14	38 55 32.02	1869, 1898
Washington, Four-and-one-half Street.	G. W. Stevens; C. A. Schott.	1852, September, October, November.	Z. T. No. 5	103	33	38 53 30.70	±.11	.00		38 53 30.70	1870

[1] See footnotes on p. 52.

[2] No. of stars.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
DISTRICT OF COLUMBIA—continued						° ′ ″	″	″	″	° ′ ″	
Washington, Georgetown College Observatory.		1846, September, October.	Simms Tr. C.	14		38 54 25.80		−0.01		38 54 25.79	(4)
Washington, Seaton	L. F. Pourtales	1850, June 24-29	Z. T. No. 5	24	16	38 53 25.20	±0.15	.00	−0.08	38 53 25.12	1869, 1898
Washington, U. S. Coast and Geodetic Survey office.	E. G. Fischer	1891, July 30-September 1.	M.T.No.9	107	20	38 53 07.51	±.06	.00	−.13	38 53 07.38	1893
Do	do	1892, July 25-August 12	do	107	19	38 53 07.46	±.06	.00	−.16	38 53 07.30	1893
Do	do	1894, Aug. 1-22	Z. T. No. 4	115	19	38 53 07.31	±.04	.00	+.05	38 53 07.36	1899
Washington, U. S. Coast and Geodetic Survey office, adopted value.							±.02			38 53 07.35	
Washington, U. S. Naval Observatory (old site, dome).		1861-1893				38 53 38.79	±.03	−.01		38 53 38.78	(5)
Washington, U. S. Naval Observatory (new site).	W. Harkness G. A. Hill	1893-1896	P. V. T. & Z. T.			38 55 13.70	±.10	−.01		38 55 13.69	(6)
Do	O. B. French	1897, June 12-22	Z. T. No. 4	100	21	38 55 13.93	±.06	−.01	−.16	38 55 13.76	1898
Washington U. S. Naval Observatory (new site) adopted value, center of clock room.							±.06			38 55 13.74	
FLORIDA											
Apalachicola	E. Goodfellow	1860, January	Z. T. No. 5	187	32	29 43 13.43	±.05	.00		29 43 13.43	1872
Barkley Point 2	do	1861, February	do	137	31	30 24 32.70	±.09	.00		30 24 32.70	1872
Cape Florida	J. E. Hilgard	1849, December	Z. T. No. 1	112	36	25 39 52.31	±.08	.00		25 39 52.31	1871
Cape Sable	E. D. Preston	1886, March, April	M. T. No. 7	118	29	25 07 01.58	±.13	.00		25 07 01.58	1887
Clear Water Harbor	E. Smith	1873, January	M. T. No. 13	70	14	27 56 40.48	±.18	.00		27 56 40.48	1873
Davis Point 2	A. T. Mosman	1871, January	Z. T. No. 6	111	20	30 07 16.81	±.15	.00		30 07 16.81	1873
Depot Key	J. E. Hilgard	1852, March	Z. T. No. 5	99	35	29 07 30.05	±.08	.00		29 07 30.05	1853
Esperanza	E. Smith	1873, March	M. T. No. 1	90	17	29 22 17.57	±.11	.00		29 22 17.57	1873
Fernandina	E. Goodfellow	1856, May, June	Z. T. No. 5	199	34	30 40 17.48	±.05	.00		30 40 17.48	1872
Fort St. Marks	J. E. Hilgard	1852, March	do	6	6	30 09 03.44	±.36				1872
Gainesville	C. H. Sinclair	1890, Dec. 10-17	Z. T. No. 6	82	27	29 39 08.50	±.08	−.01	+.27	20 39 08.76	1903
Garden Key	J. G. Oltmanns	1854, July 14	Z. T. No. 1		6	24 37 45.8	±.6				1854
Hurricane Island	do	1855, February, March, May.	do	68	14	30 04 27.7	±.7				1855
Jupiter Inlet	W. H. Burger	1906, Mar. 9	Z. T. No. 2	11	11	26 57 01.44	±.06	.00	+.09	26 57 01.53	1906
Key West	C. H. Sinclair	1896, Mar. 2-6	Z. T. No. 6	84	21	24 33 25.93	±.04	.00	−.09	24 33 25.84	1909
Lancaster 2 (U. S. E.)	W. B. Fairfield	1918, Jan. 15	Tr. No. 21	15	15	30 18 39.78	±.21	.00		30 18 39.78	1918
Pensacola	J. G. Oltmanns	1858, May, June	Z. T. No. 6	157	38	30 24 33.09	±.13	.00		30 24 33.09	1872
Punta Rasa	A. T. Mosman	1866, June	do	118	22	26 29 15.32	±.11	.00		26 29 15.32	1873
St. Augustine	W. H. Burger	1906, Apr. 25	Z. T. No. 2	11	11	29 53 12.14	±.06	.00	+.06	29 53 12.20	1906
St. Marks	J. E. Hilgard	1852, April	Z. T. No. 5	5	5	30 04 25.32	±.15	.00		30 04 25.32	1873
Sand Key	do	1849, August	Z. T. No. 1	146	44	24 27 09.27	±.04	.00		24 27 09.27	1871
Sebastian	W. H. Burger	1906, Mar. 15, 16	Z. T. No. 2	12	12	27 49 04.96	±.13	.00	+.09	27 49 05.05	1906
Titusville	do	1906, Mar. 20, 22	do	16	14	28 36 38.86	±.22	.00	+.09	28 36 38.95	1906
GEORGIA											
Atlanta	C. H. Sinclair	1880, Jan. 1-22	M. T. No. 13.	93	19	33 44 59.30	±.12	−.04	+.02	33 44 59.28	1881, 1900
Atlanta middle base	E. P. Webber	1872, Sept. 4-27	Z. T. No. 5	274	54	33 54 21.82	±.05	−.05	−.11	33 54 21.66	1875, 1900
Augusta	C. H. Sinclair	1890, Dec. 27, 29	Z. T. No. 6	76	26	33 28 20.52	±.09	.00	+.26	33 28 20.78	1908
Brunswick southeast base.	W. B. Fairfield	1917, Nov. 24	Tr. No. 21	14	14	31 09 34.27	±.09	.00		31 09 34.27	1917
Butler	A. T. Mosman	1872, March, April; 1873, January.	Z. T. No. 2. M. T. No. 7.	276	46	31 17 47.03	±.08	.00		31 17 47.03	1873
Butler	W. B. Fairfield	1918, May 25	Tr. No. 21	15	15	32 33 30.11	±.13	−.03		32 33 30.08	1918
Cochran	do	1917, Oct. 16	do	15	15	32 23 20.82	±.17	−.01		32 23 20.81	1917
Columbus E	J. E. McGrath	1918, May 18	Tr. No. 20	14	14	32 28 01.04	±.20	−.01		32 28 01.03	1918
Currahee	H. W. Blair J. B. Boutelle	1874, Sept. 28-Oct. 21.	Z. T. No. 5	223	44	34 31 37.75	±.08	−.08	+.07	34 31 37.74	1875, 1900
Harmon	J. E. McGrath	1918, June 15	Tr. No. 20	13	13	32 33 27.09	±.15	−.03		32 33 27.06	1918
Joint	W. B. Fairfield	1917, Oct. 30	Tr. No. 21	17	17	31 52 10.07	±.13	−.01		31 52 10.06	1917
Jones	do	1918, Apr. 2	do	15	15	31 30 49.59	±.14	−.02		31 30 49.57	1918
Kimbrough	do	1918, May 3	do	15	15	32 00 13.99	±.08	−.03		32 00 13.96	1918
Lavender	F. P. Webber	1874, Oct. 20-Nov. 4	Z. T. No. 3	151	27	34 19 15.81	±.12	−.08	+.02	34 19 15.75	1875, 1900
Macon	G. W. Dean	1854-55, December, January.	Z. T. No. 5	163	34	32 50 25.38	±.06				1872
Norris	W. B. Fairfield	1918, Aug. 21	Tr. No. 21	14	14	32 30 31.40	±.10	−.01		32 30 31.39	1918
Riley	do	1918, June 22	do	12	12	32 33 26.34	±.04	−.03		32 33 26.31	1918
Rose Hill	W. H. Burger	1907, Feb. 11	Z. T. No. 2	9	9	34 05 06.84	±.15	−.03	−.05	34 05 06.76	1907

[1] See footnotes on p. 52.
[4] See Gould's Astronomical Journal No. 9, p. 69.
[5] See appendix to the Washington Astronomical Observations of 1864.
[6] See Astronomical Journal No. 404, June, 1897.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
GEORGIA—continued						° ′ ″	″	″	″	° ′ ″	
Savannah	C. O. Boutelle, J. S. Totten	1851, January, February, March.	Z. T. No. 5	312	56	32 04 52.99	±0.05	0.00	------	32 04 52.99	1870
Sawnee	H. W. Blair, A. H. Scott	1873, Oct. 6–Nov. 15.	do	214	41	34 14 04.20	±.08	−.10	−0.07	34 14 04.03	1875, 1900
Sylvester D	J. E. McGrath	1918, Apr. 22	Tr. No. 20	12	12	31 32 47.81	±.39	−.01	------	31 32 47.80	1918
Turner	do	1918, Sept. 24, 25	do	13	13	32 26 19.37	±.24	−.01	------	32 26 19.36	1918
Valley	do	1918, Aug. 4, 5, 6	do	12	12	32 33 01.30	±.13	−.02	------	32 33 01.28	1918
IDAHO											
Blackfoot	do	1916, Oct. 6, 9, 12	do	26	18	43 10 58.72	±.11	−.23	------	43 10 58.49	1916
Mountain Home	W. B. Fairfield	1916, Sept. 11	Tr. No. 21	19	19	43 07 42.07	±.07	−.16	------	43 07 41.91	1916
ILLINOIS											
Bording	G. A. Fairfield	1882, Oct. 10–20	M. T. No. 7	103	21	38 36 50.73	±.06	−.03	+.23	38 36 50.93	1889, 1898
Cairo	W. Eimbeck	1877, October	M. T. No. 3	49	20	37 00 10.87	±.16	------	------	------	1879
Chicago	F. H. Parsons	1883, September, October.	Tr. No. 6	96	22	41 50 01.37	±.25	------	------	------	1888
Do.	C. H. Sinclair	1891, July 26–30	Z. T. No. 6	88	19	41 53 51.35	±.07	−.03	−.07	41 53 51.25	1909
Mattoon	E. P. Austin	1869, April, May	Z. T. No. 5	72	23	39 29 10.20	±.16	------	------	------	1872
Newton	F. W. Perkins	1883, Oct. 16–29	M. T. No. 13.	110	22	38 55 30.87	±.07	−.03	+.26	38 55 31.10	1889, 1898
St. Anne (U. S. L. S.)	W. Bowie	1908, June 25	Z. T. No. 4	15	15	41 01 20.24	±.06	−.04	+.07	41 01 20.27	1908
Springfield	E. P. Austin	1869, May, June	Z. T. No. 5	65	18	39 47 56.75	±.07	------	------	------	1872
Urbana	W. C. Brencke	1899, July 5–Sept. 4.	Warner & Swasy tr.	182	10	40 06 20.10	±.02	−.04	−.08	40 06 19.98	1900
INDIANA											
Butler	C. H. Sinclair	1891, October	Z. T. No. 6	48	16	41 25 39.59	±.07	------	+.14	41 25 39.73	1896
Carlisle (U. S. L. S.)	W. Bowie	1908, June 11	Z. T. No. 4	13	13	41 40 04.08	±.08	−.05	+.01	41 40 04.04	1908
Indianapolis	F. H. Parsons	1882, November, December.	Simm's Tr. No. 2.	47	22	39 46 11.13	±.22	------	------	------	1887
Logansport	do	1883, September	Tr. No. 6	58	14	40 45 16.06	±.18	------	------	------	1888
O. and M	O. B. French	1915, Jan. 7	Tr. No. 20	15	15	38 29 01.97	±.05	−.03	------	38 29 01.94	1915
Reizin	W. B. Fairfield	1889, Oct. 10–17	M. T. No. 7	104	18	39 02 53.58	±.10	−.05	+.23	39 02 53.76	1890
Union City	C. H. Sinclair	1891, October	Z. T. No. 6	48	16	40 11 54.32	±.07	------	+.13	40 11 54.45	1896
Vincennes	do	1881, Oct. 19–Nov. 15.	Tr. No. 4	158	32	38 40 36.77	±.06	−.02	+.05	38 40 36.80	1887, 1898
Weed Patch	J. B. Baylor	1889, Aug. 23–29	M. T. No. 7	103	20	39 10 00.55	±.06	−.06	+.19	39 10 00.68	1896
IOWA											
Burlington	E. P. Austin	1869, June	Z. T. No. 5	58	21	40 48 22.04	±.08	------	------	------	1872
Cedar Falls	F. Blake, jr	1869, Oct. 27	Z. T. No. 6	------	14	42 32 32.04	±.42	------	------	------	1875
Des Moines	E. P. Austin	1869, July	Z. T. No. 5	76	22	41 35 02.69	±.07	------	------	------	1872
Sherrills Mound	G. E. Brown	1880, September, October.	Z. T. No. 6	63	24	42 36 15.40	±.18	------	------	------	1885
KANSAS											
Adams	F. H. Parsons	1888, July 7–18	M. T. No. 7	129	20	39 02 41.72	±.10	−.06	+.14	39 02 41.80	1895
Brown	W. H. Burger	1906, Oct. 3	Z. T. No. 2	15	15	39 46 35.36	±.08	−.10	−.15	39 46 35.11	1906
Ellsworth	E. Smith	1885, Sept. 17–25	Tr. No. 4	76	20	38 43 47.60	±.13	−.08	−.03	38 43 47.49	1897
Quarry	W. H. Burger	1906, Nov. 10, 12	Z. T. No. 2	14	14	37 14 28.22	±.16	−.07	−.17	37 14 27.98	1906
Russell, southeast base	H. L. Stidham	1893, Sept. 21–30	M. T. No. 1	88	16	38 51 22.90	±.06	−.09	−.08	38 51 22.73	1896
Salina, west base	W. C. Hodgkins	1896, July 30–Aug. 10.	M. T. No. 2	98	24	38 51 03.57	±.18	−.06	+.01	38 51 03.52	1897
Sunflower	W. H. Burger	1906, Nov. 5, 7	Z. T. No. 2	12	12	37 51 38.06	±.10	−.08	−.16	37 51 37.82	1906
Wallace	E. Smith	1885, Oct. 8–11	Tr. No. 4	74	16	38 54 44.38	±.12	−.17	+.04	38 54 44.25	1896
KENTUCKY											
Bushy Pond	C. H. Sinclair	1916, Apr. 16, 17, 18, 19.	Z. T. No. 6	11	11	36 29 57.02	±.12	−.01	------	36 29 57.01	1916
Falmouth	E. Goodfellow	1871–72, December, January.	M. T. No. 13.	73	25	38 40 37.37	±.15	------	------	------	1873
Greensburg	F. H. Parsons	1883, June	Tr. No. 6	33	10	37 15 37.14	±.70	------	------	------	1888
Guthrie	do	1882, October	Tr. No. 2	23	10	36 38 53.05	±.42	------	------	------	1887
Henderson	do	do	do	19	11	37 50 24.32	±.21	------	------	------	1887
Hickman	W. Eimbeck	1877, October	M. T. No. 3.	45	25	36 34 17.92	±.12	------	------	------	1880
Lexington	F. H. Parsons	1883, May	Tr. No. 6	28	11	38 02 25.56	±.41	------	------	------	1888
London	do	1882, September, October.	Tr. No. 2	35	11	37 08 02.20	±.22	------	------	------	1887
Louisa	do	1883, June	Tr. No. 6	31	10	38 06 54.94	±.36	------	------	------	1888
Louisville	C. H. Sinclair	1879, November, December.	M. T. No. 13	62	17	38 14 58.08	±.08	------	------	------	1881
Minerva	A. T. Mosman	1887, Aug. 3–13	Z. T. No. 6	95	16	38 42 30.88	±.05	−.05	+.06	38 42 30.89	1890
Oakland	do	1871, November	do	107	24	37 02 27.47	±.10	------	------	------	1875
Paducah	W. Eimbeck	1877, September	M. T. No. 3.	37	20	37 04 59.50	±.18	------	------	------	1879
Reelfoot Lake	C. H. Sinclair	1916, Apr. 9, 10, 11.	Z. T. No. 6	14	14	36 30 03.52	±.14	−.01	------	36 30 03.51	1916
Richmond	F. H. Parsons	1883, July	Tr. No. 6	43	13	37 44 39.49	±.39	------	------	------	1888
Shelbyville	F. Blake	1869, July, August.	Z. T. No. 6	63	17	38 12 45.36	±.12	------	------	------	1872

[1] See footnotes on p. 52.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
LOUISIANA						° ′ ″	″	″	″	° ′ ″	
Baton Rouge	C. H. Sinclair	1880, April	M. T. No. 13.	47	17	30 27 13.07	±0.19	0.00		30 27 13.07	1881
Blue Buck Ridge west base.	F. W. Perkins	1883, March, April	M. T. No. 7.	60	21	29 45 48.84	±.15	.00		29 45 48.84	1886
Boyce	J. E. McGrath	1920, Feb. 27, Mar. 5.	Tr. No. 20.	10	10	31 22 49.41	±.20	.00		31 22 49.41	1920
Burwood	G. D. Cowie	1921, Oct. 5	do	14	14	28 57 57.37	±.08	.00		29 57 57.37	1921
Chandeleur Island	do	1921, Sept. 18	do	17	17	30 02 58.03	±.05	.00		30 02 58.03	1921
Chenier Tigre west base	W. B. Fairfield	1889, April, May	Z. T. No. 5.	94	11	29 34 27.69	±.09				1890
Deer Island	P. A. Welker	1888, Mar. 30–Apr. 7.	Z. T. No. 6.	54	20	29 28 53.16	±.07	.00		29 28 53.16	1917
Fort St. Philip	G. D. Cowie	1921, Oct. 10	Tr. No. 20.	14	14	29 21 45.69	±.10	.00		29 21 45.69	1921
Head of Passes	J. G. Oltmanns	1858, January	Z. T. No. 6.	123	30	29 08 33.09	±.15				1870
Isle Dernier	do	1853, January, February.	Z. T. No. 2.		21	29 02 02.2	±.6				1876
Man	W. B. Fairfield	1920, Jan. 26	Tr. No. 21.	14	14	32 01 18.47	±.10	−.01		32 01 18.46	1920
Morgan City	G. D. Cowie	1921, Nov. 8	Tr. No. 20.	14	14	29 41 45.95	±.11	.00		29 41 45.95	1921
New Orleans	J. Kinchelve	1858, Jan. 16–Feb. 10.	Z. T. No. 5.	256	44	29 57 25.28	±.07	.00	+0.08	29 57 25.36	1872, 1900
Point-a-la-Hache	G. D. Cowie	1921, Oct. 18	Tr. No. 20.	12	12	29 34 47.60	±.11	.00		29 34 47.60	1921
Port Eads	do	1921, Sept. 27	do	15	15	29 00 57.39	±.11	.00		29 00 57.39	1921
Timbalier Island	do	1921, Oct. 28	do	14	14	29 02 53.62	±.12	.00		29 02 53.62	1921
Torras	W. B. Fairfield	1920, Mar. 25	Tr. No. 21.	15	15	30 59 20.48	±.10	.00		30 59 20.48	1920
MAINE											
Agamenticus	T. J. Lee	1847, Sept. 15–Oct. 10	M. A. Z. T.	121	27	43 13 24.95	±.10				
Do	A. D. Bache, R. H. Fauntleroy, C. O. Boutelle	1847, Oct. 4–Nov. 15.	Z. S. No. 1.	105		43 13 25.16	±.11				
Do	A. D. Bache, R. H. Fauntleroy, G. Davidson	1847, Oct. 18–Nov. 26.	Tr. No. 2.	21		43 13 24.97	±.14				
Agamenticus, adopted value of triangulation station.						43 13 24.96	±.06	−.04	.00	43 13 24.92	1869, 1900
Bangor	E. Goodfellow	1857, Sept. 7–Oct. 10.	Z. T. No. 5.	213	41	44 48 12.87	±.05	−.01	+.03	44 48 12.89	1873, 1900
Calais	G. W. Dean	1857, Sept. 2–29	Z. T. No. 4.	243	57	45 11 09.40	±.06	−.01	.00	45 11 09.39	1873, 1900
Cape Small	do	1851, Sept. 17–Oct. 10.	Z. T. No.—	243	40	43 46 43.70	±.04	−.01	+.02	43 46 43.71	1869, 1900
Cooper	E. Goodfellow	1859, Sept. 8–18	Z. T. No. 5.	209	37	44 59 12.60	±.05	−.04	−.07	44 59 12.49	1873, 1900
Farmington	C. O. Boutelle	1866, Oct. 8–Nov. 6.	do	397	65	44 40 19.54	±.05	−.12	−.07	44 40 19.35	1867, 1900
Howard	E. Goodfellow	1859, July 13–23	do	221	40	44 37 49.24	±.05	−.01	−.06	44 37 49.17	1873, 1900
Humpback	A. T. Mosman	1858, July 26–Aug. 19.	do	296	37	44 51 47.56	±.05	−.08	−.11	44 51 47.37	1873, 1900
Isles of Shoals	T. J. Lee	1847, Aug. 4–22	M. A. Z. T.	137	21	42 59 12.97	±.09	.00	.00	42 59 12.97	1868, 1900
Mount Desert	S. Harris	1856, Aug. 18–Sept. 25.	Z. T. No. 5.	189	32	44 21 06.51	±.03				
Do	E. Goodfellow	1856, Sept. 18–Oct. 5.	do	171	30	44 21 06.53	±.07				
Mount Desert, adopted value.						44 21 06.51	±.05	−.08	+.09	44 21 06.52	1871, 1900
Mount Harris	G. W. Dean	1855, Aug. 6–27	Z. T. No. 10.	248	49	44 39 54.51	±.04				
Do	do	1855, Aug. 15–24	Z. T. No. 2.	179	40	44 39 54.69	±.05				
Do	E. Goodfellow	1855, Sept. 12–25	Z. T. No. 10.	218	40	44 39 54.79	±.05				
Mount Harris, adopted value.						44 39 54.66	±.04	−.07	+.09	44 39 54.68	1871, 1900
Mount Independence	G. W. Dean	1849, Sept. 20–Oct. 20.	Z. T. No. 2.	151	33	43 45 34.33	±.08				
Do	A. D. Bache, G. Davidson	1849, Sept. 21–Oct. 27.	Z. S. No. 1.	317	[2] 84	43 45 34.58	±.07				
Mount Independence, adopted value.						43 45 34.47	±.06	−.03	+.12	43 45 34.56	1869, 1900
Mount Pleasant	G. W. Dean	1851, July 20–Aug. 19.	Z. T. No. 5.	236	44	44 01 36.44	±.04	−.11	−.09	44 01 36.24	1870, 1900
Pole Hill	W. H. Burger	1907, July 15, 19, 21.	Z. T. No. 2.	26	26	45 57 16.44	±.07	−.03	+.08	45 57 16.49	1970
Ragged Mountain	G. W. Dean	1854, Aug. 18–Sept. 7.	Z. T. No. 5.	228	49	44 12 42.92	±.05				
Do	S. Harris	1854, Sept. 11–Oct. 6.	do	147	36	44 12 43.00	±.05				
Ragged Mountain, adopted value.						44 12 42.96	±.04	−.07	+.04	44 12 42.93	1871, 1900
Sebattus	J. E. Hilgard	1853, June 29–July 14.	Z. T. No. 1.	110	35	44 08 37.73	±.09	−.04	−.02	44 08 37.67	1857, 1900

[1] See footnotes on p. 52
[2] Number of stars.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
MARYLAND						° ′ ″	″	″	″	° ′ ″	
Calvert	A. T. Mosman	1871, July 26–Aug. 13.	M. T. No. 7.	145	23	38 21 31.88	±0.11	−0.01	−0.16	38 21 31.71	1872, 1898
Gaithersburg		1906–1911				39 08 13.23					1906, 1911
Gantt	E. Smith	1908, Nov. 6	M. T. No. 3.	17	17	38 20 26.03	±.09	.00	+.10	38 20 26.13	1908
Hill	G. W. Dean	1850, Aug. 23–Sept. 13.	Z. S. No. 1.	339	[7] 62	38 53 52.31	±.05	−.01	+.06	38 53 52.36	1869, 1898
Marriott	T. J. Lee	1846, June 16–25	M. A. Z. T.	34	7	38 52 24.73	±.19	−.01	−.07	38 52 24.65	
Do	A. D. Bache	1849, May 19–June 17.	Z. T. No. 1.	128	34	38 52 25.12	±.06	−.01	−.06	38 52 25.05	
Marriott, adopted value							±.06			38 52 25.05	1870, 1898
Maryland Heights	F. Blake	1870, Sept. 19–Oct. 24.	Z. T. No. 5.	343	62	39 20 32.10	±.04	−.07	+.16	39 20 32.19	1875, 1898
Pooles Island	G. Davidson	1847, June 13–July 4	M. A. Z. T.	130	26	39 17 17.52	±.15	.00	.00	39 17 17.52	1870, 1898
Principio	R. D. Cutts	1866, July 19–Sept. 10.	Z. T. No. 5.	246	40	39 35 32.81	±.04	−.01	−.05	39 35 32.75	1870, 1898
Rockville	E. Smith	1891–92	Z. T. No. 4.	1,789	146	39 05 10.45		−.03		39 05 10.42	1892
Soper	G. W. Dean	1850, June 29–July 25.	Z. S. No. 1.	194	[7] 25	39 05 10.69	±.09	−.02	−.06	39 05 10.61	1869, 1898
Sugarloaf	F. D. Granger; J. B. Boutelle	1879, Oct. 12–25	Z. T. No. 5.	125	25	39 15 49.71	±.10	−.07	−.10	39 15 49.54	1881, 1898
Taylor	T. J. Lee	1847, May 17–29	M. A. Z. T.	91	17	38 59 46.08	±.12	−.01	.00	38 59 46.07	1870, 1898
Webb	G. W. Dean	1850, Oct. 21–Nov. 14.	Z. S. No. 1.	484	[7] 79	39 05 25.21	±.04	−.01	+.15	39 05 25.35	1869, 1898
MASSACHUSETTS											
Cambridge, Cloverden Observatory.	B. A. Gould; T. Searles; C. H. F. Peters	1855, August, October.	Z. T. No. 5.	302	19	42 22 40.97	±.08	−.01		42 22 40.96	1865, 1900
Cambridge, Harvard College Observatory.	W. C. Bond; J. D. Graham; E. P. Bond; C. O. Boutelle	1844–45	P. V. Tr.	168		42 22 48.60		−.01		42 22 48.59	1845
Manomet	F. H. Agnew; C. S. Peirce	1867, July 8–Aug. 21.	Z. T. No. 5.	456	77	41 55 35.35	±.05	−.02	+.08	41 55 35.41	1868, 1900
Mount Tom	E. Goodfellow	1862, July 18–Aug. 11.	do	172	36	42 14 27.62	±.06	−.06	+.06	42 14 27.62	1871, 1900
Nantucket	C. O. Boutelle	1866, November, December.	do	410	71	41 17 13.99	±.06	.00		41 17 13.99	1868
Provincetown	E. Smith	1901, Sept. 4, 5, 6	Z. T. No. 4.	20	20	42 03 04.15	±.10	.00	+.12	42 03 04.27	1901
Thompson	T. J. Lee	1846, Sept. 19–Oct. 16.	M. A. Z. T.	129	13	42 36 38.02	±.10	−.01	−.03	42 36 37.98	1868, 1900
Wachusett	J. H. Toomer	1860, Sept. 25–Oct. 16.	Z. T. No. 5.	322	46	42 29 16.13	±.04	−.10	−.01	42 29 16.02	1873, 1900
MICHIGAN											
Bundav (U. S. L. S.)	W. Bowle	1908, May 19, 21	Z. T. No. 4.	16	16	42 03 16.91	±.08	−.07	−.05	42 03 16.79	1908
Sherman (U. S. L. S.)	do	1908, June 1	do	14	14	41 50 46.36	±.08	−.05	−.01	41 50 46.30	1908
MINNESOTA											
Dalton	W. H. Burger	1906, July 6	Z. T. No. 2.	15	15	46 10 27.36	±.08	−.07	−.07	46 10 27.22	1906
Douglas	do	1905, Sept. 19, 21, 22	do	25	25	46 36 48.20	±.10	−.07	−.17	46 36 47.96	1906
Jones	do	1905, Sept. 4, 5, 9, 12	do	33	33	46 23 53.91	±.10	−.07	−.17	46 23 53.67	1905
Minneapolis	F. Blake	1873, August, September.	do	50	10	44 58 37.72	±.16				1875
Do	C. O. Boutelle	1887, July 15–23	Z. T. No. 5.	107	21	44 58 39.02	±.14				1887
Minneapolis, 1887, adopted value.						44 58 39.00	±.14				
Morken	W. H. Burger	1906, July 16, 17	Z. T. No. 2.	21	21	47 02 06.27	±.09	−.05	−.08	47 02 06.14	1906
Osakis	do	1906, June 27, 29	do	18	18	45 49 27.87	±.07	−.07	−.05	45 49 27.75	1906
Royalton, south base	do	1905, Aug. 28, 29	do	22	22	45 44 06.90	±.07	−.05	−.17	45 44 06.68	1905
Stephen, west base	do	1905, Oct. 4, 5, 7, 12	do	28	28	48 27 23.14	±.06	−.04	−.15	48 27 22.95	1905
Tilden	do	1905, Oct. 19, 20, 23, 25, 28.	do	25	25	47 42 16.42	±.10	−.06	−.14	47 42 16.22	1905
MISSISSIPPI											
East Pascagoula	R. H. Fauntleroy.	1847, June 25–July 26.	Z. T. No. 1.	129	48	30 20 40.92	±.04	.00	−.01	30 20 40.91	1871, 1900
Fort (Vicksburg)	E. Smith	1878, June, July	M. T. No. 13.	37	14	32 20 30.63	±.12				1880
Greenville	do	1878, July	do	27	9	33 24 44.08	±.16				1881
Natchez	do	1878, June	do	35	11	31 33 27.38	±.09				1880
Strickland	F. Morse	1914, Dec. 11	Tr. 21	16	16	34 51 39.99	±.09	−.03		34 51 39.96	1914
MISSOURI											
Berger	W. H. Burger	1906, June 12	Z. T. No. 2.	12	12	38 36 01.69	±.05	−.05	−.02	38 36 01.62	1906
Hunter	F. D. Granger	1880, July 26–Aug. 3	M. T. No. 3.	120	23	38 25 48.01	±.10	−.03	+.02	38 25 48.00	1881, 1898
Ironton	G. R. Putnam	1890, Nov. 12–18	Z. T. No. 6.	101	32	37 36 30.00	±.08		+.27	37 36 30.27	1892
Jefferson City	H. W. Blair	1879, Nov. 19–29	M. T. No. 3.	98	20	38 33 43.99	±.07	−.03	−.01	38 33 43.95	1884, 1898
Kansas City	C. H. Sinclair	1882, Sept. 20–26	Tr. No. 4.	72	21	39 05 50.92	±.09	−.04	+.24	39 05 51.12	1884, 1898
Macon	do	1892, Jan. 7–15	Z. T. No. 6.	50	15	39 44 33.19	±.11		+.11	39 44 33.30	1892
Potosi	G. R. Putnam	1890, Nov. 20–24	do	62	23	37 56 14.59	±.09		+.27	37 56 14.86	1892
St. Louis, Washington University.	O. H. Tittmann; W. Eimbeck	1869, Dec. 8–27; 1870, July 3–Nov. 7.	do	74	39	38 38 02.77	±.13	−.03	+.03	38 38 02.77	
Do	F. H. Parsons	1881, Sept. 24–Oct. 10.	Tr. No. 6	90	19	38 38 02.81	±.09	−.03	+.11	38 38 02.89	
St. Louis, Second Presbyterian church, adopted value.										38 38 00.59	1885, 1898

[1] See footnotes on p. 52.
[7] Number of stars.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey*[1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year[1]
MONTANA						° ′ ″	″	″	″	° ′ ″	
Helena	C. H. Sinclair	1890, July 23, 25, 26	Z. T. No. 6	70	24	46 35 18.28	±0.07	.....	±0.04	46 35 18.32	1891
Mondak	C. V. Hodgson	1913, Oct. 8, 10, 11	Z. T. No. 4	17	17	48 00 12.09	±.07	±0.10	.....	48 00 11.99	1913
Montana-North Dakota boundary.	do	1913, Oct. 2	do	17	17	47 12 44.53	±.08	−.14	.....	47 12 44.39	1913
Wyoming, northeast corner eccentric.	do	1913, Sept. 19	do	18	18	45 00 00.57	±.05	−.18	.....	45 00 00.39	1913
NEBRASKA											
Daily	W. H. Burger	1906, Sept. 13, 17	Z. T. No. 2	21	21	41 35 44.13	±.08	−.12	−.15	41 35 43.86	1906
Omaha	E. Goodfellow	1869, January, February, April.	Z. T. No. 5	173	35	41 15 44.01	±.06	.....	.....	.....	1871
Page, southwest base	W. H. Burger	1906, Sept. 4, 5	Z. T. No. 2	16	16	42 25 29.47	±.06	−.11	−.14	42 25 29.22	1906
Shelton, east base	do	1906, Sept. 24, 25	do	17	17	40 46 35.66	±.10	−.10	−.15	40 46 35.41	1906
NEVADA											
Carson City	C. H. Sinclair	1889, July 17-20	M.T. No. 2	71	18	39 09 47.19	±.13	−.24	+.16	39 09 47.11	1890
Do	do	1893, Aug. 13-15	Z. T. No. 6	70	26	39 09 47.60	±.07	−.24	−.07	39 09 47.29	1898
Carson City, adopted value.	.....	.....	.....	.....	.....	.....	±.06	.....	.....	39 09 47.25	.....
Carson Sink	W. Eimbeck	1880, July 29-Aug. 2.	M.T. No. 7	98	27	39 34 58.15	±.08	−.45	−.03	39 34 57.67	1883, 1898
Diamond Peak	R. A. Marr	1881, Oct. 1-5	M.T. No. 3	112	26	39 35 04.13	±.07	−.55	+.07	39 35 03.65	1884, 1898
Moapa	W. B. Fairfield	1916, Dec. 6	Tr. 21	24	24	36 40 15.84	±.07	−.08	.....	36 40 15.76	1916
Monument No. 108, California-Nevada boundary.	C. V. Hodgson	1914, Oct. 10	Z. T. No. 4	14	14	36 10 23.42	±.05	−.12	.....	36 10 23.30	1914
Mount Callahan	R. A. Marr	1881, July 29-Aug. 2.	M.T. No. 3	102	22	39 42 32.32	±.08	−.53	+.13	39 42 31.92	1884, 898
Pilot Peak	E. P. Austin	1889, July 11-16	do	98	23	41 01 08.26	±.09	−.56	+.13	41 01 07.83	1898
Pioche	G. F. Bird	1883, Sept. 13-21	do	113	22	37 59 06.98	±.09	−.45	+.27	37 59 06.80	1885, 1898
Toiyabe Dome	W. Eimbeck; R. A. Marr	1880, Sept. 20-27	M.T. No. 7	87	21	38 49 54.55	±.11	−.60	−.04	38 49 53.91	1884, 1898
Tonopah	C. H. Sinclair	1902, August	Z. T. No. 6	53	15	38 04 01.47	±.09	.....	+.12	38 04 01.59	1902
Verdi, east base	G. Davidson	1872, July 12-19	Z. T. No. 1	175	44	39 31 04.70	±.07	−.25	−.16	39 31 04.29	1873, 1898
NEW HAMPSHIRE											
Gunstock	J. H. Toomer	1860, July 11-Aug. 9.	Z. T. No. 5	333	47	43 31 03.81	±.05	−.12	+.02	43 31 03.71	1870, 1900
Unkonoonuc	J. S. Ruth	1848, Sept. 16-Oct. 8.	Z. T. No. 3	115	30	42 58 59.34	±.07	−.07	+.07	42 58 59.34	1870, 1900
NEW JERSEY											
Barnegat Inlet	W. H. Burger	1907, Oct. 19, 21	Z. T. No. 2	19	19	39 45 48.22	±.08	.00	−.04	39 45 48.18	1907
Beacon Hill	J. B. Baylor	1875, July 24-Aug. 27.	Z. T. No. 4	195	33	40 22 27.81	±.07	−.02	+.14	40 22 27.93	1877, 1900
Cape May	E. Smith; F. H. Parsons	1881, May 13-27	Tr. No. 6	60	14	38 55 44.66	±.12	.00	+.05	38 55 44.71	1885, 1898
Do	C. H. Sinclair	1891, May 5-9	Z. T. No. 6	73	21	38 55 44.77	±.07	.00	−.17	38 55 44.60	1806
Cape May, adopted value.	.....	.....	.....	.....	.....	.....	±.06	.....	.....	38 55 44.63	.....
High Point	E. Smith	1908, Sept. 21	M.T. No. 3	22	22	41 19 11.29	±.05	−.09	+.11	41 19 11.31	1908
Mount Rose	J. E. Hilgard	1852, July 19-Aug. 3.	Z. T. No. 2	81	24	40 22 05.41	±.08	−.02	−.09	40 22 05.30	1871, 1900
NEW MEXICO											
Corduna	C. V. Hodgson	1914, June 8, 10	Z. T. No. 4	17	17	32 01 29.52	±.07	−.33	.....	32 01 29.19	1914
Deming City water works	do	1914, June 20	do	18	18	32 16 07.06	±.05	−.20	.....	32 16 06.86	1914
Fort Bayard (U. S. G. S.)	do	1914, June 21	do	18	18	32 47 40.56	±.08	−.29	.....	32 47 40.27	1914
Glen Rio	G. D. Cowie	1920, Nov. 18	Tr. No. 20	22	22	35 10 03.15	±.08	−.20	.....	35 10 02.95	1920
Jarilla	C. V. Hodgson	1914, June 15	Z. T. No. 4	18	18	32 23 56.61	±.04	−.23	.....	32 23 56.38	1914
Line (U. S. G. S.)	do	1914, June 24	do	19	19	32 50 59.20	±.07	−.32	.....	32 50 58.88	1914
Los Lunas	W. B. Fairfield	1920, Dec. 13	Tr. No. 21	14	14	34 48 23.72	±.12	−.24	.....	34 48 23.48	1920
NEW YORK											
Carpenters Point	E. Smith	1873, June	Z. T. No. 2	122	18	41 21 23.35	±.10	.....	.....	.....	1874
Ceres	do	1879, September	M.T. No. 13	55	19	41 59 59.21	±.13	.....	.....	.....	1879
Cheever	G. W. Dean	1874, September, October.	Z. T. No. 4	88	22	44 04 53.44	±.10	−.02	.....	44 04 53.42	1877
Corydon	E. Smith	1879, October	M.T. No. 13	63	21	41 59 59.54	±.11	.....	.....	.....	1879
Far Rockaway	O. B. French	1914, Sept. 5, 7	Tr. No. 20	14	14	40 35 54.56	±.04	.00	.....	40 35 54.56	1914
Finn	E. Smith	1877, August, September.	M.T. No. 13	46	12	41 59 59.38	±.11	.....	.....	.....	1879
Gardiners Island	W. H. Burger	1907, Oct. 10, 11	Z. T. No. 2	18	18	41 06 01.69	±.06	.00	−.02	41 06 01.67	1907
Genesee Valley	E. Smith	1879, September	M.T. No. 13	55	19	41 59 58.29	±.13	.....	.....	.....	1879
Howlett	J. B. Boutelle	1883, August	Z. T. No. 5	115	23	42 59 59.65	±.06	−.06	.....	42 59 59.59	1890
Kit	W. H. Burger	1907, Oct. 1	Z. T. No. 2	15	15	41 30 13.01	±.07	.00	.00	41 30 13.01	1907
Lawrenceville	E. Smith	1879, September	M.T. No. 13	46	19	42 00 01.12	±.14	.....	.....	.....	1879
Little Meadows	do	do	do	51	19	41 59 59.95	±.12	.....	.....	.....	1879
Mount Merino	G. W. Dean	1874, October	Z. T. No. 4	71	17	42 14 04.81	±.10	−.03	.....	42 14 04.78	1877
New York City, Manhattan Square.	E. Smith	1911, June, 19-21, 28-30.	M.T. No. 3	31	31	40 46 50.92	±.07	.00	−.24	40 46 50.68	1911
New York City, Rutherford Observatory.	E. Goodfellow	1858, June 22-25	Z. T. No. 5	90	24	40 43 48.39	±.09	.00	−.13	40 43 48.26	1871, 1900

[1] See footnotes on p. 52.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
NEW YORK—continued						° ′ ″	″	″	″	° ′ ″	
Prospect Mountain	R. D. Cutts	1878, July, August	Z. T. No. 4	139	28	43 25 12.71	±0.07	−0.11		43 25 12.60	1881
Rochester	C. H. Sinclair	1916, June 12, 13	do	22	22	43 10 36.69	±.06	−.03		43 10 36.66	1916
Rouses Point	G. W. Dean	1874, August, September.	do	92	24	45 00 27.22	±.11	−.01		45 00 27.21	1877
Tassel Hill	J. B. Boutelle	1880, October	Z. T. No. 5	135	27	42 56 19.47	±.06	−.10		42 56 19.37	1885
Travis	E. Smith	1877, July	M. T. No. 13.	43	11	42 00 02.66	±.14				1879
Troy	Prof. D. Greene	1871, July, August, September.	Z. T. No. 4	145	36	42 43 50.70	±.21	−.01		42 43 50.69	1875
Tuna Valley	E. Smith	1879, September, October.	M. T. No. 13.	63	21	42 00 04.18	±.12				1879
Waverly	do	1879, August, September.	do	48	19	42 00 00.69	±.11				1879
West Hills	A. T. Mosman	1865, Aug. 8-24	Z. T. No. 5	223	39	40 48 50.06	±.04	−.02	−0.12	40 48 49.92	1871, 1900
NORTH CAROLINA											
Fort Johnson	E. Goodfellow	1859, April, May	do	154	29	33 54 58.27	±.08	.00		33 54 58.27	1873
Fort Spinola 2	do	1866, May, June	do	123	30	35 05 17.40	±.06	.00		35 05 17.40	1871
Hog Island	E. Smith	1876, August	M. T. No. 13.	65	16	35 21 51.92	±.12	.00		35 21 51.92	1876
King	H. W. Blair	1876, Dec. 5-13	Z. T. No. 5	100	20	35 12 13.26	±.10				
Do	J. B. Boutelle	1876, Dec. 12-20	do	100	20	35 12 13.37	±.11				
King, adopted value						35 12 13.31	±.07	−.08	+.19	35 12 13.42	1879, 1900
Lee	J. E. McGrath	1918, Nov. 14	Tr. No. 20	12	12	35 28 47.45	±.19	−.02		35 28 47.43	1918
Littleton	W. B. Fairfield	1918, Dec. 4	Tr. No. 21	15	15	36 25 50.88	±.20	−.01		36 25 50.87	1918
Long Shoal Point	E. Smith	1876, September	M. T. No. 13.	68	16	35 34 36.24	±.11	.00		35 34 36.24	1876
Moore	J. B. Baylor	1876, Nov. 8-Dec. 6	Z. T. No. 2	140	22	36 23 55.08	±.13				
Do	W. B Fairfield	1876, Nov. 23-Dec. 16.	do	126	21	36 23 54.82	±.13				
Moore, adopted value						36 23 54.95	±.09	−.13	+.23	36 23 55.05	1879, 1900
Ocracoke northeast base	A. T. Mosman	1871, March, April	M.T. No. 7	142	24	35 04 03.15	±.10				1875
Portsmouth Island, station 11.[8]	do	1873, February, March.	Z. T. No. 2	84	14	35 03 47.17	±.10				1875
Portsmouth Island, station 1.[8]	do	1873, March	do	84	14	35 04 10.36	±.08				1875
Ocracoke northeast base, adopted value.						35 04 02.67		.00		35 04 02.67	
Roan High Bluff	W. H. Burger	1907, May 16, 17	Z. T. No. 2	19	19	36 05 37.80	±.08	−.31	+.08	36 05 37.57	1907
Sand Island	E. Smith	1876, January	M. T. No. 13.	68	15	35 50 25.41	±.09	.00		35 50 25.41	1876
Shellbank	C. O. Boutelle	1847, March, April	M. A. Z. T.	108	23	36 03 20.11	±.09	.00		36 03 20.11	1860
Stevensons Point	do	1847, January, February.	do	96	25	36 06 22.27	±.12	.00		36 06 22.27	1860
Virginia-North Carolina boundary, Knott Island.	C. H. Sinclair	1887, January	Z. T. No. 6	55	25	36 32 58.21	±.13				1887
Virginia-North Carolina boundary, Dismal Swamp Canal.	C. H. Sinclair	1886, November, December.	Z. T. No. 6	73	20	36 33 06.63	±.06				1887
Virginia-North Carolina boundary, northwest.	do	1886, December	do	51	19	36 32 59.87	±.10				1887
Virginia-North Carolina boundary, Nottaway River.	do	1887, February, March.	do	53	19	36 32 35.94	±.16				1887
Wadesboro	G. R. Putnam	1900, May 10, 27	M.T.No.2	5	3	34 57 52.0	±1.2				(9)
Wilmington, De Rosset	G. W. Dean	1854, May	Z. T. No. 5	205	41	34 14 00.47	±.04	.00		34 14 00.47	1872
Young	H. W. Blair	1876, Oct. 14-21	Z. T. No. 4	79	14	35 44 21.53	±.20				
Do	J. B. Boutelle	1876, Oct. 24-31	do	84	14	35 44 21.47	±.15				
Young, adopted value						35 44 21.50	±.12	−.05	+.24	35 44 21.69	1878, 1900
NORTH DAKOTA											
Ambrose northeast base	C. V. Hodgson	1913, Oct. 14	Z. T. No. 4	17	17	48 59 26.57	±.08	−.10		48 59 26.47	1913
Badland	do	1913, Sept. 30	do	17	17	46 42 01.03	±.06	−.16		46 42 00.87	1913
Bismarck	C. H. Sinclair	1890, Aug. 16-21	Z. T. No. 6	118	36	46 48 28.12	±.06	−.08	+.09	46 48 28.13	1891
Bonetrail	C. V. Hodgson	1913, Oct. 13	Z. T. No. 4	18	18	48 25 00.85	±.07	−.12		48 25 00.73	1913
Bowman	do	1913, Sept. 27	do	18	18	46 10 57.12	±.08	−.16		46 10 56.96	1913
Hankinson	W. H. Burger	1906, July 23, 24	Z. T. No. 2	18	18	46 02 16.87	±.12	−.07	−.08	46 02 16.72	1906
Sheep	C. V. Hodgson	1913, Oct. 6	Z. T. No. 4	17	17	47 37 52.07	±.10	−.14		47 37 51.93	1913
OHIO											
Cincinnati (Mount Lookout).	C. H. Sinclair	1881, July 19-27	Tr. No. 4	105	21	39 08 20.50	±.08	−.04	+.15	39 08 20.61	1884, 1898
Cleveland (Case School Observatory).			Z. T	58	11	41 30 14.53	±.04	−.03		41 30 14.50	
Cleveland	E. Goodfellow	1871, October, November.	M.T.No.13.	125	30	41 30 25.48	±.12	−.03	+.20	41 30 25.65	1873
Columbus	A. T. Mosman	1871, September, October.	Z. T. No. 6	164	29	39 57 40.55	±.07	−.04		39 57 40.51	1875
Elizabethtown	C. H. Sinclair	1891, Oct. 11-16	do	62	17	39 09 28.47	±.11	−.02	+.12	39 09 28.57	1920
Gould	A. T. Mosman	1885, Aug. 27-Sept. 11.	Z. T. No. 7	101	17	38 38 29.96	±.23	−.05	−.13	38 38 29.78	1891, 1898

[1] See footnotes on p. 52.
[8] Reduced to triangulation station Ocracoke northeast base. See p. 227.
[9] Gr., 1880; Berliner Jahrbuch, 1900; American Ephemeris, 1900.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
OKLAHOMA						° ′ ″	″	″	″	° ′ ″	
Allen	G. D. Cowie	1920, Sept. 24, 26	Tr. No. 20	16	16	34 53 20.01	±0.11	−0.05		34 53 29.56	1920
Carson	W. Bowie	1908, Oct. 24	Z. T. No. 4	16	16	35 16 26.64	±.15	−.07	+0.06	35 16 26.63	1908
Dill	G. D. Cowie	1920, Oct. 15	Tr. No. 20	22	22	35 17 28.45	±.08	−.09		35 17 28.36	1920
Marlow	E. Smith	1899, Apr. 19–May 3	M. T. No. 2	60	15	34 38 52.59	±.06	−.06	+.07	34 38 52.60	1909
Pond Creek	W. H. Burger	1906, Nov. 21, 22	Z. T. No. 2	15	15	36 40 08.06	±.12	−.05	−.17	36 40 07.84	1906
Wingard	W. Bowie	1908, Oct. 10	Z. T. No. 4	16	16	35 56 49.37	±.04	−.06	+.09	35 56 49.40	1908
OREGON											
Baker City (U. S. N.)	C. C. Wylie	1918	Fauth Tr. and Z. T. No. 1944.	32	24	44 47 25.83	±.14	−.18		44 47 25.65	1918
Balch	G. Davidson	1886, May, June	Z. T. No. 1	179	29	45 31 56.13	±.05	−.01		45 31 56.12	1890
Central Point	W. H. Burger	1908, June 7, 8	Z. T. No. 2	11	11	42 23 50.60	±.09	−.07	+.14	42 23 50.67	1908
Echo	W. B. Fairfield	1916, Aug. 22	Tr. No. 21	15	15	45 44 39.03	±.10	−.04		45 44 38.99	1916
La Grande	J. E. McGrath	1916, Aug 30, 31	Tr. No. 20	14	14	45 19 55.61	±.08	−.15		45 19 55.46	1916
Portland	C. H. Sinclair	1887, July, August	M. T. No. 2	111	21	45 31 08.29	±.06	−.01		45 31 08.28	1890
Port Orford	J. Rockwell	1851, October, November.	Z. T. No. 3	256	47	42 44 21.79	±.05	.00		42 44 21.79	1870
Rainier	G. Davidson	1886, July 10–17	Z. T. No. 1	547	34	46 05 07.93	±.04	.00		46 05 07.93	1891
Roseburg	W. H. Burger	1908, June 11, 12	Z. T. No. 2	12	12	43 12 35.61	±.08	−.03	+.15	43 12 35.73	1908
Umpquah River	G. Davidson	1853, Aug. 13	Z. T. No. 3	17	17	43 41 45.61	±.13				1870
Yam	W. H. Burger	1908, July 7, 8	Z. T. No. 2	19	19	45 03 38.56	±.07	−.06	+.18	45 03 38.68	1908
Yaquina Point	F. Morse	1885, May, June	M. T. No. 1	29	24	44 40 34.60	±.17	.00		44 40 34.60	1890
PENNSYLVANIA											
Allegheny Observatory (new)	E. Smith	1907, May 7, 9	Z. T. No. 4	20	20	40 28 58.03	±.07	−.06	+.07	40 28 58.04	1907
Altoona	C. H. Sinclair; R. A. Marr	1890, May, June	T. & S. Tr. No. 4.	78	22	40 31 45.49	±.11	−.06	−.20	40 31 45.23	1890
Austinburgh	E. Smith	1879, September	M. T. No. 13	55	19	42 00 01.35	±.11				1879
Burt	do	1877, August	do	51	15	42 00 03.59	±.12				1879
Clark	do	1877, July	do	49	12	42 00 00.79	±.09				1879
Harrisburg	do	1877, September	do	71	16	40 15 44.77	±.13				1880
Jollytown	C. H. Sinclair	1883, August	Z. T. No. 6	59	21	39 43 18.87	±.12				1883
Maryland Corner	do	1883, September	do	50	21	39 43 18.02	±.11				1883
Smiths Ferry	do	1883, July	do	60	13	40 38 27.25	±.19				1894
Southwest corner	do	1883, August	do	73	21	39 43 18.58	±.11				1883
Sugar Grove	E. Smith	1879, October	M. T. No. 13	59	21	41 59 58.84	±.12				1879
Womelsdorf	do	1908, Oct. 13, 14, 15	M. T. No. 3	28	24	40 19 29.31	±.09	−.07	+.12	40 19 29.36	1908
Yard	J. E. Hilgard	1854, Oct. 17–Nov. 2	Z. T. No. 6	148	37	39 58 29.39	±.06	−.03	+.03	39 58 29.39	1871, 1900
SOUTH CAROLINA											
Allendale	W. H. Burger	1907, Feb. 15	Z. T. No. 2	9	9	33 00 29.08	±.09	−.01	−.05	33 00 29.02	1907
Allston	C. O. Boutelle	1853–54, December, January.	Z. T. No. 5	323	55	33 21 38.34	±.05	.00		33 21 38.34	1870
Bethune I	W. B. Fairfield	1918, Oct. 15	Tr. No. 21	16	16	34 28 03.75	±.13	−.02		34 28 03.73	1918
Breach Inlet	C. O. Boutelle; J. Hewston	1849, March, April	Z. T. No. 1	275	28	32 46 19.30	±.08	.00		32 46 19.30	1870
Charleston	C. H. Sinclair	1896, Feb. 18, 21, 22	Z. T. No. 6	66	16	32 47 15.63	±.12	.00	−.09	32 47 15.54	1896
Columbia	G. W. Dean	1854, February, March.	Z. T. No. 2	156	26	33 59 58.04	±.06				1873
Do	do	1854, March, April	Z. T. No. 5	110	22	33 59 58.03	±.06				1873
Do	Dr. B. A. Gould	1854, January	Z. T. No. 2	143	26	33 59 58.31	±.10				1873
Do	do	1854, March	Z. T. No. 5	92	21	33 59 58.09	±.10				1873
Columbia, adopted value						33 59 58.08	±.04				
Edisto Island east base	C. O. Boutelle	1850, March, April	Z. T. No. 2	303	63	32 33 17.66	±.05	.00		32 33 17.66	1870
Paris	do	1875, Oct. 4–17	Z. T. No. 5	116	22	34 56 32.06	±.10				
Do	H. W. Blair	1875, Oct. 18–25	do	110	22	34 56 31.86	±.08				
Paris, adopted value						34 56 31.96	±.07	−.10	+.19	34 56 32.05	1877, 1900
Port Royal	C. O. Boutelle	1859, January, February.	Z. T. No. 5	317	60	32 17 44.85	±.05	.00		32 17 44.85	1871
SOUTH DAKOTA											
Franklin	W. H. Burger	1906, Aug. 10, 11	Z. T. No. 2	23	23	44 53 53.25	±.08	−.10	−.11	44 53 53.04	1906
Freeman	do	1906, Aug. 27, 28	do	22	22	43 18 48.69	±.11	−.08	−.14	43 18 48.47	1906
Harding	C. V. Hodgson	1913, Sept. 21	Z. T. No. 4	18	18	45 22 13.16	±.08	−.21		45 22 12.95	1913
Howard	W. H. Burger	1906, Aug. 17	Z. T. No. 2	14	14	44 00 52.06	±.13	−.08	−.12	44 00 51.86	1906
Preacher Hill	do	1906, July 31, Aug. 2.	do	21	21	45 28 15.96	±.05	−.12	−.10	45 28 15.74	1906
Provo	C. V. Hodgson	1913, Sept. 5	Z. T. No. 4	18	18	43 11 40.28	±.10	−.20		43 11 40.08	1913
Reva	do	1913, Sept. 25	do	17	17	45 34 49.73	±.08	−.19		45 34 49.54	1913
TENNESSEE											
Bean	W. H. Burger	1907, Apr. 7, 12, 14	Z. T. No. 2	33	33	35 11 37.09	±.08	−.15	+.05	35 11 36.99	1907
Knoxville	do	1907, Mar. 23, 28, Apr. 1.	do	26	26	35 57 26.17	±.08	−.05	+.02	35 57 26.14	1907
Lebanon north base	A. H. Buchanan	1878, March, April	M. T. No. 7	184	24	36 12 49.67	±.11	−.03		36 12 49.64	1870
Luper	W. H. Burger	1907, Mar. 18, 20	Z. T. No. 2	16	16	35 57 12.03	±.10	−.14	+.02	35 57 11.91	1907
Martin	O. B. French	1914, Nov. 11, 13	Tr. No. 20	14	14	35 04 39.40	±.06	−.02		35 04 39.38	1914

[1] See footnotes on p. 52.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
TENNESSEE—continued						° ′ ″	″	″	″	° ′ ″	
Memphis	W. Eimbeck	1877, November	M. T. No. 3	62	16	35 08 44.59	±0.11				1880
Mount Lore	W. H. Burger	1907, Mar. 11, 12	Z. T. No. 2	12	12	35 54 57.39	±.13	−0.08	+0.01	35 54 57.32	1907
Nashville	H. W. Blair	1877, November, December.	M. T. No. 3	98	22	36 10 01.37	±.09	−.02		36 10 01.35	1879
TEXAS											
Alice	W. H. Burger	1905, Nov. 16	Z. T. No. 2	17	17	27 44 34.65	±.08	−.01	−.08	27 44 34.56	1906
Allamore	C. V. Hodgson	1914, June 2	Z. T. No. 4	18	18	31 04 36.34	±.04	−.21		31 04 36.13	1914
Austin	W. Eimbeck	1872, March, April	M. T. No. 13	51	14	30 16 21.36	±.24	−.02		30 16 21.34	1875
Bachelor	W. H. Burger	1906, Jan. 31, Feb. 2	Z. T. No. 2	12	12	30 59 46.06	±.10	−.06	+.06	30 59 46.06	1906
Baird	E. Smith	1912, Feb. 16, 17, 18	M. T. No. 3	25	25	32 23 48.26	±.06	−.08	+.12	32 23 48.30	1912
Barstow	C. V. Hodgson	1914, May 22	Z. T. No. 4	16	16	31 27 46.11	±.06	−.12		31 27 45.99	1914
Beaumont	E. B. Roberts	1921, Nov. 19	Tr. No. 20	13	13	30 04 35.09	±.17	.00		30 04 35.09	1921
Black	C. V. Hodgson	1914, June 4	Z. T. No. 4	18	18	31 34 24.31	±.07	−.25		31 34 24.06	1914
Boracho	do	1914, May 28	do	18	18	31 04 35.51	±.07	−.20		31 04 35.31	1914
Bowie, northwest base	W. H. Burger	1906, Dec. 2, 3	Z. T. No. 2	12	12	33 37 20.69	±.11	−.05	−.16	33 37 20.48	1907
Brownsville	E. D. Preston	1885, Apr. 26–May 13.	M. T. No. 7	79	29	25 53 58.45	±.50	.00		25 53 58.45	1909
Bynum	E. Smith	1912, Mar. 2	M. T. No. 3	24	24	32 19 20.97	±.07	−.11	+.12	32 19 20.98	1912
Chamliss	W. H. Burger	1906, Feb. 14	Z. T. No. 2	13	13	31 39 25.59	±.09	−.06	+.08	31 39 25.61	1906
Conway	W. B. Fairfield	1920, Nov. 10	Tr. No. 21	15	15	35 12 26.42	±.08	−.17		35 12 26.25	1920
Dollar Point	R. H. Fauntleroy; J. H. Hilgard	1848, March	Z. T. No. 1	137	53	29 26 01.93	±.07				1871
Dryden, east base	W. B. Fairfield	1919, Aug. 15	Tr. No. 21	14	14	30 02 41.74	±.09	−.09		30 02 41.65	1919
El Paso	O. B. French	1892, May 7–11	Z. T. No. 2	95	19	31 45 32.36	±.06	−.17	−.09	31 45 32.10	1917
Estes	C. V. Hodgson	1914, May 25	Z. T. No. 4	15	15	31 29 49.22	±.07	−.12		31 29 49.10	1914
Galveston Island, east base.	G. W. Dean	1853, February, March.	Z. T. No. 5	155	33	29 12 53.28	±.05				1872
Gilbert	W. H. Burger	1906, Dec. 12, 17	Z. T. No. 2	10	10	32 48 10.39	±.23	−.06	−.14	32 48 10.19	1907
Jacksonville	C. H. Sinclair	1890, Dec. 1, 2, 3	Z. T. No. 6	49	19	31 57 49.44	±.05	−.02	−.22	31 57 49.20	1917
Do	J. E. McGrath	1919, Dec. 22	Tr. No. 20	11	11	31 57 53.16	±.16	−.02		31 57 53.14	1919
Johnstone	do	1919, July 30, 31	do	12	12	29 22 39.16	±.19	−.05		29 22 39.11	1919
Jupiter	G. W. Dean	1853, April, May	Z. T. No. 5	150	37	28 54 49.73	±.05				1872
Karnes	W. H. Burger	1906, June 5	Z. T. No. 2	13	13	28 52 38.15	±.11	−.02	+.02	28 52 38.15	1906
Lacasa	E. Smith	1912, Feb. 11	M. T. No. 3	21	21	32 39 09.35	±.10	−.07	+.11	32 39 09.39	1912
Laguna Madre, north base	W. H. Burger	1905, Nov. 26	Z. T. No. 2	15	15	27 40 15.65	±.07	.00	−.07	27 40 15.58	1906
Laplace	W. B. Fairfield	1919, June 14	Tr. No. 21	14	14	28 42 44.15	±.15	−.04		28 42 44.11	1919
Laredo	G. R. Putnam	1895, May 9, 10, 12	Z. T. No. 6	40	15	27 30 30.10	±.06	−.02	+.01	27 30 30.09	1917
Lavaca	E. Goodfellow	1868, April	Z. T. No. 5	160	35	28 37 37.23	±.07				1873
Miller	W. H. Burger	1905, Dec. 29, 30	Z. T. No. 2	16	16	28 18 06.21	±.07	−.01	−.01	28 18 06.19	1906
Mission	do	1906, Jan. 15, 16	do	13	13	29 42 48.79	±.08	−.04	+.04	29 42 48.79	1906
Pilot	do	1906, Dec. 20	do	10	10	32 15 45.12	±.26	−.07	−.14	32 15 44.91	1906
Rio Grande	Maj. W. H. Emory	1853, August	Z. T. No. 4	127	20	25 57 21.64	±.07	.00		25 57 21.64	1872
Round	C. V. Hodgson	1914, May 27	do	18	18	31 29 01.76	±.04	−.15		31 29 01.61	1914
Sabine	E. B. Roberts	1921, Nov. 25	Tr. No. 20	15	15	29 43 19.48	±.10	.00		29 43 19.48	1921
Sears	E. Smith	1912, Feb. 21, 26	M. T. No. 3	26	24	32 33 38.15	±.10	−.09	+.12	32 33 38.18	1912
Smith	do	1912, Mar. 11	do	19	19	31 58 36.89	±.07	−.14	+.13	31 58 36.88	1912
Stanton	do	1912, Mar. 6	do	19	19	32 07 35.73	±.04	−.12	+.12	32 07 35.73	1912
Tehuacana	W. B. Fairfield	1920, Oct. 18	Tr. No. 21	15	15	31 44 16.47	±.08	−.03		31 44 16.44	1920
Topo	W. H. Burger	1905, Dec. 19	Z. T. No. 2	14	14	26 45 23.54	±.08	.00	−.02	26 45 23.52	1906
UTAH											
Antelope	P. A. Welker	1892, Oct. 12–19	M. T. No. 3	119	23	40 57 40.49	±.07	−.34	+.01	40 57 40.16	1897
Deseret	do	1892, Sept. 8–13	do	108	22	40 27 31.93	±.08	−.57	−.11	40 27 31.25	1896
Green River	C. H. Sinclair	1898, July 28–31	Z. T. No. 6	61	16	38 59 23.89	±.06	−.21	−.05	38 59 23.63	1899
Ibepah	E. P. Austin	1880, Aug. 30–Sept. 5.	M. T. No. 3	117	25	39 49 39.35	±.07	−.62	+.24	39 49 38.97	1898
Lund	J. E. McGrath	1916, Nov. 21	Tr. No. 20	11	11	38 00 23.13	±.23	−.26		38 00 22.87	1916
Mount Ellen	P. A. Welker	1891, Aug. 17–24	M. T. No. 3	114	22	38 07 24.66	±.06	−.58	+.09	38 07 24.17	1895
Mount Nebo	J. H. Turner	1887, July 25–Aug. 1.	do	147	22	39 48 32.90	±.12	−.61	+.02	39 48 32.31	1898
Mount Waas	John Nelson	1893, July 17–27	do	102	22	38 32 29.70	±.12	−.63	−.07	38 32 29.00	1895
Oasis	F. Morse	1898, Aug. 25–31	Z. T. No. 6	87	34	39 17 35.47	±.08	−.24	+.06	39 17 35.29	1899
Ogden Peak	J. H. Turner	1888, Sept. 23–29	M. T. No. 3	131	22	41 11 59.60	±.07	−.50	+.12	41 11 59.22	1898
Patmos Head	P. A. Welker	1890, Sept. 22–Oct. 20.	do	146	26	39 29 57.15	±.06	−.51	+.22	39 29 56.86	1896
Promontory	do	1892, July 9–14	do	103	21	41 17 48.28	±.08	−.34	−.17	41 17 47.77	1896
Salt Lake City	F. H. Agnew	1869, Mar. 23–Apr. 29.	Z. T. No. 6	244	40	40 46 03.78	±.05	−.22	−.20	40 46 03.36	1871, 1898
Waddoup	O. B. French	1892, June 7–19	M. T. No. 3	35	16	40 54 22.11	±.13	−.22	−.16	40 54 21.73	1896
Wasatch	P. A. Welker	1890 Aug. 5–19	do	150	23	39 06 54.32	±.06	−.57	+.08	39 06 53.83	1896
VERMONT											
Burlington	A. T. Mosman	1870, September, October.	Z. T. No. 4	155	31	44 28 09.47	±.10	−.01		44 28 09.46	1872
Killington	W. H. Burger	1907, Aug. 28, 29	Z. T. No. 2	15	15	43 36 18.34	±.09	−.22	+.04	43 36 18.16	1907

[1] See footnotes on p. 52.

TABLE XVI.—*Latitudes determined by the Coast and Geodetic Survey* [1]—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year [1]
VIRGINIA						° ′ ″	″	″	″	° ′ ″	
Big Knob	W. H. Burger	1907, May 4, 7, 9	Z. T. No. 2	34	34	36 39 48.62	±0.06	−0.16	+0.07	36 39 48.53	1907
Bull Run	F. Blake, jr	1871, Sept. 29–Oct. 14.	Z. T. No. 5	205	41	38 52 56.79	±.07	−.07	.00	38 52 56.72	1875, 1898
Cahas	W. H. Burger	1907, June 14, 15	Z. T. No. 2	13	13	37 07 00.38	±.11	−.18	+.09	37 07 00.29	1907
Cape Henry	G. Davidson	1866, August	Z. T. No. 1	(10)	42	36 55 30.25	±.08	.00	.....	36 55 30.25	1870
Charlottesville (McCormick Observatory)	F. H. Parsons	1882, Aug. 11–29	Tr. No. 4	79	16	38 02 00.95	±.14	−.03	+.17	38 02 01.09	1875, 1898
Clark	F Blake, jr	1871, July 31–Aug. 20.	Z. T. No. 5	220	44	38 18 39.80	±.06	−.06	−.14	38 18 39.60	1875, 1898
Covington	C. H. Sinclair	1883–84, December, January.	M. T. No. 13.	50	15	37 47 16.55	±.12	.....	.....	.....	1884
Elliott Knob	W. B. Fairfield	1878, July 10–Aug. 2.	Z. T. No. 6	146	23	38 09 57.51	±.11	−.23	−.20	38 09 57.08	1870, 1898
Goodson	A. T. Mosman	1869, July, August	Z. T. No. 2	37	16	36 35 49.10	±.20	.....	.....	.....	1871
Hines	C. H. Sinclair	1887, February	Z. T. No. 6	54	21	36 33 02.13	±.14	.....	.....	.....	1887
Knott Island north end	A. T. Mosman	1873, March, April	Z. T. No. 2	88	14	36 33 55.37	±.09	.00	.....	36 33 55.37	1873
Long Mountain	do	1875, Oct. 16–22	do	119	20	37 17 28.72	±.09	−.07	+.19	37 17 28.84	1877, 1898
Mount Weather	E. Smith	1907, June 20, 21, 22	Z. T. No. 6	22	22	39 03 52.50	±.13	−.09	+.09	39 03 52.50	1907
Petersburg (Roslyn)	G. W. Dean	1852, July, August	Z. T. No. 5	120	34	37 14 25.48	±.04	.00	.....	37 14 25.48	1872
Rogers	W. H. Burger	1907, May 28, June 3.	Z. T. No. 2	18	18	36 39 38.71	±.08	−.28	+.09	36 39 38.52	1907
Staunton	A. T. Mosman	1869, April	M. T. No. 1	4	4	38 08 50.8	.....	−.07	.....	38 08 50.7	1873
Strasburg	C. H. Sinclair	1881, June 7–22	M. T. No. 13	106	22	38 59 31.49	±.09	−.03	+.10	38 59 31.56	1885, 1898
Suffolk	J. E. McGrath	1910, Jan. 4, 6, 7, 9	Tr. No. 20	20	20	36 44 01.35	±.19	.00	.....	36 44 01.35	1919
Tangier Island	A. T. Mosman	1871, June 15–28	M. T. No. 7	143	23	37 47 56.57	±.08	.00	.....	37 47 56.57	1871
White Rock	W. H. Burger	1907, Apr. 25, 27, 29	Z. T. No. 2	16	16	36 39 49.62	±.14	−.17	+.06	36 39 49.51	1907
Wolftrap	A. T. Mosman	1871, May 16–June 3.	M. T. No. 7	278	45	37 24 02.02	±.07	.00	.....	37 24 02.02	1871
WASHINGTON											
Cape Disappointment	G. Davidson	1851, August, September.	Z. T. No. 3	286	55	46 16 35.36	±.05	.00	.....	46 16 35.36	1872
False Dungeness	do	1852, July 21	do	.....	5	48 07 51.67	±.34	.....	.....	.....	1870
Kalama	W. Elmbeck	1873, September, October.	Z. T. No. 1	163	32	46 00 17.79	±.10	.00	.....	46 00 17.79	1875
Lummi Island	G. Davidson	1853, September	Z. T. No. 3	32	28	48 44 01.84	±.12	.....	.....	.....	1870
Point Hudson	do	1852, July 23	do	.....	9	48 07 02.16	±.18	.....	.....	.....	1870
Scarborough Harbor	do	1852, July, August	do	.....	57	48 21 49.11	±.05	.....	.....	.....	1872
Seattle	R. A. Marr	1888, July, August	M. T. No. 2	64	26	47 36 35.10	±.23	−.01	.....	47 36 35.09	1890
Tacoma	C. H. Sinclair	1894, May 21–24	Z. T. No. 6	50	12	47 15 46.93	±.05	−.02	+.05	47 15 46.96	1908
Walla Walla	do	1887, September, October.	Tr. No. 6	85	20	46 03 55.19	±.08	.....	.....	.....	1890
WEST VIRGINIA											
Charleston	F. H. Parsons	1883, Aug. 17–21	Tr. No. 6	39	22	38 21 06.39	±.19	.....	.....	.....	.....
Do	C. Schenk	1883, Aug. 24–26	do	49	20	38 21 06.98	±.10	.....	.....	.....	.....
Do	C. Terry	1883, Aug. 29–Sept. 6.	do	115	21	38 21 06.90	±.12	.....	.....	.....	.....
Charleston, adopted value						38 21 06.87	±.10	−.03	+.11	38 21 06.95	1888, 1898
Harvey	C. H. Sinclair	1883, August, September.	Z. T. No. 6	61	21	39 43 17.79	±.13	.....	.....	.....	1883
Keeney	A. T. Mosman	1880, Aug. 22–Sept. 3.	M. T. No. 13	105	18	37 46 23.26	±.11	−.20	+.01	37 46 23.07	1884, 1898
Mount Morris	C. H. Sinclair	1883, August	Z. T. No. 6	52	21	39 43 18.36	±.13	.....	.....	.....	1883
Piney	A. T. Mosman	1883, Aug. 30–Sept. 9.	M. T. No. 13	113	18	38 26 41.33	±.06	−.06	+.13	38 26 41.40	1889, 1898
WISCONSIN											
Fitzsimmons	C. O. Boutelle	1887, September	Z. T. No. 5	122	24	43 25 44.98	±.09	.....	.....	.....	1888
Gratiots Grove	G. E. Brown	1880, September	Z. T. No. 6	14	10	42 32 32.41	±.36	.....	.....	.....	1885
La Crosse	F. Blake, jr	1873, October	Z. T. No. 2	39	13	43 48 50.12	±.13	.....	.....	.....	1875
Madison	do	1873, August	do	12	12	43 04 32.63	±.05	.....	.....	.....	1884
Somers (U. S. L. S.)	W. Bowie	1908, July 7	Z. T. No. 4	15	15	42 37 11.12	±.07	−.04	+.07	42 37 11.15	1908
Yerkes Observatory	O. B. French	1900, Oct. 17–26	do	132	24	42 34 12.64	±.04	.....	−.05	42 34 12.59	1900
WYOMING											
Alkali	C. V. Hodgson	1913, Sept. 9	Z. T. No. 4	17	17	43 38 07.86	±.08	−.23	.....	43 38 07.63	1913
Cambria	do	1913, Sept. 13	do	18	18	44 02 42.09	±.05	−.33	.....	44 02 41.76	1913
Coleman	do	1913, Aug. 28	do	17	17	42 22 06.27	±.08	−.29	.....	42 22 05.98	1913
Jireh College	do	1913, Aug. 31	do	17	17	42 46 35.00	±.10	−.28	.....	42 46 34.72	1913
Kirtley	do	1913, Sept. 3, 4	do	18	18	42 51 43.97	±.05	−.27	.....	42 51 43.70	1913
Sherman	A. T. Mosman	1872, July, August	M. T. No. 13	110	19	41 07 49.55	±.10	.....	.....	.....	1874
Sundance	C. V. Hodgson	1913, Sept. 13	Z. T. No. 4	18	18	44 28 45.70	±.07	−.35	.....	44 28 45.35	1913
Wheatland	do	1913, Aug. 23	do	18	18	42 02 42.38	±.07	−.26	.....	42 02 42.12	1913
Whitaker	do	1913, Aug. 12	do	16	16	41 23 53.34	±.05	−.34	.....	41 23 53.00	1913
Wyoming-Colorado boundary monument, milepost 44.	do	1913, Aug. 22	do	17	17	40 59 50.53	±.08	−.31	.....	40 59 50.22	1913
Yellowstone Lake	G. R. Putnam	1892, June, July	Z. T. No. 6	82	33	44 33 16.10	±.06	.....	−.17	44 33 15.93	1893

[1] See footnotes on p. 52.
[10] Each pair observed from 1 to 8 times.

TABLE XVII.—*Latitudes determined by the United States Lake Survey*

Name of station	Observer	Dates	Instrument (see Table XV)	No. of observations	No. of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude
ILLINOIS						° ′ ″	″	″	″	° ′ ″
Cairo	D. W. Lookwood	1876, Dec. 2, 3	Z. T. No. 19	45		36 59 48.29				
Chicago	O. B. Wheeler	1864, Aug. 15-23	Z. T. No. 1	71		41 53 01.30	±0.08	−0.03		41 53 01.27
Fairmount	G. Y. Wisner	1880, May 5-10	Z. T. No. 19	104	33	40 01 36.74	±.11	−.04		40 01 36.70
Galena	S. W. Robinson	1873, July 14-26	P. & M. Tr. No. 1.	107		42 25 09.50				
Olney west base	G. Y. Wisner	1880, May 13-16	Z. T. No. 19	115	30	38 51 41.23	±.06	−.03	+0.08	38 51 41.28
Parkersburg	P. M. Price	1879, Aug. 9-13	do	126	38	38 34 53.25	±.09	−.03	−.12	38 34 53.10
Rock Island	C. F. Powell	1878, Oct. 2, 5	Z. T. No. 12	36		41 31 03.41				
Willow Springs	A. R. Flint	1874, Sept. 28-Oct. 3.	Z. T. No. 19	132	33	41 43 38.98	±.12	−.04		41 43 38.94
MICHIGAN										
Allegan	T. N. Bailey	1875, Sept. 10, 12	P. & M. Tr. No. 2	48		42 31 43.01				
Beaver Island	O. B. Wheeler; S. W. Robinson	1863, Nov. 2, 3	Z. T. No. 1	32		45 34 30.50				
Big Pointe au Sable	O. B. Wheeler	1866, Aug. 4-6	Z. T. No. 12	141		44 03 30.47				
Do	E. Maguire; C. B. Comstock	1872, Aug. 5-18	Z. T. No. 18	67		44 03 29.31				
Do, adopted value						44 03 30.09				
Burnt Bluff	O. B. Wheeler	1863, Sept. 29-Oct. 1.	Z. T. No. 1	51		45 40 33.47	±.15	−.03		45 40 33.44
Cedar River	S. W. Robinson	1865, Sept. 14-16	do	100		45 25 43.06	±.17	−.03		45 25 43.03
Charlotte	P. M. Price	1875, July 7-10	Z. T. No. 12	72		42 34 04.12				
Clay Banks	E. Maguire	1873, June 12-20	Z. T. No. 18	42		43 30 23.01		−.04		43 30 22.97
Copper Harbor (Fort Wilkins)	O. B. Wheeler	1864, June 14-17	Z. T. No. 1	95		47 28 05.46		−.03		47 28 05.43
Corunna	H. M. Adams	1874, July 28, 29	Z. T. No. 12	70		42 58 22.23				
Crebassa	G. A. Marr	1871, Sept. 22-28	do	146		46 58 41.01	±.07	−.03		46 58 40.98
Detroit	C. B. Comstock	1872, Aug. 1-Nov. 9	P. & M. Tr. No. 1, Z. T. No. 12.	154		42 19 58.65	±.09	−.03		42 19 58.62
Douglas	E. Maguire	1873, July 26-29	Z. T. No. 18	58		42 38 11.12				
Duck Lake	J. H. Weeden	1871, Sept. 20, 21	do	38		43 20 03.56		−.04		43 20 03.52
Escanaba	S. W. Robinson; O. B. Wheeler	1865, July 25-Aug. 13.	Z. T. No. 12	169		45 44 22.79		−.03		45 44 22.76
Flint	C. F. Powell	1874, July 17-22	P. & M. Tr. No. 1.	61		43 01 13.02				
Ford River	G. Y. Wisner	1874, July 3-8	Z. T. No. 19	115	34	45 41 05.27	±.11	−.03		45 41 05.24
Fort Gratiot	C. N. Turnbull	1858, Oct. 17-27	Z. T. No. 12	134		42 59 52.12				
Frankfort (Pointe aux Bec Scies.)	J. H. Weeden	1871, July 9, 10	Z. T. No. 18	40		44 38 53.30		−.05		44 38 53.25
Grand Island	O. B. Wheeler	1867, Aug. 26, 30	P. & M. B. Inst. No. 1.	155		46 33 40.96				
Grand Rapids	C. F. Powell	1874, Sept. 1, 3	do	47		42 57 49.02				
Hastings	T. N. Bailey	1875, July 29, Aug. 11.	P. & M. Tr. No. 2.	39		42 38 52.85				
Howell	do	1875, June 3-22	P. & M. B. Tr. No. 2.	71		42 36 00.24	±.13			
Huron Mountains	S. W. Robinson	1866, September	P. & M. Tr.	54		46 52 52.30	±.13	−.08		46 52 52.22
Ionia	C. F. Powell	1874, Aug. 24, 27	P. & M. Inst. No. 1.	47		42 58 52.53				
Iroquois Point	O. B. Wheeler	1867, Sept. 23-26	P. & M. B. Inst. No. 1.	99		46 29 05.16		−.03		46 29 05.13
Isle Royale	S. W. Robinson	1866, Aug. 26-Sept. 16.	P. & M. B. No. 1.	72		48 07 55.25	±.12	−.06		48 07 55.19
Jackson	T. N. Bailey	1875, Aug. 17, 22	P. & M. Tr. No. 2.	50		42 14 51.02				
Kalamazoo	P. M. Price	1875, Sept. 3, 6	Z. T. No. 12	51		42 17 25.83				
Keweenaw Point south base.	G. Y. Wisner	1873, July 23-Aug. 3.	do	99	51	46 52 22.35	±.07	−.04		46 52 22.31
Lansing	T. N. Bailey	1875, June 29-July 10.	P. & M. B. No. 2.	47		42 43 53.11				
Lapeer	C. F. Powell	1874, June 27-30	P. & M. Inst. No. 1.	62		43 03 07.61				
Manistee	J. H. Weeden	1871, July 22, 23	Z. T. No. 18	47		44 16 46.43				
Marshall	P. M. Price	1875, Aug. 8, 17	Z. T. No. 12	52		42 16 21.21				
Monroe	G. Y. Wisner	1868, Oct. 29-Nov. 5	do	50		41 54 49.88	±.18	−.03		41 54 49.85
Mount Houghton	S. W. Robinson	1865, July 4-12	do	24		47 24 15.89		−.08		47 24 15.82
Newaygo	T. N. Bailey	1875, Oct. 8-19	P. & M. Tr. No. 2.	37		43 25 14.16				
Paw Paw	P. M. Price	1875, Sept. 22, 27	Z. T. No. 12	54		42 13 02.41				
Pontiac	C. F. Powell	1874, June 7	do	33	33	42 38 07.20				
Porcupine Mountain	G. Y. Wisner	1870, June 20-July 1	do	44		46 47 04.24	±.17	−.10		46 47 04.14
Portage Entry	O. B. Wheeler	1864, June 9-11	Z. T. No. 1	64		46 58 47.55				
Round Island	J. N. Macomb	1853, Oct. 6, 7	Z. T	80	80	45 50 05.88		−.01		45 50 05.87
Saginaw	D. W. Lockwood	1876, Sept. 19, 21	Z. T. No. 19	52		43 25 07.59				
St. Johns	C. F. Powell	1874, July 27-29	P. & M. Tr. No. 1.	51		42 59 59.94				

TABLE XVII.—*Latitudes determined by the United States Lake Survey*—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	No. of observations	No. of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude
MICHIGAN—continued						° ′ ″	″	″	″	° ′ ″
St. Louis	D. W. Lockwood	1876, Oct. 2	Z. T. No. 19	30	30	43 24 33.81	±0.11			
Sault Ste. Marie	J. F. Gregory, G. Y. Wisner	1867, Sept. 27	Z. T. Nos. 1 and 12.	156		46 30 07.67		−0.03		46 30 07.64
Sault Ste. Marie, east pier	C. S. Riche	1893, June 11-26	Z. T. No. 12	101	101	46 30 06.25	± .08	−.03		46 30 06.22
South Haven	E. Maguire	1873, Sept. 26-Oct. 7	Z. T. No. 18	59		42 16 13.24		−.04		42 16 13.20
South Twin Sisters (Grand Haven.)	J. H. Weeden	1871, Sept. 7, 8	do	32		42 58 34.88		−.04		42 58 34.84
Stanton	P. M. Price	1875, Oct. 21, 22	Z. T. No. 12	59		43 17 29.76				
Thones Hill (Marquette)	S. W. Robinson, O. B. Wheeler	1865, July 10-30; 1867, Aug. 31 and Sept. 1.	Z. T. No. 1	79		46 32 00.60	±.16	−.03		46 32 00.57
Thunder Bay Island	C. N. Turnbull	1858, Aug. 13-24	Z. T. No. 12	122		45 02 12.69				
Vulcan, Post No. 1	J. Mercur	1867, Aug. 9, 14, 15	Z. T. No. 1	41	27	47 26 44.87	±.27			
Vulcan, Post No. 2	do	1867, July 24-Aug. 4	do	47	27	47 26 42.77	±.32			
Vulcan, adopted value of triangulation station.						47 26 47.58	±.20	−.07		47 26 44.51
Wheal Kate	O. B. Wheeler	1866, Sept. 18-25	Z. T. No. 12	103		47 04 18.44		−.08		47 04 18 36
Whitefish Point	do	1867, Sept. 16-21	P. M. B. Inst. No. 1.	123		46 46 07.20		−.03		46 46 07.17
MINNESOTA										
Buchanan	A. R. Flint	1871, July 20-26	Z. T. No. 1	76		46 56 22.15	±.25	−.04		46 56 22.11
East Sawteeth	do	1870, July 18-24	Z. T. No. 18	43		47 23 09.45	±.21	−.08		47 23 09.37
Farquhar's Knob	E. H. Ruffner	1869, Oct. 4-6	Z. T. No. 1	79		47 52 35.21	±.24	−.09		47 52 35.12
Minnesota Point north base.	G. Y. Wisner	1871	Z. T. No. 12	46	23	46 45 30.01	±.17	−.04		46 45 29.97
Minnesota Point south base.	do	1871, July 14, 16	do	77		46 42 51.67	±.14	−.03		46 42 51.64
Red Wing	C. F. Powell	1878, Oct. 18, 19	do	41		44 33 44.16				
St. Paul	A. R. Flint	1871, June 9-12	Z. T. No. 1	65		44 56 42.48	±.28			
MISSOURI										
Louisiana	C. F. Powell	1878, Nov. 21-23	Z. T. No. 12	51		39 27 14.30				
NEW YORK										
Buffalo	E. H. Ruffner	1868, Sept 14-16	Z. T. No. 1	66		42 52 41.99	±.19	−.03		42 52 41.96
Dunkirk	G. Y. Wisner	1868, Aug. 26-Sept. 4	Z. T. No. 12	77		42 29 20.03	±.12	−.03		42 29 20.00
Ogdensburg	E. H. Ruffner	1869, July 19 and 20	Z. T. No. 1	57		44 41 25.60	±.26	−.01		44 41 25.59
Oswego	O. B. Wheeler	1868, July 24-Aug. 12.	P. & M. Tr. No. 1.	65		43 27 49.05	±.10	−.03		43 27 49.02
Rochester	G. Y. Wisner	1868, Aug. 1-6	Z. T. No. 12	77		43 09 25.31	±.16	−.03		43 09 25.28
Sandy Creek north base	do	1874, Sept. 23-26	W. Z. T. No. 12.	32	32	43 40 40.74		−.03		43 40 40.71
Tonawanda	A. R. Flint	1875, Oct. 2-22	Z. T. No. 19	156	40	43 00 07.84	±.08	−.03		43 00 07.81
Watertown	G. Y. Wisner	1868, July 2-14	Z. T. No. 12	97		43 58 43.02	±.10	−.01		43 58 43.01
OHIO										
Ashtabula	do	1868, Sept. 17-Oct. 3.	do	56		41 52 33.75	±.16			
Cleveland	O. B. Wheeler	1868, Oct. 4-10	P. & M. Tr. No. 1.	60		41 30 16.51	±.19	−.03		41 30 16.48
Sandusky west base	G. Y. Wisner	1868, Oct. 10-13	Z. T. No. 12	69	31	41 27 13.49	±.15	−.03		41 27 13.46
Toledo	O. B. Wheeler	1868, Oct. 28-Nov. 5.	P. & M. Tr. No. 1.	44	24	41 39 03.21	±.15	−.03		41 39 03.18
PENNSYLVANIA										
Erie	do	1868, Sept. 2-14	do	35		42 08 10.38	±.22	−.03		42 08 10.35
TENNESSEE										
Memphis	C. F. Powell	1877, June 28-30	Z. T. No. 19	67		35 08 39.42				
WISCONSIN										
Ada 1	C. F. Powell	1873, Sept. 4-11	Z. T. No. 1	79		43 29 18.68		−.03		43 29 18.65
Aminicon	G. Y. Wisner	1871, July 20, 21	Z. T. No. 12	65		46 41 36.13	±.14	−.04		46 41 36.09
Boyers Bluff	C. A. Young	1865, Aug. 26-Sept. 4.	P. & M. Tr. No. 1.	48		45 25 08.95	±.09	−.04		45 25 08.91
Brule River	G. A. Marr	1871, July 13-20	P. & M. B. Inst. No. 1.	107		46 45 19.99	±.14	−.04		46 45 19.95
Clay Banks (Door County).	S. W. Robinson	1866, Oct. 4, 5	do	147		44 41 15.31				
Do	C. F. Powell	1872, Aug. 11-25	Z. T. No. 1	47		44 41 35.26				
Clay Banks (Door County), adopted value of traverse station 1866.						44 41 19.45				
Door Bluff	S. W. Robinson	1865, Aug. 31-Sept. 6.	Z. T. No. 1	117		45 17 44.96	±.15	−.04		45 17 44.92
Fort Howard	J. Carr	1862, Oct. 11-22	do	77	30	44 31 18.52	±.10	−.03		44 31 18.49
Fox Point	C. F. Powell	1873, Sept. 22-27	do	95		43 10 13.35				
Green Island	J. Carr	1862, Sept. 24-Oct. 2.	do	162		45 03 33.90				
Kewaunee	C. F. Powell	1873, June 30-July 5.	do	88		44 25 41.12				

TABLE XVII.—*Latitudes determined by the United States Lake Survey*—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	No. of observations	No. of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude
WISCONSIN—continued						° ′ ″	″	″	″	° ′ ″
Menominee	S. W. Robinson	1865, Aug. 13, 15	P. & M. B. Inst. No.1.	42		45 05 56.13	±0.10	−0.03		45 05 56.10
Minnesota Junction	A. R. Flint	1873, Aug. 26-Sept. 1.	Z. T. No. 19	156	36	43 28 31.82	±.11	−.05		43 28 31.77
North Sheboygan	M. R. Brown	1866, Oct. 13, 15	P. & M. Tr. No. 1.	82		43 45 54.13				
Outer Island	G. Y. Wisner	1870, Aug. 13-26	Z. T. No. 12	36		47 04 14.16	±.19	−.04		47 04 14.12
Point Creek	C. F. Powell	1873, Aug. 2-5	Z. T. No. 1	101		43 57 58.29				
Rawleys Point	S. W. Robinson	1866, Oct. 8, 9	P. & M. B No. 1.	147		44 11 34.79				
Do	C. F. Powell	1872, Sept. 6-9	Z. T. No. 1	27		44 12 04.58				
Two Rivers, adopted station value of traverse.						44 12 04.46				
Rock Island	J. Carr	1862, Sept. 3-10	Z. T. No. 1	121		45 25 30.61		−.03		45 25 30.58
South Sheboygan	C. F. Powell	1872, Sept. 13-Oct. 12.	do	36		43 41 01.37				
Valley Junction	S. W. Robinson	1873, Aug. 16, 18	P. & M. B. Inst. No.1.	52		44 03 11.00				
CANADA										
Gargantua	A. R. Flint	1869, Sept. 14-21	T. & S. Tr. No. 3.	87		47 34 39.12		−.05		47 34 39.07
Goderich	O. M. Poe	1860, Mar. 26-July 10.	Z. T. No. 1	152		43 44 21.74				
Michipicoten	O. B. Wheeler	1869, July 5-7	P. & M. B. Inst. No.1.	17		47 45 19.73	±.15	−.08		47 45 19.65
St. Ignace, post No. 1	do	1866	Z. T. No. 12.	41	17	48 47 28.55	±.14			
St. Ignace, post No. 2	G. Y. Wisner	1867	do	56	21	48 47 25.03	±.25			
St. Ignace, post No. 3	do	1867	do	33	16	48 47 27.67	±.18			
St. Ignace, adopted value of triangulation station.						48 47 28.65		−.10		48 47 28.55
St. Ignace, post No. 4	O. B. Wheeler	1866	Z. T. No. 12.	29	16	48 46 15.60	±.11			
Do	G. A. Marr	1871	do	5	5	48 46 16.65	±.31			
St. Ignace post No 4, adopted value.						48 46 15.84		−.04		48 46 15.80
St. Ignace, post No. 5	G. A. Marr	1871	Z. T. No. 12.	40	25	48 44 52.00	±.15	−.03		48 44 51.97
St. Ignace, post No. 6	do	1871	Z. T. No. 12 and P. & M. No. 1.	73	30	48 51 19.00	±.17	−.03		48 51 18.97
Tip Top (north post)	O. B. Wheeler	1867, July 21-26	P. & M. Inst. No. 1.	70		48 16 26.53	±.11			
Tip Top (south post)	do	1867, Aug. 4-13	do	62		48 16 25.74	±.11			
Tip Top, adopted value of triangulation station.						48 16 25.78	±.08	−.11		48 16 25.67

TABLE XVIII.—*Latitudes determined by the United States Geological Survey*

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude
ALABAMA						° ′ ″	″	″	″	° ′ ″
Tuscaloosa	S. S. Gannett	1895, November, December	Fauth M. T. No. 534.	50	25	33 12 35.91	±0.18	0.00		33 12 35.91
IDAHO										
Boise	R. S. Woodward	1889, Nov. 12,13,14	Würd. M. T. No. 20.	42	26	43 35 57.98	±.16	−.14		43 35 57.84
KANSAS										
Elk Falls	do	1884, Sept. 21-Oct. 8	do	84	42	37 22 03.64	±.07	−.05		37 22 03.59
Fort Scott	do	1884, Oct. 16-31	do	89	45	37 50 25.76	±.11	−.04		37 50 25.72
Oswego	do	1884, Aug. 27-Sept. 4	do	49	34	37 09 59.81	±.09	−.04		37 09 59.77
Spearville	do	1889, Oct. 24-28	do	77	31	37 51 06.34	±.14	−.12		37 51 06.22
MISSOURI										
Bolivar	do	1884, Nov. 26-Dec. 7	Würd. M. T.	35	22	37 36 35.22	±.20	−.06		37 36 35.16
Springfield	do	1884, Nov. 8-12	Würd. M. T. No. 20.	82	33	37 13 15.96	±.10	−.06		37 13 15.90
MONTANA										
Hamilton	S. S. Gannett	1897	Fauth M. T. No. 534.	56		46 14 53.91	±.11	−.18		46 14 53.73
NEW MEXICO										
Albuquerque	R. S. Woodward	1885, June 25-July 12	Würd. M. T.	103	32	35 04 32.40	±.09	−.24		35 04 32.16

TABLE XVIII.—*Latitudes determined by the United States Geological Survey*—Continued

Name of station	Observer	Dates	Instrument (see Table XV)	No. of observations	No. of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude
NORTH DAKOTA						° ′ ″	″	″	″	° ′ ″
Jamestown	S. S. Gannett	1892, October	Fauth M.T. No. 534.			46 54 13.50	±0.12			
OKLAHOMA										
Guthrie	do	1892, November	do			35 52 42.22		−0.05		35 52 42.17
Savanna	do	1895, April	do			34 48 46.49	±.18			
OREGON										
Baker	do	1897	do			44 46 41.56	±.14	−.18		44 46 41.38
Eugene	do	1894, June, July	do	73	30	44 03 28.27	±.09	−.02		44 03 28.25
SOUTH DAKOTA										
Rapid City	do	1890, November	do	64	31	44 04 45.24	±.16	−.17		44 04 45.07
Sioux Falls	do	1896, October	do	40	15	43 32 34.53	±.11	−.07		43 32 34.46
TENNESSEE										
Waverly	do	1898, May	do	37		36 04 59.47	±.12	−.02		36 04 59.45
TEXAS										
Cisco	R. S. Woodward	1889, Dec. 2, 3, 4, 5	Würd. M.T. No. 20.	68	30	32 23 31.45	±.15	−.07		32 23 31.38
Sierra Blanca	do	1890, May 17, 18	do	50	28	31 10 27.64	±.16	−.20		31 10 27.44
Spofford	S. S. Gannett	1896	Fauth M.T. No. 534.			29 10 27.23	±.15	−.05		29 10 27.18
WASHINGTON										
Ellensburg	do	1895, July, August	do	63	26	46 59 55.03	±.09	−.08		46 59 54.95
Spokane	do	1896, August	do	59	27	47 39 51.46	±.13	−.10		47 39 51.36
WYOMING										
Sheridan		1896, July	do	45	22	44 48 31.10	±.12	−.19		44 48 30.91

TABLE XIX.—*Latitudes determined by the United States General Land Office*

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error
COLORADO						° ′ ″	″
Colorado-New Mexico boundary station No. 1	H. B. Carpenter, A. MacConnel	1902, Sept. 21, 22, 23	Würdemann Z. T.		22	36 59 53.16	±0.17
Colorado-New Mexico boundary station No. 2	H. B. Carpenter, A. MacConnel	1902, Sept. 27, 28, 29	do		24	36 59 50.50	±.11
Colorado-New Mexico boundary station No. 3	H. B. Carpenter, A. MacConnel	1902, Oct. 5, 6, 7	do		21	36 59 40.88	±.12
Colorado-New Mexico boundary station No. 4	H. B. Carpenter, A. MacConnel	1902, Oct. 12, 13	do		26	36 59 45.22	±.13
Colorado-New Mexico boundary station No. 5	H. B. Carpenter, A. MacConnel	1902, Oct. 21, 22, 23	do		23	36 59 35.95	±.11
Colorado-New Mexico boundary station No. 6	H. B. Carpenter, A. MacConnel	1902, Oct. 28, 29, 30	do		25	36 59 52.19	±.17
Colorado-New Mexico boundary station No. 7	H. B. Carpenter, A. MacConnel	1902, Nov. 3, 4, 7	do		26	36 59 58.19	±.18
Colorado-Oklahoma boundary station No. 8	H. B. Carpenter, A. MacConnel	1902, Nov. 11, 12, 13, 14	do		28	36 59 38.29	±.14
Colorado-Oklahoma boundary station No. 9	A. D. Kidder, A. MacConnel	1903, Oct. 12, 13, 14	do		21	37 00 00.02	±.24
TEXAS							
Higgins	A. MacConnel	1903, Nov. 9, 11, 12	Würdemann M. T.		27	36 29 57.50	±.22
Monahans	do	1903, Dec. 8, 9, 10	do		30	31 59 41.87	±.17
Rio Grande	do	1903, Nov. 22, 23, 24	do		34	31 59 56.17	±.13
Texline	do	1903, Oct. 22, 23, 24	do		30	35 29 56.66	±.16
UTAH							
Utah-Arizona boundary station No. 1	H. B. Carpenter, A. MacConnel	1901, Mar. 25, 26, 27	Würdemann Z. T.		8	37 01 12.1	±1.0
Utah-Arizona boundary station No. 2	H. B. Carpenter, A. MacConnel	1901, Apr. 11, 12	do		12	37 00 02.50	±.35
Utah-Arizona boundary station No. 3	H. B. Carpenter, A. MacConnel	1901, Apr. 22, 23, 24	do		14	36 59 51.60	±.27
Utah-Arizona boundary station No. 4	H. B. Carpenter, A. MacConnel	1901, May 10, 11, 12	do		24	37 01 06.80	±.41
Utah-Arizona boundary station No. 5	H. B. Carpenter, A. MacConnel	1901, June 10, 11, 12, 13	do		19	37 00 23.80	±.49
Utah-Arizona boundary station No. 6	H. B. Carpenter, A. MacConnel	1901, June 22, 23, 24	do		17	36 59 24.58	±.41

TABLE XX.—*Latitudes determined by the United States and Canada Boundary Commission*

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude	Year[1]
MINNESOTA						° ′ ″	″	″	″	° ′ ″	
Warroad south base	O. B. French	1915, July 21	Tr. No. 20	11	11	48 55 22.82	±0.09	−0.06	.....	48 55 22.76	1915
MONTANA											
Kootenai River E	do	1901, Oct. 1, 2, 3	Z. T. No. 6	26	26	48 59 58.64	±.06	−.12	−0.10	48 59 58.42	1901
Tobacco Plains	C. H. Sinclair	1901, Aug. 15, 17, 18, 19, 20.	do	92	25	48 59 55.69	±.06	−.14	−.17	48 59 55.38	1901
Wigwam	do	1901, Aug. 29, 31, Sept. 2, 15.	do	23	23	48 59 58.52	±.07	−.25	−.13	48 59 58.14	1901
Wigwam 2	do	1901, Sept. 16, 17, 18	do	23	23	48 59 42.45	±.05	−.25	−.13	48 59 42.07	1901
WASHINGTON											
Carson	do	1901, July 18, 21, 22, 23, 24.	do	78	22	49 00 00.02	±.07	−.09	−.21	48 59 59.72	1901
Russell	do	1901, July 30, Aug. 1, 2, 3, 4.	do	93	27	48 59 59.65	±.06	−.08	−.21	48 59 59.36	1901
CANADA											
Columbia River E	O. B. French	1901, Oct. 15, 16, 17	do	73	25	49 00 01.54	±.05	−.07	−.07	49 00 01.40	1901
Midway	C. H. Sinclair	1901, July 9, 12, 13, 14	do	74	25	48 59 57.85	±.08	−.10	−.20	48 59 57.55	1901
Silicia Creek	do	1901, May 24, 25, June 16, 17, 18.	do	90	28	49 00 33.69	±.06	−.11	−.09	49 00 33.49	1901

[1] The latitude of each station depends upon the best available star catalogues at the date given. See p. 50.

TABLE XXI.—*Latitudes determined by the United States Engineers*

Name of station	Observer	Dates	Instrument (see Table XV)	Number of observations	Number of pairs	Observed latitude	Probable error	Reduction to sea level	Correction for variation of pole	Corrected latitude
CALIFORNIA						° ′ ″	″	″	″	° ′ ″
Fresno	J. H. Clark	1878, Oct. 3-13	M. T. No. 16	88	.....	36 43 31.22	±0.15	.....	.....	.....
COLORADO										
Colorado Springs	Dr. F. Kampf	1873, July 31-Aug. 9	M. T. No. 28	151	.....	38 49 41.67	±.04	−0.31	.....	38 49 41.36
Georgetown	do	1873, June 22-July 5	do	118	.....	39 42 36.36	±.06	−.44	.....	39 42 35.92
Hughes	do	1873, July 16-23	do	149	.....	39 59 24.09	±.03	−.26	.....	39 59 23.83
Julesburg	J. H. Clark	1874, Oct. 9-11	M. T. No. 27	63	.....	40 59 07.63	±.04	−.18	.....	40 59 07.45
Labran	Dr. F. Kampf	1873, Aug. 13-26	M. T. No. 28	151	.....	38 23 08.97	±.03	−.26	.....	38 23 08.71
Trinidad	do	1873, Sept. 4-12	do	162	.....	37 10 46.53	±.02	−.30	.....	37 10 46.23
MONTANA										
Bozeman	J. H. Clark	1873, Oct. 18-Nov. 4	M. T. No. 27	83	.....	45 40 51.92	±.06	−.25	.....	45 40 51.67
NEBRASKA										
North Platte	Dr. F. Kampf	1874, Oct. 15-17	do	68	.....	41 08 18.33	±.06	−.14	.....	41 08 18.19
Sidney Barracks	do	1874, Sept. 24-27	do	80	.....	41 08 36.75	±.05	−.21	.....	41 08 36.54
NEVADA										
Austin	E. P. Austin	1871, June 15-23	M. T. No. 16	50	.....	39 29 21.92	±.20	−.38	.....	39 29 21.54
Battle Mountain	do	1871, June 6-9	do	33	.....	40 38 18.74	±.21	−.23	.....	40 38 18.51
Carlin	do	1871, May 17-27	do	34	.....	40 42 26.67	±.17	−.26	.....	40 42 26.41
Pioche	W. W. Maryatt	1872, Oct. 4-11	do	189	.....	37 55 26.07	±.07	−.30	+0.03	37 55 25.80
Virginia City	do	1873, Aug. 13-29	M. T. No. 27	161	39	39 17 35.92	±.10	−.32	.....	39 17 35.60
Winnemucca	do	1873, July 15-30	do	141	22	40 58 19.97	±.17	−.23	.....	40 58 19.74
NEW MEXICO										
Cimarron	J. H. Clark	1874, Aug. 31-Sept 5	do	69	.....	36 30 10.01	±.09	−.32	.....	36 30 09.69
Fort Union	T. H. Safford	1873, Aug. 24-30	Z. T.	74	.....	35 54 24.86	±.22	−.33	.....	35 54 24.53
Las Vegas	J. H. Clark	1874, July 31-Aug. 4	M. T. No. 27	99	.....	35 35 27.66	±.07	−.31	.....	35 35 27.35
Santa Fe	T. H. Safford	1873, June 27-July 30	Z. T.	112	47	35 41 19.29	±.15	−.34	.....	35 41 18.95
OREGON										
Dalles	J. H. Clark	1878, Sept. 5-17	M. T. No. 16	80	.....	45 36 17.78	±.09	−.01	.....	45 36 17.77
UTAH										
Beaver	do	1872, Aug. 20-30	do	94	.....	38 16 23.28	±.06	−.30	−.08	38 16 22.90
Gunnison	W. W. Maryatt	1872, Nov. 8-25	do	179	.....	39 09 25.62	±.05	−.26	+.10	39 09 25.46
Ogden	Dr. F. Kampf	1873, Oct. 5-10	M. T. No. 28	140	36	41 13 08.65	±.02	.....	.....	.....
Do	J. H. Clark	1874, Sept. 28-Oct. 14	do	117	23	41 13 08.47	.....	.....	.....	.....
Adopted value						41 13 08.56	±.03	−.23	.00	41 13 08.33
St. George	A. R. Marvine	1871, Sept. 19-25	M. T. No. 16	103	24	37 06 29.38	±.08	−.13	.....	37 06 29.25
WYOMING										
Cheyenne	J. H. Clark	1872, Oct. 1-12	M. T. No. 28	252	.....	41 07 46.62	±.08	−.31	.....	41 07 46.31
Fort Fred Steele	do	1872, Nov. 4-27	do	205	.....	41 46 40.24	±.05	−.35	.....	41 46 39.89
Green River	W. W. Maryatt	1873, June 9-29	M. T. No. 27	178	23	41 31 38.12	±.10	−.31	.....	41 31 37.81
Laramie	J. H. Clark	1872, Dec. 6-17	M. T. No. 28	155	.....	41 18 51.80	±.08	−.36	.....	41 18 51.44

CHAPTER III.—AZIMUTHS

GENERAL STATEMENT

The astronomic azimuth of a line on the earth's surface is the angle between two planes drawn through the plumb line at the point of observation, the first plane parallel to the earth's axis and the second passing through the observed point. Azimuth is usually reckoned from the south point toward the west, from zero to 360°.

The astronomic azimuth of a line in connection with geodetic operations is determined for the purpose of fixing a side of precise, primary, or secondary triangulation or a line of traverse. Accordingly, azimuths may be classed as precise, primary, or secondary. Azimuths are also observed for purely scientific reasons; that is, for use in the determination of the shape and size of the earth in connection with precise triangulation.

METHODS OF OBSERVING

The methods which have been used by the United States Coast and Geodetic Survey for the determination of astronomic azimuths are completely described in Special Publication No. 14, "The determination of time, longitude, latitude, and azimuth." Three of the methods may be described as follows:

1. Observations are made on a close circumpolar star, usually Polaris, at any hour angle with a direction theodolite, and the angle between the star and a line of the triangulation is measured. The observations are generally made during the occupation of a station for the measurement of horizontal directions. The best type of theodolite for the determination of azimuth is shown in Figure 9. A theodolite made by Troughton & Simms in 1814, which was the first one used by the United States Coast and Geodetic Survey, is shown in Figure 8.

2. Observations are made on a close circumpolar star, usually Polaris, at elongation, with a meridian telescope, an astronomical transit, or a theodolite fitted with an eyepiece micrometer, and the angle between the star and a mark on the ground is measured micrometrically. A meridian telescope is shown in Figure 7 and a transit in Figures 1 and 2. For the history of the meridian telescope see page 48.

3. An astronomic azimuth is sometimes determined in connection with time observations with a transit or a meridian telescope, by measuring with the micrometer the angle between a mark on the ground and the line of collimation of the instrument.

The azimuths given in this publication have for the most part been determined by methods 1 and 2.

According to Coast and Geodetic Survey practice, the observations for a precise Laplace azimuth must be made on two or more nights and the probable error should not be greater than $\pm 0''.30$. The observations for a precise or a primary azimuth may be made on one night only. The probable error should not exceed $\pm 0''.50$ for a precise azimuth but may somewhat exceed that amount for a primary azimuth. Azimuth determinations with probable errors slightly greater than the above limits are sometimes accepted but the specified accuracy is usually attained.

Whenever the azimuth observations are not referred directly to a line of triangulation, a special mark is set up and this mark is connected with the triangulation by means of horizontal measures. In this case, the probable error of the astronomic azimuth of the line of triangulation is the combined probable errors of the measured horizontal angle and of the observed azimuth. The probable errors given in Tables XXIII and XXIV, pages 72–86, are the probable errors of the observed azimuths and do not include the probable errors of the horizontal angles for the cases where a mark was used.

The United States Lake Survey has determined a number of azimuths by nearly the same methods as those used by the United States Coast and Geodetic Survey. A discussion of their methods and the details of many of their observations are given in Professional Papers, No. 24, Corps of Engineers, United States Army.

INSTRUMENTS

The error of the sidereal chronometer which is used in connection with azimuth observations must be known. It may be determined by observations on the stars with a transit or a meridian telescope, by observations on the sun or the stars with a vertical circle, or from the time signals sent out by the United States Naval Observatory. The last-named method has been used for primary and secondary azimuths only.

A type of vertical circle used by the Coast and Geodetic Survey for time determinations is shown in Figure 12. If equipped with a vertical circle, the theodolite is often used for the same purpose.

The following table is a list of instruments used for the horizontal measurements of azimuth observations. It does not include a list of the instruments used for time determinations in connection with azimuth observations. A list of transits and meridian telescopes will be found in Table I, page 8.

TABLE XXII.—*Instruments used in the determination of azimuth*

UNITED STATES COAST AND GEODETIC SURVEY

No. of instrument	Name and kind of instrument	Made by—	Year made or first used	Focal length	Diameter of horizontal circle	Remarks
	Theodolites			*Cm.*	*Inches*	
1	Direction	Simms	1836	115	30	
2	do	Troughton	1817	78	24	
1a	do	Wanschaff	1917		8	The property of Columbia University Engineering Department Loaned to the Coast and Geodetic Survey in 1917.
2a	do	do	1917		8	
3	do	Würdemann	1873	98	20	
4	do	Troughton & Simms	1869		18	Improved in 1869 by Würdeman.
5	do	Würdemann-Oertling	1873	107	20	
10	do	Würdemann	1874	62	14	Regraduated in May, 1878.
16	Repeating	Gambey	1848	75	12	
19	do	do	1883		6	
20	do	do	1852		10	
24	do	do	1850		8	
28	do	do	1851		10	
30	do	Gambey-Würdemann	1851		12	
31	do	Gambey	1853		10	
32	do	do	Before 1880	53	12	
36	do	do	1876		8	
37	do	do	1859		12	
43	do	do	1859		10	
55	do	do	1855		6	
63	do	do	1853		10	
82	do	do	1856		10	
88	do	Würdeman	1885		8	
96	do	do		37	8	
100	do	Moltini	1872		11	
107	Direction	Brünner	1874	76	12	
108	do	Troughton & Simms	1874	75	12	
111	Repeating	Fauth & Co	1876	45	10	
113	Direction	Würdemann-Lingke & Co.	1876	90	20	
114	do	do	1876	90	20	
115	do	do	1876	100	20	
117	do	Fauth & Co	1878		8	
118	do	do	1878	58	12	
130	do	do	1881	44	8	
131	do	do	1882	66	12	
135	do	do	1880	49	12	
136	Repeating	Würdemann	1883	41	8	
140	Direction	Fauth & Co			8	Remodeled in 1894, in Coast and Geoditic Survey shop.
145	do	do	1885	74	12	
146	do	do	1885	74	12	
147	do	do	1887	77	12	
148	Repeating	Coast and Geodetic Survey	1890		8	
151	do	do	1889		8	
153	do	do	1890		8	
159	do	Buff & Berger	1894		7	

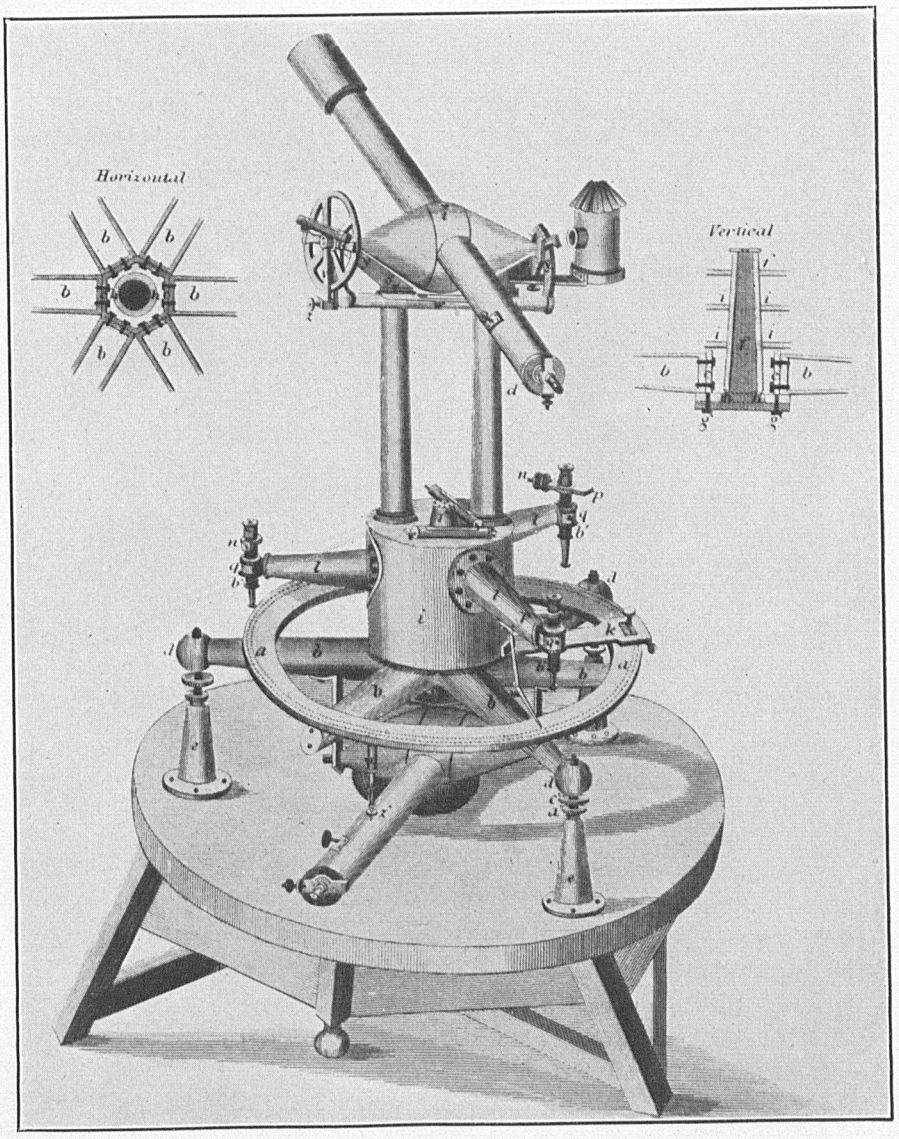


FIG. 10.—TWENTY-FOUR INCH THEODOLITE

This instrument was made by Troughton in 1814 and was one of the first instruments used by this bureau for horizontal angle measurements. Compare this with the modern theodolite shown in Figure 11

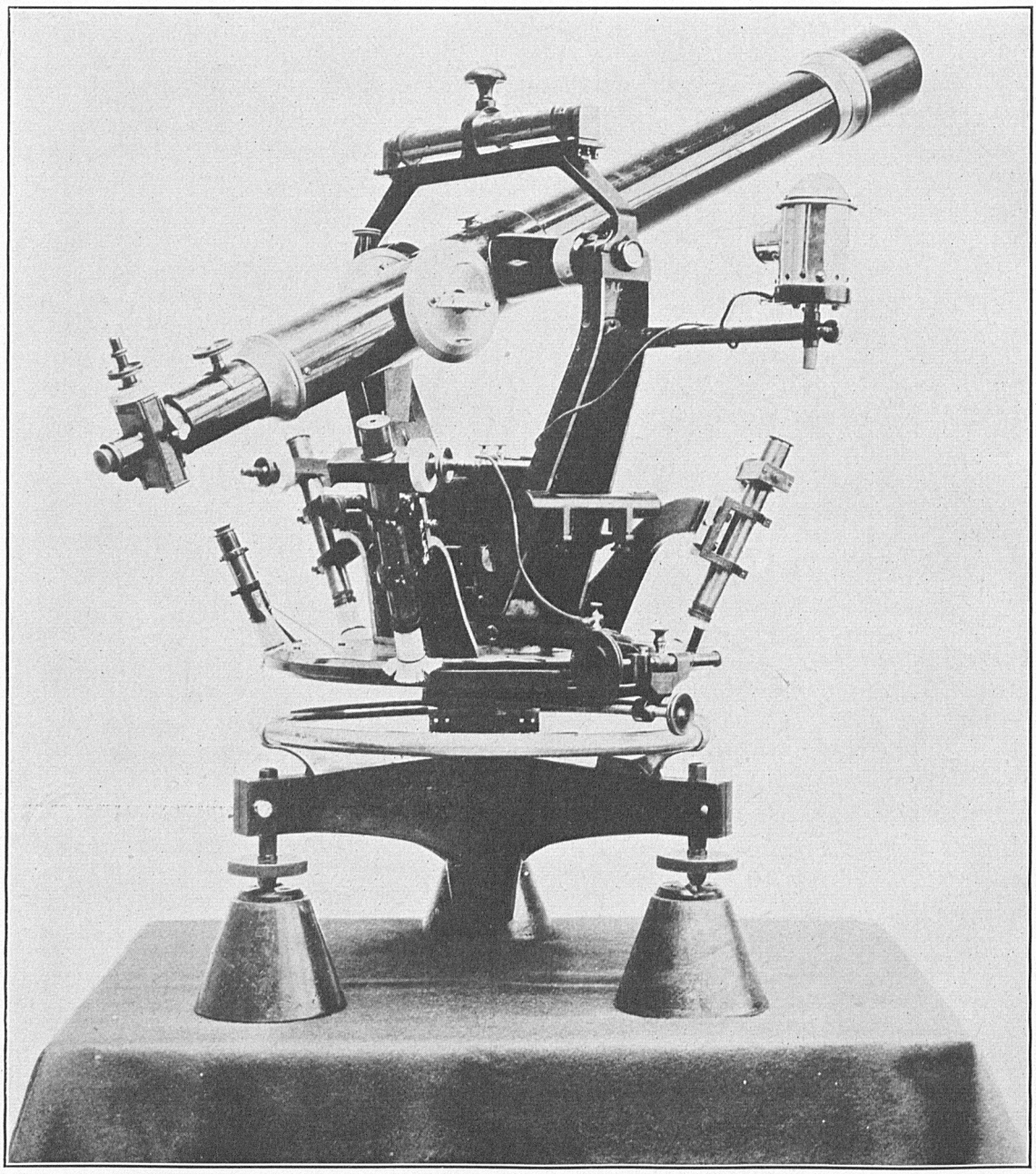


FIG. 11.—TWELVE-INCH DIRECTION THEODOLITE

This instrument is equipped with several small electric lights for illuminating the reading micrometers and the cross hairs in the telescope

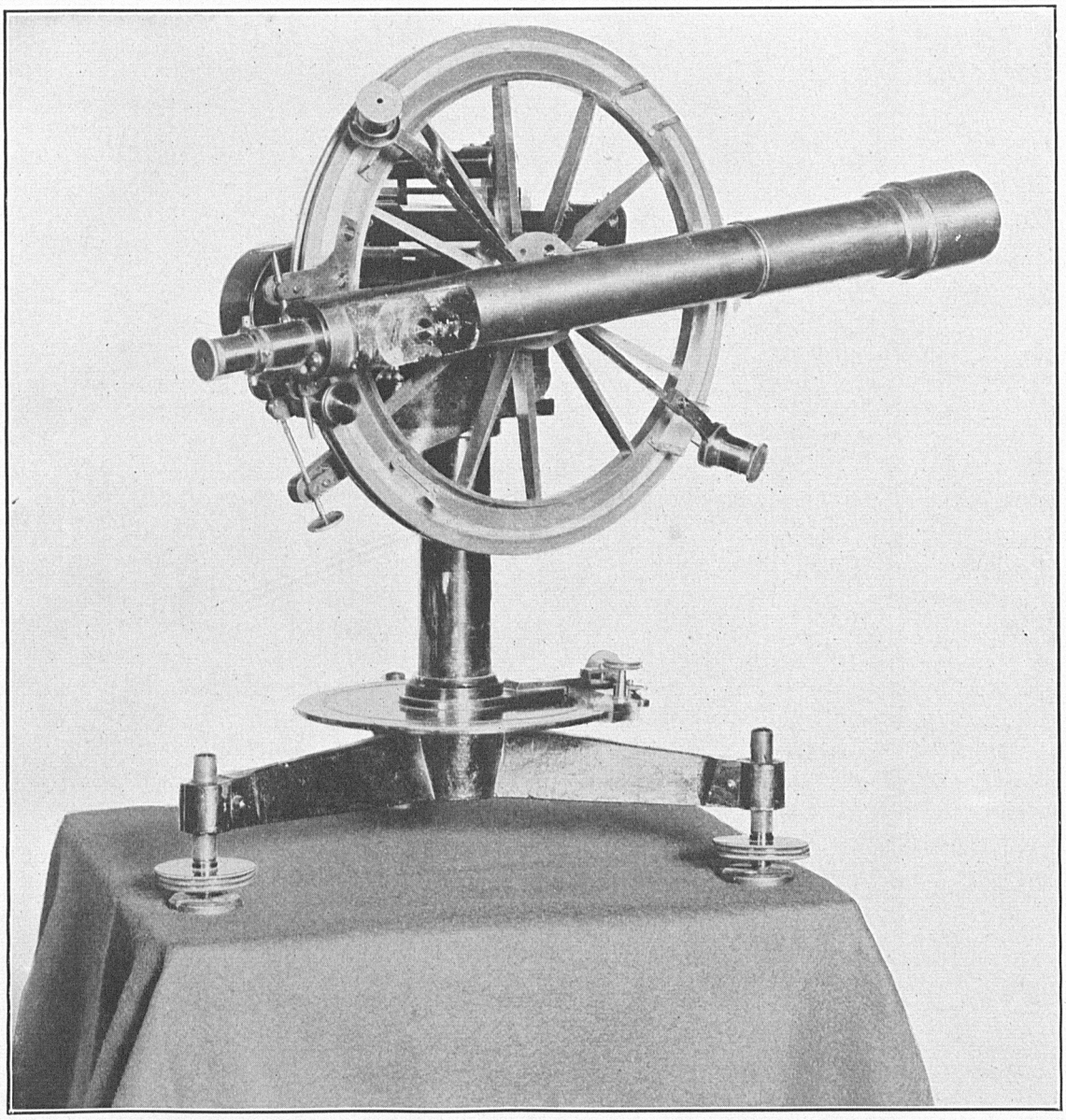


FIG. 12.—VERTICAL CIRCLE

This instrument is used for measuring zenith distances of stars for time determinations in connection with azimuth observations. It is also used for trigonometric leveling

TABLE XXII.—*Instruments used in the determination of azimuth*—Continued

UNITED STATES COAST AND GEODETIC SURVEY—Continued

No. of instrument	Name and kind of instrument	Made by—	Year made or first used	Focal length	Diameter of horizontal circle	Remarks
	Theodolites			*Cm.*	*Inches*	
167	Direction	Coast and Geodetic Survey	1900		12	
168	do	do	1900		12	
171	Repeating	C. L. Berger	1901		7	
232	do	Berger & Son	1907		7	
244	do	do	1909		7	
281	Direction	Troughton & Simms	1920		8	
	Transits					
3		Simms	1848	116		
4		Troughton & Simms	1848	119		
5		Simms	1850	117		Modified in 1890.
8		do	1852	110		
10		Würdemann	1857	62		Small, folding.
	Meridian telescopes					
1		Würdemann	1869	79		Remodeled in 1893 in Coast and Geodetic Survey shop.
3		Kuebel	1876	80		
7		Würdemann	1870	66		
9		do	1870	64		
13		do	1871	66		

UNITED STATES LAKE SURVEY

	Theodolites					
1	Direction	Troughton & Simms	1871	61	14	
2	Repeating	do	Before 1872	48	12	
3	Direction	do		76	14	
1	do	Repsold	1871	51	14	
1	Repeating	Gambey-Würdemann	1851	48	10	
2		Gambey				

OBSERVED AZIMUTHS

As in the case of longitudes and latitudes, only such data are given in the following tables as are necessary to show the accuracy with which the azimuths are determined. All classes of azimuths of possible interest, especially to this survey, are given in the tables. The data in each case will indicate the class to which an azimuth belongs.

The correction to an azimuth for the variation of the pole has been computed for many of the stations. For a discussion of this correction, see page 51. Where the mark observed upon is a station of the triangulation, the azimuth has been in most cases corrected for the elevation of the mark, but where the mark was used simply to connect the azimuth with the triangulation no correction was needed.

TABLE XXIII.—*Azimuths determined by the United States Coast and Geodetic Survey*

Station occupied	Reference	Observer	Dates	Instrument (see Table XXII)	Number of separate determinations	Observed azimuth	Diurnal aberration	Eccentricity for instrument and light	Correction for elevation of mark	Correction for variation of pole	Corrected azimuth	Probable error
						° ′ ″	″	″	″	″	° ′ ″	″
ALABAMA												
Aurora	Brandon	F. P. Webber	1877, June 19, 27	Theod. No. 108	34	[1]236 06 29.04	+0.31	0.00			236 06 29.35	±0.72
Bear Point	Inerarity, west	A. T. Mosman	1889, Mar. 29, 30	Theod. No. 63	6	223 13 22.9	+.3	.0			223 13 23.2	±.4
Ethridge	Lovers Leap	O. B. French	1898, June 16, 23, 24	do	32	245 52 49.00	+.31	.00	+0.01	−0.15	245 52 49.17	±.17
Fort Morgan (Laplace)	Cedar Point	R. H. Fauntleroy	1847, April, May	Theod. No. 2	11	[1]143 59 45.30	+.31	.00			143 59 45.61	±.23
Fort Morgan	Jacob	J. B. Baylor	1892, March	Theod. No. 36							267 34 26.4	±1.2
Girard	Ralston	E. A. Gatje	1917, Oct. 27, 30	Theod. No. 145	25	223 23 51.96	+.32	.00	+.01		223 23 52.29	±.30
Kahatchee	Horn	O. B. French	1898, June 6, 7, 8, 9	Theod. No. 63	37	253 32 12.49	+.31	.00	+.03	−.18	253 32 12.65	±.16
Madison (Laplace)	Capshaw 2	E. H. Pagenhart	1914, Sept. 28, 30	Theod. No. 168	22	182 57 15.27	+.32	−.07	.00		182 57 15.52	±.17
Montgomery north meridian stone.	Elongation mark	F. W. Perkins; W. B. Fairfield	1890, May 1	Theod. No. 16	4	82 39 31.6	+.3	.0			82 39 31.9	±.7
Perry	Parker	W. H. Burger	1907, Jan. 7	Theod. No. 145	11	333 50 19.81	+.32	+1.96	+.01	+.06	333 50 22.16	±.19
Smithers	Rowe Mountain	do	1907, Mar. 2	do	12	344 36 07.15	+.32	.00	−.02	+.07	344 36 07.52	±.27
Tanyard, 1878–1914	Penit	C. O. Boutelle	1878, November, December	Theod. No. 113	33	[1]349 59 04.46	+.32	.00	.00		349 59 04.78	±.30
Do	do	E. H. Pagenhart	1904, Sept. 14, 15	Theod. No. 167	15	349 59 09.89	+.32	+.08	.00		349 59 10.29	±.23
West Gulfshore	East Gulfshore	J. G. Oltmanns	1869, January, February	Tr. No. 10	16	[1]260 17 21.9	+.3	.0			260 17 22.2	±1.0
ARIZONA												
Boundary Monument No. 204	American	C. L. Garner	1920, Mar. 28	Theod. No. 168	16	183 30 56.04	+.32	.00	+.01		183 30 56.37	±.31
Catalina	Superstition	J. S. Hill	1910, Nov. 1	Theod. No. 167	10	152 06 05.02	+.32	.00	−.10	+.24	152 06 05.48	±.37
Chiricahua	Burro	do	1910, Sept. 26	do	22	225 00 51.71	+.32	.00	+.19	+.35	225 00 52.57	±.18
Graham (U. S. G. S.)	Catalina	do	1910, Sept. 16	do	10	71 48 56.67	+.32	.00	+.13	+.38	71 48 57.50	±.29
Granite	Pinto	W. Mussetter	1920, Mar. 11	Theod. No. 168	11	50 31 49.26	+.32	.00	+.07		50 31 49.65	±.28
Harquahalla	Whitetank	J. S. Hill	1910, Dec. 14	Theod. No. 167	10	290 08 17.03	+.32	.00	−.06	−.04	290 08 17.25	±.19
Kofa	Harquahalla	do	1911, Jan. 4	do	10	233 29 34.21	+.32	.00	+.13	−.12	233 29 34.54	±.31
Mazatzal	Baker	C. V. Hodgson	1919, Sept. 15	Theod. No. 2a	15	190 00 23.15	+.32	.00	+.06		190 00 23.53	±.30
Mohawk	American	J. S. Hill	1910, Dec. 28	Theod. No. 167	9	106 18 44.09	+.32	.00	−.03	−.11	106 18 44.27	±.40
Pine	Powell	do	1911, Feb. 22	do	10	51 35 35.43	+.32	.00	+.11	−.27	51 35 35.59	±.20
Quitavaquita	Pinto	G. D. Cowie	1920, Mar. 3	Theod. No. 168	12	125 12 50.31	+.32	.00	−.07		125 12 50.56	±.46
Sheep	Boundary monument No. 204.	W. Mussetter	1920, Mar. 25	do	9	84 08 14.42	+.32	.00	.00		84 08 14.74	±.43
Silver Bell	Black Mountain	G. D. Cowie	1919, Dec. 31	do	9	231 39 09.52	+.32	.00	+.13		231 39 09.97	±.64
South Mountain	Sierra Prieta	do	1920, Feb. 11	do	8	201 46 02.98	+.32	.00	+.06		201 46 03.36	±.63
Superstition (U. S. G. S.)	Whitetank	J. S. Hill	1910, Nov. 9	Theod. No. 167	8	99 27 47.72	+.32	.00	−.03	+.19	99 27 48.20	±.23
Union	Granite	C. V. Hodgson	1919, Aug. 12	Theod. No. 2a	16	151 04 49.79	+.32	.00	−.15		151 04 49.96	±.36
Whitetank	Harquahalla	J. S. Hill	1910, Dec. 8	Theod. No. 167	12	110 34 36.31	+.32	.00	−.09	+.02	110 34 36.56	±.18
Williams Laplace (Laplace)	Frisco	C. L. Garner	1920, Aug. 13, 14	Theod. No. 1a	31	257 14 06.49	+.32	+.18	+.12		257 14 07.11	±.22
ARKANSAS												
Danville	Magazine	E. H. Pagenhart	1916, Dec. 12	Theod. No. 145	10	110 57 18.12	+.32	.00	−.04		110 57 18.40	±.24
Devall	White	do	1916, Oct. 20	do	14	212 01 19.74	+.32	.00	.00		212 01 20.06	±.34
Forrest	Becks	do	1916, Oct. 16	do	14	70 29 05.86	+.32	.00	.00		70 29 06.18	±.25
Hartford (Laplace)	Sugarloaf	do	1917, Jan 11, 13	do	22	94 45 21.99	+.32	.00	−.01		94 45 22.30	±.25
Helena	Battery Hindman	E. Smith	1878, May 30, 31	M. T. No. 13	6	[1]15 55 18.1						±.7
Helena, mid base	Helena, north base	C. H. Boyd	1878, Mar. 13, 14, 15	Theod. Nos. 100 and 107.	24	188 04 18.3	+.3	.0			188 04 18.6	±1.0
Hopefield south base	Hopefield north base	do	1879, Apr. 11, 12	Theod. No. 100	18	211 32 35.80	+.32	.00	.00		211 32 36.12	±.39
Little Rock, northwest base (Laplace).	Granite	E. H. Pagenhart	1916, Nov. 3, 4	Theod. No. 145	23	36 12 21.52	+.32	+.44	+.06		36 12 22.34	±.22
CALIFORNIA												
Arguello	Gaviota	O. H. Tittmann	1876, January, February	Theod. No. 4	14	[1]284 59 37.42	+.31	.00			284 59 37.73	±.27
Avila	San Luis Obispo west base.	G. Davidson	1874, Mar. 15	Theod. No. 37	7	281 43 09.9	+.3	.0			281 43 10.2	±.8
Boundary line, T_{49}	Azimuth mark	C. H. Sinclair	1895, June 14, 15	Theod. No. 82	8	68 41 18.8	+.3	.0			68 41 19.1	±1.1
Boundary line, T_{101}	Rose	do	1895, Oct. 8, 9	Theod. No. 159	5	21 18 20.9	+.3	.0			21 18 21.2	
Butte	American	J. S. Hill	1911, Feb. 4	Theod. No. 167	10	324 34 12.56	+.32	.00	−.05	−.25	324 34 12.58	±.24
Castle Mount	Hepsedam	J. S. Lawson	1885, Oct. 22–31	Theod. No. 131	49	[1]133 51 10.76	+.32	.00			133 51 11.08	±.47
Colorado River	Elongation mark	C. H. Sinclair; W. B. Fairfield	1893, June, July	Theod. Nos. 20 and 153	37	142 41 55.7	+.3	.0			142 41 56.0	±1.6
Crescent City	Smyth 2	G. Davidson	1871, July 24	Theod. No. 37	5	272 08 39.7	+.3	.0			272 08 40.0	±.7
Dominguez Hill	West Beach	do	1870, Feb. 8–25	Theod. No. 4	26	[1]95 17 41.25	+.31	−.08			95 17 41.48	±.30
Eureka	Westpoint	do	1871, July 28	Theod. No. 37	7	165 46 29.45	+.31	.00			165 46 29.76	±.57
Gaviota	Santa Barbara	O. H. Tittmann	1875, November, December	Theod. No. 4	12	[1]283 30 01.38	+.31	.00			283 30 01.69	±.44
Gazelle astronomic (Laplace)	Soda	O. B. French	1904, July 4, 5, 8	Theod. No. 146	13	183 13 40.50	+.31	.00	+.01	+.17	183 13 40.99	±.38
Do	Spur	do	do	do	15	300 59 46.91	+.31	.00	−.16	+.17	300 59 47.23	±.23
Goosenest	Eddy	E. O. Heaton	1920, July 14	Theod. No. 2a	12	25 49 12.07	+.32	.00	+.13		25 49 12.52	±.46
Harbor	Boulder	D. B. Wainwright	1878, July 1, 2, 4, 11	Theod. No. 4	4	[1]322 23 22.6	+.3	.0			322 23 22.9	±2.5
Do	West Peak	W. H. Burger	1908, Mar. 5	Theod. No. 145	12	179 17 37.16	+.32	−.32		+.21	179 17 37.37	±.23
Hepsedam	Santa Ana	J. S. Lawson	1885–86, December, January	Theod. No. 131	10	150 57 18.26	+.32	.00			150 57 18.58	±.43
Kent	Bally	J. S. Hill	1904, May 25, 26, 27	Theod. No. 146	14	185 58 09.48	+.32	.00		+.04	185 58 09.84	±.25
Lake Tahoe, southeast end	Folsom Peak	G. Davidson	1893, August, September	Theod. No. 115	17	[1]177 56 18.78	+.32	.00		+.03	177 56 19.13	±.10
Los Angeles northwest base	Los Angeles southeast base.	J. J. Gilbert	1890, June 3–12	do	11	322 33 08.05	+.30	.00		+.22	322 33 08.57	±.48
Los Angeles southeast base	Los Angeles northwest base.	do	1890, May 12–23	do	8	142 36 57.12	+.30	.00		+.16	142 36 57.58	±.38
Lospe	Tepusquet	J. S. Lawson	1883, May 20–26	Theod. No. 131	12	267 09 51.46	+.32	.00			267 09 51.78	±.31
Lyons	Round	J. S. Hill	1904, June 3, 4	Theod. No. 146	12	154 22 14.02	+.32	.00		+.06	154 22 14.40	±.66
Marysville Butte	Snow Mountain east	O. B. French	1904, May 3, 4, 5	do	13	104 05 08.07	+.32	.00		−.06	104 05 08.33	±.42
Mocho	Mount Diablo	J. S. Lawson	1887, September, October	Theod. No. 115	24	[1]144 57 35.44	+.32	.00		−.05	144 57 35.71	±.21
Do	do	W. B. Fairfield	1907, February, March	Theod. No. 146	38	144 57 35.34	+.32	.00		+.09	144 57 35.75	±.20
Monterey Bay	Elongation mark	J. S. Ruth	1852, January, February	Theod. No. 20	8	116 01 11.5	+.3	.0			116 01 11.8	±.9
Monticello	Mount Helena	G. Davidson	1880, September, October	Theod. No. 115	24	91 04 24.96	+.32	.00		+.02	91 04 25.30	±.21
Mount Conness	Round Top	do	1890, Aug. 13–26	do	30	[1]142 39 18.88	+.32	.00		+.26	142 39 19.46	±.19
Mount Diablo	Mount Helena	do	1876, July, August	Theod. No. 5	26	[1]144 28 15.54	+.32	.00		+.17	144 28 16.03	±.10
Mount Helena	Mount Diablo	do	1876, October, November	do	23	[1]324 01 24.74	+.32	.00		−.10	324 01 24.96	±.13
Mount Lola	Mount Helena	do	1879, July 9–24	Theod. No. 115	26	[1]67 22 02.08	+.32	.00		−.04	67 22 02.36	±.14
Mount Tamalpais	Mount Diablo	do	1882, September, October	do	24	94 15 14.84	+.32	.00		−.10	94 15 15.06	±.15
Do	Sonoma Mountain	J. F. Pratt	1907, June 22, 25	Theod. No. 146	30	182 25 36.21	+.32	.00		−.04	182 25 36.49	±.18
Mount Toro	Loma Prieta	R. A. Marr	1885, January, February	Theod. No. 115	12	162 12 26.35	+.28	.00			162 12 26.63	±.16
Do	Santa Ana	C. H. Sinclair	1906–07, November, December, January	Theod. Nos. 167 and 28	34	218 31 01.59	+.32	.00		+.13	218 31 02.04	±.30
New San Miguel	Harbor 2; Arguello	O. H Tittmann	1873, November, December	Theod. No. 4	12	221 59 40.25	+.31	.00			221 59 40.56; 165 05 11.05	±.72
Paxton	Mount Sanhedrin	C. H. Sinclair	1897, October, November	Theod. No. 115	38	[1]203 47 05.48	+.32	.00		−.03	203 47 05.77	±.18
Point Avisadero	Elongation mark	R. D. Cutts	1851, September	Theod. No. 20	19	195 03 39.65	+.31	.00			195 03 39.96	±.33
Ross Mountain	Azimuth mark	G. Davidson	1859–60, December, January	Theod. No. 37	34	164 24 38.67	+.31	.00			164 24 38.98	±.19
Round	Spur	O. B. French	1904, June 11, 12	Theod. No. 146	16	159 54 02.82	+.32	.00		+.09	159 54 03.23	±.33
Round Top	Mount Helena	G. Davidson	1879, August, September	Theod. No. 115	26	[1]90 58 53.45	+.32	.00		+.12	90 58 53.89	±.09
San Buenaventura	Azimuth Mark	do	1869, December	Theod. No. 4	27	114 04 28.49	+.31	.00			114 04 28.80	±.21
San Diego	Fitchs Hill	do	1851, May, June	Theod. No. 28	11	187 53 15.59	+.31	−1.72			187 53 14.18	±.48
San Diego astronomic (Laplace)	Point Loma Lighthouse (old)	W. H. Burger	1908, Feb. 21, 22	Theod. No. 145	22	52 46 50.02	+.32	.00		+.17	52 46 50.51	±.19
San Jacinto	Santiago	J. S. Hill	1910, Aug. 11	Theod. No. 167	11	81 56 10.18	+.32	.00	+.04	+.43	81 56 10.97	±.36
San Simeon	Azimuth mark	G. Davidson	1874, March	Theod. No. 37	6	160 42 50.3	+.3	.0			160 42 50.6	±1.3
Santa Ana	Mount Toro	E. F. Dickins	1885, November, December	Theod. No. 115	13	38 44 25.89	+.32	.00			38 44 26.21	±.18
Santa Barbara	Gaviota	G. Davidson	1869, November, December	Theod. No. 4	22	[1]103 46 25.80	+.31	.00			103 46 26.11	±.33
Santa Cruz	Azimuth mark	R. D. Cutts	1854, October, November	Theod. No. 30	30	165 14 18.02	+.31	.00			165 14 18.33	±.26
Santa Cruz west	Santa Barbara	O. H. Tittmann	1874, February, March	Theod. No. 4	14	[1]206 51 40.42	+.31	.00			206 51 40.73	±.51
Santa Lucia	Mount Toro	E. F. Dickins	1885, Oct. 17–23	Theod. No. 115	13	157 58 51.18	+.32	.00			157 58 51.50	±.21
Snow Mountain east	Kent	O. B. French	1904, May 19	Theod. No. 146	12	181 03 26.86	+.32	.00		+.01	181 03 27.19	±.43
Soledad	Elongation mark	A. T. Mosman	1899, Feb. 6–9	M. T. No. 1	17	178 32 29.94	+.32	+.01		−.05	178 32 30.22	±.14
Sulphur Peak	Azimuth mark	G. Davidson	1859, August, September	Theod. No. 37	57	81 28 35.32	+.31	.00			81 28 35.63	±.26

[1] Azimuth of mark referred to triangulation station.

TABLE XXIII.—*Azimuths determined by the United States Coast and Geodetic Survey*—Continued

Station occupied	Reference	Observer	Dates	Instrument (See Table XXII)	Number of separate determinations	Observed azimuth	Diurnal aberration	Eccentricity for instrument and light	Correction for elevation of mark	Correction for variation of pole	Corrected azimuth	Probable error
CALIFORNIA—continued						° ′ ″	″	″	″	″	° ′ ″	″
Tepusquet	Lospe	P. A. Welker	1882, Dec. 14-25	Theod. No. 131	11	87 24 11.92	+0.32	0.00			87 24 12.24	±0.26
Turning Point	Folsom Peak	C. H. Sinclair	1894, August	Theod. No. 82	10	171 16 25.9	+.3				171 16 26.2	±1.0
Vaca	Yolo, southeast base	G. Davidson	1880, Nov. 1-24	Theod. No. 115	25	235 38 36.12	+.32	.00		+0.11	235 38 36.55	±.27
Yolo, northwest base	Yolo, southeast base	do	1880, Aug. 19-30	do	24	343 05 01.84	+.32	.00		−.09	343 05 02.07	±.13
Yolo, southeast base	Yolo, northwest base	do	1880, July, August	do	24	163 07 12.93	+.32	.00		−.14	163 07 13.11	±.16
COLORADO												
Boulder	Morrison	C. V. Hodgson	1912, Aug. 1	Theod. No. 167	16	348 40 48.33	+.32	.00	−0.06	−.07	348 40 48.52	±.22
Dewey	Horsetooth	do	1912, July 10	do	12	94 00 18.78	+.32	.00	−.02	−.11	94 00 18.97	±.34
El Paso, east base	El Paso, west base	O. H. Tittmann	1879, Oct. 5-16	M. T. No. 3	7	[1]102 48 04.09	+.32	−1.16		+.21	102 48 03.46	±.59
Grand Junction	Chiquita	John Nelson	1895, June 4-8	Theod. No. 5	14	23 57 23.71	+.32	.00		−.05	23 57 23.98	±.49
Gunnison (Laplace)	Uncompahgre	do	1893, Oct. 4-7	do	18	[1]41 55 00.00	+.32	.00		+.07	41 55 00.39	±.20
Mount Ouray	do	W. Eimbeck	1894, July 24-28	do	17	[1]70 35 51.03	+.32	.00		−.08	70 35 51.27	±.29
Overland	Eureka	O. H. Tittmann	1881, Sept. 15-21	M. T. No. 9	10	[1]284 10 32.41	+.32	.00		−.11	284 10 32.62	±.40
Pikes Peak	Mount Ouray	R. L. Faris	1895, Oct. 2-8	Theod. No. 5	18	[1]66 05 15.79	+.32	+.64		−.05	66 05 16.70	±.22
Tavaputs	Patmos Head	W. Eimbeck	1891, Oct. 12-16	do	27	[1]88 17 40.26	+.32	.00		+.27	88 17 40.85	±.16
Treasury Mountain	Mount Waas	do	1893, Sept. 21-24	do	24	[1]74 45 04.32	+.32	.00		+.07	74 45 04.71	±.12
Uncompahgre	Treasury Mountain	do	1895, Sept. 1-6	do	19	[1]196 42 55.52	+.32	.00		.00	196 42 55.84	±.18
Watkins astronomic (Laplace)	Indian	C. V. Hodgson	1912, Aug. 11, 13	Theod. No. 167	32	350 08 06.60	+.32	.00	−.04	−.05	350 08 06.83	±.18
CONNECTICUT												
Sandford	Ruland	G. W. Dean	1862, Sept. 9-27	Theod. No. 1	16	[1]5 50 24.97	+.31	.00			5 50 25.28	±.30
DELAWARE												
Cape Henlopen Lighthouse	Brandywine Shoal Lighthouse.	O. B. French	1897, Sept. 5-11	Theod. No. 135	49	173 45 37.38	+.32	−20.37		+.31	173 45 17.64	±.21
DISTRICT OF COLUMBIA												
Causten	Soper	G. W. Dean	1851, May, June	Theod. No. 1	8	[1]210 54 41.46	+.32	.00		−.13	210 54 41.65	±.37
Washington, Seaton (Laplace)	Hill	C. O. Boutelle	1868-69, December, January	do	34	[1]265 32 53.44	+.32	.00		−.15	265 32 53.61	±.18
FLORIDA												
Apalachicola	St. Georges Lighthouse	G. W. Dean	1860, January	Theod. No. 2	13	[1]22 04 52.3	+.3				22 04 52.6	±.5
Baldwin	Lane	H. G. Ogden, A. L. Baldwin	1897, Feb. 17, 18, 19	Theod. Nos. 63 and 140.	16	18 28 33.7	+.3	.0			18 28 34.0	±.6
Barkley Point 2	Plantation Hill	G. W. Dean	1860-61, December, January	Theod. No. 2	11	[1]306 54 01.89	+.31				306 54 02.20	±.38
Bluff	*Biglow's north chimney.*	*H. G. Ogden*	1876, January, February	Theod. No. 36	6	206 17 46.8	+.3	.0			206 17 47.1	±1.0
Boulogne (Laplace)	St. Mary	E. H. Pagenhart	1917, May 18	Theod. No. 145	12	162 00 44.48	+.32	.00	.00		162 00 44.80	±.44
Bridgeport	Nine Mile Point	E. Ellicott, J. E. McGrath	1885, Apr. 11	Theod. No. 88	4	198 50 41.2	+.3	.0			198 50 41.5	±1.5
Bronson	Turn	H. G. Ogden and others.	1898, Mar. 4, 5, 6	Theod. No. 63	11	50 19 32.8	+.3	.0			50 19 33.1	±.9
Cape Florida (Key Biscayne south base).	Soldier Key	J. E. Hilgard	1850, January	Theod. No. 16	16	[1]3 30 56.62	+.31	.00			3 30 56.93	±.53
Cape Romano	Caximbas	E. D. Preston	1886, February	Theod. No. 82	28	147 12 54.5	+.3	.0			147 12 54.8	±.3
Cape Sable latitude	Palm Point	do	1886, March	do	36	134 41 25.69	+.31	.00			134 41 26.00	±.2
Clearwater Harbor astronomic	Long Reach	E. Smith	1873, January, February	Theod. No. 16	22	194 54 09.48	+.31	.00			194 54 09.79	±.54
Davis Point 2	Vista Buena	A. T. Mosman	1871, January	do	22	163 57 43.24	+.31	.00			163 57 43.55	±.40
Depot Key	Sea Horse Key	J. E. Hilgard	1852, March	Tr. No. 8	12	[1]44 51 32.2	+.3	.0			44 51 32.5	±.4
Do	Sea Horse Key Lighthouse.	A. T. Mosman	1874, February	Theod. No. 16	42	46 18 10.9	+.3	+3.6			46 18 14.8	±.6
Eagle Point	Cape St. Blas Lighthouse.	do	1871, February	do	15	344 52 38.95	+.31	.00			344 52 39.26	±.52
Esperanza	Oswald	E. Smith	1873, March	do	15	[1]338 48 33.62	+.31	.00			338 48 33.93	±.30
Fog Island	Lamp	F. W. Perkins	1874, March	do	19	183 49 46.01	+.31	.00			183 49 46.32	±.19
Harts Point (Hart)	Harding	E. Ellicott, J. E. McGrath	1885, April	Theod. No. 88	8	172 05 41.3	+.3	.0			172 05 41.6	±1.2
Hurricane Island	Azimuth mark	J. G. Oltmanns	1855, January	Theod. No. 16	6	178 09 41.6	+.3	.0			178 09 41.9	±.9
Lancaster 2 (U. S. E.) (Laplace)	Spur	E. H. Pagenhart	1917, May 19	Theod. No. 145	14	252 33 07.56	+.32	+3.84	.00		252 33 11.72	±.44
Lauderdale	Midway	J. B. Weir	1883, Apr. 19, 20, 21	Theod. No. 19	29	[1]186 01 20.3	+.3	.0			186 01 20.6	±.6
Punta Rasa	Sword Point	A. T. Mosman	1866, June 22, 23, 26	Theod. No. 16	11	146 31 16.14	+.31	.00			146 31 16.45	±.44
Sand Key	West Crawfish Key	J. E. Hilgard	1849, July, August	do	15	176 07 30.26	+.31	.00			176 07 30.57	±.35
Ten 2	Jupiter Lighthouse	B. A. Colonna	1883, Mar. 13, 15, 16	Theod. No. 136	32	345 14 53.0	+.3	−264.6	.0		345 10 28.7	±1.2
Waldo	Azimuth mark	H. G. Ogden, A. L. Baldwin, H. P. Flynn, H. C. Denson	1897, Apr. 7, 8, 11	Theod. No. 63	9	181 24 24.6	+.3	.0			181 24 24.9	±.6
GEORGIA												
Albany	Court	E. A. Gatje	1917, Nov. 2	Theod. No. 145	16	104 59 27.20	+.32	.00	.00		104 59 27.52	±.35
Artesia	Acree	E. H. Pagenhart	1917, Aug. 1	do	16	102 57 06.14	+.32	.00	.00		102 57 06.46	±.26
Atlanta middle base (Laplace)	Stone Mountain	C. O. Boutelle	1873, January, February	Theod. No. 1	35	[1]312 22 30.81	+.31	−2.18			312 22 28.94	±.55
Battle	Evelyn	E. A. Gatje	1918, Jan. 8	Theod. No. 145	14	306 26 33.07	+.32	.00	−.01		306 26 33.38	±.31
Brook	News	E. D. Bromley	1919, July 7	Theod. No. 167	14	308 39 41.41	+.32	.00	−.01		308 39 41.72	±.39
Brunswick, southeast base (Laplace).	Middle	C. V. Hodgson	1917, Apr. 26, 28	Theod. No. 146	25	163 06 39.05	+.32	.00	.00		163 06 39.37	±.23
Butler (St. Simon Island)	Sapelo Lighthouse	A. T. Mosman	1872, March, April	Theod. No. 16	12	208 23 37.0	+.3				208 23 37.3	±.4
Cochran (Laplace)	Zade	C. V. Hodgson	1917, June 23	do	16	170 10 17.60	+.32	−1.40	.00		170 10 16.52	±.26
Currahee	Rabun	C. O. Boutelle	1874, October, November	Theod. No. 3	33	[1]188 10 27.58	+.31	.00			188 10 27.89	±.42
Danville	Pad	E. D. Bromley	1918, Mar. 8, 9	Theod. No. 167	22	127 20 09.63	+.32	.00	−.01		127 20 09.94	±.34
Fargo	Edith	M. E. Lutz	1918, Feb. 23	Theod. No. 145	15	306 24 09.31	+.32	.00	.00		306 24 09.63	±.39
Fay (Laplace)	Don	E. D. Bromley	1918, Mar. 25	Theod. No. 167	13	123 29 38.28	+.32	.00	.00		123 29 38.60	±.37
Forsyth east base	Whit	do	1919, July 28	do	15	311 08 25.43	+.32	.00	−.02		311 08 25.73	±.32
Harmon (Laplace)	Butler	G. D. Cowie	1917, Aug. 21	Theod. No. 146	15	94 23 08.45	+.32	.00	.00		94 23 08.77	±.34
Hump (Laplace)	Tobe	C. V. Hodgson	1917, July 16	do	14	63 15 38.92	+.32	.00	+.01		63 15 39.25	±.53
Jake	Jones	E. H. Pagenhart	1917, July 11, 12	Theod. No. 145	28	268 29 35.75	+.32	.00	.00		268 29 36.07	±.34
Joffre	Deenwood	E. A. Gatje	1917, May 29	do	15	288 44 00.83	+.32	.00	.00		288 44 01.15	±.35
Joint (Laplace)	Temple	C. V. Hodgson	1917, May 26	Theod. No. 146	13	156 34 18.54	+.32	.00	.00		156 34 18.86	±.38
Kimbrough (Laplace)	Lester	C. L. Garner	1917, Aug. 24	Theod. No. 145	15	312 25 11.81	+.32	.00	−.01		312 25 12.12	±.43
Lavender	Kenesaw	F. P. Webber	1874, November, December	Theod. No. 32	29	[1]300 11 58.80	+.31	.00			300 11 59.11	±.36
Lowndes (Laplace)	Valdosta	E. A. Gatje	1918, Feb. 5	Theod. No. 145	14	89 05 34.46	+.32	.00	.00		89 05 34.78	±.41
Meldrim	Keep	E. D. Bromley	1918, Apr. 20	Theod. No. 167	13	96 35 29.29	+.32	.00	.00		96 35 29.61	±.49
Mud (Laplace)	Eastman	C. V. Hodgson	1917, June 15	Theod. No. 146	14	162 38 36.03	+.32	−1.47	.00		162 38 34.88	±.33
Rose Hill	Dewey Rose	W. H. Burger	1907, Feb. 25	Theod. No. 145	12	118 01 39.90	+.32	.00		+.07	118 01 40.29	±.35
St. George	Cambria	M. E. Lutz	1918, Mar. 5	do	14	269 01 33.11	+.32	.00	.00		269 01 33.43	±.42
Savannah Exchange	Savannah south base	C. O. Boutelle	1851, Mar. 6, 8	Theod. No. 30	4	249 00 08.8	+.3	−11.7			248 59 57.4	±1.7
Sawnee	Currahee	do	1873, Oct. 13-22	Theod. No. 1	35	[1]245 34 25.81	+.31	.00			245 34 26.12	±.41
Telfair	Coast Line	E. A. Gatje	1918, Apr. 3	Theod. No. 145	14	328 32 29.70	+.32	.00	.00		328 32 30.02	±.50
Townsend	Warsaw	do	1918, Mar. 21	do	14	201 34 15.99	+.32	.00	.00		201 34 16.31	±.38
Turner (Laplace)	Box	E. D. Bromley	1918, Apr. 4, 5	Theod. No. 167	17	36 36 13.89	+.32	.00	+.01		36 36 14.22	±.43
Valley (Laplace)	Fort	G. D. Cowle	1917, Aug. 11	Theod. No. 146	14	102 16 25.18	+.32	−2.72	.00		102 16 22.78	±.46
Willacoochee (Laplace)	Paris	E. A. Gatje	1917, June 5	Theod. No. 145	14	109 10 47.70	+.32	.00	.00		109 10 48.02	±.33
IDAHO												
Big Butte	Picabo	C. V. Hodgson	1915, Aug. 19	Theod. No. 168	11	82 25 25.13	+.32	.00	+.03		82 25 25.48	±.53
Cache	Big Butte	do	1915, July 16, 19	do	8	201 01 01.31	+.32	−.04	+.09		201 01 01.68	±.50
Caribou	Putnam	do	1915, July 24	do	11	73 36 14.34	+.32	.00	+.09		73 36 14.75	±.27
Flat	Picabo	do	1915, Sept. 29	do	12	199 03 24.70	+.32	.00	+.07		199 03 25.09	±.26
Mountain Home (Laplace)	Blue	do	1915, Oct. 6, 15	do	26	332 31 15.05	+.32	.00	−.06		332 31 15.31	±.33
Nyssa	Mitchell	do	1915, Nov. 4	do	12	54 31 26.73	+.32	−.01	+.06		54 31 27.10	±.38
Oxford	Putnam	do	1915, June 26	do	11	177 53 25.10	+.32	.00	−.01		177 53 25.41	±.43
Silver	Blue	do	1915, Oct. 20	do	12	286 56 02.66	+.32	.00	−.04		286 56 02.94	±.40

[1] Azimuth of mark referred to triangulation station.

TABLE XXIII.—*Azimuths determined by the United States Coast and Geodetic Survey*—Continued

Station occupied	Reference	Observer	Dates	Instrument (See Table XXII)	Number of separate determinations	Observed azimuth	Diurnal aberration	Eccentricity for instrument and light	Correction for elevation of mark	Correction for variation of pole	Corrected azimuth	Probable error
ILLINOIS						° ′ ″	″	″	″	″	° ′ ″	″
Bording	Goeffrey	G. A. Fairfield	1882, October, November	Theod. No. 135	17	53 25 07.29	+ 0.31	0.00		−0.07	53 25 07.53	±0.30
Cumberland	Decalb	E. C. States	1920, Aug. 22	Theod. No. 146	14	43 27 09.06	+.32	.00	+0.01		43 27 09.39	±.43
De Witt	Douglas	do	1920, Aug. 24	do	15	144 00 52.77	+.32	.00	−.01		144 00 53.08	±.34
Fred	Scarboro	do	1920, Aug. 31	do	14	172 30 32.86	+.32	.00	.00		172 30 33.18	±.37
Gallatin	Holcomb	do	1920, Aug. 26	do	15	181 20 45.01	+.32	.00	.00		181 20 45.33	±.42
Garner	Sturgess	do	1920, Oct. 8	do	12	352 10 09.81	+.32	.00	.00		352 10 10.13	±.37
Kerrick	Marshal	do	1920, Sept. 17	do	12	176 21 29.82	+.32	.00	.00		176 21 30.14	±.49
Latham	Carroll	do	1920, Aug. 21	do	15	195 20 01.88	+.32	.00	+.01		195 20 02.21	±.47
Leach	Warren	do	1920, Oct. 5	do	11	179 42 26.15	+.32	.00	+.01		179 42 26.48	±.57
Macon	Short	do	1920, Sept. 28	do	14	191 33 02.99	+.32	.00	+.01		191 33 03.32	±.42
Mendota	Kendall	do	1920, Sept. 2	do	16	190 15 30.12	+.32	.00	.00		190 15 30.44	±.47
Newton	Claremont	G. A. Fairfield	1883, October, November	Theod. No. 135	17	321 29 04.86	+.32	.00		+.12	321 29 05.30	±.27
Ospur	Weld	E. C. States	1920, Sept. 23	Theod. No. 146	13	179 23 48.56	+.32	+1.07	.00		179 23 49.95	±.48
Rockton	Shaw	do	1920, Aug. 17	do	10	209 11 11.20	+.32	.00	+.01		209 11 11.53	±.92
St. Anne (U. S. L. S.)	Clifton	W. Bowie	1908, June 26	Theod. No. 168	16	62 47 15.93	+.32	.00		+.29	62 47 16.54	±.32
Tonica	McLean	E. C. States	1920, Sept. 12	Theod. No. 146	11	175 43 40.97	+.32	.00	.00		175 43 41.29	±.58
Vinson	Logan	do	1920, Sept. 7	do	13	180 05 58.50	+.32	.00	.00		180 05 58.82	±.61
INDIANA												
Aman	States	do	1920, Aug. 3	do	19	192 08 35.65	+.32	.00	+.01		192 08 35.98	±.32
Boon	Montgomery	do	1920, July 19	do	15	179 48 00.06	+.32	.00	.00		179 48 00.38	±.43
Carlisle (U. S. L. S)	Bertrand	W. Bowie	1908, June 9, 10	Theod. No. 108	16	217 58 06.66	+.32	+338.81	.00	+.30	218 03 46.09	±.27
Cassedy	Shope	E. C. States	1920, July 11	Theod. No. 146	10	153 04 37.59	+.32	.00	−.01		153 04 37.90	±.34
Clay	Clark	C. A. Mourhess	1920, May 18	do	13	149 45 19.27	+.32	.00	−.01		149 45 19.58	±.41
Dubois	Delaware	do	1920, May 21	do	12	310 36 23.57	+.32	.00	−.01		310 36 23.88	±.47
Hancock	Harrison	do	1920, June 7	do	8	179 45 25.40	+.32	.00	.00		179 45 25.72	±.59
Henry	Cicero	E. C. States	1920, June 25	do	13	186 05 02.23	+.32	.00	.00		186 05 02.55	±.51
Jackson	New Hope	do	1920, July 9	do	12	159 11 18.42	+.32	.00	−.01		159 11 18.73	±.61
Joseph	Twin	do	1920, July 27	do	15	36 43 52.71	+.32	.00	+.01		36 43 53.04	±.44
Leonda	Vandalia	do	1920, July 17	do	15	82 36 09.27	+.32	.00	.00		82 36 09.59	±.51
O. and M. (Laplace)	Marysville	E. H. Pagenhart	1914, Oct. 27, 30	Theod. No. 168	24	189 18 01.09	+.32	−.26	.00		189 18 01.15	±.20
Osborn	Calvary	G. A. Fairfield	1887, June, July	Theod. No. 147	17	[1]192 16 17.39	+.32	.00		−.12	192 16 17.59	±.24
Penn	South Bend east base	E. C. States	1920, Aug. 2	Theod. No. 146	11	207 00 16.90	+.32	.00	+.01		207 00 17.23	±.38
Porter	Posy	do	1920, July 23	do	15	177 46 52.28	+.32	.00	.00		177 46 52.60	±.43
Reizin	Tanner	A. T. Mosman	1889, October	Theod. No. 114	34	276 56 45.88	+.32	−.27		+.09	276 56 46.02	±.22
Sherman	Elevator	C. A. Mourhess	1920, June 28	Theod. No. 146	13	179 30 12.92	+.32	.00	.00		179 30 13.24	±.39
Tripp	Adams	do	1920, May 9, 13	do	22	183 40 12.56	+.32	.00	.00		183 40 12.88	±.47
Weed Patch	Fountain	G. A. Fairfield	1889, September	Theod. No. 147	23	[1]7 33 20.82	+.32	.00		+.14	7 33 21.28	±.51
Western	Gibson	E. C. States	1920, June 24	Theod. No. 146	16	221 37 03.29	+.32	.00	+.01		221 37 03.62	±.26
Williams	Louisville north base	E. Smith	1881, Apr. 5, 9, 14	Theod. No. 118	18	232 09 08.51	+.31	−.20			232 09 08.62	±.18
IOWA												
Sherrills Mound	Platts Mound	G. E. Brown	1880, October	Theod. No. 32	15	[1]240 35 22.2	+.3	.0			240 35 22.5	±.4
KANSAS												
Adams	Clark	F. D. Granger	1888, July 18-22	Theod. No. 10	35	[1]11 46 11.61	+.32	.00		+.01	11 46 11.94	±.14
Brown	Lebanon	W. H. Burger	1906, Oct. 2	Theod. No. 145	10	249 26 54.25	+.32	.00		+.01	249 26 54.58	±.26
Quarry	Anthony southeast base	do	1906, Nov. 14	do	12	30 09 39.61	+.32	.00		+.05	30 09 39.98	±.35
Russell southeast base	Russell northwest base	F. D. Granger; H. L. Stidham	1893, Oct. 2-8	Theod. No. 10	34	140 42 59.37	+.32	.00		+.10	140 42 59.79	±.15
Salina west base (Laplace)	Salina east base	F. D. Granger	1896, Aug. 3, 4, 7	Theod. No. 118	24	248 36 17.76	+.32	.00		+.24	248 36 18.32	±.22
Sunflower	Partridge	W. H. Burger	1906, Nov. 5, 6, 7	Theod. No. 145	19	122 57 12.27	+.32	.00		+.04	122 57 12.63	±.50
Wallace latitude (Laplace)	Wallace Bluffs	do	1908, Oct. 6	do	10	353 19 49.94	+.32	+.47		−.12	353 19 50.61	±.25
KENTUCKY												
Minerva	Ash Ridge	A. T. Mosman	1887, Aug. 10-29	Theod. No. 118	41	[1]210 54 42.16	+.31	.00		−.09	210 54 42.38	±.28
LOUISIANA												
Baton Rouge Barracks	Baton Rouge south base	H. G. Ogden	1880, March	Theod. No. 107	14	6 18 15.49	+.32	.00			6 18 15.81	±.63
Boyce (Laplace)	Joyner	W. Mussetter	1919, Nov. 18, 20	Theod. No. 145	18	293 30 13.61	+.32	.00	.00		293 30 13.93	±.43
Blue Buck Ridge west base	Blue Buck Ridge east base.	F. W. Perkins	1883, April	Theod. No. 36	13	268 40 52.83	+.31	.00			268 40 53.14	±.34
Chenier Tigre west base	Chenier Tigre east base	W. B. Fairfield	1889, April, May	Theod. No. 16	35	250 14 15.7	+.3	.0			250 14 16.0	±.6
Deer Island	Point au Fer Lighthouse	J. G. Oltmanns	1855, May 23, 24	do	5	26 37 46.0	+.3	.0			26 37 46.3	±.8
Deer Island	Little Hog	C. H. Sinclair	1888, March, April	Theod. No. 82	18	[1]176 20 38.5	+.3	.0			176 20 38.8	±.7
Depot	Bovard	H. G. Ogden	1880, January, February	Theod. No. 107	12	36 26 53.94	+.32	.00			36 26 54.26	±.56
Donaldsonville north base	Donaldsonville south base.	do	1878, May	do	9	7 14 41.12	+.32	.00			7 14 41.44	±.59
Field	Man	C. L. Garner	1919, July 10	Theod. No. 1a	16	134 30 00.10	+.32	−1.04	.00		184 29 59.38	±.29
Flora	Rum	W. Mussetter	1919, Nov. 22	Theod. No. 145	7	107 01 49.87	+.32	.00	.00		107 01 50.19	±.68
Head of Passes	Mississippi Delta south base.	J. G. Oltmanns	1858, January, February	Theod. No. 16	8	[1]221 21 53.39	+.31	.00			221 21 53.70	±.88
Lake Pontchartrain east base	Lake Pontchartrain west base.	P. A. Welker	1896, Feb. 10, 11	Theod. No. 28	8	86 37 11.5	+.3	.0			86 37 11.8	±1.1
Lake Providence north base	Lake Providence south base.	H. G. Ogden	1880, May 5, 6, 7	Theod. No. 107	14	354 43 22.78	+.32	+.46			354 43 23.56	±.39
Lums Point southwest base	Lums Point northeast base.	do	1880, April	do	16	224 20 44.06	+.32	.00			224 20 44.38	±.51
Magnolia lower base	Magnolia upper base	W. Eimbeck	1872, February	Theod. No. 32	11	144 44 17.40	+.31	.00			147 44 17.71	±.81
Man (Laplace)	Field	C. L. Garner	1919, July 11, 12	Theod. No. 1a	32	4 29 58.18	+.32	+4.53	.00		4 30 03.03	±.21
Mansura	Amond	W. Mussetter	1919, Nov. 14	Theod. No. 145	10	91 54 01.01	+.32	−1.57	.00		91 53 59.76	±.62
Marthaville	Peanut	do	1919, Sept. 8	Theod. No. 1a	12	83 51 32.58	+.32	.00	.00		83 51 32.90	±.65
Pass Manchac north base	Azimuth mark	O. B. French	1899, Feb. 18	Theod. No. 76	6	350 04 19.4	+.3				350 04 19.7	±.9
Quary	Rock	W. Mussetter	1919, Nov. 10	Theod. No. 145	7	305 48 48.38	+.32	−2.67	.00		305 48 46.03	±.60
Raccoon	Ship Shoal Lighthouse	C. H. Sinclair	1888, Jan. 26, 27	Theod. No. 82	12	[1]36 10 55.4	+.3	.0			36 10 55.7	±.8
Sodus	Soto	W. Mussetter	1919, Sept. 10	Theod. No. 1	7	134 39 57.93	+.32	+1.08	−.01		134 39 59.32	±.73
South Point southwest base	South Point northeast base.	O. B. French	1898, Jan. 25, 28	Theod. No. 28	9	214 51 24.6	+.3	.0			214 51 24.9	±.2
Torras (Laplace)	Royal Oak	W. Mussetter	1919, Nov. 11, 12	Theod. No. 145	20	135 37 24.14	+.32	.00	.00		135 37 24.46	±.31
Zeman	Stafford	do	1919, Nov. 16	do	11	327 20 22.89	+.32	.00	.00		327 20 23.21	±.61
MAINE												
Agamenticus	Thompson	A. D. Bache	1847, September, October	Theod. No. 1	10	[1]2 36 55.22	+.31	.00			2 36 55.53	±.32
Cape Small	Sebattus	do; W. P. Trowbridge; C. O. Boutelle	1851, Oct. 14-23	do	11	[1]155 19 03.20	+.31	.00			155 19 03.51	±.29
Cooper	Howard	G. W. Dean; R. E. Halter	1859, Sept. 14-19	do	13	[1]351 53 11.74	+.31	.00			351 53 12.05	±.25
Howard	Pigeon	G. W. Dean; R. E. Halter	1859, July, August	do	15	[1]63 54 44.79	+.32	.00			63 54 45.11	±.27
Humpback	Cooper	G. W. Dean	1858, Aug. 9-25	do	15	[1]254 42 31.98	+.32	.00			254 42 32.30	±.22
Mount Blue	Sebattus	W. H. Burger	1907, Aug. 8	Theod. No. 145	14	341 59 15.41	+.32	.00		−.04	341 59 15.69	±.47
Mount Desert	Ragged Mountain	A. D. Bache; G. W. Dean	1856, August, September	Theod. No. 1	16	[1]78 30 46.46	+.31	.00			78 30 46.77	±.20
Mount Harris	Humpback	A. D. Bache; G. W. Dean	1855, August, September	do	15	[1]254 35 10.42	+.31	.00			254 35 10.73	±.25
Mount Independence	Agamenticus	A. D. Bache	1849, September, October	do	14	[1]26 55 48.33	+.31	.00			26 55 48.64	±.17
Mount Pleasant	Mount Blue	do; W. P. Trowbridge; C. O. Bontelle	1851, July, August	do	7	205 59 21.20	+.31	.00			205 59 21.51	±.34

[1] Azimuth of mark referred to triangulation station.

TABLE XXIII.—*Azimuths determined by the United States Coast and Geodetic Survey*—Continued

Station occupied	Reference	Observer	Dates	Instrument (See Table XXII)	Number of separate determinations	Observed azimuth	Diurnal aberration	Eccentricity for instrument and light	Correction for elevation of mark	Correction for variation of pole	Corrected azimuth	Probable error
MAINE—continued						° ′ ″	″	″	″	″	° ′ ″	″
Pole Hill	Kennedy	W. H. Burger	1907, July 16	Theod. No. 145	11	293 06 46.75	+0.32	−1.26		0.00	293 06 45.81	±0.34
Ragged Mountain	Mount Pleasant	A. D. Bache, G. W. Dean	1854, August, September	Theod. No. 1	11	[1] 81 48 44.67	+.31	.00			81 48 44.98	±.20
Sebattus	Mount Independence	A. D. Bache, G. W. Dean	1853, July 13–30	do	12	[1] 24 31 23.27	+.31	.00			24 31 23.58	±.29
MARYLAND												
Calvert	Meekins Neck	A. T. Mosman	1871, August, September	Theod. No. 16	18	252 06 08.61	+.32	.00		+.25	252 06 09.18	±.17
Davis	Quilling	J. E. Hilgard	1853, Sept. 26, 27	Theod. No. 31	10	[1] 13 37 05.64	+.31	.00			13 37 05.95	±.62
Hill	Webb	A. D. Bache, G. W. Dean	1850, September, October	Theod. No. 1	10	219 46 57.57	+.32	.00		+.22	219 46 58.11	±.26
Marriott	Hill	A. D. Bache, J. Heuston, jr	1849, June 4–10	Theod. No. 2	16	[1] 96 37 43.05	+.31	.00		+.04	96 37 43.40	±.48
Maryland Heights	Bull Run	C. O. Boutelle	1870, Oct. 9–15	Theod. No. 1	35	[1] 358 43 06.56	+.32	.00		+.30	358 43 07.18	±.18
Principio	Turkey Point	R. D. Cutts	1866, August, September	Theod. No. 2	19	[1] 1 34 43.19	+.32	.00		−.01	1 34 43.50	±.40
Soper	Webb	A. D. Bache	1850, July 4–29	Theod. No. 1	10	[1] 268 49 23.14	+.32	.00		+.14	268 49 23.60	±.29
Sugarloaf	Bull Run	C. O. Boutelle, F. D. Granger	1879, September, October, November.	Theod. No. 113	33	[1] 32 29 16.47	+.32	.00		+.18	32 29 16.97	±.20
Webb	Soper	A. D. Bache, G. W. Dean	1850, October, November	Theod. No. 1	10	[1] 88 59 48.92	+.32	.00		+.14	88 59 49.38	±.21
MASSACHUSETTS												
Blue Hill	Manomet	A. D. Bache	1845, September, October	Theod. No. 1	13	[1] 305 57 29.75	+.31	.00			305 57 30.06	±.25
Copecut	Blue Hill	do	1844, September, October	do	14	[1] 175 17 05.2	+.3	.0			175 17 06.5	±.3
Cambridge Observatory, west transit (Laplace).	do	A. T. Mosman	1869, January, February, March.	Tr. No. 5	34	[1] 356 22 57.64	+.31	.00			356 22 57.95	±.13
Indian	Copecut	A. D. Bache, C. O. Boutelle	1845, July 10–19	Theod. No. 1	15	[1] 135 35 58.51	+.31	.00			135 35 58.82	±.36
Mount Tom	Monadnock	G. W. Dean, R. E. Halter	1862, July, August	do	15	[1] 212 37 21.42	+.32	.00			212 37 21.74	±.20
Sankaty Head Lighthouse	Great Point Lighthouse	E. Smith	1908, Sept. 3, 4	Theod. No. 167	18	[1] 150 21 48.48	+.32	+.74		+.14	150 21 49.68	±.44
Shootflying	Manomet	A. D. Bache	1845, Aug. 1–13	Theod. No. 1	13	[1] 143 03 22.43	+.31	.00			143 03 22.74	±.24
Thompson	do	do	1846, October, November, December.	do	6	[1] 351 21 41.54	+.31	.00			351 21 41.85	±.34
Wachusett	Bald Hill	G. W. Dean, R. E. Halter	1860, September, October	do	15	[1] 24 17 41.01	+.31	.00			24 17 41.32	±.11
MICHIGAN												
Bunday (U. S. L. S.) (Laplace)	Woodstock	W. Bowie	1908, May 12, 15	Theod. No. 168	22	294 08 17.05	+.32	.00		+.28	294 08 17.65	±.23
Sherman (U. S. L. S.)	Van Buren	do	1908, May 29	do	10	40 54 11.88	+.32	−339.98		+.30	40 48 32.52	±.33
Vulcan (U. S. L. S.)	Triloba	do	1908, July 19	do	18	345 59 10.88	+.32	.00		+.27	345 59 11.47	±.66
MINNESOTA												
Dalton astronomic (Laplace)	Dalton	W. H. Burger	1906, July 5, 7, 9	Theod. No. 145	26	89 01 54.53	+.32	+.14		+.16	89 01 55.15	±.22
Grindle	Kimberly	do	1905, July 13	do	15	118 20 46.85	+.32	−.05		−.06	118 20 47.06	±.23
Gull	Jones	do	1904, Oct. 21, 22	do	15	282 13 32.10	+.32	−.04		+.26	282 13 32.64	±.36
Minneapolis	Prospect Park	C. O. Boutelle	1887, July, August	Theod. No. 113	33	298 46 06.55	+.32	.00			298 46 06.87	±.53
Morken	Keene	W. Bowie	1906, Aug. 9, 10	Theod. No. 167	16	279 29 04.09	+.32	.00		−.09	279 29 04.32	±.44
Osakis	Leslie	W. H. Burger	1904, Aug. 10, 11	Theod. No. 145	15	192 08 03.97	+.32	−.02		+.15	192 08 04.42	±.27
Royalton south base	Alberta	do	1904, Sept. 20, 21	do	16	221 42 30.06	+.32	+.15		+.23	221 42 30.76	±.39
Stephen west base (Laplace)	Stephen east base	do	1905, Oct. 5, 11, 12	Theod. No. 168	23	253 19 13.33	+.33	−3.55		+.20	253 19 10.31	±.34
Tilden	Ives	W. Bowie	1906, Sept. 6	Theod. No. 167	16	160 31 06.09	+.31	.00		−.03	160 31 06.37	±.47
MISSISSIPPI												
Ben	More	E. C. States	1921, Mar. 3	Theod. No. 2a	15	177 04 28.27	+.32	.00	0.00		177 04 28.59	±.35
Big	Point	do	1921, Jan. 27	do	11	185 54 58.81	+.32	.00	.00		185 54 59.13	±.44
Camel	Nebo	do	1921, Mar. 10	do	16	128 17 23.69	+.32	.00	.00		128 17 24.01	±.38
Cat Island	Mississippi City	J. E. Hilgard	1855, December	Tr. No. 9	6	[1] 192 11 14.01	+.31	.00			192 11 14.32	±.23
East Pascagoula	Bayou Casotte	R. H. Fauntleroy	1847, June, July	Theod. No. 2	12	[1] 296 30 50.96	+.31	.00			296 30 51.27	±.34
Fort (Vicksburg)	Island	C. H. Sinclair	1878, July 5, 6, 7, 8	Theod. No. 107	19	[1] 142 44 57.67	+.32	.00			142 44 57.99	±.42
Greenville south base	Greenville north base	E. Smith	1881, Mar. 22, 23, 24	Theod. No. 118	15	204 49 50.8	+.3	.0			204 49 51.1	±.4
Hub	Mont	E. C. States	1921, Feb. 2	Theod. No. 2a	16	182 04 31.41	+.32	.00	.00		182 04 31.73	±.39
Jago	Bexley	do	1921, Feb. 18	do	15	120 38 36.68	+.32	.00	.00		120 38 37.00	±.35
Leaf	Brown	do	1921, Feb. 25	do	15	172 35 32.73	+.32	.00	.00		172 35 33.05	±.45
Moss Point	Bijou	E. C. States	1921, Jan. 8	Theod. No. 2a	11	273 27 03.92	+.32	.00	.00		273 27 04.24	±.42
Natchez, Lookout near	Giles	H. G. Ogden	1878, May 24, 25, 27	Theod. No. 107	10	[1] 203 18 42.9	+.3	.0	.0		203 18 43.2	±.4
Pascagoula east base	Round	E. C. States	1921, Jan. 15	Theod. No. 2a	12	14 28 17.18	+.32	.00	.00		14 28 17.50	±.53
Strickland (Laplace)	Knob	E. H. Pagenhart	1914, Aug. 15, 16	Theod. No. 167	23	295 11 26.27	+.32	.00	−.01		295 11 26.58	±.24
Vant	Dale	E. C. States	1921, Feb. 11	Theod. No. 2a	14	319 47 06.33	+.32	.00	.00		319 47 06.65	±.39
MISSOURI												
Berger (Laplace)	Winter	H. W. Blair	1878, Sept. 16–25	Theod. No. 10	34	[1] 39 12 05.01	+.32	.00		+.31	39 12 05.64	±.31
Cottonwood Point north base	Cottonwood Point south base.	H. G. Ogden	1880, Jan. 3, 8, 9	Theod. No. 107	16	46 24 56.66	+.32	.00			46 24 56.98	±.57
Hunter	Christian	F. D. Granger	1880, Aug. 6–12	Theod. No. 10	36	[1] 221 48 20.30	+.32	.00		−.13	221 48 20.49	±.36
Jefferson City	Cedar	H. W. Blair	1879, November, December	do	34	199 55 36.91	+.31	.00		+.25	199 55 37.47	±.47
Kleinschmidt	Insane Asylum	W. Eimbeck	1871, November, December	Theod. No. 32	14	[1] 200 09 31.30	+.32	.00		+.19	200 09 31.81	±.79
Knob Noster (Laplace)	Normal	W. H. Burger	1906, June 19, 20	Theod. No. 145	20	83 15 41.56	+.32	.00		−.13	83 15 41.75	±.22
MONTANA												
Blue	Flat	E. H. Pagenhart	1912, Aug. 20	Theod. No. 168	16	229 07 15.08	+.32	.00	+.04	−.04	229 07 15.40	±.24
Mondak (Laplace)	Montana	do	1912, July 24, 25	do	24	171 45 18.44	+.32	.00	−.01	−.09	171 45 18.66	±.20
Wymonkota	Harding	do	1912, Oct. 20	do	16	201 17 21.37	+.32	.00	+.04	+.06	201 17 21.79	±.36
NEBRASKA												
Daily	Custer	W. H. Burger	1906, Sept. 12	Theod. No. 145	10	242 14 42.24	+.32	.00		−.02	242 14 42.54	±.38
Page southwest base (Laplace)	Page northeast base	do	1906, Sept. 3, 4	do	18	218 53 24.17	+.32	+.04		−.03	218 53 24.50	±.27
Shelton east base	Shelton west base	do	1906, Sept. 22, 25	do	15	70 13 07.91	+.32	.00		−.01	70 13 08.22	±.39
NEVADA												
Carson Sink	Mount Callahan	W. Eimbeck	1880, July 14–27	Theod. No. 5	32	[1] 262 20 25.33	+.32	.00		−.15	262 20 25.50	±.13
Diamond Peak	do	do	1881, Sept. 17–25	do	25	[1] 98 27 13.64	+.32	.00		−.14	98 27 13.82	±.13
Mill	Miller	C. H. Sinclair	1902, October	Theod. No. 171							355 19 02.7	
Mount Callahan	Carson Sink	W. Eimbeck	1881, July 20–22	Theod. No. 5	29	[1] 83 09 34.62	+.32	.00		−.10	83 09 34.84	±.16
Mount Grant	Wassuck	do	1879, Nov. 19–23	do	14	171 02 58.11	+.32	.00			171 02 58.43	±.33
Pilot Peak	Mount Nebo	do	1889, July 18, 19, 20	do	20	[1] 303 40 13.69	+.32	.00		+.14	303 40 14.15	±.18
Pioche	Tushar	do	1883, Sept. 14–24	do	26	[1] 250 58 49.83	+.32	.00		+.14	250 58 50.29	±.13
Toiyabe Dome	Mount Grant	do	1880, Sept. 19–29	do	21	[1] 77 20 48.98	+.32	.00		−.01	77 20 49.29	±.13
Verdi east base	Point of Rocks	G. Davidson	1872, July 20–22	Theod. No. 37	14	[1] 128 31 06.07	+.31	.00			128 31 06.38	±1.4
NEW HAMPSHIRE												
Croydon	Observatory Hill	E. T. Quimby	1875, July	Theod. No. 2	10	167 58 09.26	+.31	.00			167 58 09.57	±.80
Gunstock	Mount Pleasant	G. W. Dean, R. E. Halter	1860, July, August	Theod. No. 1	18	[1] 217 43 33.21	+.32	.00			217 43 33.53	±.18
Moosilauk	Prospect Mountain	E. T. Quimby	1873, Aug. 17	Theod. No. 2	1	[1] 327 22 18.5	+.3	.0			327 22 18.8	
Observatory Hill	Croydon	do	1874, May, June	do	5	[1] 347 55 29.01	+.31	.00			347 55 29.32	±.46
Prospect Mount	Moosilauk	do	1873, July 22, 23	do	2	[1] 147 31 36.6	+.3	.0			147 31 36.9	±1.7
Unkonoonuc	Gunstock	A. D. Bache	1848, September, October	Theod. No. 1	13	[1] 193 35 20.09	+.31	.00			193 35 20.40	±.45

[1] Azimuth of mark referred to triangulation station.

TABLE XXIII.—*Azimuths determined by the United States Coast and Geodetic Survey*—Continued

Station occupied	Reference	Observer	Dates	Instrument (See Table XXII)	Number of separate determinations	Observed azimuth	Diurnal aberration	Eccentricity for instrument and light	Correction for elevation of mark	Correction for variation of pole	Corrected azimuth	Probable error
						° ′ ″	″	″	″	″	° ′ ″	″
NEW JERSEY												
Barnegat Inlet	Gowdy's house	W. H. Burger	1907, Oct. 19	Theod. No. 145	12	164 08 32.68	+0.32	0.00		−0.18	164 08 32.82	±0.54
Beacon Hill	Weasel	G. W. Dean	1875, August	Tr. No. 5	12	[1]183 35 29.57	+.32	.00			183 35 29.89	±.21
Chapel Hill	Sandy Hook Lighthouse	A. T. Mosman	1869, May 22, 23, 24	Theod. No. 16	7	216 05 15.0	+.3	.0			216 05 15.3	±.4
High Point	Culvers Gap	E. Smith	1908, Sept. 29	Theod. No. 167	16	34 08 11.40	+.32	.00		+.01	34 08 11.73	±.47
Leeds Point	Absecum Lighthouse	A. T. Mosman	1869, June 6, 7	Theod. No. 16	10	352 55 34.1	+.3	.0			352 55 34.4	±.5
Mount Rose	Mount Holly	J. E. Hilgard; G. W. Stevens	1852, Aug. 13-20	Theod. No. 2	12	[1]7 46 55.28	+.31	.00			7 46 55.59	±.31
NEW MEXICO												
Burro	Line	J. S. Hill	1910, Aug. 29, 30	Theod. No. 167	10	118 50 50.97	+.32	.00	−0.14	+.40	118 50 51.55	±.17
Cooks	Florida	do	1909, Dec. 8	Theod. No. 168	12	348 00 16.02	+.32	.00	−.08	−.23	348 00 16.03	±.35
Glen Rio (Laplace)	Martin	E. O. Heaton	1921, Aug. 24, 25	Theod. No. 2a	29	58 19 06.61	+.32	.00	+.10		58 19 07.03	±.19
Jarilla (Laplace)	Kent	J. S. Hill	1909, Nov. 19, 20	Theod. No. 168	16	109 00 26.18	+.32	.00	−.10	−.14	109 00 26.26	±.14
Los Lunas (Laplace)	Sandia	R. L. Shoppe	1920, May 27, 28	Theod. No. 167	24	210 13 31.63	+.32	.00	+.21		210 13 32.16	±.32
NEW YORK												
Carpenters Point	Meridian mark	E. Smith	1873, May, June	Tr. No. 5	12	180 01 14.67						±.20
Cheever	Whitford	G. W. Dean	1874, September, October	Tr. No. 4	11	275 11 10.65	+.31	.00			275 11 10.96	±.48
Dannemora	Bellevue	W. H. Burger	1907, Sept. 17	Theod. No. 145	14	264 45 39.27	+.32	.00		−.12	264 45 39.47	±.39
Gardiners Island	Little Gull Island Lighthouse.	do	1907, Oct. 10	do	12	179 33 50.12	+.32	.00		−.17	179 33 50.27	±.23
Howlett	Fenner	C. O. Boutelle	1883, Sept 5-11	Theod. No. 113	30	275 41 31.12	+.31	.00			275 41 31.43	±.39
Mannsville (U. S. L. S.)(Laplace)	Sandy Creek	W. H. Burger	1907, Sept. 23, 26, 28	Theod. No. 145	24	29 01 15.92	+.32	.00		−.14	29 01 16.10	±.28
Mount Merino	Catskill	G. W. Dean	1874, Oct. 20-26	Tr. No. 4	8	74 44 46.95	+.31	.00			74 44 47.26	±.20
Prospect Mountain	Mount Equinox	R. D. Cutts	1878, July, August	Theod. No. 115	32	298 03 00.02	+.32	.00			298 03 00.34	±.26
Rouses Point	Windmill Point Lighthouse.	G. W. Dean	1874, Aug. 24-29	Tr. No. 4	12	335 03 24.69	+.31	.00			335 03 25.00	±.36
Tassel Hill	Fenner	C. O. Boutelle	1880-81, October, November, July	Theod. No. 113	33	92 55 43.82	+.31	.00			92 55 44.13	±.30
West Hills	Wooster	G. W. Dean	1865, Aug. 16-18	Theod. No. 1	15	174 57 38.00	+.32	.00			174 57 38.32	±.15
NORTH CAROLINA												
Alpha	"A"	D. B. Wainwright	1887, June 17, 18	Theod. No. 96	4	299 18 09.5	+.3				299 18 09.8	
Bodies Island	Roanoke Marshes	C. O. Boutelle	1846, Feb. 3	Theod. No. 2	14	98 28 13.34	+.31	.00			98 28 13.65	±.43
Bridge	Union	J. A. Bond	1918, Oct. 22	Theod. No. 146	8	4 20 43.80	+.32	.00	.00		4 20 44.12	±.95
Bumble	Beck	R. P. Strough	1914, May 9	Theod. No. 232	8	203 39 10.08	+.32	.00	.00		203 39 10.40	±.65
Canaday	Lighter	W. C. Hodgkins	1888, June	Theod. No. 96	13	[1]291 04 38.6	+.3	.0			291 04 38.9	±.4
Cox (Laplace)	Cow	J. A. Bond	1918, July 24	Theod. No. 146	14	236 22 08.59	+.32	.00	+.01		236 22 08.92	±.48
Cut	Isle	C. L. Garner	1918, June 29	Theod. No. 244	10	185 22 11.18	+.32	.00	.00		[2]185 22 11.50	[2]±.37
Dro	Farley	J. A. Bond	1918, Oct. 8	Theod. No. 146	7	31 25 29.13	+.32	.00	.00		31 25 29.45	±.55
Fort Johnson flagstaff	Three Cedars	G. W. Dean	1859, April, May	Theod. No. 2	15	314 36 32.1	+.3	.0			314 36 32.4	±.8
Fort Spinola 2	Duck Creek	do	1866, May, June	do	10	264 11 37.08	+.31	.00			264 11 37.39	±.41
Greensboro	Guilford	C. L. Garner	1918, Dec. 17, 18	Theod. No. 1a	22	96 12 51.79	+.32	.00	.00		96 12 52.11	±.37
Hoffman	Carr	E. C. Bennett	1918, Sept. 9, 10	Theod. No. 145	20	253 22 20.64	+.32	.00	+.01		253 22 20.97	±.50
Hog Island	Ocracoke Lighthouse	E. Smith	1876, Aug. 16, 19	Theod. No. 107	14	346 24 52.95	+.31	.00			346 24 53.26	±.32
Humphreys	Hummock	W. C. Hodgkins	1888, May 26, 27, 30	Theod. No. 96	10	[1]42 29 46.3	+.3				42 29 46.6	±.3
King	Benn	C. O. Boutelle	1877, May, June	Theod. No. 3	33	141 33 36.6	+.3	.0			141 33 36.9	±.25
Lee	Brook	E. C. Bennett	1918, Oct. 24, 25, 26	Theod. No. 145	11	175 48 23.61	+.32	.00	.00		175 48 23.93	±.65
Long Shoal Point	Gull Island, 1873	E. Smith	1876, September	Theod. No. 107	18	295 10 04.35	+.31	.00			295 10 04.66	±.50
Mobile	Dec	J. A. Bond	1918, Aug. 19	Theod. No. 146	7	354 24 49.34	+.32	.00	.00		354 24 49.66	±.49
Money Point	Berry	D. B. Wainwright	1887, May, June	Theod. No. 96	12	27 35 22					27 35 22	±1.3
Moore	Buffalo	A. T. Mosman	1876, November, December	Tr. No. 8	54	[1]158 33 31.19					158 33 31.19	±.15
New Macon	Ocean View Hotel	W. C. Hodgkins	1886, June 2, 3	Theod. No. 111	10	206 25 42.0	+.3				206 25 42.3	±1.2
New South Caswell	Prices Creek Bug Light	D. B. Wainwright	1886, April, May	Theod. No. 96	9	[1]207 25 45.3	+.3				207 25 45.6	±1.8
Ocracoke northeast base	Ocracoke Lighthouse	A. T. Mosman	1871, March	Theod. No. 16	12	232 32 14.19	+.31	−.20			232 32 14.30	±.30
Raleigh (Laplace)	Cary	J. A. Bond	1918, Sept. 25	Theod. No. 146	7	92 50 17.01	+.32	.00			92 50 17.33	±.92
Roan High Bluff	Big Butt	W. H. Burger	1907, May 16	Theod. No. 145	10	85 29 42.13	+.32	.00		+.05	85 29 42.50	±.35
Roseboro	Hayne	J. A. Bond	1918, Nov. 11	Theod. No. 146	11	110 45 45.05	+.32	.00			110 45 45.37	±.55
Sand Island	Bodies Island south base	E. Smith	1876, January, February	Theod. No. 16	18	287 31 08.23	+.30	.00			287 31 08.53	±1.5
Sanford (Laplace)	Jonesboro	E. D. Bromley	1919, Sept. 25, Nov. 18, 19	Theod. No. 167	41	250 18 28.00	+.32	.00	.00		250 18 28.32	±.28
Sloop Point 2	Batson	D. B. Wainwright	1888, June 5, 6	Theod. No. 88	6	234 19 17.9	+.3	.0			234 19 18.2	±.7
Stevenson's Point	Palmetto	C. O. Boutelle	1848, April	Theod. No. 2	10	342 31 06.99	+.31	.00			342 31 07.30	±.43
Tank	Dif	J. A. Bond	1918, Aug. 30	Theod. No. 146	6	168 40 58.28	+.32	.00	.00		168 40 58.60	±.49
Wilmington, St. James Church	Nutt	C. P. Bolles	1854, May, June	Theod. No. 2	14	160 24 19.1	+.3	.0			160 24 19.4	±.9
Young	Poore	C. O. Boutelle	1876, Oct. 10-23	Theod. No. 3	33	[1]126 52 53.38	+.31	.00			126 52 53.69	±.26
NORTH DAKOTA												
Bowie	Ambrose northeast base	E. H. Pagenhart	1912, June 4, 5	Theod. No. 168	13	273 03 43.55	+.32	.00		−.18	273 03 43.69	±.53
Gladys	Howard	do	1912, June 22	do	15	192 14 59.31	+.32	.00	+.01	−.15	192 14 59.49	±.40
Hankinson	Foss	W. H. Burger	1904, June 18, 21, 23, 24	Theod. No. 145	16	257 24 30.16	+.32	+.15		+.02	257 24 30.65	±.26
Saddle	Cook	E. H. Pagenhart	1912, Sept. 5	Theod. No. 168	16	116 42 17.70	+.32	.00	−.03	−.03	116 42 17.96	±.20
OHIO												
Gould	Howland	A. T. Mosman	1885, Sept. 14-18	M. T. No. 7	23	[1]84 49 13.09	+.32	−.05		+.25	84 49 13.61	±.26
Toledo	Mark	P. A. Welker	1890, May 14, 17	Theod. No. 148	5	180 00 18.5	+.3				180 00 18.8	±.82
OKLAHOMA												
Allen (Laplace)	Hawkins	R. L. Schoppe	1920, Oct. 15, 16	Theod. No. 1	29	182 11 32.25	+.32	.00			182 11 32.57	±.33
Blue	Panther	C. L. Garner	1919, Nov. 17	Theod. No. 1a	15	99 44 06.43	+.32	.00	−.01		99 44 06.74	±.25
Carson	El Reno east base	W. Bowie	1908, Oct. 19, 23	Theod. No. 168	16	185 11 32.08	+.32	.00		−.15	185 11 32.25	±.28
Dill (Laplace)	Grebe	E. O. Heaton	1921, June 20, July 1	Theod. No. 2a	25	276 16 25.94	+.32	+.57	−.01		276 16 26.82	±.29
Rosedale	Table Hill	R. L. Schoppe	1920, Nov. 19	Theod. No. 1a	14	53 07 59.43	+.32	+.87	+.03		53 08 00.65	±.38
Savanna south base	Savanna north base	C. L. Garner	1919, Dec. 13	Theod. No. 1a	13	213 42 52.96	+.32	−.06	+.01		213 42 53.23	±.42
Wingard	Edmonds	W. Bowie	1908, Oct. 14, 15	Theod. No. 168	31	356 13 03.14	+.32	.00		−.15	356 13 03.31	±.41
OREGON												
Balch	Harney	G. Davidson	1886, May	Theod. No. 131	7	210 43 43.87	+.32	.00			210 43 44.19	±.66
Barnes	Larch	O. B. French	1903, Aug. 27, 29, 31, Sept. 1	Theod. No. 146	12	268 58 26.89	+.32	.00		+.31	268 58 27.52	±.35
Do	Yam	do	1903, Aug. 31	do	4	30 59 00.27	+.32	.00		+.31	30 59 00.90	±.81
Beaver	Fanny	C. V. Hodgson	1916, Sept. 10	Theod. No. 167	13	183 05 00.74	+.32	.00	+.01		183 05 01.07	±.23
Beulah	Star	E. O. Heaton	1920, Oct. 7	Theod. No. 2a	12	349 23 33.35	+.32	.00	−.04		349 23 33.63	±.45
Burns	Jack	do	1920, Sept. 27	do	15	344 15 39.93	+.32	.00	−.05		344 15 40.20	±.31
Echo (Laplace)	Stanfield east base	C. V. Hodgson	1916, June 15, 18	Theod. No. 167	26	110 20 13.02	+.32	.00			110 20 13.34	±.32
Ella	Job	do	1916, June 22	do	11	257 10 09.56	+.32	.00	+.01		257 10 09.89	±.39
Eugene astronomic (Laplace)	Spencer	O. B. French; J. S. Hill	1904, Nov. 7, 9	Theod. No. 146	20	1 57 52.98	+.32	.00		+.19	1 57 53.49	±.14
Fort Stevens (Laplace)	Scarboro Hill 2	E. H. Pagenhart	1912, Jan. 7, 12	Theod. No. 168	16	211 48 17.19	+.32	.00	+.01	+.14	211 48 17.66	±.28
John	Lookout	C. V. Hodgson	1916, July 5	Theod. No. 167	13	85 08 36.02	+.32	.00	+.02		85 08 36.36	±.40
Juniper	Burns	W. Mussetter	1920, Sept. 18	Theod. No. 145	14	221 51 12.76	+.32	.00	+.09		221 51 13.17	±.58
LaGrande (Laplace)	Emily	C. V. Hodgson	1916, Aug. 19, 20	Theod. No. 167	27	180 05 17.46	+.32	.00	.00		180 05 17.78	±.17
Lakeview, B. M. M-16	Cougar	W. Mussetter, E. O. Heaton	1920, Oct. 28, 30	Theod. No. 145	18	[3]119 47 01.07	+.32	.00	−.13		119 47 01.26	±.58
Mary	Spencer	O. B. French	1903, July 21, 24, 25	Theod. No. 146	14	327 37 56.62	+.32	.00		+.33	327 37 57.27	±.51
Onion	Black	do	1904, Oct. 12	do	6	229 59 42.80	+.32	.00		+.25	229 59 43.37	±.48
Do	White	do	do	do	8	198 11 17.40	+.32	.00		+.25	198 11 17.97	±.36
Pigeon	Azimuth mark	A. T. Mosman	1861, Aug. 16, 18	Theod. No. 20	6	183 17 37.66	+.31	.00			183 17 37.97	±.62
Rainier	Rinearson	G. Davidson	1886, June, July	Theod. No. 131	7	119 26 38.37	+.32	.00			119 26 38.69	±.33
Riddle	Crow	W. Mussetter	1920, Sept. 29	Theod. No. 145	14	179 21 52.43	+.32	.00	.00		179 21 52.75	±.38

[1] Azimuth of mark referred to triangulation station.
[2] Actual error much greater due to error in time determination.
[3] This value in doubt due to unstable ground around instrument. Will probably be superseded.

TABLE XXIII.—*Azimuths determined by the United States Coast and Geodetic Survey*—Continued

Station occupied	Reference	Observer	Dates	Instrument (See Table XXII)	Number of separate determinations	Observed azimuth	Diurnal aberration	Eccentricity for instrument and light	Correction for elevation of mark	Correction for variation of pole	Corrected azimuth	Probable error
OREGON—continued						° ′ ″	″	″	″	″	° ′ ″	″
Rust	Onion	O. B. French	1904, Sept. 28, 29	Theod. No. 146	15	96 38 32.66	+0.32	0.00	−0.24	+0.26	96 38 33.00	±0.33
Scott	Black	do	1904, Oct. 21	do	12	295 36 08.05	+.32	.00		+.24	295 36 08.61	±.25
Spencer	Peterson	do	1903, July 8, 10	do	12	189 45 02.90	+.32	.00		+.31	189 45 03.53	±.62
Tongue Point Neck	Grays Point	R. D. Cutts	1852, Sept. 22, 23, 24, 25, 26	Theod. No. 20	18	[1] 180 48 25.94	+.31	.00			180 48 26.25	±.24
Yam	Hult	O. B. French	1903, July 3, Aug. 4, 5	Theod. No. 146	16	287 50 36.82	+.32	.00		+.35	287 50 37.49	±.30
Yonna	Cougar	E. O. Heaton	1920, Aug. 5	Theod. No. 2a	12	272 06 54.79	+.32	.00	−.01		272 06 55.10	±.39
PENNSYLVANIA												
Womelsdorf	White Horse	E. Smith	1908, Nov. 1, 2	Theod. No. 167	20	158 47 40.58	+.32	.00		−.15	158 47 40.75	±.39
Yard	Lippincott	J. E. Hilgard	1854, October, November	Theod. No. 2	10	347 17 38.26	+.31	.00			347 17 38.57	±.31
RHODE ISLAND												
Beaconpole	Blue Hill	A. D. Bache	1844, October, November	Theod. No. 1	12	[1] 228 55 16.93	+.31	.00			228 55 17.24	±.20
Spencer	Beaconpole	do	1844, Aug. 13-21	do	9	[1] 185 57 32.71	+.31	.00			185 57 33.02	±.42
SOUTH CAROLINA												
Allen	Extension	E. A. Gatje	1918, June 11	Theod. No. 145	12	130 00 11.43	+.32	.00	.00		130 00 11.75	±.49
Allston	Bay	C. O. Boutelle	1854, January	Theod. No. 2	12	333 37 19.0	+.3	.0			333 37 19.3	±1.0
Battery	Pilot	O. H. Tittmann	1873, Mar. 10	Theod. No. 55	5	352 55 28.0	+.3	.0			352 55 28.3	±2.1
Bethune I (Laplace)	Bethune J	E. C. Bennett	1918, Aug. 10	Theod. No. 145	10	201 11 41.70	+.32	.00	+.01		201 11 42.03	±.58
Breach Inlet	Elliotts Cut	C. O. Boutelle	1849, April	Theod. No. 2	9	87 45 00.84	+.31	.00			87 45 01.15	±.78
Columbia	College	E. A. Gatje	1918, June 18	Theod. No. 145	15	174 41 45.75	+.32	.00	.00		174 41 46.07	±.42
Denmark	Pete	do	1918, Apr. 27	do	16	6 29 44.04	+.32	.00	.00		6 29 44.36	±.30
Edisto Island east base	Edisto Island west base	C. O. Boutelle	1850-51, April, May	Theod. No. 24, Theod. No. 30	20	61 21 19.9	+.3	.0			61 21 20.2	±2.1
Estill	Ben	E. A. Gatje	1918, Apr. 15	Theod. No. 145	15	1 26 06.61	+.32	.00	.00		1 26 06.93	±.36
Fort Johnson	Fort Sumter	F. D. Granger	1890, Mar. 23, 27	Theod. No. 151	12	266 26 47.6	+.3	.0			266 26 47.9	±.4
New Cut	Edisto Island east base	C. O. Boutelle	1852, March	Theod. No. 2	12	[1] 10 53 36.01	+.31	.00			10 53 36.32	±.41
Paris	Wofford	do	1875, October, November	Theod. No. 3	33	267 18 14.86	+.31	.00			267 18 15.17	±.21
Port Royal	Beaufort Church	do	1859, February, March	Theod. No. 2	10	[1] 169 40 03.43	+.31	.00			169 40 03.74	±.84
SOUTH DAKOTA												
Franklin	Elfring	W. H. Burger	1906, Aug. 9	Theod. No. 145	10	67 47 14.23	+.32	+.13		−.08	67 47 14.60	±.46
Freeman	Silver Lake	do	1906, Aug. 26	do	8	189 32 48.58	+.32	.00		−.05	189 32 48.85	±.36
Preacher Hill	Brown Valley southeast base.	do	1906, July 28	do	12	247 56 33.67	+.32	.00		−.10	247 56 33.89	±.30
Provo astronomic (Laplace)	Provo west base	C. V. Hodgson	1912, Oct. 7	Theod. No. 146	24	70 55 56.25	+.32	.00	+.05	+.04	70 55 56.66	±.36
Reva	Table	E. H. Pagenhart	do	Theod. No. 168	16	135 35 39.22	+.32	.00	−.06	+.03	135 35 39.51	±.35
TENNESSEE												
Bean	Roy	W. H. Burger	1907, Apr. 9	Theod. No. 145	12	195 24 03.13	+.32	.00		+.07	195 24 03.52	±.40
Hickory	Ebenezer	E. H. Pagenhart	1914, July 22	Theod. No. 167	14	90 44 44.52	+.32	.00	.00		90 44 44.84	±.32
Lebanon north base	Lebanon south base	A. H. Buchanan	1878, April, May	Theod. No. 108	42	6 00 48.44	+.32	.00			6 00 48.76	±.33
Luper	Hinch Mountain	W. H. Burger	1907, Mar. 19	Theod. No. 145	12	41 46 02.42	+.32	.00		+.07	41 46 02.81	±.25
Martin (Laplace)	White	E. H. Pagenhart	1914, May 23, 26	Theod. No. 168	21	108 00 15.38	+.32	−.43	.00		108 00 15.27	±.22
Mount Lore	Chestnut	W. H. Burger	1907, Mar. 11	Theod. No. 145	13	282 06 48.77	+.32	−.22		+.07	282 06 48.94	±.35
TEXAS												
Alice (Laplace)	Wood	W. H. Burger	1905, Jan. 28, 29	do	20	276 47 24.04	+.32	−.10		.00	276 47 24.26	±.28
Appleby	Enterprise	C. L. Garner	1919, June 19	Theod. No. 1a	14	154 27 20.30	+.32	.00	−.01		154 27 20.61	±.35
Austin Capitol dome, star in hand of Liberty (Laplace).	Barton	W. H. Burger	1906, Jan. 23, 24, 25	Theod. No. 145	40	109 25 40.65	+.32	+.24		+.06	109 25 41.27	±.33
Bachelor	Lampasas southwest base.	do	1906, Jan. 31	do	10	109 44 40.80	+.32	.00		+.05	109 44 41.17	±.25
Black	Eagle	J. S. Hill	1909, Oct. 15	Theod. No. 168	12	355 15 35.07	+.32	.00	−.03	+.06	355 15 35.42	±.29
Blue	Babb	E. H. Pagenhart	1918, Feb. 11	Theod. No. 2a	12	82 27 44.40	+.32	.00	+.01		82 27 44.73	±.23
Bowie northwest base (Laplace)	Bowie southeast base	W. H. Burger	1906, November, December	Theod. No. 145	30	322 44 09.23	+.32	−.03		+.06	322 44 09.58	±.24
Brenner	Yturria	C. V. Hodgson	1913, Apr. 11	Theod. No. 168	13	217 02 26.63	+.32	+.04	.00		217 02 26.99	±.32
Bynum	Wolf	J. S. Hill	1909, Jan. 13	do	14	234 58 39.41	+.32	.00	+.06	−.27	234 58 39.52	±.29
Chamliss	Gibson	W. H. Burger	1906, Feb. 13	Theod. No. 145	8	166 57 28.96	+.32	.00		+.02	166 57 29.30	±.28
Conway (Laplace)	Washburn	E. O. Heaton	1921, Aug. 2, 3	Theod. No. 2a	25	80 57 44.50	+.32	−.57	+.02		80 57 44.27	±.29
Dentonio	Carlow	C. L. Garner	1917, Dec. 27	Theod. No. 1a	14	175 26 45.29	+.32	.00	.00		175 26 45.61	±.25
Dollar Point	Azimuth mark	J. E. Hilgard	1848, March, April	Theod. No. 4	45	0 03 29.11	+.31	.00			0 03 29.42	±.38
Donna (Laplace)	Rio	C. V. Hodgson	1913, May 23, 24	Theod. No. 168	30	314 04 13.04	+.32	−.16	.00		314 05 13.20	±.22
Dryden east base (Laplace)	Hen	E. H. Pagenhart	1918, Jan. 18, 22	Theod. No. 2a	22	167 48 20.42	+.32	.00	−.02		167 48 20.72	±.23
Eagle	Diablo	J. S. Hill	1909, Sept. 30	Theod. No. 168	12	207 58 15.83	+.32	.00	+.13	+.15	207 58 16.43	±.33
Estes	Aroya	do	1909, Mar. 24, 25	do	12	155 29 35.54	+.32	.00	−.05	−.06	155 29 35.75	±.42
Fronton (Laplace)	Point Isabel south base.	W. H. Burger	1905, Dec. 9, 13	Theod. No. 145	19	73 34 36.49	+.33	+.08		+.14	73 34 37.04	±.22
Galveston Island east base	Mark	G. W. Dean	1853, March	Theod. No. 2	17	70 36 00.62	+.30	.00			70 36 00.92	±.33
Gilbert	Comanche	W. H. Burger	1906, Dec. 13, 17	Theod. No. 145	12	349 41 37.77	+.32	.00		+.07	349 41 38.16	±.54
Jacksonville (Laplace)	Jacksonville south base	C. L. Garner	1919, June 4, 5	Theod. No. 1a	32	338 27 44.78	+.32	.00	−.01		338 27 45.09	±.21
Johnstone (Laplace)	Hamilton	do	1918, Feb. 13, 14	do	31	203 04 43.44	+.32	.00	+.03		203 04 43.79	±.27
Jupiter	Azimuth mark	G. W. Dean	1853, May	Theod. No. 2a	11	235 09 28.61	+.30	.00			235 09 28.91	±.27
Karnes	Ruckman	W. H. Burger	1904, Nov. 21, 24	Theod. No. 145	16	226 01 35.86	+.32	−.03		+.17	226 01 36.32	±.32
Laguna Madre north base	Laguna Madre south base.	R. E. Halter	1882, May	Theod. No. 130	22	22 32 41.82	+.32	.00			22 32 42.14	±.08
Lacasa	Pierce	W. Bowie	1908, Nov. 18	Theod. No. 168	15	12 49 46.44	+.32	.00	+.02	−.24	12 49 46.54	±.41
Laplace (Laplace)	Nine	C. L. Garner	1918, Jan. 22, 23	Theod. No. 1a	30	167 44 41.40	+.32	.00	−.01		167 44 41.71	±.26
Laredo (Laplace)	Orvil	do	1917, Nov. 22, 23	do	28	187 10 03.51	+.32	.00	.00		187 10 03.83	±.22
Lavaca	Sand Point	G. W. Dean	1868, April	Theod. No. 43	13	[1] 285 26 56.6	+.3	.0			285 26 56.9	±1.5
Lee	Pilot	C. L. Garner	1919, May 23	Theod. No. 1a	14	131 27 45.14	+.32	.00	−.03		131 27 45.43	±.50
Matagorda south base	Matagorda north base	R. E. Halter	1883, May	Theod. No. 130	29	164 19 26.5	+.3	.0			164 19 26.8	±.5
Miller	Beeville	W. H. Burger	1904, Dec. 24, 26, 27	Theod. No. 145	12	190 33 46.63	+.32	−.17		+.10	190 33 46.88	±.30
Mission	Tieken	do	1906, Jan. 13	do	12	268 42 07.65	+.32	.00		+.09	268 42 08.06	±.33
Monument	Corpus	C. V. Hodgson	1917, Sept. 22, 23	Theod. No. 1a	29	180 59 16.85	+.32	.00	.00		180 59 17.17	±.22
Pilot	Comanche	W. H. Burger	1906, Dec. 21	Theod. No. 145	12	247 38 19.11	+.32	.00		+.08	247 38 19.51	±.38
Point Isabel east base	Point Isabel Lighthouse	R. E. Halter	1886, March	Theod. No. 117	31	272 05 40.9	+.3	.0			272 05 41.2	±1.0
Pyle	Madero	E. H. Pagenhart	1917, Dec. 31	Theod. No. 2a	10	137 49 55.54	+.32	.00	−.11		137 49 55.75	±.44
Raymond	Brenner	C. V. Hodgson	1918, Apr. 13	Theod. No. 168	16	88 57 11.58	+.32	.00	.00		88 57 11.90	±.23
Robbins	Riviera	do	1913, Mar. 16	do	16	84 43 49.24	+.32	.00	.00		84 43 49.56	±.23
Round	Ingle	J. S. Hill	1909, Sept. 9	do	12	245 31 27.76	+.32	.00	+.05	+.27	245 31 28.40	±.23
Sears	Allen	W. Bowie	1908, Dec. 22	do	12	98 06 42.26	+.32	+.04	−.01	−.28	98 06 42.33	±.31
Smith	Morris	J. S. Hill	1909, Mar. 5	do	14	242 18 25.64	+.32	.00	+.06	−.15	242 18 25.87	±.34
Springgap	Kennard	W. Bowie	1908, Dec. 8	do	16	142 15 22.86	+.32	+.03	−.05	−.27	142 15 22.89	±.29
Stanton (Laplace)	Evart	J. S. Hill	1909, Jan. 28, 29	do	25	224 31 57.63	+.32	.00	+.06	−.25	224 31 57.76	±.25
Star	Baldy	E. H. Pagenhart	1917, Dec. 9	Theod. No. 2a	12	66 40 50.07	+.32	.00	+.15		66 40 50.54	±.44
Tehuacana (Laplace)	Hubbard	C. L. Garner	1919, May 12, 13	Theod. No. 1a	29	108 16 53.61	+.32	.00	−.01		108 16 53.92	±.24
Venado	Cayote	R. E. Halter	1881, June	Theod. No. 130	32	103 10 47.9	+.3	.0			103 10 48.2	±.9
Zapata	Moleno	C. L. Garner	1917, Oct. 31	Theod. No. 1a	17	195 59 50.70	+.32	.00	+.01		195 59 51.03	±.27
UTAH												
Antelope	Deseret	P. A. Welker	1892, Oct. 23-27	Theod. No. 5	21	[1] 31 59 03.56	+.32	.00		+.26	31 59 04.14	±.14
Deseret	Mount Nebo	W. Eimbeck	1892, Sept. 7-11	do	26	[1] 314 14 00.79	+.32	.00		+.27	314 14 01.38	±.17
Ibepah	Diamond Peak	do, P. A. Welker	1889, Sept. 6-10	do	22	[1] 81 11 28.14	+.32	.00		+.03	81 11 28.49	±.15
Mount Ellen	Patmos Head	W. Eimbeck	1891, Aug. 18-25	do	28	[1] 195 35 57.29	+.32	.00		+.28	195 35 57.89	±.12
Mount Nebo	Tushar	do	1887, July 20-22	do	26	[1] 20 05 22.89	+.32	.00		−.15	20 05 23.06	±.09

[1] Azimuth of mark referred to triangulation station.

TABLE XXIII.—*Azimuths determined by the United States Coast and Geodetic Survey*—Continued

Station occupied	Reference	Observer	Dates	Instrument (See Table XXII)	Number of separate determinations	Observed azimuth	Diurnal aberration	Eccentricity for instrument and light	Correction for elevation of mark	Correction for variation of pole	Corrected azimuth	Probable error
UTAH—continued						° ′ ″	″	″	″	″	° ′ ″	″
Mount Waas	Mount Ellen	J. Eimbeck, J. Nelson	1893, Aug. 1-6	Theod. Nov. 5	16	[1] 72 00 16.35	+0.32	0.00		−0.05	72 00 16.62	±0.20
Ogden (Laplace)	Ogden Peak	W. Eimbeck	1891, May, June	do	26	[1] 283 08 44.31	+.32	.00		+.07	283 08 44.70	±.09
Ogden Peak	Mount Nebo	do	1888, September, October	do	27	[1] 356 19 30.17	+.32	.00		−.12	356 19 30.37	±.14
Patmos Head	Wasatch	do	1890, Oct. 15-20	do	26	[1] 66 41 18.36	+.32	.00		+.02	66 41 18.70	±.14
Promontory	Ogden Peak	do	1892, July 11-15	do	24	[1] 283 24 02.22	+.32	.00		+.10	283 24 02.64	±.16
Salt Lake City (Laplace)	City Creek	do	1893, June 2-7	do	25	[1] 192 02 50.37	+.32	.00		−.19	192 02 50.50	±.13
Waddoup	Ogden Peak	do	1892, June 13-17	do	9	180 42 32.36	+.32	.00		−.13	180 42 32.55	±.33
Wasatch	Mount Nebo	do	1890, Aug. 20-25	do	27	[1] 160 54 02.16	+.32	.00		+.25	160 54 02.73	±.11
VERMONT												
Burlington	Juniper	A. T. Mosman	1870, October	Theod. No. 16	23	67 54 08.11	+.31	.00			67 54 08.42	±.41
Killington	Mount Equinox	W. H. Burger	1907, Aug. 22	Theod. No. 145	14	26 21 41.97	+.32	.00		−.06	26 21 42.23	±.38
Mount Mansfield	Bellevue	do	1907, Sept. 8	do	14	145 10 04.30	+.32	−45.38		−.10	145 09 19.14	±.32
VIRGINIA												
Big Knob	Roan High Bluff	W. H. Burger	1907, May 7	Theod. No. 145	12	332 52 31.15	+.32	.00		+.06	332 52 31.53	±.29
Boykins	Cay	J. A. Bond	1918, June 24	Theod. No. 146	14	73 12 35.95	+.32	.00	0.00		73 12 36.27	±.36
Bull Run	Peach Grove	C. O. Boutelle	1871, October, November	Theod. No. 1	35	[1] 263 53 27.83	+.32	.00		+.34	263 53 28.49	±.20
Cahas	Smith Mountain	W. H. Burger	1907, June 17	Theod. No. 145	8	285 47 30.55	+.32	.00		+.02	285 47 30.89	±.66
Cape Henry Lighthouse	Cape Charles Lighthouse	R. D. Cutts	1866, November	Theod. No. 16	21	205 38 21.67	+.31	−.92			205 38 21.06	±.48
Church (Laplace)	Suffolk	J. A. Bond	1918, June 1	Theod. No. 146	14	271 39 33.32	+.32	.00	.00		271 39 33.64	±.32
Clark	Bull Run	C. O. Boutelle	1871, Aug. 7-30	Theod. No. 1	35	[1] 202 19 27.45	+.32	.00		+.21	202 19 27.98	±.18
Elliott Knob	Humpback	A. T. Mosman	1878, Aug. 2-4	Theod. No. 114	30	[1] 303 25 24.05	+.32	.00		+.09	303 25 24.46	±.27
Knott Island, north end	Ragged Island	do	1869, August	Theod. No. 16	15	172 34 08.36	+.31	.00			172 34 08.67	±.69
Long Mountain	Spear	do	1875, Nov. 13-27	Theod. No. 10	46	[1] 223 28 41.42	+.32	.00		−.10	223 28 41.64	±.23
Mount Weather (Laplace)	Sugarloaf	W. B. Fairfield	1907, Aug. 4, 7, 12, 14	Theod. No. 168	22	242 30 53.37	+.32	.00		−.04	242 30 53.65	±.19
Rogers	Poore	W. H. Burger	1907, May 28	Theod. No. 145	12	332 46 29.88	+.32	.00		+.04	332 46 30.24	±.30
Roslyn (Laplace)	Finn	A. D. Bache, W. R. Trowbridge	1852, July, August	Theod. No. 1	10	227 54 45.02	+.31	+5.35			227 54 50.68	±.41
Tangier Island	Watts Island Lighthouse	A. T. Mosman	1871, June, July	Theod. No. 16	12	282 48 38.59	+.31	−1.18			282 48 37.72	±.30
White Rock	Short	W. H. Burger	1907, Apr. 29	Theod. No. 145	12	322 14 43.18	+.32	.00		+.06	322 14 43.56	±.26
Wolftrap	New Point Comfort Lighthouse.	A. T. Mosman	1871, May, June	Theod. No. 16	22	14 37 04.63	+.31	.00			14 37 04.94	±.29
WASHINGTON												
Bel	Min	J. S. Hill	1905, Aug. 18, 20	Theod. No. 146	16	15 43 55.24	+.32	.00		+.19	15 43 55.75	±.30
Classet	Tatoosh Lighthouse	W. H. Burger	1908, Sept. 2	Theod. No. 145	12	90 43 18.61	+.32	.00		−.03	90 43 18.90	±.48
Goose 2	Willapa Bay Lighthouse.	E. H. Pagenhart	1911, Nov. 21	Theod. No. 168	14	136 32 59.14	+.32	.00		+.36	136 32 59.82	±.47
Kalama	Drays Mound	W. Eimbeck	1873, October	Theod. No. 37	19	162 55 20.99	+.31	.00			162 55 21.30	±.87
Lam	Len	J. S. Hill	1906, July 16	Theod. No. 146	10	231 36 12.06	+.32	.00		−.04	231 36 12.34	±.39
Langley	Marsh	E. H. Pagenhart	1911, Sept. 21, 25	Theod. No. 168	15	7 20 21.6	+.3	+15.7		+.4	7 20 38.0	±.5
Pioneer	Delphi	do	1911, Oct. 16, 17	do	14	237 20 14.13	+.32	+1.62		+.44	237 20 16.51	±.23
Point Hudson	Point Wilson	G. Davidson	1856, August	Theod. No. 20	50	170 40 18.79	+.31	.00			170 40 19.10	±.35
Point Hanson	Azimuth mark	A. T. Mosman	1860, September	do	14	183 29 42.1	+.3	.0			183 29 42.4	±.6
Port Townsend (Laplace)	Kilisut 2	W. H. Burger	1908, Aug. 17, 18	Theod. No. 145	23	307 32 03.37	+.32	.00		+.03	307 32 03.72	±.22
Rain	Hurst	E. H. Pagenhart	1911, July 14	Theod. No. 140	7	205 27 32.17	+.32	+.66	+.01		205 27 33.16	±.72
Tacoma astronomic (Laplace)	Gull	O. B. French, J. S. Hill	1905, July 3, 5	Theod. No. 146	29	197 20 34.18	+.32	.00		+.01	197 20 34.51	±.23
WEST VIRGINIA												
Keeney	Bald Knob	A. T. Mosman	1880, Sept. 10-18	Theod. No. 114	37	[1] 257 04 35.62	+.32	.00		−.05	257 04 35.89	±.21
Piney	Gebhart	do, W. B. Fairfield	1883, Sept. 7-22	Theod. No. 114, M. T. No. 13.	25	119 04 31.21	+.32	.00		+.31	119 04 31.84	±.26
WISCONSIN												
Babe	Dixe	E. C. States	1921, June 30	Theod. No. 281	14	335 15 22.74	+.32	.00	−.01		335 15 23.05	±.51
Buffalo	Clinton	do	1920, Oct. 16	Theod. No. 146	16	245 43 28.66	+.32	.00	+.01		245 43 28.99	±.44
Burlington	Oconto	do	1920, Oct. 24	do	14	59 51 00.66	+.32	.00	+.01		59 51 00.99	±.34
Carter	Durgan	do	1921, July 11	Theod. No. 281	10	185 09 26.63	+.32	.00	.00		185 09 26.95	±.67
Chalmers	Dort	do	1921, Aug. 19	do	11	90 19 40.08	+.32	.00	.00		90 19 40.40	±.65
Detour (U. S. L. S.)	Clay Bank	W. Bowie	1908, July 30	Theod. No. 168	14	62 00 49.23	+.32	.00		+.30	62 00 49.85	±.58
Dover (U. S. L. S.)	Midway	E. C. States	1920, Oct. 28	Theod. No. 146	13	230 54 28.48	+.32	.00	+.01		230 54 28.81	±.48
Fitzsimmons	Arlington	C. O. Boutelle	1887, September, October	Theod. No. 113	31	291 19 34.32	+.31	−57.22			291 18 37.41	±.21
Fond	Elorence	E. C. States	1920, Oct. 21	Theod. No. 146	15	55 41 55.57	+.32	.00	+.02		55 41 55.91	±.41
Gordon	Phelps	do	1921, Sept. 24	Theod. No. 145	14	164 49 48.66	+.32	.00	−.01		164 49 48.97	±.37
Gratiots Grove	Azimuth mark	G. E. Brown	1880, August, September	Theod. No. 32	12	359 57 18.2	+.3	.0			359 57 18.5	±.9
Green Bay east base	Bruce	E. C. States	1921, June 17	Theod. No. 281	11	270 36 43.09	+.32	.00			270 36 43.41	±.59
Harding	Marie	do	1921, Aug. 3	do	9	272 54 58.32	+.32	.00			272 54 58.64	±.67
High	Maiden	do	1921, July 8	do	14	148 25 23.74	+.32	−1.08	−.02		148 25 22.96	±.50
Lake	Oover	do	1921, Sept. 29, 30	Theod. No. 145	17	177 51 55.76	+.32	.00			177 51 56.08	±.39
Laona	Rock	do	1921, July 20	Theod. No. 281	12	179 01 21.46	+.32	.00			179 01 21.78	±.50
Lem	Omaha	do	1921, Sept. 2	Theod. No. 145	15	328 18 34.92	+.32	.00	−.02		328 18 35.22	±.35
Long	Brownlee	do	1921, Sept. 28	do	15	326 18 13.17	+.32	.00	−.02		326 18 13.47	±.31
Manson	Pat	do	1921, Aug. 20, Oct. 15	Theod. No. 281	22	255 21 32.29	+.32	.00	+.01		255 21 32.62	±.40
Massive (Laplace)	Jerome	do	1921, Sept. 5, 6	Theod. No. 145	10	152 31 14.80	+.32	.00	−.02		151 39 15.10	±.36
Mount	Gravel	do	1921, July 5	Theod. No. 281	13	145 55 01.54	+.32	.00	−.02		145 55 01.84	±.44
Night (Laplace)	Good	do	1921, Nov. 4	Theod. No. 145	23	130 27 11.16	+.32	.00	−.01		130 27 11.47	±.26
North	Cranden	do	1921, July 23	Theod. No. 281	12	80 22 20.98	+.32	.00	+.01		80 22 21.31	±.46
Owen	Pate	C. A. Egner	1921, Oct. 4, 5	Theod. No. 145	19	321 28 36.52	+.32	.00	−.02		321 28 36.82	±.41
Park	Gilman	E. C. States	1921, Oct. 20	Theod. No. 281	11	152 36 07.90	+.32	.00	−.02		152 36 08.20	±.54
Point	Otto	do	1921, June 22	do	14	178 07 24.91	+.32	.00	.00		178 07 25.23	±.29
Prentice	Jean	do	1921, Aug. 18	do	8	107 03 44.82	+.32	.00	−.01		107 03 45.13	±.80
Pulaski	Lucy	do	1921, June 23	do	12	151 52 46.72	+.32	.00	−.01		151 52 47.03	±.52
Quarry Bluff	Big Hollow	J. E. Davies	1875, August	Theod. No. 32	27	102 28 03.75	+.31	.00			102 28 04.06	±.84
Rhinelander (Laplace)	Cabot	E. C. States	1921, July 29, Aug. 4	Theod. No. 281	24	39 13 04.12	+.32	.00	+.03		39 13 04.47	±.39
Robert	Laris	C. A. Egner	1921, Oct. 12	Theod. No. 145	11	322 00 55.88	+.32	.00	−.02		322 00 56.18	±.46
Smook	Hawkins	E. C. States	1921, Aug. 27	Theod. No. 281	11	99 13 45.42	+.32	.00	−.01		99 13 45.73	±.76
Somers (U. S. L. S.)	Caledonia	W. Bowie	1908, July 4	Theod. No. 168	14	159 31 23.55	+.32	.00		+.29	159 31 24.16	±.44
Spring Green east base	Stewarts Bluff	J. E. Davies	1875, July	Theod. No. 32	6	245 47 21.5	+.3	.0			245 47 21.8	±1.7
Wabeno	Forest	E. C. States	1921, July 12	Theod. No. 281	10	100 30 55.82	+.32	.00	−.01		100 30 56.13	±.50
Way	Range	do	1921, Sept. 22, 26	Theod. No. 145	21	108 41 25.23	+.32	.00	−.01		108 41 25.54	±.40
WYOMING												
Alkali	Cambria	C. V. Hodgson	1913, Sept. 9	Theod. No. 168	14	207 19 14.41	+.32	.00	+.09		207 19 14.82	±.38
Cambria	Alkali	do	1913, Sept. 12	do	14	27 31 18.57	+.32	.00	+.06		27 31 18.95	±.29
Ragged	Chugwater	do	1912, June 4	Theod. No. 167	16	212 56 35.02	+.32	.00	+.11	−.16	212 56 35.29	±.31
Twin	Horsetooth	do	1912, June 25	do	16	353 54 38.53	+.32	.00	−.03	−.13	353 54 38.69	±.21
Willow	Coleman	do	1912, Oct. 15	do	15	46 48 47.14	+.32	.00	+.10	+.05	46 48 47.61	±.24
CANADA												
Beachy Head	Discovery	W. H. Burger	1908, Sept. 12	Theod. No. 145	12	251 19 16.90	+.32	.00			251 19 17.22	±.44

[1] Azimuth of mark referred to triangulation station.

TABLE XXIV.—*Azimuths determined by the United States Lake Survey*

Station occupied	Reference	Observer	Dates	Instrument (see Table XXII)	Final azimuth	Probable error
CANADA					° ′ ″	″
Johnstown	Frazers	L. Foote	1873, Aug. 7, 8, 9, 16	G.-W. Theod. No. 1	29 14 59.51	±1.21
Gargantua	Mamainse		1895, June 8,9,14,15,16	T. & S. Theod. No. 3	335 06 19.93	
ILLINOIS						
Parkersburg (Laplace)	Denver	A. R. Flint	1879, Aug. 9, 10, 11, 12, 13, 16, 17.	T. & S. Theod. No. 1	143 16 15.44	±.36
Willow Springs (Laplace)	Shot Tower	do	1874, Oct. 2, 3, 4, 5	Repsold Theod. No. 1	224 29 41.24	±.4
MICHIGAN						
Belle Isle azimuth post	Engine House, Detroit, center	G. A. Marr	1873, Nov. 1, 3, 4, 5	T. & S. Theod. No. 1	107 21 59.84	±.45
Ford River 2 (Laplace)	Cedar River	G. Y. Wisner	1874, July 10, 11, 12, 13	do	31 35 00.28	±.67
Keweenaw Point south base	Keweenaw north base	do	1873, July 23,25,26	do	199 11 07.29	±.30
A Mackinac west base	D St. Ignace		1896, Sept. 27, 28, Oct. 1, 2.	T. & S. Theod. No. 3	213 53 29.05	
Sault Ste. Marie Observatory west pier (Laplace).	Azimuth	E. E. Haskell			178 06 38.87	
MINNESOTA						
Minnesota Point north base. (Laplace).	Minnesota Point south base.	G. Y. Wisner	1871, July 13	T. & S. Theod. No. 1	323 52 24.32	±.38
NEW YORK						
Jinks	Pine Tree	L. Foote	1873, June 12, 17, 21	G.-W. Theod. No. 1	152 27 12.54	±2.79
Ogdensburg Lighthouse, 1871 (Laplace).[1]	Windmill Point				[1]206 54 47.00	
Sandy Creek north base	Sandy Creek south base	G. Y. Wisner	1874, Sept. 13,14,18,20, 21.	T. & S. Theod. No. 1	357 14 26.95	±.27
Sopers Hill	Maitland	W. A. Metcalf	1873, Aug. 20, 21, 22	Gambey Theod. No.2	93 00 15.71	±1.82
Tonawanda (Laplace)	Buffalo Plains	G. Y. Wisner	1875, Aug. 25,26,27,28	T. & S. Theod. No. 1	314 22 40.61	±.50
OHIO						
Sandusky west base	Sandusky east base	do	1877, Sept. 13, 14, 17, 18, 21.	do	319 36 38.60	±.21
WISCONSIN						
Aminicon River	Lester River	do	1871, July 22, 23	do	153 37 06.15	±.29
Bruce	Long Tail Point Light	A. R. Flint	1872, July 12, 14, 16	Repsold Theod. No. 1	139 16 04.90	±.33
Minnesota Junction	Horicon	do	1873, Sept. 3,4,6,7,8	do	272 30 45.03	±.50

[1] The mean of the three azimuths, Sopers Hill, Johnstown, and Jinks, reduced to Ogdensburg Lighthouse, 1871.

CHAPTER IV.—DEFLECTIONS OF THE VERTICAL

FIGURE OF THE EARTH

The true figure of the earth is called a geoid and may be defined as a surface which is everywhere normal to the force of gravity. It is shown in Clarke's Geodesy and other works on higher geodesy that the figure of the earth is very closely represented by a spheroid, an ellipsoid of revolution, but not exactly on account of the irregularities of the surface of the earth and the variation in density of the material composing the crust of the earth.

Extensive geodetic operations have made it possible to determine a spheroid or mathematical surface of the earth from which the deviations of the geoid are very small. A history of these operations may be found in Geodesy, A. R. Clarke, 1880; Elements of Geodesy, J. Howard Gore, 1889, second edition; La Figure de la Terre, Capitaine G. Perrier, published in Revue Annuell de Géographie, Tome II, 1908.

The principal investigations of the size and shape of the spheroid have been made from astronomical and triangulation data obtained from the measurement of arcs of meridians. The shape of the spheroid or the flattening at the poles has also been determined from observations of the force of gravity.

Two important determinations of the spheroid are those of Bessel in 1841 and Clarke in 1866, important because the Bessel spheroid has been largely used in Europe and the Clarke spheroid of 1866 has been adopted by North American countries. The Bessel spheroid was determined from the measurements of 10 meridional arcs and the Clarke spheroid of 1866 from five meridional arcs. The Clarke spheroid of 1866, as expressed by Clarke in meters, was adopted by the United States in 1880 and by Canada and Mexico in 1913.

Additional data always make possible a new computation of the spheroid and indicate the accuracy of the adopted spheroid in relation to the geoid. The following publications contain investigations of the spheroid made by the United States Coast and Geodetic Survey:

Chas. A. Schott. The Transcontinental Triangulation and the American Arc of the Parallel, 1900; and The Eastern Oblique Arc of the United States, 1902.

John F. Hayford. The Figure of the Earth and Isostasy from Measurements in the United States, 1909; and Supplementary Investigations in 1909 of the Figure of the Earth and Isostasy.

John F. Hayford and W. Bowie. The Effect of Topography and Isostatic Compensation upon the Intensity of Gravity, 1912. (Spec. Pub. No. 10.)

W. Bowie. The Effect of Topography and Isostatic Compensation upon the Intensity of Gravity (second paper), 1912, (Spec. Pub. No. 12); and Investigations of Gravity and Isostasy, 1917, (Spec. Pub. No. 40).

Comparison of the United States Coast and Geodetic Survey spheroids with the Clarke spheroid of 1866

Investigation by—	Date	Reciprocal of flattening	Equatorial radius	Polar semidiameter	Investigation by—	Date	Reciprocal of flattening	Equatorial radius	Polar semidiameter
			Meters	*Meters*				*Meters*	*Meters*
Clarke	1866	295.0	6,378,206	6,356,584	Hayford	1909	297.0	6,378,388	6,356,909
Schott	1900	304.5	6,378,157	6,357,210	Bowie	1912	298.4		
Hayford	1906	297.8	6,378,283	6,356,868	Bowie	1917	297.4		

The Hayford spheroid has been officially recommended by the section of geodesy of the International Geodetic and Geophysical Union, but with the flattening exactly equal to 1/297, so that the polar semidiameter is 6,356,912 meters.

NORTH AMERICAN DATUM

After a spheroid has been adopted and all the angles and lengths in a triangulation have been fully fixed it is still necessary, before the computation of latitudes, longitudes, and azimuths can be made, to adopt a standard latitude and longitude for a specified station and a

standard azimuth of a line from that station. For convenience the adopted standard position (latitude and longitude) of a given station, together with the adopted standard azimuth of a line from that station, is called the geodetic datum.

The triangulation in the United States was commenced at various points and existed at first as a number of detached portions in each of which the geodetic datum was necessarily dependent only upon the astronomic stations connected with that particular portion. As examples of such detached portions of triangulation there may be mentioned the early triangulation in New England and along the Atlantic coast, a detached portion of the transcontinental triangulation centering on St. Louis and another portion of the same triangulation in the Rocky Mountain region, and three separate portions of triangulation in California, in the latitude of San Francisco, in the vicinity of Santa Barbara Channel, and in the vicinity of San Diego. With the lapse of time these separate pieces expanded until they touched.

The transcontinental triangulation, the office computation of which was completed in 1899, joined all the detached portions mentioned and made them one continuous triangulation. As soon as this took place the logical necessity existed of discarding the old geodetic data used in these various pieces and substituting one for the whole country, or at least for as much of the country as is covered by continuous triangulation. To do this was a very tedious piece of work and involved much preliminary study to determine the best datum to be adopted. On March 13, 1901, the Superintendent adopted what was known from that time until 1913 as the United States standard datum, but is now known as the North American datum, and it was decided to reduce the positions to that datum as rapidly as possible. The datum adopted was that formerly in use in New England, and therefore its adoption did not affect the positions which had been used for geographic purposes in New England and along the Atlantic coast to North Carolina, nor those in the States of New York, Pennsylvania, New Jersey, and Delaware. The adopted datum does not agree, however, with that used in the Transcontinental Triangulation and in the Eastern Oblique Arc of the United States, publications which deal primarily with the purely scientific problem of the determination of the figure of the earth and which were prepared for publication before the adoption of the new datum. As the adoption of such a standard datum was a matter of considerable importance it is in order here to explain the desirability of this step more fully.

The main objects to be attained by the geodetic operations of the United States Coast and Geodetic Survey are, first, the control of the charts published by the survey; second, the furnishing of the geographic positions (latitudes and longitudes), accurately determined elevations, distances, and azimuths to field parties of this bureau and to other organizations; third, the determination of the figure of the earth. For the first and second objects it is not necessary that the reference spheroid should be accurately that which most closely fits the geoid within the area covered, not that the adopted geodetic datum should be absolutely the best that can be derived from the astronomic observations at hand. It is simply desirable that the reference spheroid and the geodetic datum adopted shall be, if possible, such a close approximation to the truth that any correction which may hereafter be derived from the observations which are now, or may become, available shall not greatly exceed the probable errors of such corrections. It is, however, very desirable that one spheroid and one geodetic datum be used for the whole country. In fact, this is absolutely necessary if a geodetic survey is to perform fully the function of accurately coordinating all surveys within the area which it covers. This is the most important function of a geodetic survey. To perform this function it is also highly desirable that when a certain spheroid and geodetic datum have been adopted for a country they be rigidly adhered to without change for all time unless shown to be largely in error.

In striving to attain the third object, the determination of the figure of the earth, the conditions are decidedly different. This problem concerns itself, primarily, with astronomic observations of latitude, longitude, and azimuth and with the geodetic positions of the points at which the astronomic observations were made, but is not concerned with the geodetic positions of other points fixed by the triangulations. The geodetic positions (latitudes and longitudes) of comparatively few points are therefore concerned in this problem. However, in

marked contrast to the statements made in preceding paragraphs, it is desirable in dealing with this problem that with each new important accession of data a new spheroid fitting the geoid with the greatest possible accuracy and new values of the geodetic latitudes, longitudes, and azimuths of the highest degree of accuracy should be derived.

The North American datum was adopted with reference to positions furnished for geographic purposes but has no reference to the problem of the determination of the figure of the earth. It was adopted with reference to the engineer's problem of furnishing standard positions and does not affect the scientist's problem of the determination of the figure of the earth.

The principles which guided in the selection of the datum to be adopted were: First, that the adopted datum should not differ widely from the ideal datum for which the sum of the station errors in latitude, longitude, and azimuth should each be zero; second, it was desirable that the adopted datum should produce minimum changes in the publications of the United States Coast and Geodetic Survey, including its charts; and, third, it was desirable, other things being equal, to adopt that datum which allowed the maximum number of positions already in the office files to remain unchanged, and therefore necessitated a minimum amount of new computation. These considerations led to the adoption, as the standard, of that datum which had been in use for many years in the northeastern group of States and along the Atlantic coast as far south as North Carolina.

An examination of the station errors of the astronomical stations so far reduced, scattered widely over the United States from Maine to Louisiana and to California, indicated that this datum approaches closely the ideal for which the algebraic sum of the station errors of each class would be zero.

The North American datum, upon which the geodetic positions and azimuths given in this publication depend, may be defined in terms of the position of the station Meades Ranch, Kans., as follows:

	°	′	″
$\phi=$	39	13	26.686
$\lambda=$	98	32	30.506
α to Waldo $=$	75	28	14.52

Points are then said to be upon the North American datum when they are connected with the station Meades Ranch by a continuous triangulation, through which the latitudes, longitudes, and azimuths have been computed on the Clarke spheroid of 1866, as expressed in meters, starting from the above data.

Early in the year 1913 the Superintendent of the United States Coast and Geodetic Survey was notified by the director of the Commission Geodesica Mexicana and by the chief astronomer of the Dominion of Canada Astronomical Observatory that the so-called United States standard datum had been adopted as the datum for the triangulation of those organizations. They also reported that the Clarke spheroid of 1866, now in use in the United States, would be used by them. Owing to the international character of the datum adopted by the three countries, the Superintendent of the United States Coast and Geodetic Survey changed its designation from the United States standard datum to the "North American datum."

COMPUTATIONS FOR DEFLECTIONS OF THE VERTICAL

The spheroid of reference and the geodetic datum adopted by the United States Coast and Geodetic Survey are explained on pages 87–89, where it is stated that the adopted spheroid is the Clarke spheroid of 1866, as expressed by Clarke in meters, and that the geodetic datum adopted closely approaches the ideal. The geodetic determinations of latitude, longitude, and azimuth, at a station are referred to the point on the celestial sphere defined by the normal to the Clarke spheroid at the station. But the astronomic determinations of latitude, longitude, and azimuth at the same station are referred to the point on the celestial sphere defined by the plumb line at the station. We may call these points of reference on the celestial sphere the geodetic and the astronomic zeniths, respectively.

It is evident that a comparison of the astronomic and the geodetic determinations of latitude, longitude, and azimuth at a station will give the deflection of the plumb line from the normal to the Clarke spheroid, or very nearly. This deflection may be expressed by the angular distance between the geodetic zenith and the astronomic zenith and the azimuth of the line joining them, or by the components of the deflection along the meridian and the prime vertical.

The following brief explanation shows how the meridian and the prime vertical components of the deflection of the vertical at a station may be obtained from the comparison of the geodetic and the astronomic latitudes, longitudes, and azimuths at the station. This explanation will be found in greater detail in Clarke's Geodesy, Chapter XII; in Handbuch der Vermessungskunde by Dr. W. Jordan, Volume III, third edition, pages 529–533; and in Höhere Geodäsie by Dr. F. R. Helmert, Volume I, pages 512–518.

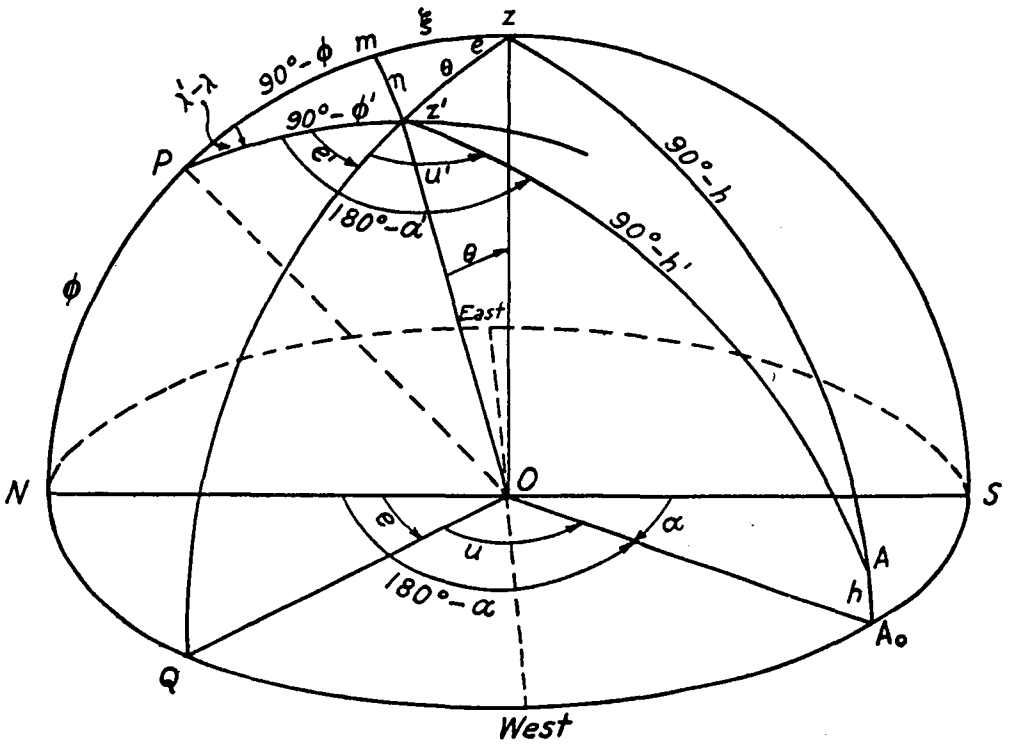


FIG. 13.—Geometrical illustration of deflection of the vertical

In Figure 13, O is a station at which astronomic and geodetic determinations of latitude, longitude, and azimuth have been made; Z is the geodetic zenith; Z', the astronomic zenith; P, the pole for both Z and Z'; ϕ, the geodetic latitude, ϕ', the astronomic latitude; λ, the geodetic longitude, and λ', the astronomic longitude, both positive from the east toward the west; α, the geodetic azimuth of a point A at the elevation h and α', the astronomic azimuth of the point, both azimuths being reckoned from the south in a clockwise direction; $ZZ'=\theta$, is the absolute deflection of the vertical. The point sighted is assumed to be nearly in the horizon, so that h is small.

Project Z' upon PZ. Then ξ is the meridian component and η the prime vertical component of the deflection of the vertical. But $PZ'=90°-\phi'=Pm$ approximately and $PZ=90°-\phi$; therefore

$$Zm=\phi'-\phi=\xi. \qquad (1)$$

The astronomic latitude minus the geodetic latitude is the meridian component of the deflection of the vertical. It is plus when the astronomic zenith is deflected toward the north.

The difference of longitude of two points on the earth is the difference of their local times at the same absolute instant or the difference of their hour angles and so the angle $ZPZ'=\lambda'-\lambda$.

In the triangle $PZ'm$

$$\sin \eta=\sin (90°-\phi') \sin (\lambda'-\lambda).$$

Since η, $\lambda'-\lambda$, and $\phi'-\phi$ are small,

$$\eta=\cos\phi\ (\lambda'-\lambda). \tag{2}$$

The prime vertical component of the deflection of the vertical is therefore the astronomic longitude minus the geodetic longitude times the cosine of the geodetic latitude. It is plus when the astronomic zenith is deflected to the west of the geodetic zenith.

Prolong ZZ' to Q. Then $e=PZQ$; $u=QZA$; $e'=PZ'Q$; and $u'=QZ'A$. Since $180°-\alpha=u+e$ and $180°-\alpha'=u'+e'$,

$$\alpha'-\alpha=-(u'-u)-(e'-e).$$

In the triangle $ZZ'm$

$$\sin\eta=\sin\theta\sin e$$

Since both η and θ are small,

$$\eta=\theta\sin e.$$

In the triangle $ZZ'A$,

$$\cot(90°-h)\sin\theta=\cos\theta\cos u+\sin u\cot(180°-u'),$$

or

$$\tan h\sin\theta=\cos\theta\cos u-\sin u\cot u'.$$

Since θ is small its cosine may be put equal to unity, whence multiplying by $\sin u'$

$$\tan h\sin\theta\sin u'=\sin(u'-u).$$

Since h, and $u'-u$ are also small,

$$\theta\tan h\sin u'=u'-u,$$

a quantity so small as to be negligible, and

$$\alpha'-\alpha=-(e'-e).$$

In like manner, in the triangle PZZ',

$$\cot(90°-\phi)\sin\theta=\cos\theta\cos e+\sin e\cot(180°-e'),$$

or, putting $\cos\theta=1$, as before, and $\theta=\sin\theta$

$$\theta\tan\phi\sin e'=\sin(e\ -e).$$

$\theta\sin e'$ may be put $=\theta\sin e=\eta$ and $e'-e$ is small; therefore

$$\eta=\cot\phi\ (e'-e),$$

or substituting $-(\alpha'-\alpha)$ for $(e'-e)$

$$\eta=-\cot\phi\ (\alpha'-\alpha). \tag{3}$$

The prime vertical component of the deflection of the vertical is therefore equal to the astronomic azimuth minus the geodetic azimuth times the negative cotangent of the geodetic latitude.

Since from (2) and (3)

$$\cos\phi\ (\lambda'-\lambda)=-\cot\phi\ (\alpha'-\alpha)$$

$$\sin\phi\ (\lambda'-\lambda)+\alpha'=\alpha, \tag{4}$$

the true geodetic azimuth, which is the well-known Laplace equation. This equation gives a means of determining the true geodetic azimuth at a geodetic station at which the astronomic longitude and an astronomic azimuth have been determined. Such a station is called a Laplace

station, and the azimuth a Laplace azimuth. At Laplace stations where the true geodetic azimuth has been found in this way and held in the adjustment of the triangulation, the equation $\cos \phi\ (\lambda' - \lambda) = -\cot \phi\ (\alpha' - \alpha)$ will hold within a very small amount, depending upon the manner in which the adjustment was made. In the adjustments of triangulation by the United States Coast and Geodetic Survey previous to 1902, the true geodetic azimuth at Laplace stations was not held in the adjustment of triangulation, and at such stations the equation does not hold.

All azimuth stations at which there are coincident longitude stations are designated in the following tables by the word Laplace in parentheses whether used as Laplace stations in the adjustment of the triangulation or not.

EXPLANATION OF TABLES

All latitude, longitude, and azimuth stations determined by the various organizations previously referred to in this publication are collected in the three following tables. The tables give the final observed latitudes, longitudes, and azimuths of the astronomic stations and the geodetic positions, based on the North American datum if possible, of the geodetic stations with which these astronomic stations are coincident or with which they are connected by direct measurement. The astronomic values are reduced to the geodetic station in every case, but the tables include the necessary data to obtain the geodetic position of the astronomic point if desired. For a number of the stations only approximate positions were available and these are given to tenths of minutes only.

The last column of the tables contains the meridional or prime vertical component of the deflection of the vertical for each station connected with a geodetic point, the position of which is on the North American datum. The method by which these deflections are obtained is explained on page 89. The topographic deflections for many of these stations have been computed and are given in Figure of the Earth and Isostasy from Measurements in the United States and in Supplementary Investigations in 1909 of the Figure of the Earth and Isostasy, both publications by John F. Hayford.

TABLE XXV.—*Deflections of the vertical at latitude stations*

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	ALABAMA	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1877	Aurora	34 08 47.63	+0.26	0.00	Aurora, 1877	86 11 00.660	34 08 47.89	47.479	[1] +0.41
1898	Coon	31 14 47.74	−.03	−.27	Coon, 1895	88 05 43.313	31 14 47.71	50.292	[1] −2.58
1860	Eufaula	31 53 40.91				(85 08.3)			
1847	Fort Morgan	30 13 47.88	.00	.00	Fort Morgan azimuth, 1847.	88 01 23.255	30 13 47.88	42.236	[1] +5.64
1898	Kahatchee	33 13 39.74	+.39	+.37	Kahatchee, 1887	86 21 36.527	33 13 40.13	38.271	[1] +1.86
1857	Lower Peach Tree	31 50 21.00	.00	+.06	Lower Peach Tree longitude, 1857.	87 32 42.87	31 50 21.00	20.45	[1] +.55
1914	Madison	34 42 08.92	.00	−.19	Madison, 1914	86 44 41.756	34 42 08.92	11.204	−2.28
1856–57	Mobile	30 41 33.52	.00	+.04	Mobile transit pier, 1856–57	88 02 33.395	30 41 33.52	30.888	[1] +2.63
1856	Montgomery	32 22 45.24	+.22	+1.09	Montgomery, Capitol, 1887–1892.	86 18 01.505	32 22 45.46	39.555	[1] +5.90
1907	Perry	32 45 34.81	−.14	−.07	Perry, 1890	86 57 21.077	32 45 34.67	33.149	[1] +1.52
1907	Smithers	34 48 54.73	.00	.00	Smithers, 1878	86 36 58.267	34 48 54.73	58.906	[1] −4.18
1878	Tanyard	34 39 13.43	+.16	−1.19	Tanyard, 1878–1914	87 23 01.094	34 39 13.59	11.355	[1] +2.23
1895	Tuscaloosa (U. S. G. S.)	33 12 35.91	.00	.00	Tuscaloosa (U. S. G. S.), 1890.	87 33 01.42	33 12 35.91	36.90	−.99
	ARIZONA								
1914	Azimuth (U. S. G. S.)	33 22 08.18	.00	+.10	Azimuth (U. S. G. S.)	[2] 110 45 19.03	33 22 08.18	[2] 9.59	
1914	Ehrenberg (U. S. G. S.)	33 36 11.18	.00	.00	Ehrenberg (U. S. G. S.)	[2] 114 29 24.84	33 36 11.18	[2] 12.17	
1914	Harquahalla	33 48 37.90	.00	.00	Harquahalla, 1910	113 20 47.388	33 48 37.90	42.650	−4.76
1914	Kofa	33 21 26.95	.00	.00	Kofa, 1911	114 04 56.894	33 21 26.95	33.578	−6.63
1899	Maricopa	33 03 28.91	+.52	+.49	Maricopa astronomic eccentric, 1910.	112 03 01.456	33 03 29.43	34.351	−4.92

[1] Topographic deflection computed. See above.

[2] Approximate North American datum.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	ARIZONA—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1914	Mohawk	32 35 17.21	0.00	0.00	Mohawk, 1910	113 38 50.720	32 35 17.21	22.608	−5.40
1892	Nogales	31 20 04.27	−.07	−.05	Nogales astronomic, 1893	110 56 22.363	31 20 04.20	1.764	+2.44
1914	Number Three (U. S. G. S.)	33 26 14.70	+.02	+.04	Number 3 (U. S. G. S.)	[1]111 38 24.60	33 26 14.72	[2]18.76	-------
1914	Pantano railroad station (U. S. G. S.).	31 59 58.76	−.12	+1.32	Pantano railroad station (U. S. G. S.).	[2]110 34 54.7	31 59 58.64	[2]59.5	-------
1914	Parker School (U. S. G. S.)	34 08 58.63	+.08	+.27	Parker School (U. S. G. S.)	[2]114 19	34 08 58.71	-------	-------
1914	Pima Church (U. S. G. S.)	32 53 29.90	+.01	−1.49	Pima Church (U. S. G. S.)	[2]109 49 31.46	32 53 29.91	[2]32.41	-------
1914	Pine	34 45 57.90	+.13	+.05	Pine, 1910	113 51 12.165	34 45 58.03	68.486	−10.46
1914	Pusch (U. S. G. S.)	32 22 16.09	−.14	−.24	Pusch (U. S. G. S.)	[2]110 56 19.58	32 22 15.95	[2]18.74	-------
1914	Sawmill (U. S. G. S.)	31 55 02.88	+.35	−.10	Sawmill (U. S. G. S.)	[2]109 16 24.16	31 55 03.23	[2]59.39	-------
1914	Whitetank	33 33 56.91	.00	.00	Whitetank, 1910	112 33 28.731	33 33 56.91	62.053	−5.14
1920	Williams Laplace	35 15 06.72	+.01	−.15	Williams Laplace, 1920	112 11 25.628	35 15 06.73	8.448	−1.72
1892	Yuma	32 43 34.68	.00	.00	Yuma latitude, 1892	114 37 20.858	32 43 34.68	37.671	−2.99
	ARKANSAS								
1920	Hartford	35 01 10.96	+.22	−.03	Hartford, 1917	94 23 12.488	35 01 11.18	14.490	−3.31
1878	Helena	34 31 50.83	-------	-------	-------	(90 35.4)	-------	-------	-------
1893	Little Rock	34 44 56.29	+.61	−.30	Little Rock longitude, 1920	92 16 24.86	34 44 56.90	52.22	+4.68
	CALIFORNIA								
1876	Arguello	34 34 53.44	+.32	+1.01	Arguello, 1875	120 33 39.011	34 34 53.76	58.957	[1]−5.20
1874	Avila	35 10 32.73	+.01	−.19	Avila, 1871	120 43 17.319	35 10 32.74	40.203	[1]−7.46
1853	Bodega	38 18 20.11	.00	.00	Bodega latitude, 1853	123 03 15.639	38 18 20.11	29.842	[1]−9.73
1853	Bucksport	40 46 37.62	-------	-------	-------	(124 11.6)	-------	-------	-------
1914	Butte	33 33 38.49	.00	.00	Butte, 1910	115 20 39.657	33 33 38.49	41.442	−2.95
1914	Calexico (U S. G. S.)	32 39 56.06	−.11	+1.09	Calexico (U. S. G. S.)	115 29 54.51	32 39 55.95	53.95	+2.00
1869	Cape Mendocino	40 26 16.18	.00	.00	Cape Mendocino latitude, 1869.	124 24 11.230	40 26 16.18	21.018	[1]−4.84
1885	Castle Mount	35 56 19.57	.00	+.06	Castle Mount, 1885	120 20 22.908	35 56 19.57	21.338	[1]−1.77
1893	Colorado River (Von Schmidt's east latitude post).	35 00 15.02	.00	−.23	Colorado River (Von Schmidt's east latitude post, 1873-1893).	[2]114 39 23	35 00 15.02	-------	-------
1908	Corning	39 55 38.23	+.29	−.91	Corning Tower, 1904	122 10 44.008	39 55 38.52	40.774	[1]−2.25
1853	Crescent City	41 44 43.27	[4]+.15	+.38	Crescent City, 1871	124 12 00.553	41 44 43.42	49.567	[1,3]−6.15
1914	Cuyamaca	32 56 44.55	.00	.00	Cuyamaca, 1898	116 36 22.527	32 56 44.55	48.643	−4.09
1870	Dominguez Hill	33 51 55.18	+.01	+.21	Dominguez Hill, 1854	118 14 11.638	33 51 55.19	55.639	[1]−.45
1878	Fresno (U. S. E.)	36 43 31.22	-------	-------	-------	(119 47.3)	-------	-------	-------
1875	Gaviota	34 29 55.78	−.91	+.40	Gaviota, 1873	120 11 53.426	34 29 54.87	67.450	[1]−12.58
1908	Gazelle	41 31 41.12	−.01	+.38	Gazelle astronomic, 1904	122 31 08.281	41 31 41.11	36.248	[1]+4.86
1908	Harbor	32 59 57.66	.00	.00	Harbor, 1860	118 33 40.818	32 59 57.66	54.779	[1]+2.88
1853	Havens Anchorage	38 47 59.57	-------	-------	-------	(123 35.0)	-------	-------	-------
1885	Hepsedam	36 18 42.16	.00	+.06	Hepsedam, 1885	120 49 26.362	36 18 42.16	53.603	[1]−11.44
1893	Lake Tahoe, southeast end	38 57 19.37	.00	−.05	Lake Tahoe longitude, 1893	[4]119 56 41.03	38 57 19.37	[4]16.70	[1]+2.67
1892	Los Angeles	34 02 44.25	+.05	−1.85	Los Angeles Normal School, flagstaff, 1883.	118 15 14.695	34 02 44.30	62.249	[1]−17.95
1890	Los Angeles northwest base.	33 54 58.01	−.04	+.53	Los Angeles northwest base, 1889.	118 03 23.777	33 54 57.97	65.648	[1]−7.68
1883	Lospe	34 53 32.81	.00	−.06	Lospe, 1875	120 36 19.944	34 53 32.81	38.475	[1]−5.67
1898	Marysville	39 08 12.27	+10.05	−21.67	Marysville, courthouse flagstaff, 1898.	121 35 17.366	39 08 22.32	29.645	[1]−7.32
1853	Mendocino City	39 18 05.50	.00	.00	Mendocino City latitude, 1853-1871.	123 48 16.649	39 18 05.50	13.461	[1]−7.96
1887	Mocho	37 28 36.71	.00	+.07	Mocho, 1887	121 33 18.781	37 28 36.71	39.696	[1]−2.99
1880	Monticello	38 39 46.26	−.31	+.11	Monticello, 1880	122 11 22.327	38 39 45.95	50.645	[1]−4.70
1914	Monument No. 28, California-Nevada boundary	38 37 46.01	+.12	.00	Monument No. 28	[2]119 27 47	38 37 46.13	-------	-------
1914	Monument No. 41, California-Nevada boundary	38 16 24.89	−.13	−.19	Monument No. 41	[2]118 57 21	38 16 24.76	-------	-------
1914	Monument No. 59, California-Nevada boundary	37 54 13.48	−.11	−.16	Monument No. 59	[2]118 26 19	37 54 13.37	-------	-------
1914	Monument No. 74, California-Nevada boundary	37 29 39.65	+.06	+.08	Monument No. 74	[2]117 52 31	37 29 39.71	-------	-------
1914	Monument No. 88, California-Nevada boundary	37 03 11.82	−.14	+.19	Monument No. 88	[2]117 16 38	37 03 11.68	-------	-------
1914	Monument No. 97, California-Nevada boundary	36 36 38.21	−.06	−.09	Monument No. 97	[2]116 41 15	36 36 38.15	-------	-------
1914	Monument No. 120, California-Nevada boundary	35 47 06.99	+.08	+.10	Monument No. 120	[2]115 37 14	35 47 07.07	-------	-------
1914	Monument No. 129, California-Nevada boundary	35 26 35.69	−.07	−.13	Monument No. 129	[2]115 11 06	35 26 35.62	-------	-------
1890	Mount Conness	37 57 55.98	.00	.00	Mount Conness latitude, 1890	119 19 07.469	37 57 55.98	59.249	[1]−3.27

[1] Topographic deflection computed. See p. 92.
[2] Approximate North American datum.
[3] There is an uncertainty of 0.″13 in this value.
[4] Unadjusted.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	CALIFORNIA—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1876	Mount Diablo	37 52 49.60	+0.03	−2.09	Mount Diablo, 1876	121 54 48.355	37 52 49.63	55.482	[1]−5.85
1888	Mount Hamilton	37 20 28.85	.00	+.08	Mount Hamilton longitude, 1888.	121 38 14.52	37 20 28.85	34.81	[1]−5.96
1876	Mount Helena	38 40 01.05	.00	.00	Mount Helena latitude, 1876	122 37 57.45	38 40 01.05	10.58	[1]−9.53
1879	Mount Lola	39 25 57.37	−.22	+.28	Mount Lola, 1879	120 21 51.594	39 25 57.15	60.061	[1]−2.91
1882	Mount Tamalpais	37 55 19.18	−.04	−.22	Mount Tamalpais, 1882	122 35 45.242	37 55 19.14	27.507	[1]−8.37
1885	Mount Toro	36 31 40.34	−.46	−.55	Mount Toro, 1885	121 36 32.276	36 31 39.88	34.712	[1]+5.17
1895	Needles	34 50 18.39	.00	−.05	Needles longitude, 1889	114 36 15.899	34 50 18.39	16.036	+2.35
1873	New San Miguel	34 02 21.65	+.16	+.13	New San Miguel, 1873	120 23 09.472	34 02 21.71	23.753	[1]−2.04
1908	Pine Hill	38 43 04.57	.00	.00	Pine Hill, 1876	120 59 22.962	38 43 04.57	11.112	[1]−6.54
1870	Point Arena	38 55 10.16	.00	.00	Arena latitude, 1870–1906	123 43 36.908	38 55 10.16	18.927	[1]−8.77
1850	Point Conception	34 26 56.34	.00	.00	Point Conception astronomic, 1850.	120 26 45.427	34 26 56.34	69.558	[1]−13.22
1851	Point Pinos	36 37 59.48	.00	.00	Point Pinos latitude, 1851	121 55 31.632	36 37 59.48	59.186	[1]+.29
1853	Point Reyes	37 59 33.62	.00	.00	Point Reyes latitude, 1853	122 58 34.31	37 59 33.62	44.28	[1]−10.66
1852	Prisoners Harbor	34 01 09.43				(119 40)			
1854	Red Bluff	40 44 40.16	.00	.00	Red Bluff latitude, 1854	124 12 56.746	40 44 40.16	44.184	[1]−4.02
1908	Redding	40 34 08.00	.00	−.67	Redding astronomic, 1904	122 23 38.684	40 34 08.00	19.354	[1]−11.35
1885	Rocky Butte	35 39 43.95	.00	−.06	Rocky Butte, 1884	121 03 32.063	35 39 43.95	56.026	[1]−12.08
1859–60	Ross Mountain	38 30 09.96	.00	+.40	Ross Mountain, 1891	123 07 09.221	38 30 09.96	20.583	[1]−10.62
1879	Round Top	38 39 46.27	+.01	−.44	Round Top, 1879	120 00 01.126	38 39 46.28	50.316	[1]−4.04
1870	San Buenaventura	34 15 48.27	−4.40	.00	San Buenaventura, 1858	119 15 57.154	34 15 43.87	54.801	[1]−10.93
1851	San Diego	32 41 57.64	.00	+.07	San Diego latitude, 1851	117 14 31.174	32 41 57.64	63.945	[1]−6.30
1892	do	32 43 20.74	.00	−.05	San Diego longitude, 1892	117 09 28.461	32 43 20.74	29.962	[1]−9.22
1891–92	San Francisco, Lafayette Park.	37 47 28.31	.00	+.06	San Francisco, Lafayette Park, 1881, 1896.	122 25 37.228	37 47 28.31	31.930	[1]−3.62
1852	San Francisco, Presidio (old).	37 47 35.96	.00	−.07	San Francisco, Presidio magnetic, 1852.	122 27 13.554	37 47 35.96	39.163	[1]−3.20
1896	San Francisco, Presidio (new).	37 47 48.35	.00	+.06	San Francisco, Presidio longitude, 1896–1903.	122 27 05.233	37 47 48.35	51.386	[1]−3.04
1873	San Francisco, Washington Square.	37 47 56.90	.00	.00	San Francisco, Washington Square, 1869–1887.	122 24 31.515	37 47 56.90	64.721	[1]−7.82
1914	San Jacinto	33 49 05.40	.00	.00	San Jacinto, 1898–1914	116 40 44.187	33 48 65.40	53.459	+11.94
1852	San Luis Obispo	35 10 37.25	[5].00	[5].00	San Luis Obispo latitude, 1852.	120 44 45.256	35 10 37.25	43.557	[1]−6.31
1852	San Nicolas	33 14 12.27				(119 26.0)			
1908	do	33 16 26.11	+.97	.00	San Nicolas magnetic, 1908	119 30 38.781	33 16 27.08	28.324	[1]−1.24
1852	San Pedro	33 43 18.80	.00	.00	San Pedro latitude, 1852	118 17 02.18	33 43 18.80	21.04	[1]−2.24
1852	San Simeon	35 38 24.38	[5]−2.4	[5]+25.2	San Simeon, 1871	121 11 51.788	35 38 22.0	33.958	[1]−11.96
1874	do	35 38 19.58	.00	−.24	do	121 11 51.788	35 38 19.58	33.958	[1]−14.38
1885	Santa Ana	36 54 15.66	−.23	−.36	Santa Ana, 1852	121 13 57.738	36 54 15.43	19.368	[1]−3.94
1852	Santa Barbara	34 24 24.69	.00	.00	Santa Barbara latitude, 1852	119 41 24.56	34 24 24.69	41.17	−16.48
1869	do	34 23 59.28	−.07	+.20	Santa Barbara, 1857	119 42 53.086	34 23 59.21	77.596	[1]−18.39
1852	Santa Catalina Island	33 26 35.19	.00	.00	Santa Catalina Island latitude, 1852.	118 29 50.259	33 26 35.19	29.868	[1]+5.32
1852	Santa Cruz	36 57 27.22	[5]+.41	[5]−.20	Santa Cruz warehouse flagstaff, 1854.	122 01 28.69	36 57 27.63	40.14	−12.51
1874	Santa Cruz west	34 04 28.04	−.13	+.60	Santa Cruz west, 1874	119 55 02.762	34 04 27.91	24.021	[1]+3.89
1885	Santa Lucia	36 08 37.80	−.29	+.40	Santa Lucia, 1885	121 25 05.937	36 08 37.51	45.328	[1]−7.82
1853	Shelter Cove	40 01 15.06				(124 04.1)			
1899	Soledad	32 50 21.91	−.58	−.02	Soledad, 1887	117 15 07.227	32 50 21.33	23.935	[1]−2.61
1859	Sulphur Peak	38 45 44.42	+.01	+.23	Sulphur Peak, 1859	122 50 40.221	38 45 44.43	54.278	[1]−9.85
1878	Summit	39 18 59.76				(120 19.9)			
1882	Tepusquet	34 54 26.69	−.59	−.38	Tepusquet, 1875	120 11 09.654	34 54 26.10	37.432	[1]−11.33
1853	Trinidad	41 03 20.03				(124 08.2)			
1897	Ukiah	39 08 54.59	+3.42	−1.63	Ukiah, courthouse cupola flagstaff, 1878.	123 12 26.593	39 08 58.01	62.294	[1]−4.28
1880	Vaca	38 22 23.27	+.37	+.77	Vaca, 1880	122 05 01.988	38 22 23.64	33.808	[1]−10.17
1905	Wilson Peak	34 12 54.81	+4.93	+13.59	Wilson Peak, 1890	118 03 39.906	34 12 59.74	86.222	[1]−26.48
1880	Yolo northwest base	38 40 37.25	−.13	−.18	Yolo northwest base, 1880	121 51 28.553	38 40 37.12	44.806	[1]−7.69
1880	Yolo southeast base	38 31 34.55	−.45	+1.93	Yolo southeast base, 1880	121 47 58.518	38 31 34.10	42.185	[1]−8.09
	COLORADO								
1881	Adobe	38 40 37.42	+.01	+.27	Adobe, 1881	103 33 16.360	38 40 37.43	40.853	[1]−3.42
1913	Brighton	40 00 02.94	+.46	−.01	Brighton bench mark eccentric, 1912.	104 48 58.148	40 00 03.40	1.626	+1.77
1902	Colorado–New Mexico boundary station No. 1 (U. S. G. L. O.).	36 59 53.16	+6.84	.00	Boundary monument (U. S. G. L. O.)	(108 41)	37 00 00.00		
1902	Colorado–New Mexico boundary station No. 2 (U. S. G. L. O.).	36 59 50.50	+9.50	.00	Boundary monument (U. S. G. L. O.).	(107 52)	37 00 00.00		
1902	Colorado–New Mexico boundary station No. 3 (U. S. G. L. O.).	36 59 40.88	+19.12	.00	Boundary monument (U. S. G. L. O.).	(106 55)	37 00 00.00		

[1] Topographic deflection computed. See p. 92.

[5] Reduction to geodetic station is uncertain to a few tenths of a second.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	COLORADO—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1902	Colorado-New Mexico boundary station No. 4 (U. S. G. L. O.).	36 59 45.22	+14.78	0.00	Boundary monument (U. S. G. L. O.).	(106 01)	37 00 00.00		
1902	Colorado-New Mexico boundary station No. 5 (U. S. G. L. O.).	36 59 35.95	+24.05	.00	Boundary monument (U. S. G. L. O.).	(105 06)	37 00 00.00		
1902	Colorado-New Mexico boundary station No. 6 (U. S. G. L. O.).	36 59 52.19	+7.81	.00	Boundary monument (U. S. G. L. O.).	(104 04)	37 00 00.00		
1902	Colorado-New Mexico boundary station No. 7 (U. S. G. L. O.).	36 59 58.19	+1.81	.00	Boundary monument (U. S. G. L. O.).	(103 08)	37 00 00.00		
1902	Colorado-Oklahoma boundary station No. 8 (U. S. G. L. O.).	36 59 38.29	+21.71	.00	Boundary monument (U. S. G. L. O.).	(102 18)	37 00 00.00		
1902	Colorado-Oklahoma boundary station No. 9 (U. S. G. L. O.).	37 00 00.02	.00	.00	Boundary monument (U. S. G. L. O.).	(102 02)	37 00 00.02		
1873	Colorado Springs	38 49 59.98	.00	.00	Colorado Springs latitude and longitude, 1873.	104 49 35.115	38 49 59.98	63.230	[1] −3.25
1873	Colorado Springs (U. S. E.)	38 49 41.36	.00	.00	Colorado Springs astronomic (U. S. E.), 1873.	104 49 45.438	38 49 41.36	43.900	−2.54
1873	Denver	39 45 21.71				(104 59.4)			
1913	Dewey	40 30 19.53	.00	.00	Dewey (U. S. G. S.), 1912	104 33 16.100	40 30 19.53	25.868	−6.34
1879	El Paso east base	38 57 16.50	+.15	.00	El Paso east base, 1879	104 27 41.954	38 57 16.65	22.331	[1]−5.68
1913	Elbert	39 14 02.40	.00	.00	Elbert, 1912	104 34 33.167	39 14 02.40	2.936	−.54
1873	Georgetown (U. S. E.)	39 42 35.92				(105 41.5)			
1886	Grand Junction	39 03 59.04	.00	.00	Grand Junction latitude and longitude, 1886.	[4]108 33 53.36	39 03 59.04	[4]55.21	[1]+3.83
1893	Gunnison	38 32 44.39	−.45	.00	Gunnison azimuth, 1894	106 55 26.644	38 32 43.94	46.597	[1]−2.66
1873	Hughes (U. S. E.)	39 59 23.83				(104 49.0)			
1874	Julesburg (U. S. E.)	40 59 07.45				(102 21.5)			
1873	Labran (U. S. E.)	38 23 08.71				(105 06.3)			
1913	Loveland	40 24 10.79	−6.17	+2.00	Loveland tall white chimney, 1912.	105 03 35.817	40 24 04.62	10.770	−6.15
1913	Morrison (U. S. G. S.)	39 40 11.67	+.10	+.10	Morrison, U. S. G. S., 1912	105 13 09.104	39 40 11.77	9.669	+2.10
1894	Mount Ouray	38 25 18.00	−.06	+.12	Mount Ouray, 1894	106 13 27.238	38 25 17.34	22.175	[1]−4.84
1895	Pikes Peak	38 50 27.28	.00	−.23	Pikes Peak, 1895	105 02 37.268	38 50 27.28	26.293	[1]+.99
1891	Tavaputs	39 32 17.12	−.62	−.12	Tavaputs, 1891	109 00 19.148	39 32 16.50	23.946	[1]−7.45
1893	Treasury Mountain	39 00 47.25	+.85	+.69	Treasury Mountain, 1893	107 05 54.688	39 00 48.10	51.931	[1]−3.83
1873	Trinidad	37 10 13.78				(104 30.1)			
1873	Trinidad (U. S. E.)	37 10 46.23				(104 30.0)			
1895	Uncompahgre	38 04 15.74	+.29	+.51	Uncompahgre, 1895	107 27 41.694	38 04 16.03	18.385	[1]−2.35
	CONNECTICUT								
1913	Camp Columbia (C. U.)	41 40 38.87	.00	.00	Camp Columbia longitude, 1912.	73 13 23.733	41 40 38.87	40.601	−1.73
1862	Sanford	41 27 40.57	−.39	−.54	Sanford azimuth, 1862	72 56 59.304	41 27 40.18	42.801	[1]−2.62
	DELAWARE								
1897	Cape Henlopen	38 46 40.07	−.56	−.17	Cape Henlopen Lighthouse, 1841.	75 05 02.944	38 46 39.51	41.553	[1]−2.04
1897	Dover	39 09 13.47	+.52	+1.24	Dover, courthouse cupola, 1896.	75 31 25.197	39 09 13.99	21.264	[1]−7.27
	DISTRICT OF COLUMBIA								
1851	Causten	38 55 32.02	+.34	−2.21	Causten azimuth, 1851	77 04 23.810	38 55 32.36	35.294	[1]−2.93
1852	Washington, Four-and-one-half Street.	38 53 30.70	−10.88	−28.79	Dome of Capitol, head of Goddess of Liberty, 1869.	77 00 33.533	38 53 19.82	23.246	−3.43
1846	Washington, Georgetown College Observatory.	38 54 25.79	.00	+.28	Georgetown College Observatory, dome.	77 04 39.052	38 54 25.79	29.940	[1]−4.15
1850	Washington, Seaton	38 53 25.12	.00	.00	Seaton, 1850	76 59 59.541	38 53 25.12	28.962	[1]−3.84
1891-1894	Washington, U. S. Coast and Geodetic Survey office.	38 53 07.35	+1.34	−1.24	U. S. Coast and Geodetic office, flagstaff on main building.	77 00 31.00	38 53 08.69	13.49	[1]−4.80
1861-1893	Washington, U. S. Naval Observatory, (old site), dome.	38 53 38.78	.00	.00	U. S. Naval Observatory (old site), dome.	77 03 06.119	38 53 38.78	42.255	[1]−3.48
1893-1897	Washington, U. S. Naval Observatory (new site), center of clock room.	38 55 13.74	−1.69	−3.48	U. S. Naval Observatory (new site), center of small dome on main building.	77 03 58.756	38 55 12.05	15.338	[1]−3.29
	FLORIDA								
1860	Apalachicola	29 43 13.43	+.12	−.85	Apalachicola, 1856	84 59 07.560	29 43 13.55	13.066	[1]+.48
1861	Barkley Point 2	30 24 32.70	−.08	−.25	Barkley Point 2, 1860	87 12 26.526	30 24 32.62	31.126	[1]+1.49
1849	Cape Florida	25 39 52.31	.00	.00	Key Biscayne south base, 1850.	80 09 21.996	25 39 52.31	55.230	[1]−2.92
1886	Cape Sable	25 07 01.58	.00	.00	Cape Sable latitude, 1886	81 05 13.394	25 06 61.58	59.582	[1]+2.00
1873	Clearwater Harbor	27 56 40.48	−.02	−.24	Clearwater Harbor astronomic, 1873.	82 48 40.107	27 56 40.46	36.588	[1]+3.87

[1] Topographic deflection computed. See p. 92.]

[4] Unadjusted.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	FLORIDA—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1871	Davis Point 2	30 07 16.81	−0.03	+0.09	Davis Point 2, 1869	85 41 10.806	30 07 16.78	14.295	[1]+2.48
1852	Depot Key	29 07 30.05	.00	+.06	Depot Key, 1851	83 01 54.795	29 07 30.05	27.095	[1]+2.95
1873	Esperanza	29 22 17.57	−.01	−.24	Esperanza, 1873-1906	81 05 37.960	29 22 17.56	15.561	[1]+2.00
1856	Fernandina	30 40 17.48	.00	.00	Fernandina astronomic, 1856-57.	81 27 49.574	30 40 17.48	17.10	[1]+.38
1852	Fort St. Marks	30 09 03.44				(84 12.5)			
1890	Gainesville	29 39 08.76	−3.37	+2.90	Gainesville, courthouse spire, 1897.	82 19 28.586	29 39 05.39	4.711	[1]+.68
1854	Garden Key	24 37 45.8				(82 52.9)			
1855	Hurricane Island	30 04 27.7	.00	.00	Hurricane Island, latitude and azimuth, 1855.	[4]85 39 29.47	30 04 27.7	[4]30.71	−3.0
1906	Jupiter Inlet	26 57 01.53	+.84	+1.42	Jupiter Inlet Lighthouse, 1883.	80 04 56.166	26 56 62.37	54.498	[1]+7.87
1896	Key West	24 33 25.84	+6.26	+1.28	Tifts Observatory, 1853	81 48 27.312	24 33 32.10	34.536	[1]−2.44
1918	Lancaster 2 (U. S. E.)	30 18 39.78	−.19	+.08	Lancaster 2 (U. S. E.), 1909	81 40 38.635	30 18 39.59	37.229	+2.36
1858	Pensacola	30 24 33.09	−.01	+.27	Pensacola public square, flagstaff, 1856.	[4]87 12 49.82	30 24 33.08	[4]31.45	[1]+1.63
1866	Punta Rasa	26 29 15.32	+.18	+.43	Punta Rasa, 1859	82 00 48.081	26 29 15.50	12.127	[1]+3.37
1906	St. Augustine	29 53 12.20	−6.28	+2.11	St. Augustine Lighthouse (new), 1882-1905.	81 17 19.603	29 53 05.92	6.934	[1]−1.01
1852	St. Marks	30 04 25.32	+.04		St. Marks Lighthouse, 1859	84 10 47.158	30 04 25.36	25.329	[1]+.03
1849	Sand Key	24 27 09.27	.00	.00	Sand Key, 1849	81 52 39.551	24 27 09.27	12.942	[1]−3.67
1906	Sebastian	27 49 05.05	.00	−.14	Sebastian 2, 1900	80 28 13.184	27 49 05.05	1.508	[1]+3.54
1906	Titusville	28 36 38.95	+.80	−1.39	Titusville, Indian River Hotel, flagstaff, 1906.	80 48 23.269	28 36 39.75	40.203	[1]−.45
	GEORGIA								
1880	Atlanta	33 44 59.28	−.35	−1.22	Atlanta City Hall cupola, 1872.	[4]84 23 17.75	33 44 58.93	[4]57.69	[1]+1.24
1872	Atlanta middle base	33 54 21.66	+.40	+2.25	Atlanta middle base, 1873	84 16 37.632	33 54 22.06	21.460	[1]+.60
1890	Augusta	33 28 20.78	+1.58	−1.44	Augusta Post Office, 1902	81 58 08.004	33 28 22.36	25.517	[1]−3.16
1917	Brunswick southeast base	31 09 34.27	+.41	+.03	Brunswick southeast base, 1917.	81 29 55.290	31 09 34.68	26.259	+8.42
1872	Butler	31 17 47.03	+.21	.00	Butler, 1859	81 20 48.875	31 17 47.24	39.330	[1]+7.91
1918	do	32 33 30.08	−.75	.00	Butler, 1917	[4]84 13 50.01	32 33 29.33	[4]23.93	+5.40
1917	Cochran	32 23 20.81	+.35	−.18	Cochran, 1917	[4]83 21 34.42	32 23 21.16	[4]19.73	+1.43
1918	Columbus E.	32 28 01.03	+1.79	+1.12	Columbus E., 1917	[4]84 58 56.42	32 27 62.82	[4]55.15	+7.67
1874	Currahee	34 31 37.74	+6.20	+8.07	Currahee, 1874	83 22 33.201	34 31 43.94	44.887	[1]−.95
1918	Harmon	32 33 27.06	+.19	.00	Harmon, 1917	[4]84 13 18.30	32 33 27.25	[4]21.87	+5.38
1917	Joint	31 52 10.06	−.11	+.03	Joint, 1917	[4]82 35 58.61	31 52 09.95	[4]5.93	+4.02
1918	Jones	31 30 49.57	+.20	−.24	Jones, 1917	[4]83 44 16.36	31 30 49.77	[4]49.40	+.37
1918	Kimbrough	32 00 13.96	−.37	+.08	Kimbrough, 1917	[4]84 39 02.42	32 00 13.59	[4]13.83	−.24
1874	Lavender	34 19 15.75	+1.24	−11.37	Lavendar, 1873	85 17 18.251	34 19 16.99	19.243	[1]−2.25
1854-55	Macon	32 50 25.38				(83 37.6)			
1918	Norris	32 30 31.39	+.43	−.30	Norris, 1918	[4]82 30 09.97	32 30 31.82	[4]31.48	+.34
1918	Riley	32 33 26.31	−.86	.00	Riley, 1917	[4]84 12 00.81	32 33 25.45	[4]18.46	+6.99
1907	Rose Hill	34 05 06.76	.00	+.32	Rose Hill, 1902	82 45 33.327	34 05 06.76	1.417	[1]+5.34
1851	Savannah	32 04 52.99	+.17	+.82	Savannah Exchange, spire, 1850.	81 05 28.310	32 04 53.16	51.475	[1]+1.68
1873	Sawnee	34 14 04.03	+6.89	−2.32	Sawnee, 1873	84 09 38.695	34 14 10.92	11.830	[1]−.92
1918	Sylvester D.	31 32 47.80	+.57	+.46	Sylvester D., 1917	[4]83 54 14.49	31 32 48.37	[4]49.12	−.75
1918	Turner	32 26 19.36	+1.12	−.16	Turner, 1918	[4]81 47 04.10	32 26 20.48	[4]20.07	+.41
1918	Valley	32 33 01.28	+.06	+.04	Valley, 1917	[4]83 53 21.06	32 32 61.34	[4]57.60	+3.74
	IDAHO								
1916	Blackfoot	43 10 58.49	.00	.00	Blackfoot longitude, 1916	112 21 01.412	43 10 58.49	59.710	−1.22
1889	Boise (U. S. G. S.)	43 35 57.84				(116 13.1)			
1916	Mountain Home	43 07 41.91	.00	−.33	Mountain Home, 1915	115 41 36.050	43 07 41.91	44.382	−2.47
	ILLINOIS								
1882	Bording	38 36 50.93	.00	+.43	Bording, 1882	89 20 25.603	38 36 50.93	45.305	[1]+5.63
1876	Cairo (U. S. L. S.)	36 59 48.29	−.30	−.54	Defiance (M. R. C.)	(89 09.5)	36 59 47.99		
1877	Cairo	37 00 10.87				(89 10.3)			
1864	Chicago (U. S. L. S.)	41 53 01.27	+21.19		Chicago Lighthouse (U. S. L. S.).	87 36 51.46	41 53 22.46	20.50	[1]+1.96
1883	Chicago	41 50 01.37	−1.54	−4.71	Chicago University, tall entrance tower (U. S. L. S.).	87 36 44.41	41 49 59.83	58.54	[1]+1.29
1891	do	41 53 51.25	+.90	+4.58	Chicago, water-works tower (U. S. L. S.).	87 37 27.55	41 53 52.15	49.78	[1]+2.37
1880	Fairmount (U. S. L. S.)	40 01 36.70	−.03	+.34	Fairmount (U. S. L. S.), 1879	87 50 48.101	40 01 36.67	35.720	[1]+.95
1873	Galena (U. S. L. S.)	42 25 09.50				(90 25.9)			
1869	Mattoon	39 29 10.20				(88 23.1)			
1883	Newton	38 55 31.10	.00	−.63	Newton, 1883	88 09 50.322	38 55 31.10	28.587	[1]+2.51

[1] Topographic deflection computed. See p. 92.

[4] Unadjusted.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	ILLINOIS—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1880	Olney west base (U. S. L. S.).	38 51 41.28	−0.01	+0.67	Olney west base (U. S. L. S.), 1879.	88 06 08.380	38 51 41.27	38.566	[1]+2.70
1879	Parkersburg (U. S. L. S.)	38 34 53.10	−.04	−1.43	Parkersburg (U. S. L. S.), 1879.	88 01 49.004	38 34 53.06	51.518	[1]+1.54
1878	Rock Island (U. S. L. S.)	41 31 03.41				(90 33.7)			
1908	St. Anne (U. S. L. S.)	41 01 20.27	−.09	−.34	St. Anne (U. S. L. S.)	87 43 15.336	41 01 20.18	19.389	[1]+.79
1869	Springfield	39 47 56.75				(89 39.3)			
1899	Urbana	40 06 19.98	+14.11	+4.88	Illinois Industrial University, east tower (U.S.L.S.).	88 13 37.83	40 06 34.09	32.95	[1]+1.14
1874	Willow Springs (U. S. L. S.)	41 43 38.94	−.35	−.20	Willow Springs (U. S. L. S.), 1874.	87 51 05.629	41 43 38.59	36.903	[1]+1.69
	INDIANA								
1891	Butler	41 25 39.73				(84 52.4)			
1908	Carlisle (U. S. L. S.)	41 40 04.04	+.41	+.99	Carlisle (U. S. L. S.), 1877	86 29 38.037	41 40 04.45	5.097	[1]−.65
1882	Indianapolis	39 46 11.13				(86 09.6)			
1883	Logansport	40 45 16.06				(86 21.1)			
1915	O. and M.	38 29 01.94	−.01	+.23	O. and M., 1884	85 40 11.497	38 29 01.93	0.278	+1.65
1889	Reizin	39 02 53.76	+.02	+.36	Reizin, 1889	85 08 24.085	39 02 53.78	53.857	[1]−.08
1891	Union City	40 11 54.45				(84 48.4)			
1881	Vincennes	38 40 36.80	−.48	+2.30	Vincennes, courthouse cupola, 1885.	87 31 37.354	38 40 36.32	35.216	[1]+1.10
1889	Weed Patch	39 10 00.68	.00	−.99	Weed Patch, 1889	86 13 00.771	39 10 00.68	0.634	[1]+.05
	IOWA								
1869	Burlington	40 48 22.04				(91 06.4)			
1869	Cedar Falls	42 32 32.04				(92 27.0)			
1869	Des Moines	41 35 02.69				(93 37.3)			
1880	Sherrills Mound	42 36 15.40				(90 47.6)			
	KANSAS								
1888	Adams	39 02 41.80	−.06	.00	Adams, 1888	96 04 24.369	39 02 41.74	40.968	[1]+.77
1906	Brown	39 46 35.11	.00	.00	Brown, 1898	98 42 16.680	39 46 35.11	37.160	[1]−2.05
1884	Elk Falls (U. S. G. S.)	37 22 03.59				(96 11.3)			
1885	Ellsworth	38 43 47.49	+1.30	−.84	Ellsworth, schoolhouse cupola, 1891.	98 13 44.13	38 43 48.79	50.06	[1]−1.27
1884	Fort Scott (U. S. G. S.)	37 50 25.72				(94 42.5)			
1884	Oswego (U. S. G. S.)	37 09 59.77				(95 06.4)			
1900	Quarry	37 14 27.98	.00	.00	Quarry, 1901	97 58 19.839	37 14 27.98	28.323	[1]−.34
1893	Russell southeast base	38 51 22.73	.00	+.26	Russell southeast base, 1892.	98 47 08.07	38 51 22.73	22.30	[1]+.43
1896	Salina west base	38 51 03.52	.00	+.33	Salina west base, 1895	97 36 10.840	38 51 03.52	7.674	[1]−4.15
1889	Spearville (U. S. G. S.)	37 51 06.22				(99 45.2)			
1906	Sunflower	37 51 37.82	.00	.00	Sunflower, 1901	97 51 28.036	37 51 37.82	40.281	[1]−2.46
1885	Wallace	38 54 44.25	.00	.00	Wallace latitude, 1885	101 35 31.505	38 54 44.25	44.339	[1]−.09
	KENTUCKY								
1916	Bushy Pond	36 29 57.01				(89 11.5)			
1871–72	Falmouth	38 40 37.37				(84 19.7)			
1883	Greensburg	37 15 37.14				(85 30.0)			
1882	Guthrie	36 38 53.05				(87 09.6)			
1882	Henderson	37 50 24.32				(87 35.5)			
1877	Hickman	36 34 17.92				(89 11.7)			
1883	Lexington	38 02 25.56				(84 30.4)			
1882	London	37 08 02.20				(84 05.3)			
1883	Louisa	38 06 54.94				(82 36.1)			
1879	Louisville	38 14 58.08	+12.42	−21.75	Louisville Catholic Cathedral, 1880.	85 45 31.823	38 15 10.50	6.791	+3.71
1887	Minerva	38 42 30.89	.00	−.32	Minerva, 1887	83 55 06.653	38 42 30.89	31.158	[1]−.27
1871	Oakland	37 02 27.47				(86 15.4)			
1877	Paducah	37 04 59.50				(88 35.9)			
1916	Reelfoot Lake	36 30 03.51				(89 11.5)			
1883	Richmond	37 44 39.49				(84 18.1)			
1869	Shelbyville	38 12 45.36				(85 13.3)			
	LOUISIANA								
1880	Baton Rouge	30 27 13.07	+10.33	+6.57	Baton Rouge Barracks, 1880.	[2]91 11 25	30 27 23.40		
1883	Blue Buck Ridge west base	29 45 48.84	.00	−.04	Blue Buck Ridge west base, 1883.	93 44 28.019	29 45 48.84	43.674	+5.17
1920	Boyce	31 22 49.41	+.54	−.18	Boyce, 1919	[4]92 39 10	31 22 49.95		
1921	Burwood	28 57 57.37	+6.31	−8.19	Burwood, 1921	89 22 42.558	28 58 03.68	2.900	+.78
1921	Chandeleur Island	30 02 58.03	+2.07	+.49	Chandeleur Lighthouse, 1910.	88 52 17.889	30 02 60.10	52.456	+7.64

[1] Topographic deflection computed. See p. 92. [2] Approximate North American datum. [4] Unadjusted.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	LOUISIANA—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1889	Chenier Tigre west base	29 34 27.69	0.00	−0.04	Chenier Tigre west base, 1889	92 11 06.620	29 34 27.69	22.447	+5.24
1888	Deer Island	29 28 53.16	−.03	+.24	Deer Island, 1855–1888	91 16 01.878	29 28 53.13	49.106	+4.02
1921	Fort St. Philip	29 21 45.69	+6.00	−4.38	Fort St. Philip, flagpole, 1868.	89 27 53.48	29 21 51.69	46.62	+5.07
1858	Head of Passes	29 08 33.09	.00	.00	Head of Passes, astronomic, 1858.	89 15 05.70	29 08 33.09	31.43	+1.66
1853	Isle Dernier	29 02 02.2				(90 53.6)			
1920	Man	32 01 18.46	.00	−.48	Man, 1919	93 43 02.100	32 01 18.46	18.589	−.13
1921	Morgan City	29 41 45.95	+3.99	−9.08	Morgan City Methodist Episcopal Church spire, 1891.	91 12 19.966	29 41 49.94	44.879	+5.06
1858	New Orleans	29 57 25.36	−32.80	−13.61	New Orleans, St. Patrick's Church, center of tower, 1874.	90 04 11.033	29 56 52.56	47.140	[1] +5.42
1921	Pointe a la Hache	29 34 47.60	−36.68	+5.77	Magnolia Upper Base, 1871	89 47 48.761	29 34 10.92	4.463	+6.46
1921	Port Eads	29 00 57.39	+.76	−1.49	Port Eads wireless pole, 1921	89 09 47.164	29 00 58.15	58.359	−.21
1921	Timbalier Island	29 02 53.62	.00	.00	Timbalier Island Lighthouse, 1906.	90 21 17.90	29 02 53.62	50.40	+3.22
1920	Torras	30 59 20.48	.00	−.14	Torras, 1919	[4] 91 40 45	30 59 20.48		
	MAINE								
1847	Agamenticus	43 13 24.92	.00	.00	Agamenticus, 1847	70 41 32.907	43 13 24.92	24.630	[1] +.29
1857	Bangor	44 48 12.89	.00	.00	Thomas Hill Observatory, 1851.	68 47 00.152	44 48 12.89	16.145	[1] −3.25
1857	Calais	45 11 09.39	−.01	−.07	Calais Observatory, 1866	67 16 52.762	45 11 09.38	5.680	[1] +3.70
1851	Cape Small	43 46 43.71	−.21	−.32	Cape Small, 1852	69 50 44.221	43 46 43.50	43.217	[1] +.28
1859	Cooper	44 59 12.49	+.04	−.64	Cooper (western ridge), 1859	67 28 02.254	44 59 12.53	13.477	[1] −.95
1866	Farmington	44 40 19.35	.00	+.03	Farmington, 1866	70 09 17.40	44 40 19.35	22.77	[1] −3.42
1859	Howard	44 37 49.17	−.56	−.79	Howard, 1859	67 23 45.364	44 37 48.61	46.582	[1] +2.03
1858	Humpback	44 51 47.37	−.43	−.29	Humpback, 1858	68 06 37.785	44 51 46.94	50.693	[1] −3.75
1847	Isles of Shoals	42 59 12.97	−.10	.00	Isles of Shoals, 1851	70 36 50.285	42 59 12.87	14.862	[1] −1.99
1856	Mount Desert	44 21 06.52	−1.88	+1.44	Mount Desert, 1856	68 13 37.648	44 21 04.64	5.234	[1] −.59
1855	Mount Harris	44 39 54.68	+.21	−.91	Mount Harris, 1855	69 08 54.668	44 39 54.89	54.874	[1] +.02
1849	Mount Independence	43 45 34.56	−.03	−.72	Mount Independence, 1849	70 19 14.341	43 45 34.53	33.754	[1] +.78
1851	Mount Pleasant	44 01 36.24	+.05	−.26	Mount Pleasant, 1853	70 49 21.940	44 01 36.29	36.693	[1] −.40
1907	Pole Hill	45 57 16.49	−.05	−.17	Pole Hill, 1889	67 46 59.789	45 57 16.44	18.400	[1] −1.96
1854	Ragged Mountain	44 12 42.93	+.40	+.50	Ragged Mountain, 1854	69 09 05.331	44 12 43.33	45.385	[1] −2.06
1853	Sebattus	44 08 37.07	−.15	+.50	Sebattus, 1853	70 04 43.738	44 08 37.52	37.883	[1] −.36
	MARYLAND								
1871	Calvert	38 21 31.71	−.02	.00	Calvert, 1854	76 23 34.922	38 21 31.69	34.290	[1] −2.60
1906	Gaithersburg	39 08 13.23				(77 11.9)			
1908	Gantt	38 20 26.13	.00	+.05	Gantt, 1908	75 06 25.210	38 20 26.13	28.938	[1] −2.81
1850	Hill	38 53 52.36	+.53	−.19	Hill azimuth, 1850	76 52 49.762	38 53 52.89	54.908	[1] −2.02
1849	Marriott	38 52 25.05	−.27	−.54	Marriott azimuth, 1849	76 36 35.149	38 52 24.78	27.562	[1] −2.78
1870	Maryland Heights	39 20 32.19	−.74	+.40	Maryland Heights azimuth, 1870.	77 42 59.915	39 20 31.45	27.689	[1] +3.76
1847	Pooles Island	39 17 17.52	−7.84	+5.31	Pooles Island, 1844	76 15 49.375	39 17 09.68	7.822	[1] +1.86
1866	Principio	39 35 32.75	.00	+.31	Principio azimuth, 1866	76 00 16.407	39 35 32.75	36.692	[1] −3.94
1891	Rockville	39 05 10.42	+.18	+.10	Smith, 1892	77 09 36.75	39 05 10.60	11.39	[1] −.79
1850	Soper	39 05 10.61	−.10	+.64	Soper azimuth, 1850	76 57 00.726	39 05 10.51	11.843	[1] −1.33
1879	Sugarloaf	39 15 49.54	−1.24	−.03	Sugarloaf, 1879	77 23 36.882	39 15 48.30	44.545	[1] +3.76
1847	Taylor	38 59 46.07	−.10	−.10	Taylor, 1847	76 27 55.906	38 59 45.97	48.390	[1] −2.42
1850	Webb	39 05 25.35	+.25	+.48	Webb, 1850	76 40 30.166	39 05 25.60	26.556	[1] −.96
	MASSACHUSETTS								
1851	Cambridge, Cloverden Observatory.	42 22 40.96	+7.20	+26.28	Harvard College Observatory dome, 1851.	71 07 43.885	42 22 48.16	53.490	[1] −5.33
1844–45	Cambridge, Harvard College Observatory.	42 22 48.59	−.55		do	71 07 43.885	42 22 48.04	53.490	[1] −5.45
1867	Manomet	41 55 35.41	.00		Manomet, 1835	70 35 28.128	41 55 35.41	38.699	[1] −3.29
1862	Mount Tom	42 14 27.62	+.91	−.56	Mount Tom, 1860	72 38 55.056	42 14 28.53	30.798	[1] −2.27
1866	Nantucket	41 17 13.99	+.07	−.18	Folger, 1867	70 06 16.562	41 17 14.06	17.013	[1] −2.95
1901	Provincetown	42 03 04.27	−7.29	+.84	Provincetown, new Universalist Church spire, 1847.	70 11 19.94	42 02 56.98	62.09	[1] −5.11
1846	Thompson	42 36 37.98	+.25		Thompson, 1846	70 43 49.164	42 36 38.23	41.924	[1] −3.69
1860	Wachusett	42 29 16.02	+.95	+1.75	Wachusett, 1833	71 53 13.984	42 29 16.97	20.784	[1] −3.81
	MICHIGAN								
1875	Allegan (U. S. L. S)	42 31 43.01				(85 51.1)			
1863	Beaver Island (U. S. L. S.)	45 34 30.50	−1.72		Beaver Island Lighthouse (U. S. L. S.), 1860.	85 34 23.839	45 34 28.78	32.851	[1] −4.07
1872	Big Pointe au Sable (U. S. L. S.).	44 03 30.09	−.80	−3.40	Big Pointe au Sable Lighthouse (U. S. L. S.).	86 30 52.58	44 03 29.29		
1908	Bunday (U. S. L. S.)	42 03 16.79	.00	.00	Bunday (U. S. L. S.), 1879	84 27 41.295	42 03 16.79	15.911	[1] +.88
1863	Burnt Bluff (U. S. L. S.)	45 40 33.44	+30.41		Burnt Bluff (old) (U. S. L. S.), 1864.	86 42 38.896	45 41 03.85	9.951	[1] −6.10

[1] Topographic deflection computed. See p. 92. [4] Unadjusted.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	MICHIGAN—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1865	Cedar River (U. S. L. S.)	45 25 43.03	+0.07		Cedar River (U. S. L. S.), 1864–1874.	87 19 34.123	45 25 43.10	48.765	[1] −5.66
1875	Charlotte (U. S. L. S.)	42 34 04.12				(84 50.0)			
1873	Clay Banks (U. S. L. S.)	43 30 22.97	+.01	+0.63	Clay Banks (U. S. L. S.), 1871.	86 28 19.29	43 30 22.98		
1864	Copper Harbor (Fort Wilkins) (U. S. L. S.).	47 28 05.43	−2.31		Copper Harbor, stone post post marked S (U. S. L. S.)	87 51 56.53	47 28 03.12	9.05	[1] −5.93
1874	Corunna (U. S. L. S.)	42 58 22.23				(84 07.1)			
1871	Crebassa (U. S. L. S.)	46 58 40.98	.00	.00	Crebassa latitude post (U. S. L. S.).	88 24 52.66	46 58 40.98	41.12	[1] −0.14
1872	Detroit (U. S. L. S.)	42 19 58.62	.00	−.07	Detroit Observatory post, east pier (U. S. L. S.) 1871.	83 03 06.647	42 19 58.62	60.556	[1] −1.94
1873	Douglas (U. S. L. S.)	42 38 11.12	+.58	+.80	Douglas (U. S. L. S.), 1873	86 13 43.11	42 38 11.70		
1871	Duck Lake (U. S. L. S.)	43 20 03.52	−.49	−.38	Duck Lake (U. S. L. S.), 1871	86 24 14.67	43 20 03.03		
1865	Escanaba (U. S. L. S.)	45 44 22.76	+12.26		Escanaba Lighthouse (U. S. L. S.), 1868 (Sand Point, 1863).	87 02 39.80	45 44 35.02	41.43	[1] −6.41
1874	Flint (U. S. L. S.)	43 01 13.02				(83 41.1)			
1874	Ford River (U. S. L. S.)	45 41 05.24	+.07	−.40	Ford River (U. S. L. S.), 1874	87 06 08.445	45 41 05.31	12.321	[1] −7.01
1858	Fort Gratiot (U. S. L. S.)	42 59 52.12	+.06		Fort Gratiot Observatory [6]	82 25 44.49	42 59 52.18	52.76	[1] −.58
1871	Frankfort (U. S. L. S.)	44 38 53.25	−.24	+1.22	Frankfort (U. S. L. S.), 1871.	86 15 03.53	44 38 53.01		
1867	Grand Island (U. S. L. S.)	46 33 40.96	−1.19		Grand Island Lighthouse (U. S. L. S.).	(86 40.9)	46 33 39.77		
1874	Grand Rapids (U. S. L. S.)	42 57 49.02				(85 40.1)			
1875	Hastings (U. S. L. S.)	42 38 52.85				(85 17.3)			
1875	Howell (U. S. L. S.)	42 36 00.24				(83 55.8)			
1866	Huron Mountains (U. S. L. S.).	46 52 52.22	+.77	−.83	Huron Mountains (U. S. L. S.).	87 55 16.615	46 52 52.99	42.539	[1] +10.45
1874	Ionia (U. S. L. S.)	42 58 52.53				(85 03.9)			
1867	Iroquois Point (U. S. L. S.)	46 29 05.13	−.32		Iroquois Point Lighthouse (old) (U. S. L. S.).	84 37 53.67	46 29 04.81	3.61	[1] +1.20
1866	Isle Royale (U. S. L. S.)	48 07 55.19	−.03	+1.30	Isle Royale east (U. S. L. S.), 1869.	88 33 36.907	48 07 55.16	43.901	[1] +11.26
1875	Jackson (U. S. L. S.)	42 14 51.02				(84 21.5)			
1875	Kalamazoo (U. S. L. S.)	42 17 25.83				(85 35.2)			
1873	Keweenaw Point south base (U. S. L. S.).	46 52 22.31	.00	+.36	Keweenaw south base (U. S. L. S.), 1871.	88 29 15.815	46 52 22.31	18.010	[1] +4.30
1875	Lansing (U. S. L. S.)	42 43 53.11				(84 33.3)			
1874	Lapeer (U. S. L. S.)	43 03 07.61				(83 18.9)			
1871	Manistee (U. S. L. S.)	44 16 46.43	−.90	+.54	Manistee (U. S. L. S.), 1871.	86 19 04.30	44 16 45.53		
1875	Marshall (U. S. L. S.)	42 16 21.21				(84 57.8)			
1868	Monroe (U. S. L. S.)	41 54 49.85	−1.23		Monroe, courthouse (U. S. L. S.), 1877.	83 23 48.93	41 54 48.62	52.44	[1] −3.82
1865	Mount Houghton (U. S. L. S.).	47 24 15.81	−.06	.00	Mount Houghton (U. S. L. S.), 1867.	87 56 28.584	47 24 15.75	26.272	[1] −10.52
1875	Newaygo (U. S. L. S.)	43 25 14.16				(85 48.1)			
1875	Paw Paw (U. S. L. S.)	42 13 02.41				(85 53.0)			
1874	Pontiac (U. S. L. S.)	42 38 07.20				(83 17.2)			
1870	Porcupine Mountains (U. S. L. S.).	46 47 04.14	−.44	+.21	Porcupine Mountain (U. S. L. S.), 1869.	89 43 49.969	46 47 03.70	1.326	[1] +2.37
1864	Portage Entry (U. S. L. S.)	46 58 47.55				(88 25)			
1853	Round Island (U. S. L. S.)	45 50 05.87	.00	.00	Round Island observatory post (U. S L. S.).	84 36 43.92	45 50 05.87	7.46	[1] −1.59
1876	Saginaw (U. S. L. S.)	43 25 07.59				(83 57.8)			
1874	St. Johns (U. S. L. S.)	42 59 59.94				(84 33.6)			
1876	St. Louis (U. S. L. S.)	43 24 33.81				(84 36.4)			
1867	Sault Ste. Marie (U. S. L. S.).	46 30 07.64				(84 20.9)			
1893	Sault Ste. Marie, east pier (U. S. L. S.).	46 30 00.22	+.02		Sault Ste. Marie observatory, west pier (U. S. L. S.)	84 20 55.641	46 30 06.24	5.770	[1] +.47
1908	Sherman (U. S. L. S.)	41 50 46.30	+.99	+.77	Sherman (U. S. L. S.), 1878	85 27 11.662	41 50 47.29	48.490	[1] −1.20
1873	South Haven (U. S. L. S.)	42 16 13.20	+.24	+.53	South Haven (U. S. L. S.), 1873.	86 20 42.48	42 16 13.44	9.37	[1] +4.07
1871	South Twin Sister or Grand Haven (U. S. L. S.).	42 58 34.84	.00	−.19	South Twin Sister (U. S. L. S.), 1871.	86 13 23.22	42 58 34.84		
1875	Stanton (U. S. L. S.)	43 17 29.76				(85 04.9)			
1865–67	Thones Hill (Marquette) (U. S. L. S.).	46 32 00.57	−.07		Observatory post, Thones Hill (U. S. L. S.).	87 27 03.30	46 31 60.50	54.12	[1] +6.38
1858	Thunder Bay Island (U. S. L. S.).	45 02 12.69	+4.58		Thunder Bay Island Lighthouse (U. S. L. S.).	83 11 38	45 02 17.27		
1867	Vulcan (U. S. L. S.)	47 26 44.51	.00		Vulcan (U. S. L. S.), 1869	87 47 37.163	47 26 44.51	46.915	[1] −2.41
1866	Wheal Kate (U. S. L. S.)	47 04 18.36	−.32	+1.34	Wheal Kate (U. S. L. S.), 1869.	88 39 44.270	47 04 18.04	20.534	[1] −2.49
1867	Whitefish Point (U. S. L. S.).	46 46 07.17	.00	.00	Whitefish Point latitude post (U. S. L. S.), 1867.	84 57 25.752	46 46 07.17	6.786	[1] +.38

[1] Topographic deflection computed. See p. 92.
[6] See Figure of the Earth and Isostasy from Measurements in the United States, U. S. Coast and Geodetic Survey Special Publication No. 10, p. 15.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	MINNESOTA	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1871	Buchanan (U. S. L. S.)	46 56 22.11	+2.30	−16.88	Buchanan (U. S. L. S.), 1871	91 47 19.052	46 56 24.41	28.406	[1]−4.00
1906	Dalton	46 10 27.22	.00	.00	Dalton Astronomic, 1904	95 54 59.592	46 10 27.22	23.613	[1]+3.61
1905	Douglas	46 36 47.96	.00	−.47	Douglas, 1905	93 08 18.020	46 36 47.96	45.538	[1]+2.42
1870	East Sawteeth (U. S. L. S.)	47 23 09.37	−.45	−.29	East Sawteeth (U. S. L. S.), 1870.	91 10 14.969	47 23 08.92	19.355	[1]−10.44
1869	Farquhars Knob (U. S. L. S.).	47 52 35.12	+.06	+.37	Farquhars Knob (U. S. L. S.), 1869.	89 59 22.862	47 52 35.18	40.515	[1]−5.34
1905	Jones	46 23 53.67	.00	−.35	Jones, 1904–5	94 04 12.128	46 23 53.67	49.202	[1]+4.47
1887	Minneapolis	44 58 39.00				(93 14.1)			
1871	Minnesota Point north base (U. S. L. S.).	46 45 29.97	−1.69	+5.01	Minnesota Point north base (U. S. L. S.), 1870.	92 04 42.521	46 45 28.28	28.225	[1]+.06
1871	Minnesota Point south base (U. S. L. S.).	46 42 51.64	−.25	−.26	Minnesota Point south base (U. S. L. S.).	92 01 54.391	46 42 51.39	49.768	[1]+1.62
1906	Morken	47 02 06.14	+.01	−.59	Morken, 1906	96 36 21.990	47 02 06.15	6.430	[1]−.28
1906	Osakis	45 49 27.75	.00	−.05	Osakis, 1904–1906	95 07 51.988	45 49 27.75	27.288	[1]+.46
1878	Red Wing (U. S. L. S.)	44 33 44.16				(92 31.8)			
1905	Royalton south base	45 44 06.68	.00	+.41	Royalton south base, 1904–1906.	94 12 04.987	45 44 06.68	8.243	[1]−1.56
1871	St. Paul (U. S. L. S.)	44 56 42.48				(93 05.6)			
1905	Stephen west base	48 27 22.95	−.95	+4.75	Stephen west base, 1903–1907	96 51 21.101	48 27 22.00	23.134	[1]−1.13
1905	Tilden	47 42 16.22	.00	−.43	Tilden, 1905–1906	96 19 48.882	47 42 16.22	13.392	[1]+2.83
1915	Warroad south base (U. S. & C.).	48 55 22.76	+.07	.00	Warroad south base (U. S. & C.).	95 19 34.139	48 55 22.83	20.165	[1]+2.67
	MISSISSIPPI								
1847	East Pascagoula	30 20 40.91	.00	.00	East Pascagoula, 1847	88 32 45.210	30 20 40.91	35.517	[1]+5.39
1878	Fort (Vicksburg)	32 20 30.63	−.52	+.31	Fort, 1878	[2]90 53 02	32 20 30.11		
1878	Greenville	33 24 44.08	+.51	+.70	Episcopal church, cross	[2]91 03 54	33 24 44.59		
1878	Natchez	31 33 27.38	+1.54	+1.55	Catholic church spire, cross	[2]91 24 04	31 33 28.92		
1914	Strickland	34 51 39.96	−.02	+.23	Strickland, 1914	88 25 44.527	34 51 39.94	38.306	+1.63
	MISSOURI								
1906	Berger	38 36 01.62	−.53	−.12	Berger, 1874	91 17 27.984	38 35 61.09	58.120	[1]+2.97
1884	Bolivar (U. S. G. S.)	37 36 35.16				(93 24.8)			
1880	Hunter	38 25 48.00	.00	−.27	Hunter, 1880	92 46 24.373	38 25 48.00	45.210	[1]+2.79
1890	Ironton	37 36 30.27				(90 37.7)			
1879	Jefferson City	38 33 43.95	.00		Jefferson City astronomic, 1879.	92 09 45.553	38 33 43.95	41.161	[1]+2.79
1882	Kansas City	39 05 51.12	+5.41	−8.71	Kansas City, Second Presbyterian Church spire, 1884.	94 35 13.448	39 05 56.53	55.813	[1]+ .72
1878	Louisiana (U. S. L. S.)	39 27 14.30				(91 03.1)			
1892	Macon	39 44 33.30				(92 28.3)			
1890	Potosi	37 56 14.86				(90 47.3)			
1869–81	St. Louis	38 38 00.59	.00		St. Louis, Second Presbyterian Church spire, 1871.	90 12 14.534	38 37 60.59	56.190	[1]+4.40
1884	Springfield (U. S. G. S.)	37 13 15.90				(93 17.3)			
	MONTANA								
1873	Bozeman (U. S. E.)	45 40 51.67				(111 02.6)			
1897	Hamilton (U. S. G. S.)	46 14 53.73				(114 09.2)			
1890	Helena	46 35 18.32				(112 02.1)			
1901	Kootenai River E. (U. S. & C.).	48 59 58.42	.00		Monument No. 245 (U. S. & C.).	115 09 58.289	48 59 58.42	60.020	−1.60
1913	Mondak	48 00 11.99	.00	.00	Mondak, 1912	104 02 48.867	48 00 11.99	10.435	+1.55
1913	Montana-North Dakota boundary.	47 12 44.39	.00	.00	Montana - North Dakota boundary monument eccentric, 1912.	104 02 39.376	47 12 44.39	42.065	+2.33
1901	Tobacco Plains (U. S. & C.).	48 59 55.38	+.05	−.35	Monument No. 247 (U. S. & C.).	115 03 16.556	48 59 55.43	59.903	−4.53
1901	Wigwam (U. S. & C.)	48 59 58.14	+.02	−13.0	Monument No. 255 (U. S. & C.).	114 45 31.166	48 59 58.16	62.700	−4.54
1901	Wigwam 2 (U. S. & C.)	48 59 42.07	+17.16	+.65	do	114 45 31.166	48 59 59.23	62.700	−3.47
1913	Wyoming northeast corner eccentric.	45 00 00.39	.00	.00	Wyoming northeast corner eccentric, 1912.	104 03 18.515	44 59 60.39	59.117	+1.27
	NEBRASKA								
1906	Daily	41 35 43.86	.00	.00	Daily, 1900	98 38 55.516	41 35 43.86	45.236	[1]−1.38
1874	North Platte (U. S. E.)	41 08 18.19				(100 45.9)			
1869	Omaha	41 15 44.01				(95 56.5)			
1906	Page southwest base	42 25 29.22	+.05	+.06	Page southwest base, 1900	98 25 59.745	42 25 29.27	25.518	[1]+3.75
1906	Shelton east base	40 46 35.41	.00	.00	Shelton east base, 1900	98 44 39.333	40 46 35.41	38.396	[1]−2.99
1874	Sidney Barracks (U. S. E.)	41 08 36.54				(102 58.2)			

[1] Topographic deflection computed. See p. 92

[2] Approximate North American datum.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	NEVADA	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1871	Austin (U. S. E.)	39 29 21.54	0.00	0.00	Wheeler stone (U. S. E.), 1898.	117 03 27.551	39 29 21.54	21.081	+0.46
1871	Battle Mountain (U. S. E.).	40 38 18.51				(116 56.2)			
1871	Carlin (U. S. E.)	40 42 26.41				(116 07.3)			
1889-1893	Carson City	39 09 47.25	−.85	+6.78	Carson, capitol dome, 1897	119 45 55.513	39 09 46.40	51.358	[1]−4.96
1880	Carson Sink	39 34 57.67	−.47	+.74	Carson Sink, 1880	118 14 05.093	39 34 57.20	60.232	[1]−3.03
1881	Diamond Peak	39 35 03.65	−.28	+1.02	Diamond Peak, 1881	115 49 04.960	39 35 03.37	6.910	[1]−3.54
1916	Moapa	36 40 15.76	−1.21	.00	U. S. Coast and Geodetic Survey bench mark I.	(114 37.5)	36 40 14.55		
1914	Monument No. 108, California-Nevada boundary.	36 10 23.30	−.09	+.05	Monument No. 108	[2]116 07 00	36 10 23.21		
1881	Mount Callahan	39 42 31.92	−.41	+1.34	Mount Callahan, 1881	116 57 00.642	39 42 31.51	35.002	[1]−3.49
1889	Pilot Peak	41 01 07.83	+.05	+.53	Pilot Peak, 1887	114 04 36.286	41 01 07.88	17.240	[1]−9.36
1872	Pioche (U. S. E.)	37 55 25.80	.00	.00	Pioche (U. S. E.) latitude station.	114 26 47.80	37 55 25.80	38.51	[1]−12.71
1883	Pioche	37 59 06.80	−.28	−.35	Pioche, 1883	114 03 04.823	37 59 06.52	10.901	[1]−4.38
1880	Toiyabe Dome	38 49 53.91	−.69	−.53	Toiyabe Dome, 1881	117 21 08.629	38 49 53.22	58.809	[1]−5.59
1902	Tonopah	38 04 01.59	−.01	−.08	Tonopah astronomic, 1902	117 13 55.808	38 04 01.58	8.546	−6.97
1872	Verdi east base	39 31 04.29	.00	.00	Verdi east base, 1872	119 57 51.869	39 31 04.29	6.103	[1]−1.81
1873	Virginia City (U. S. E.)	39 17 35.60	.00	.00	Wheeler monument (U. S. E.).	119 39 14.733	39 17 35.60	44.784	−9.18
1873	Winnemucca (U. S. E.)	40 58 19.74				(117 43.9)			
	NEW HAMPSHIRE								
1860	Gunstock	43 31 03.71	+1.33	+.50	Gunstock, 1860	71 22 11.378	43 31 05.04	4.319	[1]+.72
1848	Unkonoonuc	42 58 59.34	+.36	+.62	Unkonoonuc, 1860	71 35 19.380	42 58 59.70	59.864	[1]−.16
	NEW JERSEY								
1907	Barnegat Inlet	39 45 48.18	.00	.00	Barnegat Inlet astronomic, 1907.	74 06 24.587	39 45 48.18	53.636	[1]−5.46
1875	Beacon Hill	40 22 27.93	.00	+.63	Beacon Hill, 1839-1881	74 13 41.913	40 22 27.93	26.549	[1]+1.38
1881-1891	Cape May	38 55 44.63	+1.28	−.17	Pole on arbor, 1881	74 55 47.283	38 55 45.91	49.944	[1]−4.03
1908	High Point	41 19 11.31	.00	+.05	High Point, 1881	74 39 42.833	41 19 11.31	15.225	[1]−3.92
1852	Mount Rose	40 22 05.30	.00	−.08	Mount Rose, 1839-1868	74 43 25.769	40 22 05.30	3.410	[1]+1.89
	NEW MEXICO								
1885	Albuquerque (U. S. G. S.)	35 04 32.16				(106 39.2)			
1874	Cimarron (U. S. E.)	36 30 09.69				(104 55.0)			
1914	Corduna	32 01 29.19	.00	.00	Corduna, 1909	105 30 57.015	32 01 29.19	31.467	−2.28
1892	Corner boundary (United States and Mexico).	[7]31 46 58.32	+1.17	−.38	Monument No. 40 (United States and Mexico).	108 12 29.563	31 46 59.49	61.265	−1.77
1914	Deming, city water works.	32 16 06.86	+.36	−.50	Deming, city water works, 1910.	107 46 01.390	32 16 07.22	10.600	−3.39
1914	Fort Bayard	32 47 40.27	−.01	+.03	Fort Bayard (U. S. G. S.; U. S. E.)	108 09 06.82	32 47 40.26	48.58	−8.32
1873	Fort Union (U. S. E.)	35 54 24.53				(105 00.9)			
1920	Glen Rio	35 10 02.95	−.02	−.40	Glen Rio, 1921	103 02 31.641	35 10 02.93	4.666	−1.74
1914	Jarilla	32 23 56.38	+.01	+.10	Jarilla, 1909	106 06 45.737	32 23 56.39	59.912	−3.52
1874	Las Vegas (U. S. E.)	35 35 27.35				(105 13.5)			
1914	Line	32 50 58.88	.00	.00	Line (U. S. G. S.), 1910	108 59 48.023	32 50 58.88	66.601	−7.72
1920	Los Lunas	34 48 23.48	+.28	+.03	Los Lunas, 1920	106 44 07.075	34 48 23.76	26.704	−2.94
1873	Santa Fe (U. S. E.)	35 41 18.95				(105 56.7)			
	NEW YORK								
1868	Buffalo (U. S. L. S.)	42 52 41.96	+2.67		Buffalo, Intersection of axes of Exchange and Michigan Streets (U. S. L. S.)	78 52 13.25	42 52 44.63	40.98	[1]+3.65
1873	Carpenters Point	41 21 23.35				(74 41.7)			
1879	Cores	41 59 59.21				(78 15.9)			
1874	Cheever	44 04 53.42	.00	−.06	Cheever	73 27 02.849	44 04 53.42	54.055	[1]−.64
1902	Connelly (U. S. & C.)	[8]45 00 18.82	.00	+.31	Monument No. 678 (U. S. & C.).	73 42 21.48	45 00 18.82	11.65	[1]+7.17
1879	Corydon	41 59 59.54				(78 57.0)			
1868	Dunkirk (U. S. L. S.)	42 29 20.00	+24.27		Dunkirk Lighthouse (new), 1876.	79 21 14.81	42 29 44.27	37.68	[1]+6.59
1903	Fairbanks (U. S. & C.)	[8]45 00 41.38	.00	−6.64	Monument No. 648 (U. S. & C.)	73 22 36.90	45 00 41.38	37.27	[1]+4.11

[1] Topographic deflection computed. See p. 92.
[2] Approximate North American datum.
[7] For details of observations see Report of the International Boundary Commission, United States and Mexico, West of Rio Grande. 1891-1896. Observed value is reduced to sea level.
[8] For details of observations see report of the Chief Astronomer and Boundary Commissioner, Department of the Interior, Dominion of Canada, Annual Report, Pt. IX, 1904. Observed latitude has been reduced to sea level and corrected for variation of the pole.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	NEW YORK—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1914	Far Rockaway	40 35 54.56	0.00	0.00	Far Rockaway, Coast and Geodetic Survey longitude pier, 1914.	73 44 58.628	40 35 54.56	60.249	−5.69
1877	Finn	41 59 59.38				(75 45.6)			
1907	Gardiners Island	41 06 01.67	−.08	.00	Gardiners Island, 1837	72 06 22.310	41 06 01.59	5.596	[1]−4.01
1879	Genesee Valley	41 59 58.29				(77 55.0)			
1903	Hollinbeck (U. S. & C.)	[3]44 59 59.00	.00	+10.94	Monument No. 760 (U. S. & C.).	74 33 32.91	44 59 59.00	56.00	[1]+3.00
1883	Howlett	42 59 59.59	−4.71	+6.53	Howlett, 1883	76 17 26.621	42 59 54.88	52.950	[1]+1.92
1907	Kit	41 30 13.01	.00	−.75	Kit, 1905	[4]73 58 59.23	41 30 13.01	[4]12.36	[1]+.65
1879	Lawrenceville	42 00 01.12				(77 06)			
1879	Little Meadows	41 59 59.95				(76 08)			
1874	Mount Merino	42 14 04.78	.00	+.06	Mount Merino, 1859–1874	73 49 03.541	42 14 04.78	5.060	[1]−.28
1858	New York City	40 43 48.26	+.21	+.65	New York, Rutherford Observatory, 1848.	73 59 14.42	40 43 48.47	51.45	[1]−2.98
1911	New York City Manhattan Square.	40 46 50.68				(73 58.6)			
1868	Ogdensburg (U. S. L. S.)	44 41 25.59	+27.59		Ogdensburg L. H., Dome (U. S. L. S.).	75 30 14.71	44 41 53.18	52.44	[1]+.74
1868	Oswego (U. S. L. S.)	43 27 49.02	−69.47	+29.09	Oswego (U. S. L. S.), 1875	76 30 49.281	43 26 39.55	37.313	[1]+2.24
1878	Prospect Mountain	43 25 12.60	.00	−.18	Prospect, 1878	73 46 04.570	43 25 12.60	17.949	[1]−5.35
1868	Rochester (U. S. L. S.)	43 09 25.28	−2.87		Rochester, city hall statue (U. S. L. S.).	77 36 49.60	43 09 22.41	18.05	[1]+4.36
1916	Rochester, Bausch & Lomb observatory.	43 10 36.66				(77 37.5)			
1874	Rouses Point	45 00 27.21	.00	−.07	Rouses Point, 1874	73 21 30.33	45 00 27.21	23.27	[1]+3.94
1874	Sandy Creek north base (U. S. L. S.).	43 40 40.71	+.78	−.26	Sandy Creek north base (U. S. L. S.) 1874.	76 12 00.918	43 40 41.49	43.669	[1]−2.18
1880	Tassel Hill	42 56 19.37	+13.37	+3.69	Tassel, 1881	75 19 00.511	42 56 32.74	29.134	[1]+3.61
1875	Tonawanda (U. S. L. S.)	43 00 07.81	−.02	+.43	Tonawanda (U. S. L. S.), 1875.	78 53 20.885	43 00 07.79	3.730	[1]+4.06
1877	Travis	42 00 02.66				(75 21.4)			
1871	Troy	42 43 50.69	−3.47	−6.03	Troy University, 1860	73 41 00.364	42 43 47.22	46.138	[1]+1.08
1879	Tuna Valley	42 00 04.18				(78 42)			
1868	Watertown (U. S. L. S.)	43 58 43.01	−10.14		Watertown, courthouse, 1874.	75 54 52.959	43 58 32.87	32.311	[1]+.56
1879	Waverly	42 00 00.69				(76 35)			
1865	West Hills	40 48 49.92	−.16	−.23	West Hills, 1836	73 25 32.405	40 48 49.76	55.188	[1]−5.43
	NORTH CAROLINA								
1859	Fort Johnson	33 54 58.27	+.17	−.34	Fort Johnson flagstaff, 1853–1859.	78 01 01.20	33 54 58.44	63.03	−4.59
1866	Fort Spinola 2	35 05 17.40	−.28	.00	Spinola 2, 1866	77 01 50.435	35 05 17.12	21.165	−4.04
1876	Hog Island	35 21 51.92	−.04	−.27	Hog Island, 1873	76 03 40.445	35 21 51.88	49.584	+2.30
1876	King	35 12 13.42	+16.07	−10.85	King, 1876	81 18 45.517	35 12 29.49	27.718	[1]+1.77
1918	Lee	35 28 47.43	−2.66	−.65	Lee, 1918	79 10 37.053	35 28 44.77	47.235	−2.47
1918	Littleton	36 25 50.87	−.22	+.29	Littleton, 1918	77 55 02.598	36 25 50.65	55.621	−4.97
1876	Long Shoal Point	35 34 36.24	+.01	−.32	Long Shoal Point, 1873	75 46 54.593	35 34 36.25	34.533	+1.72
1876	Moore	36 23 55.05	−.04	+.06	Moore, 1876	80 16 59.222	36 23 55.01	53.488	[1]+1.52
1871	Ocracoke northeast base	35 04 02.67	.00		Ocracoke northeast base	76 03 09.221	35 04 02.67	1.925	+.75
1907	Roan High Bluff	36 05 37.57	.00	.00	Roan High Bluff, 1894	82 08 44.141	36 05 37.57	35.231	[1]+2.34
1876	Sand Island	35 50 25.41	−.12	−.11	Sand Island, 1874	75 40 07.457	35 50 25.29	25.049	+.24
1847	Shellbank	36 03 20.11	−.08	+.51	Shellbank, 1849	75 44 27.191	36 03 20.03	21.722	−1.69
1847	Stevenson's Point	36 06 22.27	−6.30	−2.80	Stevenson's Point, 1847	76 11 24.936	36 06 15.97	19.023	−3.05
1886	Virginia-North Carolina boundary, Dismal Swamp Canal.	36 33 06.63				(76 22.6)			
1887	Virginia-North Carolina boundary, Knott Island.	36 32 58.21	+56.74	−22.32	Knott Island, north end, 1850.	75 55 18.576	36 33 54.95	57.614	[1]−2.66
1886	Virginia-North Carolina boundary, Northwest.	36 32 59.87				(76 11.8)			
1887	Virginia-North Carolina boundary, Nottaway River.	36 32 35.94				(76 55.9)			
1900	Wadesboro	34 57 52.0				(80 04.4)			
1854	Wilmington (De Rosset)	34 14 00.47	+.46	+1.04	Wilmington, St. James Church, 1854.	77 56 45.659	34 14 00.93	6.835	−5.91
1876	Young	35 44 21.69	+.01	+1.50	Young, 1876	80 38 51.122	35 44 21.70	14.356	[1]+.734

[1] Topographic deflection computed. See p. 92. [4] Unadjusted. [3] See footnote (3) on p. 101.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	NORTH DAKOTA	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1913	Ambrose northeast base	48 59 26.47	0.00	0.00	Ambrose northeast base, 1912.	103 29 09.836	48 59 26.47	24.331	+2.14
1913	Badland	46 42 00.87	.00	.00	Badland, 1912	103 19 59.087	46 42 00.87	.620	+.25
1890	Bismarck	46 48 28.13				(100 47.0)			
1913	Bonetrail	48 25 00.73	.00	.00	Bonetrail, 1912	103 49 44.219	48 25 00.73	.000	+.73
1913	Bowman	46 10 56.96	−.27	−.56	Bowman water tank, 1912	103 24 10.452	46 10 56.69	57.262	−.57
1906	Hankinson	46 02 16.72	.00	+.31	Hankinson, 1904	96 57 03.773	46 02 16.72	15.729	[1] +.99
1892	Jamestown (U. S. G. S.)	46 54 13.50				(98 42.2)			
1913	Sheep	47 37 51.93	.00	.00	Sheep, 1912	103 47 39.515	47 37 51.93	50.103	+1.83
	OHIO								
1868	Ashtabula (U. S. L. S.)	41 52 33.75				(80 47.6)			
1881	Cincinnati (Mount Lookout).	39 08 20.61	−1.09	−.39	Observatory, 1889	84 25 21.540	39 08 19.52	20.787	[1] −1.27
1868	Cleveland (U. S. L. S.)	41 30 16.48	−10.38		Cleveland Lighthouse (U. S. L. S.), 1877.	81 42 08.68	41 30 06.10	1.40	[1] +4.70
1871	Cleveland	41 30 25.65	+2.24	−2.45	Cleveland, marine hospital, dome (U. S. L. S.).	81 41 26.76	41 30 27.89	23.12	[1] +4.77
1901	Cleveland (Case School observatory).	41 30 14.50	.00		Case School, center of almucantar (U. S. L. S.), 1901.	81 36 27.60	41 30 14.50	10.36	[1] +4.14
1871	Columbus	39 57 40.51				(82 59.7)			
1891	Elizabethtown	39 09 28.57				(84 48.4)			
1885	Gould	38 38 29.78	−2.00	+.07	Gould, 1885	82 49 56.728	38 38 27.78	27.582	[1] +.20
1868	Sandusky west base (U. S. L. S.)	41 27 13.46	+111.10		Sandusky west base (U. S. L. S.), 1877.	82 40 57.571	41 29 04.56	2.111	[1] +2.45
1868	Toledo (U. S. L. S.)	41 39 03.18	+.44	+.72	Toledo stone longitude post (U. S. L. S.), 1881.	83 32 31.00	41 39 03.62	4.36	[1] −.74
	OKLAHOMA								
1920	Allen	34 53 29.56	.00	+.12	Allen, 1920	96 25 04.299	34 53 29.56	26.592	+2.97
1908	Carson	35 16 26.63	.00	.00	Carson, 1902	97 57 32.760	35 16 26.63	24.848	[1] +1.78
1920	Dill	35 17 28.36	.00	−0.41	Dill, 1920	99 07 40.487	35 17 28.36	24.368	+3.99
1892	Guthrie (U. S. G. S.)	35 52 42.17	.00	.00	Guthrie (U. S. G. S.)	97 25 36.62	35 52 42.17	39.74	+2.43
1899	Marlow	34 38 52.60	.00	−.12	Marlow longitude, 1899	97 57 38.42	34 38 52.60	50.54	[1] +2.06
1906	Pond Creek	36 40 07.84	.00	−.07	Pond Creek astronomic, 1906.	97 47 51.586	36 40 07.84	7.573	[1] +.27
1895	Savanna (U. S. G. S.)	34 48 46.49				(95 50.4)			
1908	Wingard	35 56 49.40	.00	.00	Wingard, 1902	97 29 20.129	35 56 49.40	47.428	[1] +1.97
	OREGON								
1897	Baker (U. S. G. S.)	44 46 41.38				(117 50.2)			
1918	Baker (U. S. N.)	44 47 25.65				(117 50.8)			
1886	Balch	45 31 56.12	.00	−.10	Balch, 1881	122 42 30.763	45 31 56.12	54.574	[1] +1.55
1908	Central Point	42 23 50.67	+.07	+.19	Central Point astronomic, 1904.	122 56 23.451	42 23 50.74	51.581	[1] −.84
1878	Dalles (U. S. E.)	45 36 17.77				(121 12.3)			
1916	Echo	45 44 38.99	−.10	.00	Echo, 1916	119 11 20.222	45 44 38.89	38.385	+.50
1894	Eugene (U. S. G. S.)	44 03 28.25	.00	.00	Eugene astronomic, 1894	123 05 28.438	44 03 28.25	30.319	[1] −2.07
1916	La Grande	45 19 55.46	−2.47	−1.85	La Grande, 1916	118 05 39.346	45 19 52.99	49.467	+3.52
1851	Port Orford	42 44 21.79	.00	−.07	Port Orford astronomic, 1869.	124 30 05.243	42 44 21.79	28.919	−7.13
1887	Portland	45 31 08.28	+4.38	−.87	Oregonian, 1903	122 40 38.967	45 31 12.66	13.209	[1] −.55
1886	Rainier	46 05 07.93	.00	+.05	Rainier, 1873	122 55 28.342	46 05 07.93	11.963	−4.03
1908	Roseburg	43 12 35.73	−.02	−.08	Roseburg astronomic, 1904	123 21 13.849	43 12 35.71	40.769	[1] −5.06
1853	Umpqua River	43 41 45.61				(124 10.0)			
1908	Yam	45 03 38.68	−.12	−.15	Yam, 1903	123 08 34.292	45 03 38.56	44.993	[1] −6.43
1885	Yaquina Point	44 40 34.60	+.55	+.53	Yaquina Head Light-house, 1908.	124 04 42.826	44 40 35.15	37.967	−2.82
	PENNSYLVANIA								
1907	Allegheny Observatory (new site).	40 28 58.04	.00	−.73	Allegheny Observatory (new site), dome. (U. S. G. S.), 1900.	80 01 16.94	40 28 58.04	57.26	+.78
1890	Altoona	40 31 45.23	.00	.00	Altoona (U. S. G. S.), 1900	78 23 23.88	40 31 45.23	47.24	−2.01
1879	Austinburgh	42 00 01.35				(77 33)			
1877	Burt	42 00 03.59				(76 43.7)			
1877	Clark	42 00 00.79				(79 44.7)			
1868	Erie (U. S. L. S.)	42 08 10.35	+67.11		Erie Light-house (U. S. L. S.)	80 04 39.22	42 09 17.46	11.66	[1] +5.80
1877	Harrisburg	40 15 44.77				(76 52.8)			
1883	Jollytown	39 43 18.87				(80 22)			
1883	Maryland Corner	39 43 18.02				(79 30)			
1883	Smiths Ferry	40 38 27.25	+19.05	−65.44	Smiths Ferry (U. S. G. S.), 1900.	80 30 05.06	40 38 46.30	48.07	−1.77
1883	Southwest corner	39 43 18.58				(80 32)			
1879	Sugar Grove	41 59 58.84				(79 25)			
1908	Womelsdorf	40 19 29.36	.00	+.05	Womelsdorf, 1882	76 11 44.689	40 19 29.36	28.250	[1] +1.11
1854	Yard	39 58 29.39	.00	+.05	Yard, 1841	75 23 13.793	39 58 29.39	24.796	[1] +4.59

[1] Topographic deflection computed. See p. 92.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	SOUTH CAROLINA	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1907	Allendale	33 00 29.02	0.00	0.00	Allendale latitude, 1907	81 18 40.662	33 00 29.02	31.476	[1]−2.46
1853	Allston	33 21 38.34	−.54	+.22	Allston, 1854	[2]79 16 37	33 21 37.80		
1918	Bethune I	34 28 03.73	−.77	.00	Bethune I, 1918	80 15 29.426	34 28 02.96	7.227	−4.27
1849	Breach Inlet	32 46 19.30	.00	−3.5	Breach Inlet, 1849	79 48 56.686	32 46 19.30	20.331	−1.03
1896	Charleston	32 47 15.54	−5.92	+8.43	Orphan Asylum	[2]79 56 16	32 47 09.62		
1854	Columbia	33 59 58.08				(81 02.0)			
1850	Edisto Island east base	32 33 17.66	−1.10	−16.00	Edisto Island east base, 1851	80 13 33.993	32 33 16.56	15.425	+1.14
1875	Paris	34 56 32.05	−.87	−1.39	Paris, 1875	82 24 39.956	34 56 31.18	29.062	[1]+2.12
1859	Port Royal	32 17 44.85	.00	−4.08	Port Royal, 1859	80 38 36.078	32 17 44.85	45.406	[1]−.56
	SOUTH DAKOTA								
1906	Franklin	44 53 53.04	+.05	−.18	Franklin, 1903	96 56 18.679	44 53 53.09	52.549	[1]+.54
1906	Freeman	43 18 48.47	.00	.00	Freeman, 1901	97 27 06.857	43 18 48.47	47.711	[1]+.76
1913	Harding	45 22 12.95	.00	.00	Harding, 1912	103 53 09.605	45 22 12.95	14.317	−1.37
1906	Howard	44 00 51.86	+.11	−.56	Howard, courthouse dome, 1903.	97 31 35.900	44 00 51.97	55.075	[1]−3.11
1906	Preacher Hill	45 28 15.74	.00	.00	Preacher Hill, 1903	97 06 18.457	45 28 15.74	14.847	[1]+.89
1913	Provo	43 11 40.08	−.01	−.16	Provo astronomic, 1912	103 49 41.058	43 11 40.07	44.159	−4.09
1890	Rapid City (U. S. G. S.)	44 04 45.07				(103 13.0)			
1913	Reva	45 34 49.54	.00	.00	Reva, 1912	103 12 44.169	45 34 49.54	51.060	−1.52
1896	Sioux Falls (U. S. G. S.)	43 32 34.46				(96 43.5)			
	TENNESSEE								
1907	Bean	35 11 36.99	.00	.00	Bean, 1887	84 33 29.635	35 11 36.99	31.466	[1]+5.52
1907	Knoxville	35 57 26.14	+1.53	+.03	Knoxville College cupola, 1884.	83 55 33.100	35 57 27.67	26.295	[1]+1.37
1878	Lebanon north base	36 12 49.64	.00	.00	Lebanon north base, 1877	86 18 24.558	36 12 49.64	46.893	[1]+2.75
1907	Luper	35 57 11.91	.00	.00	Luper, 1883	84 47 20.120	35 57 11.91	16.067	[1]−4.16
1914	Martin	35 04 39.38	+.38	−.26	Martin, 1914	89 47 52.191	35 04 39.76	41.077	−1.32
1877	Memphis	35 08 44.59	−5.70	+2.17	Memphis (M. R. C.), 1879	(90 03.3)	35 08 38.89		
1877	Memphis (U. S. L. S.)	35 08 39.42	+.42	+1.25	do	(90 03.3)	35 08 39.84		
1907	Mount Lore	35 54 57.32	.00	.00	Mount Lore, 1882	85 32 26.861	35 54 57.32	54.429	[1]+2.89
1877	Nashville	36 10 01.35	−.50	+2.57	Nashville Capitol, 1879	86 47 02.819	36 09 60.85	57.068	[1]+3.78
1898	Waverly (U. S. G. S.)	36 04 59.45	.00	.00	Waverly (U. S. G. S.) 1896	87 47 43.5	36 04 59.45	58.7	+.7
	TEXAS								
1905	Alice	27 44 34.56	.00	+.33	Alice, 1904	98 04 30.885	27 44 34.56	33.012	[1]+1.55
1914	Allamore	31 04 36.13	−.27	+.39	Allamore, 1909	105 00 09.624	31 04 35.86	39.476	−3.62
1872	Austin	30 16 21.34	+5.62	+5.02	Austin capitol dome, star in hand of Liberty, 1903.	97 44 25.032	30 16 26.96	27.968	[1]−1.01
1906	Bachelor	30 59 46.06	.00	−1.55	Bachelor, 1902	98 05 51.294	30 59 46.06	39.956	[1]+6.10
1912	Baird	32 23 48.30	−.44	−1.28	Baird, courthouse dome, 1908	99 23 38.695	32 23 47.86	40.294	+7.57
1914	Barstow	31 27 45.99	−.03	+1.26	Barstow, courthouse cupola, 1909.	103 23 38.575	31 27 45.96	41.627	+4.33
1921	Beaumont	30 04 35.09	+.37	−.76	Beaumont (U. S. E.), 1911	94 04 26.68	30 04 35.46	33.23	+2.23
1914	Black	31 34 24.06	.00	.00	Black, 1909	105 08 52.357	31 34 24.06	21.899	+2.16
1914	Boracho	31 04 35.31	.00	.00	Boracho, 1911	104 23 24.716	31 04 35.31	34.202	+1.11
1906	Bowie northwest base	33 37 20.48	+.06	+.05	Bowie northwest base, 1900	98 00 14.492	33 37 20.54	21.756	[1]−1.22
1885	Brownsville	25 53 58.45	.00	.00	Brownsville, 1885	97 29 31.202	25 53 58.45	52.910	[1]+5.54
1912	Bynum	32 19 20.98	.00	−.07	Bynum, 1909	101 00 00.967	32 19 20.98	15.921	+5.06
1906	Chamliss	31 39 25.61	.00	.00	Chamliss, 1902	98 07 29.303	31 39 25.61	23.364	[1]+2.25
1889	Cisco (U. S. G. S.)	32 23 31.38	.00	.00	Cisco astronomic (U. S. G. S.), 1908.	98 58 59.617	32 23 31.38	24.857	+6.52
1920	Conway	35 12 26.25	−2.11	+27.05	Conway, 1921	101 23 23.044	35 12 24.14	24.229	−.09
1848	Dollar Point	29 26 01.93	.00	.00	Dollar Point, 1847	94 53 27.041	29 25 61.93	59.014	+2.92
1919	Dryden east base	30 02 41.65	−.40	.00	Dryden east base, 1918	102 05 55.380	30 02 41.25	39.865	+1.39
1892	El Paso	31 45 32.10	+.63	+2.46	West, 1911	106 29 29.968	31 45 32.73	36.435	−3.70
1914	Estes	31 29 49.10	.00	.00	Estes, 1909	102 57 44.531	31 29 49.10	50.428	−1.33
1853	Galveston Island, east base	29 12 53.28	−.51	+1.63	Galveston Island east base, 1850.	94 55 50.147	29 12 52.77	49.123	+3.65
1906	Gilbert	32 48 10.19	.00	.00	Gilbert, 1902	97 53 38.984	32 48 10.19	11.037	[1]−.85
1903	Higgins (U. S. G. L. O.)	36 29 57.50	+2.50	.00	Boundary Monument (U. S. G. L. O.).	(100 00.0)	36 30 00.00		
1890	Jacksonville	31 57 49.20	−11.79	+3.23	Jacksonville Methodist Church spire, 1919.	95 16 24.583	31 57 37.41	38.743	−1.33
1919	Jacksonville	31 57 53.14	−.31	.00	Jacksonville, 1919	95 16 50.743	31 57 52.83	54.475	−1.64
1919	Johnstone	29 22 39.11	+.09	−.24	Johnstone, 1918	100 46 11.628	29 22 39.20	38.529	+.67
1853	Jupiter	28 54 49.73	−.86	+.37	Jupiter, 1852	95 20 33.860	28 54 48.87	44.269	+4.60
1906	Karnes	28 52 38.15	.00	+.18	Karnes, 1904	97 54 48.145	28 52 38.15	38.640	[1]−.49
1912	Lacasa	32 39 09.39	.00	+.10	Lacasa, 1908	98 41 30.374	32 39 09.39	5.105	+4.29
1905	Laguna Madre, north base	27 40 15.58	.00	+.37	Laguna Madre, north base, 1882.	97 16 20.529	27 40 15.58	10.565	[1]+5.02
1919	Laplace	28 42 44.11	−.11	.00	Laplace, 1918	100 29 33.719	28 42 44.00	46.426	−2.43

[1] Topographic deflection computed. See p. 92.

[2] Approximate North American datum.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	TEXAS—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1895	Laredo	27 30 30.09	−2.04	−1.63	Laredo, north wireless mast, 1917.	99 31 06.895	27 30 28.05	25.279	+2.77
1868	Lavaca	28 37 37.23	−.29	+.47	Lavaca, 1867	96 37 18.543	28 37 36.94	33.765	+3.18
1905	Miller	28 18 06.19	.00	−.17	Miller, 1904	97 48 22.538	28 18 06.19	6.751	[1]−.56
1906	Mission	29 42 48.79	.00	+.19	Mission, 1903	98 09 52.906	29 42 48.79	52.761	[1]−3.97
1903	Monahans (U. S. G. L. O.)	31 59 41.87	+18.13	.00	Boundary monument (U. S. G. L. O.)	(103 00)	32 00 00.00		
1906	Pilot	32 15 44.91	.00	.00	Pilot, 1902	98 08 20.098	32 15 44.91	38.086	[1]+6.82
1853	Rio Grande	25 57 21.64	.00	.00	Rio Grande Observatory, 1853.	97 08 49.146	25 57 21.64	17.197	[1]+4.44
1903	Rio Grande (U. S. G. L. O.)	31 59 56.17	+3.83	.00	Boundary monument (U. S. G. L. O.)	(106 38)	32 00 00.00		
1914	Round	31 29 01.61	.00	.00	Round, 1909	103 53 11.902	31 28 61.61	54.637	+6.97
1921	Sabine	29 43 19.48	−15.91	−66.98	Sabine Pass Lighthouse, 1874.	93 51 00.596	29 42 63.57	58.678	+4.89
1912	Sears	32 33 38.18	.00	−.09	Sears, 1908	100 02 17.040	32 33 38.18	30.799	+7.38
1890	Sierra Blanca (U. S. G. S.)	31 10 27.44				(105 21.4)			
1912	Smith	31 58 36.88	.00	−.08	Smith, 1909	102 27 49.901	31 58 36.88	35.288	+1.59
1896	Spofford (U. S. G. S.)	29 10 27.18				(100 24.6)			
1912	Stanton	32 07 35.73	+.07	.00	Stanton, 1909	101 46 24.746	32 07 35.80	33.087	+2.71
1920	Tehuacana	31 44 16.44	+.17	−.02	Tehuacana, 1919	96 32 56.794	31 44 16.61	16.472	+.14
1903	Texline (U. S. G. L. O.)	36 29 56.66	+3.34	.00	Boundary monument (U. S. G. L. O.)	(103 00)	36 30 00.00		
1905	Topo	26 45 23.52	+.01	−.14	Topo, 1878	97 28 19.344	26 45 23.53	18.196	[1]+5.33
	UTAH								
1892	Antelope	40 57 40.16	+.33	−.10	Antelope, 1892	112 12 55.547	40 57 40.49	44.374	[1]−3.88
1872	Beaver (U. S. E.)	38 16 22.90	.00	.00	Beaver flagstaff (U. S. E. 1872–1885), 1885	112 38 27.323	38 16 22.90	25.616	[1]−2.72
1892	Deseret	40 27 31.25	+.31	−.21	Deseret, 1887	112 37 32.551	40 27 31.56	35.301	[1]−3.74
1898	Green River	38 59 23.63	+20.35	−.05	Green River north meridian, 1898.	110 09 55.658	38 59 43.98	50.639	[1]−6.66
1872	Gunnison (U. S. E.)	39 09 25.46	.00	.00	Gunnison astronomic, 1890	111 49 13.671	39 09 25.46	31.032	[1]−5.57
1889	Ibepah	39 49 38.97	−.22	−.84	Ibepah, 1889	113 55 08.933	39 49 38.75	42.459	[1]−3.71
1916	Lund	38 00 22.87	+.87	+.04	Lund (proposed)	(113 26.0)	38 00 23.74		
1891	Mount Ellen	38 07 24.17	+.48	−.06	Mount Ellen, 1891	110 48 50.657	38 07 24.65	17.115	[1]+7.53
1887	Mount Nebo	39 48 32.31	+.59	+.61	Mount Nebo, 1887	111 45 56.918	39 48 32.90	39.113	[1]−6.21
1893	Mount Waas	38 32 29.00	+.88	+.60	Mount Waas, 1893	109 13 38.302	38 32 29.88	21.444	[1]+8.44
1898	Oasis	39 17 35.29	+.17	−.06	Oasis south meridian, 1898	112 37 44.336	39 17 35.46	38.149	[1]−2.69
1874	Ogden, (U. S. E.)	41 13 08.33	.00	.00	Ogden longitude, 1873–86	111 59 37.990	41 13 08.33	12.554	[1]−4.22
1888	Ogden Peak	41 11 59.22	−.02	−.57	Ogden Peak, 1884	111 52 53.072	41 11 59.20	60.762	[1]−1.56
1890	Patmos Head	39 29 56.86	−1.81	+.42	Patmos Head, 1890	110 18 57.933	39 29 55.05	68.566	[1]−13.52
1892	Promontory	41 17 47.77	+.01	−.71	Promontory, 1892	112 25 09.269	41 17 47.78	53.690	[1]−5.91
1871	St. George (U. S. E.)	37 06 29.25				(113 35.0)			
1869	Salt Lake City	40 46 03.36	−.81	+.10	Salt Lake City azimuth, 1893.	111 53 27.343	40 46 02.55	11.574	[1]−9.02
1901	Utah-Arizona boundary station No. 1 (U. S. G. L. O.)	37 01 12.1	−72.1	.0	Boundary monument (U. S. G. L. O.)	(114 03)	37 00 00.0		
1901	Utah-Arizona boundary station No. 2 (U. S. G. L. O.).	37 00 02.50	−1.31	.00	Boundary monument (U. S. G. L. O.)	(113 07)	37 00 01.19		
1901	Utah-Arizona boundary station No. 3 (U. S. G. L. O.)	36 59 51.60	+8.40	.00	Boundary monument (U. S. G. L. O.)	(112 22)	37 00 00.00		
1901	Utah-Arizona boundary station No. 4 (U. S. G. L. O.)	37 01 06.80	−66.69	.00	Boundary monument (U. S. G. L. O.)	(111 19)	37 00 00.11		
1901	Utah-Arizona boundary station No. 5 (U. S. G. L. O.)	37 00 23.80	−22.85	−105.50	Boundary monument (U. S. G. L. O.)	(110 27)	37 00 00.95		
1901	Utah-Arizona boundary station No. 6 (U. S. G. L. O.)	37 00 54.58	−56.12	.00	Boundary monument (U. S. G. L. O.)	(109 33)	36 59 58.46		
1892	Waddoup	40 54 21.73	+2.00	+6.39	Waddoup, 1892	111 53 10.499	40 54 23.73	26.002	[1]−2.27
1890	Wasatch	39 06 53.83	−3.06	+3.15	Wasatch, 1890	111 27 11.915	39 06 50.77	54.362	[1]−3.59
	VERMONT								
1870	Burlington	44 28 09.46	.00	+.22	Burlington, 1870	73 12 34.13	44 28 09.46	9.05	[1]+.41
1907	Killington	43 36 18.16	.00	.00	Killington, 1872–1874	72 49 14.285	43 36 18.16	17.504	[1]+.66
	VIRGINIA								
1907	Big Knob	36 39 48.53	.00	.00	Big Knob, 1893	82 30 21.435	36 39 48.53	52.635	[1]−4.10
1871	Bull Run	38 52 56.72	−.63	+.21	Bull Run, 1871	77 42 12.604	38 52 56.09	53.579	[1]+2.51
1907	Cahas	37 07 00.29	.00	.00	Cahas, 1877	80 00 56.644	37 07 00.29	1.860	[1]−1.57
1866	Cape Henry	36 55 30.25	+.07	−.36	Cape Henry Lighthouse, 1869–1896.	76 00 30.232	36 55 30.32	32.815	[1]−2.50
1882	Charlottesville	38 02 01.09	.00	.00	Charlottesville, McCormick Observatory longitude, 1882.	78 31 20.62	38 01 61.09	58.06	[1]+3.03

[1] Topographic deflection computed. See p. 92.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	VIRGINIA—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1871	Clark	38 18 39.60	−0.25	+0.63	Clark, 1871	78 00 11.478	38 18 39.35	41.098	[1]−1.75
1883	Covington	37 47 16.55				(79 59.7)			
1878	Elliott Knob	38 09 57.08	−.29	−.06	Elliott Knob, 1878	79 18 51.328	38 09 56.79	59.328	[1]−2.54
1869	Goodson	36 35 49.10				(82 11.2)			
1887	Hines	36 33 02.13				(76 33.5)			
1873	Knott Island, north end	36 33 55.37	.00	−10.21	Knott Island, north end, 1850.	75 55 18.576	36 33 55.37	57.614	[1]−2.24
1875	Long Mountain	37 17 28.84	−.02	+.09	Long Mount, 1875	79 05 10.230	37 17 28.82	27.586	[1]+1.23
1907	Mount Weather	39 03 52.50	−.92	+.14	Mount Weather, 1907	77 53 16.503	39 03 51.58	48.556	[1]+3.02
1907	Rogers	36 39 38.52	.00	.00	Rogers, 1894	81 32 41.885	36 39 38.52	36.031	[1]+2.49
1852	Roslyn (Petersburg)	37 14 25.48	−.02	−.48	Roslyn, 1852	77 23 50.71	37 14 25.46	28.33	[1]−2.87
1869	Staunton	38 08 50.7	.00	.00	Staunton longitude, 1869	79 04 19.077	38 08 50.7	46.545	[1]+4.15
1881	Strasburg	38 59 31.56	+.01	−.20	Strasburg longitude, 1881	78 21 39.01	38 59 31.57	29.96	[1]+1.61
1919	Suffolk	36 44 01.35	−.22	+1.19	Suffolk, 1918	76 34 41.256	36 44 01.13	1.332	−.20
1871	Tangier Island	37 47 56.57	−.03	−.06	Tangier Island, 1854	75 59 14.996	37 47 56.54	57.702	[1]−1.16
1907	White Rock	36 39 49.51	.00	.00	White Rock, 1893	83 27 05.070	36 39 49.51	54.173	[1]−4.66
1871	Wolftrap	37 24 02.02	−.03	−.06	Wolftrap, 1854	76 14 42.975	37 24 01.99	4.746	[1]−2.76
	WASHINGTON								
1851	Cape Disappointment	46 16 35.36	.00	.00	Cape Disappointment astronomic, 1851-74.	124 02 51.764	46 16 35.36	37.440	−2.08
1901	Carson (U. S. & C.)	48 59 59.72	+.16	−.50	Monument No. 154 (U. S. & C.).	118 30 14.362	48 59 59.88	62.065	−2.18
1895	Ellensburg (U. S. G. S.)	46 59 54.95				(120 32.4)			
1852	False Dungeness	48 07 51.67				(123 23.7)			
1873	Kalama	46 00 17.79	.00	−.09	Kalama astronomic, 1872	[4]122 50 26.44	46 00 17.79	[4]25.78	−7.99
1853	Lummi Island	48 44 01.84	.00	−.45	Lummi Island latitude, 1853-1859.	122 41 17.315	48 44 01.84	5.421	[1]−3.58
1852	Point Hudson	48 07 02.16	+3.69	−7.18	Point Hudson, 1856	122 44 52.901	48 07 05.85	3.831	[1]+2.02
1901	Russell (U. S. & C.)	48 59 59.36	+.07	+.37	Monument No. 164 (U. S. & C.).	118 13 47.081	48 59 59.43	61.985	−2.55
1852	Scarborough Harbor	48 21 49.11							
1888	Seattle	47 36 35.09	.00	+1.03	Seattle longitude, 1886-1888	122 20 02.189	47 36 35.09	32.215	[1]+2.87
1896	Spokane (U. S. G. S.)	47 39 51.36				(117 25.8)			
1894	Tacoma	47 15 46.96	.00	+.18	Tacoma astronomic, 1892	122 26 51.446	47 15 46.96	47.911	[1]−.95
1887	Walla Walla	46 03 55.19				(118 20.8)			
	WEST VIRGINIA								
1883	Charleston	38 21 06.95	.00	.00	Charleston astronomic, 1881	81 37 59.193	38 21 06.95	2.287	[1]+4.66
1883	Harvey	39 43 17.79				(79 50.4)			
1880	Keeney	37 46 23.07	−.75	+.03	Keeney, 1880	80 42 19.179	37 46 22.32	24.843	[1]−2.52
1883	Mount Morris	39 43 18.36				(80 03.7)			
1883	Piney	38 26 41.40	−.44	00	Piney, 1883	82 03 28.996	38 26 40.96	39.588	[1]+1.37
	WISCONSIN								
1873	Ada I (U. S. L. S.)	43 29 18.65	+.02	−.78	Ada I (U. S. L. S.), 1873	87 47 35.79	43 29 18.67		
1871	Aminicon River (U. S. L. S.).	46 41 36.09	+.19	+.34	Aminicon River (U. S. L. S.), 1871.	91 51 42.845	46 41 36.28	32.466	[1]+3.81
1865	Boyers Bluff (old) (U. S. L. S.).	45 25 08.91	+.35	+1.16	Boyers Bluff (old) (U. S. L. S.), 1864.	86 56 10.525	45 25 09.26	12.967	[1]−3.71
1871	Brule River (U. S. L. S.)	46 45 19.95	+.12	−.98	Brule (U. S. L. S.), 1871	91 35 18.024	46 45 20.07	18.206	[1]+1.86
1872	Claybanks (U. S. L. S.)	44 41 19.45	.00		Claybanks (U. S. L. S.), 1866.	87 21 50.26	44 41 19.45		
1865	Door Bluff (U. S. L. S.)	45 17 44.92	+.73	−.72	Door Bluff (U. S. L. S.), 1864-1874.	87 03 53.667	45 17 45.65	47.109	[1]−1.46
1887	Fitzsimmons	43 25 44.98	−.29	+.13	Fitzsimmons, 1887	[2]89 39 14	43 25 44.69		
1862	Fort Howard (U. S. L. S.)	44 31 18.49	−48.24	+95.38	Fort Howard (U. S. L. S.), 1872-1874.	88 02 33.209	44 30 30.25	30.404	[1]−.15
1873	Fox Point (U. S. L. S.)	43 10 13.35	−.09	−.89	Fox Point (U. S. L. S.), 1873	87 52 53.63	43 10 13.26		
1880	Gratiots Grove	42 32 32.41	.00	+.40	Gratiots Grove	[2]90 13 41			
1862	Green Island (U. S. L. S.)	45 03 33.90	−9.10		Green Island Lighthouse	87 29 33.69	45 03 24.80	23.24	[1]+1.56
1873	Kewaunee (U. S. L. S.)	44 25 41.12	.00	−.59	Kewaunee (U. S. L. S.), 1873	87 30 14.77	44 25 41.12		
1873	La Crosse	43 48 50.12				(91 14.8)			
1873	Madison	43 04 32.63	.00	.00	Madison latitude, 1873	[2]89 24 07	43 04 32.63		
1865	Menominee (U. S. L. S.)	45 05 56.10	−43.35		Menominee (U. S. L. S.), 1874.	87 35 33.706	45 05 12.75	12.899	[1]−.15
1873	Minnesota Junction (U. S. L. S.).	43 28 31.77	.00	.00	Minnesota Junction (U. S. L. S.), 1873.	88 43 46.782	43 28 31.77	28.537	[1]+3.23
1866	North Sheboygan (U. S. L. S.).	43 45 54.13	−1.07	−1.91	North Sheboygan (U. S. L. S.), 1871.	87 41 45.57	43 45 53.06		
1870	Outer Island (U. S. L. S.)	47 04 14.12	−.35	+.16	Outer Island (U. S. L. S.), 1870.	90 26 26.404	47 04 13.77	17.396	[1]−3.63
1873	Point Creek (U. S. L. S.)	43 57 58.29	+.56	−.32	Point Creek (U. S. L. S.), 1873.	87 41 56.06	43 57 58.85		
1872	Rawleys point (U. S. L. S.). (Two Rivers.)	44 12 04.46	.00		Two Rivers (U. S. L. S.), 1866.	87 30 36.09	44 12 04.46		

[1] Topographic deflection computed. See p. 92. [2] Approximate North American datum. [4] Unadjusted.

TABLE XXV.—*Deflections of the vertical at latitude stations*—Continued

Astronomic station					Geodetic station				
Year	Name of station	Astronomic latitude	Reduction to geodetic station: Latitude	Reduction to geodetic station: Longitude	Name of station	Geodetic longitude	Astronomic latitude A	Geodetic latitude G	A−G
	WISCONSIN—continued	° ′ ″	″	″		° ′ ″	° ′ ″	″	″
1862	Rock Island (U. S. L. S.)	45 25 30.58	+4.88		Rock Island Lighthouse (U. S. L. S.).	86 49 39.83	45 25 35.46	39.38	[1]−3.92
1908	Somers (U. S. L. S.)	42 37 11.15	.00	0.00	Somers (U. S. L. S.), 1873	87 52 32.838	42 37 11.15	10.094	[1]+1.06
1872	South Sheboygan (U. S. L. S.).	43 41 01.37	−.09		South Sheboygan (U. S. L. S.), 1872.	87 42 16.25	43 41 01.28		
1873	Valley Junction (U. S. L. S.).	44 03 11.00				(90 24.6)			
1900	Yerkes Observatory	42 34 12.59				(88 33.3)			
	WYOMING								
1913	Alkali	43 38 07.63	+.16	−.03	Alkali, 1912	104 29 11.373	43 38 07.79	12.937	−5.15
1913	Cambria	44 02 41.76	.00	+.08	Cambria, 1912	104 11 36.919	44 02 41.76	43.952	−2.19
1872	Cheyenne (U. S. E.)	41 07 46.31				(104 48.9)			
1913	Coleman	42 22 05.98	.00	.00	Coleman, 1912	105 07 13.823	42 22 05.98	3.568	+2.41
1872	Fort Fred Steele (U. S. E.).	41 46 39.89				(106 56.8)			
1873	Green River (U. S. E.)	41 31 37.81				(109 28.1)			
1913	Jireh College	42 46 34.72	−2.20	.00	Jireh College, cupola, 1912	104 42 34.38	42 46 32.52	29.82	+2.70
1913	Kirtley	42 51 43.70	.00	.00	Kirtley, 1912	104 06 00.914	42 51 43.70	44.682	−.98
1872	Laramie (U. S. E.)	41 18 51.44				(105 35.6)			
1896	Sheridan (U. S. G. S.)	44 48 30.91				(106 56.8)			
1872	Sherman	41 07 49.55				(105 23.6)			
1913	Sundance	44 28 45.35	.00	.00	Sundance, 1912	104 27 02.821	44 28 45.35	44.696	+.65
1913	Wheatland	42 02 42.12	+.21	+1.09	Wheatland standpipe, 1912	104 57 26.898	42 02 42.33	43.815	−1.49
1913	Whitaker	41 23 53.00	.00	.00	Whitaker, 1912	104 59 38.801	41 23 53.00	56.362	−3.36
1913	Wyoming-Colorado boundary monument, mile post No. 44.	40 59 50.22	−.48	.00	Wyoming-Colorado boundary monument, mile post No. 44, 1912.	104 53 33.575	40 59 49.74	54.156	−4.42
1892	Yellowstone Lake	44 33 15.93				(110 23.7)			
	CANADA								
1901	Columbia River E. (U. S. & C.).	49 00 01.40				(117 37)			
1869	Gargantua (U. S. L. S.)	47 34 39.07	−.33	+.23	Gargantua (U. S. L. S.), 1869–1895.	84 58 53.927	47 34 38.74	42.832	[1]−4.09
1860	Goderich (U. S. L. S.)	43 44 21.74				(81 43)			
1869	Michipicoten (U. S. L. S.)	47 45 19.65	+.85	−1.22	Michipicoten (U. S. L. S.), 1869.	85 52 57.592	47 45 20.50	21.842	[1]−1.34
1901	Midway (U. S. & C.)	48 59 57.55	−.63	.00	Midway azimuth station (U. S. & C.).	118 45 49.812	48 59 56.92	62.154	−5.23
1867	St. Ignace, adopted value reduced from posts 1, 2, and 3 (U. S. L. S.).	48 47 28.55	.00	.00	St. Ignace, 1867	87 51 06.269	48 47 28.55	19.228	[1]+9.32
1871	St. Ignace, post No. 4 (U. S. L. S.).	48 46 15.80	+71.77	+165.25	St. Ignace, 1867	87 51 06.269	48 47 27.57	19.228	+8.34
1871	St. Ignace, post No. 5 (U. S. L. S.).	48 44 51.97	+151.75	−49.44	St. Ignace, 1867	87 51 06.269	48 47 23.72	19.228	+4.49
1871	St. Ignace, post No. 6 (U. S. L. S.).	48 51 18.97	−229.98	+.59	St. Ignace, 1867	87 51 06.269	48 47 28.99	19.228	+9.76
1901	Silicia Creek (U. S. & C.)	49 00 33.49				(121 37)			
1867	Tip Top (U. S. L. S.)	48 16 25.67	.00		Tip Top, 1867	86 00 11.611	48 16 25.67	24.868	[1]+.80

[1] Topographic deflection computed. See p. 92.

TABLE XXVI.—*Deflections of the vertical at longitude stations*

Astronomic station							Geodetic station						
Year	Name of station	Reference point	Astronomic longitude: Time	Astronomic longitude: Arc	Reduction to geodetic station: Longitude	Reduction to geodetic station: Latitude	Name of station	Geodetic latitude	Astronomic longitude A	Geodetic longitude G	A−G	Cos φ	A−G in prime vertical
	ALABAMA		h. m. s.	° ′ ″	″	″		° ′ ″	° ′ ″	″	″		″
1860	Eufaula	Tr. 1860	5 40 33.367	85 08 20.50				(31 53.7)					
1907	Fort Morgan	Tr. 1907	5 52 05.734	88 01 26.01	−0.15	−0.22	Fort Morgan azimuth, 1847	30 13 42.236	88 01 25.86	23.255	+2.60	+0.8642	[1]+2.25
1857	Lower Peach Tree	Tr. 1857	5 50 10.730	87 32 40.95	.00	.00	Lower Peach Tree longitude, 1857	31 50 20.45	87 32 40.95	42.87	−1.92	+.8495	[1]−1.63
1914	Madison	Tr. 1914	5 46 58.196	86 44 32.94	−.19	.00	Madison, 1914	34 42 11.204	86 44 32.75	41.756	−9.01	+.8221	−7.41
1857	Mobile	Tr. 1857–1861	5 52 10.492	88 02 37.38	.00	.00	Mobile transit, pier, 1856–57	30 41 30.888	88 02 37.38	33.395	+3.98	+.8599	[1]+3.42
1856	Montgomery	Tr. 1856–57	5 45 11.947	86 17 59.20	+1.09	+.22	Montgomery Capitol, 1887–1892.	32 22 39.555	86 18 00.29	1.505	−1.22	+.8445	[1]−1.03
1895	Tuscaloosa (U. S. G. S.)	Tr. 1895	5 50 11.828	87 32 57.42	.00	.00	Tuscaloosa (U. S. G. S.), 1890	33 12 36.90	87 32 57.42	61.42	−4.00	+.8367	−3.35
	ARIZONA												
1899	Maricopa	Tr. 1899	7 28 12.282	112 03 04.23	+.56	+.52	Maricopa astronomic eccentric, 1910.	33 03 34.351	112 03 04.79	1.456	+3.33	+.8381	+2.79
1892	**Nogales**	**Tr. 1892**	**7 23 45.912**	**110 56 28.68**	.00	−.07	Nogales astronomic, 1893	31 20 01.764	110 56 28.68	22.363	+6.32	+.8542	+5.40
1920	Williams Laplace	Tr. 1920	7 28 46.432	112 11 36.48	−.15	+.01	Williams Laplace, 1920	35 15 08.448	112 11 36.33	25.628	+10.70	+.8169	+8.74
1892	**Yuma**	**Tr. 1892**	**7 38 29.608**	**114 37 24.12**	+.06	+.01	Yuma latitude, 1892	32 43 37.671	114 37 24.18	20.858	+3.32	+.8413	+2.79
	ARKANSAS												
1885	Fort Smith	Tr. 1885	6 17 43.687	94 25 55.30	+.46	−.06	Initial Point (U. S. G. S.), 1905.	35 23 16.91	94 25 55.76	51.35	+4.41	+.8152	+3.60
1920	Hartford	Tr. 1920	6 17 33.134	94 23 17.01	−.03	+.22	Hartford, 1917	35 01 14.490	94 23 16.98	12.488	+4.49	+.8190	+3.68
1878	Helena	Tr. 1878	6 02 21.673	90 35 25.10	+.60	+.67	Helena, pinnacle of courthouse.	34 31 49	90 35 25.70				
1885	**Little Rock**	**Tr. 1885–1896**	**6 09 05.727**	**92 16 25.90**	−.25	+.61	Little Rock longitude, 1920	34 44 52.22	92 16 25.65	24.86	+.79	+.8216	+.65
1885	Texarkana	Tr. 1885	6 16 10.417	94 02 36.26				(33 25.7)					
	CALIFORNIA												
1870	Buenavista (Los Angeles)	Tr. 1870	7 52 58.751	118 14 41.26	.00	.00	Buenavista, 1870	34 03 18.597	118 14 41.26	34.380	+6.88	+.8285	[1]+5.70
1908	Gazelle	Tr. 1908	8 10 03.825	122 30 57.38	+.38	−.01	Gazelle astronomic, 1904	41 31 36.248	122 30 57.76	68.281	−10.52	+.7486	[1]−7.88
1893	Lake Tahoe, southeast end	Tr. 1893	7 59 47.060	119 56 45.90	.00	.00	Lake Tahoe, longitude, 1893	[2]38 57 16.70	119 56 45.90	[2]41.03	+4.87	+.7776	[1]+3.79
1889	**Los Angeles**	**Tr. 1892**	**7 53 01.561**	**118 15 23.42**	−1.80	+.05	Los Angeles Normal School, flagstaff, 1883.	34 03 02.249	118 15 21.62	14.695	+6.92	+.8285	[1]+5.73
1908	Mare Island	Naval Observatory, east pier, Tr. 1908.	8 09 05.635	122 16 24.52	+.10	−.23	Observatory, 1877	38 06 02.414	122 16 24.62	15.723	+8.90	+.7869	[1]+7.00
1889	Marysville	Tr. 1889	8 06 21.186	121 35 17.79	+7.04	+.46	Marysville, courthouse flagstaff, 1898.	39 08 29.645	121 35 24.83	17.366	+7.46	+.7756	[1]+5.79
1888	Mount Hamilton	Meridian of Lick Observatory. (Fauth Tr.)	8 06 34.895	121 38 43.42	+.92	+.19	Lick Observatory, small dome, 1882–1887.	37 20 31.511	121 38 44.34	31.707			
	do	Tr. 1888	8 06 33.810	121 38 27.15	.00	.00	Mount Hamilton longitude, 1888.	37 20 34.81	121 38 27.15	14.52	+12.63	+.7950	[1]+10.04
1889	**Needles**	**Tr. 1889–1916**	**7 38 24.836**	**114 36 12.54**	.00	.00	Needles longitude station, 1889.	34 50 16.036	114 36 12.54	15.899	−3.36	+.8208	−2.76
1889	Oakland	Chabot Observatory, Tr. 1889.	8 09 06.639	122 16 39.58				(37 47.5)					
1889	Point Arena	Tr. 1889	8 14 47.084	123 41 46.26	.00	.00	Point Arena longitude, 1889	38 54 36.160	123 41 46.26	24.432	+21.83	+.7781	[1]+16.99
1888	**Sacramento**	**Tr. 1888–1908**	**8 05 58.387**	**121 29 35.81**	+4.03	+2.53	Sacramento, ball on capitol dome, 1876–1880.	38 34 37.331	121 29 39.84	34.498	+5.34	+.7818	[1]+4.17
1871	San Diego	Tr. 1871	7 48 38.821	117 09 42.32	+.18	.00	San Diego 2, 1871	32 43 12.313	117 09 42.50	28.014	+14.49	+.8414	[1]+12.19
1892	do	**Tr. 1892**	**7 48 38.748**	**117 09 41.22**	.00	.00	San Diego longitude, 1892	32 43 29.962	117 09 41.22	28.461	+12.76	+.8413	[1]+10.73
1887	**San Francisco**	**Lafayette Park, west pier, Tr. 1882–1887:1896.**	**8 09 42.861**	**122 25 42.92**	.00	.00	San Francisco, Lafayette Park, 1881–1896.	37 47 31.930	122 25 42.92	37.228	+5.69	+.7902	[1]+4.50
1896	do	Presidio, Tr. 1896–1903	8 09 48.813	122 27 12.20	.00	.00	San Francisco Presidio longitude, 1896–1903.	37 47 51.386	122 27 12.20	5.233	+6.97	+.7902	[1]+5.51
1887	do	Washington Square, Tr. 1869–1878.	8 09 38.441	122 24 36.62	.00	.00	San Francisco, Washington Square, 1869–1887.	37 48 04.721	122 24 36.62	31.515	+5.10	+.7902	[1]+4.03
1878	Summit	Tr. 1878	8 01 19.470	120 19 52.05				(39 19.0)					
1897	Ukiah	Tr. 1897	8 12 50.234	123 12 33.51	−1.54	+3.41	Ukiah, courthouse cupola, flagstaff, 1878.	39 09 02.294	123 12 31.97	26.593	+5.38	+.7755	[1]+4.17
1905–6	Wilson Peak	Mount Wilson Solar Observatory, Snow Telescope pier.	7 52 14.326	118 03 34.89	+10.65	+.19	Wilson Peak, 1890	34 13 26.222	118 03 45.54	39.906			
	Wilson Peak (Mount Wilson)	Tr. 1905–6	7 52 14.130	118 03 31.95	+13.59	+4.93	do	34 13 26.222	118 03 45.54	39.906	+5.63	+.8269	[1]+4.66
	COLORADO												
1885	**Colorado Springs**	**Tr. 1885–86**	**6 59 16.710**	**104 49 10.65**	+.46	+4.05	Colorado Springs latitude and longitude, 1873.	38 50 03.230	104 49 11.11	35.115	−24.01	+.7790	[1]−18.70
1873	Denver	Tr. 1873	6 59 58.287	104 59 34.30				(39 45.4)					
1886	Grand Junction	Tr. 1886	7 14 15.601	108 33 54.02	.00	.00	Grand Junction latitude and longitude, 1886.	[2]39 03 55.21	108 33 54.02	[2]53.36	+.66	+.7764	[1]+.51
1886	Gunnison	do	7 07 42.045	106 55 30.68	.00	−.45	Gunnison azimuth, 1894	38 32 46.597	106 55 30.68	26.644	+4.04	+.7821	[1]+3.16
1873	Trinidad	Tr. 1873	6 58 00.287	104 30 04.30				(37 10.2)					
1912	Watkins	Tr. 1912	6 58 24.907	104 36 13.61	+.19	+1.58	Watkins astronomic, 1912	39 44 43.813	104 36 13.80	18.915	−5.12	+.7689	−3.94
	CONNECTICUT												
1912	Camp Columbia (C. U.)	East pier, Tr. 1912	4 52 54.036	73 13 30.54	.00	.00	Camp Columbia longitude, 1912.	41 40 40.601	73 13 30.54	23.733	+6.81	+.7469	+5.09
	DELAWARE												
1897	Dover	Tr. 1897	5 02 05.230	75 31 18.45	+1.29	+.52	Dover, courthouse cupola, 1896.	39 09 21.264	75 31 19.74	25.197	−5.46	+.7754	[1]−4.23
	DISTRICT OF COLUMBIA												
1852	Washington	Seaton station, Tr. 1852–1867	5 07 59.516	76 59 52.74	.00	.00	Seaton, 1850	38 53 28.962	76 59 52.74	59.541	−6.80	+.7783	[1]−5.29
1896	do	U. S. Coast and Geodetic Survey office, Tr. 1896–1911.	5 08 01.709	77 00 25.64	−1.15	+1.34	U. S. Coast and Geodetic Survey, main office building, flagstaff.	38 53 13.49	77 00 24.49	31.00	−6.51	+.7784	[1]−5.07
1879	do	**U. S. Naval Observatory, old site, dome.**	**5 08 12.153**	**77 03 02.30**	.00	.00	U. S. Naval Observatory, old site, dome.	38 53 42.255	77 03 02.30	6.119	−3.82	+.7783	[1]−2.97
1896	do	U. S. Naval Observatory, new site, center of clock room.	5 08 15.784	77 03 56.76	−3.48	−1.69	U. S. Naval Observatory, new site, center of small dome on main building, 1894.	38 55 15.338	77 03 53.28	58.756	−5.48	+.7780	[1]−4.26
	FLORIDA												
1860	Apalachicola	Tr. 1860	5 39 56.696	84 59 10.44	−.94	+.12	Apalachicola, 1856	29 43 13.066	84 59 09.50	7.560	+1.94	+.8685	[1]+1.68
1907–8	Belleview	Tr. 1907–8	5 31 14.563	82 48 38.45	.00	−.03	Belleview, 1906	27 56 34.116	82 48 38.45	42.951	−4.50	+.8834	[1]−3.98
1874	Cedar Keys	Tr. 1874	5 32 07.377	83 01 50.66	−4.92	−2.30	Way Key north base, 1851	29 08 12.678	83 01 45.74	43.410	+2.33	+.8735	[1]+2.04
1907	Daytona	Tr. 1907	5 24 03.832	81 00 57.48	+.33	−.09	Daytona, 1906	29 12 35.944	81 00 57.81	59.123	−1.31	+.8728	[1]−1.14
1907	Fernandina	do	5 25 50.719	81 27 40.78	−.66	+.14	Fernandina, courthouse spire, 1905.	30 40 14.284	81 27 40.12	42.362	−2.24	+.8601	[1]−1.93
1890	Gainesville	Tr. 1890	5 29 17.497	82 19 22.46	+2.90	−3.37	Gainesville, courthouse spire, 1897.	29 39 04.711	82 19 25.36	28.586	−3.23	+.8691	[1]−2.81
1907	Jupiter Inlet	Tr. 1907	5 20 18.828	80 04 42.42	+1.43	+.81	Jupiter Inlet Lighthouse, 1883.	26 56 54.498	80 04 43.85	56.166	−12.32	+.8914	[1]−10.98
1896	**Key West**	**Tr. 1896**	**5 27 13.579**	**81 48 23.68**	+1.33	+6.26	Tifts Observatory, 1853	24 33 34.536	81 48 25.01	27.312	−2.30	+.9095	[1]−2.09
1917	Lancaster 2 (U. S. E.)	Tr. 1917	5 26 42.344	81 40 35.16	+.08	−.19	Lancaster 2 (U. S. E.), 1909	30 18 37.229	81 40 35.24	38.635	−3.40	+.8633	−2.94
1907	Miami	Tr. 1907	5 20 46.223	80 11 33.34	.00	.00	Miami longitude, 1907	25 46 29.008	80 11 33.34	42.974	−9.63	+.9005	[1]−8.67
1861	Pensacola	Tr. 1861	5 48 50.176	87 12 32.64	−.32	.00	Barkley Point 2, 1860	30 24 31.126	87 12 32.32	26.526	+5.79	+.8624	[1]+4.99
1874	Punta Rasa	Tr. 1874	5 28 02.877	82 00 43.16	.00	.00	Punta Rasa astronomic, 1874.	26 29 13.774	82 00 43.16	46.062	−2.90	+.8950	[1]−2.60
1882	St. Augustine	Tr. 1882	5 25 14.448	81 18 36.72	−1.47	+.65	Fort Marion, northeast tower.	[2]29 53 52.98	81 18 35.25	[2]40.81	−5.56	+.8669	[1]−4.82
1907	St. Marks	Tr. 1907	5 36 49.187	84 12 17.80	.00	+.03	Long, 1907	30 09 27.672	84 12 17.80	17.647	+.15	+.8647	[1]+.13
1907	Sebastian	do	5 21 52.491	80 28 07.36	−.06	+.08	Sebastian 2, 1900	27 49 01.508	80 28 07.30	13.184	−5.88	+.8844	[1]−5.25

[1] Topographic deflection computed. See p. 92.

[2] Unadjusted.

TABLE XXVI.—*Deflections of the vertical at longitude stations*—Continued

Astronomic station							Geodetic station						
Year	Name of station	Reference point	Astronomic longitude: Time	Astronomic longitude: Arc	Reduction to geodetic station: Longitude	Reduction to geodetic station: Latitude	Name of station	Geodetic latitude	Astronomic longitude A	Geodetic longitude G	A−G	Cos φ	A−G in prime vertical
	GEORGIA		h. m. s.	° ′ ″	″	″		° ′ ″	° ′ ″	″	″		″
1879	**Atlanta**	**Tr. 1896**	**5 37 33.338**	**84 23 20.07**	−1.15	−0.43	Atlanta city hall cupola, 1872.	33 44 57.69	84 23 18.92	17.75	+1.17	+0.8315	[1] +0.97
1890	Augusta	Tr. 1890	5 27 51.809	81 57 57.14	−1.44	+1.58	Augusta post office, 1902	33 28 25.517	81 57 55.70	68.004	−12.30	+.8341	[1] −10.26
1917	Brunswick southeast base	Tr. 1917	5 25 59.476	81 29 52.14	+.03	+.41	Brunswick southeast base, 1917.	31 09 26.26	81 29 52.17	55.29	−3.12	+.8558	−2.67
1918	Butler	Tr. 1918	5 36 55.483	84 13 52.24	.00	−.75	Butler, 1917	[2] 32 33 23.93	84 13 52.24	[2] 50.01	+2.23	+.8429	+1.88
1917	Cochran	Tr. 1917	5 33 26.070	83 21 31.05	−.18	+.35	Cochran, 1917	[2] 32 23 19.73	83 21 30.87	[2] 34.42	−3.55	+.8445	−3.00
1918	Columbus E	Tr. 1918	5 39 56.067	84 59 01.00	+1.12	+1.79	Columbus E, 1917	[2] 32 27 55.15	84 58 62.12	[2] 56.42	+5.70	+.8437	+4.81
1907	Darien	Tr. 1907	5 25 43.519	81 25 52.79	−.01	−.08	Darien proposed longitude, 1906.	31 22 05.587	81 25 52.78	57.623	−4.84	+.8539	[1] −4.13
1907	Doraville	do	5 37 06.565	84 16 38.48	.00	+.06	Atlanta middle base, 1873	33 54 21.460	84 16 38.48	37.632	+.85	+.8300	[1] +.71
1918	Folkston	Tr. 1918	5 28 02.351	82 00 35.26	−.14	+.06	Folkston, 1917	[2] 30 50 17.77	82 00 35.12	[2] 37.93	−2.81	+.8587	−2.41
1918	Harmon	do	5 36 53.454	84 13 21.81	.00	+.19	Harmon, 1917	[2] 32 33 21.87	84 13 21.81	[2] 18.30	+3.51	+.8429	+2.96
1917	Hump	Tr. 1917	5 34 34.333	83 38 34.99	−.02	+.19	Hump, 1917	[2] 32 47 34.78	83 38 34.97	[2] 36.67	−1.70	+.8406	−1.43
1917	Jesup	do	5 27 30.302	81 52 34.53	−.04	+.40	Jesup, 1917	[2] 31 36 28.01	81 52 34.49	[2] 42.54	−8.05	+.8517	−6.86
1917	Joint	do	5 30 23.692	82 35 55.38	+.03	−.11	Joint, 1917	[2] 31 52 05.93	82 35 55.41	[2] 58.61	−3.20	+.8493	−2.72
1918	Jones	Tr. 1918	5 34 57.148	83 44 17.22	−.24	+.20	Jones, 1917	[2] 31 30 49.40	83 44 16.98	[2] 16.36	+.62	+.8525	+.53
1918	Kimbrough	do	5 38 36.045	84 39 00.68	+.08	−.37	Kimbrough, 1917	[2] 32 00 13.83	84 39 00.76	[2] 2.42	−1.66	+.8480	−1.41
1855	Macon	Tr. 1855–1860	5 34 30.381	83 37 35.72				(32 50.4)					
1917	Mud	Tr. 1917	5 32 40.949	83 10 14.24	+.01	−.65	Mud, 1917	[2] 32 11 15.55	83 10 14.25	[2] 17.53	−3.28	+.8463	−2.78
1918	Norris	Tr. 1918	5 30 00.376	82 30 05.64	−.30	+.43	Norris, 1917	[2] 32 30 31.48	82 30 05.34	[2] 9.97	−4.63	+.8433	−3.90
1918	Riley	do	5 36 48.322	84 12 04.83	.00	−.86	Riley, 1917	[2] 32 33 18.46	84 12 04.83	[2] 0.81	+4.02	+.8429	+3.39
1851	Savannah	Tr. 1851–1882	5 24 21.427	81 05 21.40	+.82	+.17	Savannah Exchange, spire, 1850.	32 04 51.475	81 05 22.22	28.310	−6.09	+.8473	[1] −5.16
1918	Sylvester D	Tr. 1918	5 35 37.029	83 54 15.44	+.46	+.57	Sylvester D, 1917	[2] 31 32 49.12	83 54 15.90	[2] 14.49	+1.41	+.8522	+1.20
1918	Turner	do	5 27 07.941	81 46 59.12	−.16	+1.12	Turner, 1918	[2] 32 26 20.07	81 46 58.96	[2] 64.10	−5.14	+.8440	−4.34
1918	Valdosta	do	5 33 06.694	83 16 40.41	−.40	+.18	Valdosta, 1917	[2] 30 49 48.09	83 16 40.01	[2] 40.25	−.24	+.8587	−.21
1917	Valley	Tr. 1917–18	5 35 33.112	83 53 16.68	+.04	+.06	Valley, 1917	[2] 32 32 57.60	83 53 16.72	[2] 21.06	−4.34	+.8429	−3.66
1918	Waresboro	Tr. 1918	5 29 54.706	82 28 40.59	−.04	−.24	Waresboro, 1917	[2] 31 14 56.00	82 28 40.55	[2] 42.21	−1.66	+.8549	−1.42
1918	Willacoochee	do	5 32 12.147	83 03 02.20	+.08	+.45	Willacoochee, 1917	[2] 31 20 30.67	83 03 02.28	[2] 5.26	−2.98	+.8541	−2.54
	IDAHO												
1916	Blackfoot	Tr. 1916	7 29 24.758	112 21 11.37	.00	.00	Blackfoot longitude, 1916	43 10 59.710	112 21 11.37	1.412	+9.96	+.7292	+7.26
1889	Boise (U. S. G. S.)	Tr. 1889	7 44 52.362	116 13 05.43				(43 36.0)					
1916	Mountain Home	Tr. 1916	7 42 46.689	115 41 40.33	−.33	.00	Mountain Home, 1915	43 07 44.382	115 41 40.00	36.050	+3.95	+.7299	+2.88
	ILLINOIS												
1876	Cairo (U. S. L. S.)	Tr. 1876	5 56 38.066	89 09 30.99	−.54	−.30	Defiance (M. R. C.)	(36 59.8)					
1877	Cairo	Tr. 1877	5 56 41.133	89 10 17.00				(37 00.2)					
1864	Chicago (U. S. L. S.)	Tr. 1864	5 50 29.589	87 37 23.84	−35.55		Chicago Lighthouse (U. S. L. S.).	41 53 20.50	87 36 48.29	51.46	−3.17	+.7444	[1] −2.36
1883	**Chicago**	**Tr. 1891**	**5 50 29.446**	**87 37 21.69**	+4.64	+.90	Chicago waterworks tower (U. S. L. S.).	41 53 49.78	87 37 26.33	27.55	−1.22	+.7443	[1] −.91
1873	Galena (U. S. L. S.)	Tr. 1873	6 01 43.426	90 25 51.39				(42 25.2)					
1869	Mattoon	Tr. 1869	5 53 32.547	88 23 08.20				(39 29.2)					
1879	Parkersburg (U. S. L. S.)	Tr. 1879	5 52 20.681	88 05 10.22	−201.92	−529.04	Parkersburg (U. S. L. S.)	38 34 51.518	88 01 48.30	49.004	−.70	+.7802	[1] −.55
1878	Rock Island (U. S. L. S.)	Tr. 1878	6 02 14.626	90 33 39.39				(41 31.0)					
1882	Springfield	Tr. 1882	5 58 37.385	89 39 20.78				(39 47.9)					
1898	Urbana	Tr. 1898	5 52 54.067	88 13 31.01	+4.38	+14.11	Illinois Industrial University, east tower (U. S. L. S.).	40 06 32.95	88 13 35.38	37.83	−2.45	+.7648	[1] −1.87
1876	Willow Springs (U. S. L. S.)	Tr. 1876	5 51 27.511	87 51 52.66	−46.57	−44.50	Willow Springs (U. S. L. S.), 1874.	41 43 36.903	87 51 06.09	5.629	+.46	+.7464	[1] +.34
	INDIANA												
1891	Butler	Tr. 1891	5 39 29.647	84 52 24.71				(41 25.7)					
1882	Indianapolis	Tr. 1882	5 44 38.544	86 09 38.16				(39 46.2)					
1883	Logansport	Tr. 1883	5 45 21.486	86 21 07.29				(40 45.3)					
1915	O and M	Tr. 1915	5 42 40.764	85 40 11.46	+.23	−.01	O and M, 1884	38 29 00.278	85 40 11.69	11.497	+.19	+.7828	+.15
1891	Union City	Tr. 1891	5 39 13.772	84 48 26.58				(40 11.9)					
1881	Vincennes	Tr. 1881	5 50 06.009	87 31 30.14	+2.30	−.48	Vincennes, courthouse cupola, 1885.	38 40 35.216	87 31 32.44	37.354	−4.91	+.7807	[1] −3.83
	IOWA												
1869	Burlington	Tr. 1869	6 04 25.707	91 06 25.60				(40 48.4)					
1869	Des Moines	do	6 14 29.127	93 37 16.90				(41 35.0)					
	KANSAS												
1871	Chetopah	Tr. 1871	6 20 24.696	95 06 10.44				(37 02.2)					
1884	Elk Falls (U. S. G. S.)	Tr. 1884	6 24 45.057	96 11 15.86				(37 22.1)					
1885	Ellsworth	Tr. 1885	6 32 54.424	98 13 36.36	−0.84	+1.30	Ellsworth, schoolhouse cupola, 1891.	38 43 50.06	98 13 35.52	44.13	−8.61	+.7801	[1] −6.72
1871	Fort Leavenworth (U. S. L. S.).	Tr. 1871	6 19 39.306	94 54 49.59				(39 21.2)					
1884	Fort Scott (U. S. G. S.)	Tr. 1884	6 18 49.876	94 42 28.14				(37 50.4)					
1884	Oswego (U. S. G. S.)	do	6 20 25.737	95 06 26.06				(37 08.0)					
1907	Salina west base	Tr. 1907	6 30 24.624	97 36 09.36	.00	−1.09	Salina west base, 1895	38 51 07.674	97 36 09.36	10.840	−1.48	+.7788	[1] −1.15
1889	Spearville (U. S. G. S.)	Tr. 1889	6 39 00.763	99 45 11.44				(37 51.1)					
1885	Wallace	Tr. 1885	6 46 21.731	101 35 25.96	.00	.00	Wallace latitude, 1885	38 54 44.339	101 35 25.96	31.505	−5.54	+.7781	[1] −4.31
	KENTUCKY												
1871	Falmouth	Tr. 1871	5 37 20.646	84 20 09.69				(38 40.6)					
1883	Greensburg	Tr. 1883	5 41 59.886	85 29 58.29				(37 15.6)					
1882	Guthrie	Tr. 1882	5 48 38.526	87 09 37.89				(36 38.9)					
1882	Henderson	do	5 50 21.866	87 35 27.99				(37 50.4)					
1877	Hickman	Tr. 1877	5 56 46.803	89 11 42.04				(36 34.3)					
1883	Lexington	Tr. 1883	5 38 01.556	84 30 23.34				(38 02.4)					
1882	London	Tr. 1882	5 36 21.436	84 05 21.54				(37 08.1)					
1883	Louisa	Tr. 1883	5 30 24.536	82 36 08.04				(38 06.9)					
1879	**Louisville**	**Tr. 1879–1883**	**5 43 03.636**	**85 45 54.54**	−21.66	+12.73	Louisville, Catholic Cathedral, 1880.	38 15 06.791	85 45 32.88	31.823	+1.06	+.7853	+.83
1871	Oakland	Tr. 1871	5 45 01.276	86 15 19.14				(37 02.5)					
1877	Paducah	Tr. 1877	5 54 23.853	88 35 57.80				(37 05.0)					
1883	Richmond	Tr. 1883	5 37 11.536	84 17 53.04				(37 44.7)					
1871	Shelbyville	Tr. 1871	5 40 53.096	85 13 16.44				(38 12.7)					
	LOUISIANA												
1880	Baton Rouge	Tr. 1880	6 04 45.248	91 11 18.72	+6.57	+10.33	Baton Rouge Barracks, 1880.	[2] 30 27 24	91 11 25.29				
1920	Boyce	Tr. 1920	6 10 36.735	92 39 11.02	−.18	+.54	Boyce	[2] 31 22 53	92 39 10.84				
1920	Man	do	6 14 52.100	93 43 01.50	−.48	.00	Man	32 01 18.589	93 43 01.02	2.100	−1.08	+.8478	−.92
1880	**New Orleans**	**Tr. 1880–1895**	**6 00 16.763**	**90 04 11.44**	−.63	−6.27	St. Patrick's Church, center of tower, 1874.	29 56 47.140	90 04 10.81	11.033	−.22	+.8665	[1] −.19
1920	Torras	Tr. 1920	6 06 43.078	91 40 46.17	−.14	.00	Torras, 1919	[2] 30 59 23	91 40 46.03				
	MAINE												
1857	Bangor	Tr. 1851–1857	4 35 08.173	68 47 02.60	.00	.00	Thomas Hill Observatory, 1851.	44 48 16.145	68 47 02.60	.152	+2.45	+.7096	[1] +1.74
1866	**Calais**	**Tr. 1857–1895**	**4 29 07.857**	**67 16 57.86**	.00	.00	Calais Observatory, 1866	45 11 05.680	67 16 57.86	52.762	+5.10	+.7048	[1] +3.59
	MARYLAND												
1864	Cumberland	Tr. 1864	5 15 01.723	78 45 25.84				(39 39.2)					
1899	Gaithersburg	Tr. 1899	5 08 47.729	77 11 55.94				(39 08.2)					

[1] Topographic deflection computed. See p. 92. [2] Unadjusted. [3] Approximate North American datum.

TABLE XXVI.—*Deflections of the vertical at longitude stations*—Continued

Astronomic station							Geodetic station						
Year	Name of station	Reference point	Astronomic longitude: Time	Astronomic longitude: Arc	Reduction to geodetic station: Longitude	Reduction to geodetic station: Latitude	Name of station	Geodetic latitude	Astronomic longitude A	Geodetic longitude G	A−G	Cos φ	A−G in prime vertical
			h. m. s.	° ′ ″	″	″		° ′ ″	° ′ ″	″	″		″
	MASSACHUSETTS												
1869-70	**Cambridge**	**Harvard College, Observatory, dome.**	**4 44 31.046**	**71 07 45.69**	0.00	0.00	Harvard College Observatory, center of dome, 1851.	42 22 53.490	71 07 45.69	43.885	+1.81	+0.7387	[1]+1.34
1869-70	**Duxbury**	**Tr. 1869-70**	**4 42 49.858**	**70 40 12.87**	.00	.00	Duxbury longitude station, 1869-70.	42 02 55.18	70 40 12.87	10.96	+1.91	+.7426	[1]+1.42
1901	Provincetown	Tr. 1901	4 40 45.165	70 11 17.48	+.92	−7.29	Provincetown, New Universalist Church, spire, 1847.	42 03 02.09	70 11 18.40	19.94	−1.54	+.7426	[1]−1.14
	MICHIGAN												
1875	Allegan (U. S. L. S.)	Tr. 1875	5 43 24.546	85 51 08.19				(42 31.7)					
1861-1864	Ann Arbor (U. S. L. S.)	Detroit Observatory, meridian circle.	5 34 55.296	83 43 49.44				(42 16.8)					
1908	Bunday	Tr. 1908	5 37 50.335	84 27 35.02	.00	.00	Bunday (U. S. L. S.), 1879.	42 03 15.911	84 27 35.02	41.295	−6.28	+.7425	[1]−4.66
1875	Charlotte (U. S. L. S.)	Tr. 1875	5 39 20.056	84 50 00.84				(42 34.0)					
1874	Corunna (U. S. L. S.)	Tr. 1874	5 36 28.256	84 07 03.84				(42 58.4)					
1881	**Detroit**	**Coast and Geodetic Survey, Tr. 1881.**	**5 32 11.830**	**83 02 57.45**	+5.49		Detroit Observatory, east pier (U. S. L. S.), 1871.	42 20 00.556	83 03 02.94	6.647	−3.71	+.7392	[1]−2.74
1865	Escanaba (U. S. L. S.)	Tr. 1865	5 48 12.059	87 03 00.88	+179.85		Ford River (U. S. L. S.), 1874.	45 41 12.321	87 06 00.73	8.445	−7.71	+.6986	[1]−5.39
1874	Flint (U. S. L. S.)	Tr. 1874	5 34 44.406	83 41 06.09				(43 01.2)					
1860	Grand Haven (U. S. L. S.)	Tr. 1860	5 44 57.919	86 14 28.78				(43 03)					
1874	Grand Rapids (U. S. L. S.)	Tr. 1874	5 42 40.066	85 40 00.99				(42 57.8)					
1875	Hastings (U. S. L. S.)	Tr. 1875	5 41 09.176	85 17 17.64				(42 38.9)					
1875	Howell (U. S. L. S.)	do	5 35 42.906	83 55 43.59				(42 36.2)					
1874	Ionia (U. S. L. S.)	Tr. 1874	5 40 15.236	85 03 48.54				(42 58.9)					
1875	Jackson (U. S. L. S.)	Tr. 1875	5 37 38.076	84 21 31.14				(42 14.8)					
1875	Kalamazoo (U. S. L. S.)	do	5 42 20.326	85 35 04.89				(42 17.4)					
1875	Lansing (U. S. L. S.)	do	5 38 13.266	84 33 18.99				(42 43.9)					
1874	Lapeer (U. S. L. S.)	do	5 33 15.616	83 18 54.24				(43 03.1)					
1875	Marshall (U. S. L. S.)	do	5 39 51.226	84 57 48.39				(42 16.4)					
1868	Monroe (U. S. L. S.)	Tr. 1868	5 33 33.869	83 23 28.04	+17.61		Monroe, courthouse (U. S. L. S.), 1877.	41 54 52.44	83 23 45.65	48.93	−3.28	+.7441	[1]−2.43
1875	Newaygo (U. S. L. S.)	Tr. 1875	5 43 12.206	85 48 03.09				(43 25.3)					
1875	Paw Paw (U. S. L. S.)	do	5 43 32.286	85 53 04.29				(42 13.0)					
1874	Pontiac (U. S. L. S.)	Tr. 1874	5 33 09.346	83 17 20.19				(42 38.1)					
1876	Saginaw (U. S. L. S.)	Tr. 1876	5 35 51.166	83 57 47.49				(43 25.1)					
1874	St. Johns (U. S. L. S.)	Tr. 1874	5 38 14.446	84 33 36.69				(43 00.0)					
1876	St. Louis (U. S. L. S.)	Tr. 1876	5 38 24.766	84 36 11.49				(43 24.5)					
1893	Sault Ste. Marie (U. S. L. S.)	Tr. 1893	5 37 23.291	84 20 49.36	.00	.00	Sault Ste. Marie Observatory west pier, (U. S. L. S.), 1893	46 30 05.770	84 20 49.36	55.641	−6.28	+.6884	[1]−4.32
1875	Stanton (U. S. L. S.)	Tr. 1875	5 40 19.876	85 04 58.14				(43 17.5)					
1865	Thones Hill (Marquette) (U. S. L. S.)	Tr. 1865	5 49 47.289	87 26 49.34	.00	.00	Observatory post, Thones Hill.	46 31 54.12	87 26 49.34	63.30	−13.96	+.6879	[1]−9.60
	MINNESOTA												
1907	Dalton	Tr. 1907-8	6 23 40.003	95 55 00.04	−.19	+.07	Dalton astronomic, 1904	46 10 23.613	95 54 59.85	59.592	+.26	+.6925	[1]+.18
1890	**Minneapolis**	**Tr. 1873-1915**	**6 12 56.845**	**93 14 12.68**				(44 58.6)					
1871	Minnesota Point, north base (U. S. L. S.).	Tr. 1871	6 08 18.016	92 04 30.24	+2.15	−1.09	Minnesota Point north base, 1870.	46 45 28.225	92 04 32.39	42.521	−10.13	+.6851	[1]−6.94
1878	Red Wing (U. S. L. S.)	Tr. 1878	6 10 07.906	92 31 58.59				(44 33.7)					
1871	St. Paul (U. S. L. S.)	Tr. 1871	6 12 21.806	93 05 27.09				(44 56.7)					
1907	Stephen west base	Tr. 1907-8	6 27 25.147	96 51 17.20	+.47	−.04	Stephen west base, 1903-1907.	48 27 23.134	96 51 17.67	21.101	−3.43	+.6632	[1]−2.27
1915	Warroad south base (U. S. & C.).	Tr. 1915	6 21 18.178	95 19 32.67	.00	+.07	Warroad south base (U. S. & C.).	48 55 20.165	95 19 32.67	34.149	−1.47	+.6571	−.97
	MISSISSIPPI												
1878	Greenville	Tr. 1878	6 04 15.513	91 03 52.70	+.70	+.51	Greenville, Episcopal Church, cross.	[2]33 24 42	91 03 53.40				
1878	Natchez	do	6 05 36.323	91 24 04.84	+1.55	+1.54	Natchez, Catholic Church spire, cross.	[2]31 33 31	91 24 06.39				
1914	Strickland	Tr. 1914	5 53 43.106	88 25 46.59	+.23	−.02	Strickland, 1914	34 51 38.306	88 25 46.82	44.527	+2.29	+.8206	+1.88
1878	Vicksburg (Fort)	Tr. 1878	6 03 32.233	90 53 03.50	+.31	−.52	Fort, 1878	[2]32 20 28	90 53 03.81				
	MISSOURI												
1907	Berger	Tr. 1907	6 05 10.044	91 17 30.66	−.12	−.64	Berger, 1874	38 35 58.120	91 17 30.54	27.984	+2.56	+.7815	[1]+2.00
1884	Bolivar (U. S. G. S.)	Tr. 1884	6 13 39.272	93 24 49.08				(37 36.6)					
1890	Ironton	Tr. 1890	6 02 30.791	90 37 41.86				(37 36.5)					
1882	**Kansas City**	**Tr. 1882-83**	**6 18 21.404**	**94 35 21.06**	−8.71	+5.41	Kansas City, Second Presbyterian Church, 1874.	39 05 55.813	94 35 12.35	13.448	−1.10	+.7761	[1]−.85
1907	Knob Noster	Tr. 1907	6 14 12.498	93 33 07.47	.00	+.12	Knob Noster, 1882	38 46 35.456	93 33 07.47	7.090	+.38	+.7796	[1]+.30
1878	Louisiana (U. S. L. S.)	Tr. 1878	6 04 12.376	91 03 05.64				(39 27.2)					
1892	Macon	Tr. 1892	6 09 53.308	92 28 19.62				(39 44.5)					
1890	Potosi	Tr. 1890	6 03 09.350	90 47 20.25				(37 56.2)					
1881	**St. Louis**	**Washington University, Tr. 1881-82.**	**6 00 49.256**	**90 12 18.84**	−2.90	−2.40	St. Louis, Second Presbyterian Church spire, 1871.	38 37 56.190	90 12 15.94	14.534	+1.41	+.7812	[1]+1.10
1884	Springfield (U. S. G. S.)	Tr. 1884	6 13 09.265	93 17 18.98				(37 13.3)					
	MONTANA												
1903	Chinook	Tr. 1903	7 16 54.884	109 13 43.26				(48 35.5)					
1897	Hamilton (U. S. G. S.)	Tr. 1897	7 36 36.626	114 09 09.39				(46 14.9)					
1888	**Helena**	**Tr. 1888-1903**	**7 28 08.789**	**112 02 11.84**				(46 35.3)					
1912	Mondak	Tr. 1912	6 56 11.139	104 02 47.09	+.01	−.13	Mondak, 1912	48 00 10.435	104 02 47.10	48.867	−1.77	+.6691	−1.18
	NEBRASKA												
1869	**Omaha**	**Tr. 1869-1891**	**6 23 46.087**	**95 56 31.30**				(41 15.7)					
1907	Page southwest base	Tr. 1907	6 33 43.448	98 25 51.72	.00	−.04	Page southwest base, 1900	42 25 25.518	98 25 51.72	59.745	−8.02	+.7382	[1]−5.92
	NEVADA												
1889	Austin	Tr. 1889	7 48 17.816	117 04 27.24	−.22	+.06	Austin longitude eccentric, 1898.	39 29 32.650	117 04 27.02	11.991	+15.03	+.7717	[1]+11.60
1889	Carson City	do	7 59 02.973	119 45 44.60	+6.45	−.83	Carson, Capitol dome, 1897.	39 09 51.358	119 45 51.05	55.513	−4.46	+.7753	[1]−3.46
1889	Eureka	do	7 43 50.504	115 57 37.56	.00	.00	Eureka longitude, 1889	39 30 48.342	115 57 37.56	30.639	+6.92	+.7715	[1]+5.34
1880	Fort McDermit, (U. S. L. S.)	Tr. 1880	7 50 30.136	117 37 32.04				(41 58)					
1889	Genoa	Tr. 1889	7 59 21.489	119 50 22.34	−2.41	−1.29	Genoa, flagstaff, 1897	39 00 12.405	119 50 19.93	43.962	−24.03	+.7771	[1]−18.67
1916	Moapa	Tr. 1916	7 38 29.940	114 37 29.10	.00	−1.21	U. S. C. & G. S. bench mark I 1.	(36 40.2)	114 37 29.10				
1902	Tonopah	Tr. 1902	7 48 56.282	117 14 04.23	.00	.00	Tonopah astronomic, 1902	38 04 08.546	117 13 64.23	55.808	+8.42	+.7873	+6.63
1889	Verdi	Tr. 1889	7 59 55.527	119 58 52.90	.00	.00	Verdi longitude, 1889	39 31 14.486	119 58 52.90	58.129	−5.23	+.7714	[1]−4.03
1872	Verdi east base	Tr. 1872	7 59 51.108	119 57 46.62	.00	.00	Verdi east base, 1872	39 31 06.103	119 57 46.62	51.869	−5.25	+.7714	−4.05
1889	Virginia City	Tr. 1889	7 58 34.805	119 38 42.08	.00	.00	Virginia City astronomic, 1889.	39 18 39.641	119 38 42.08	50.028	−7.95	+.7737	[1]−6.15
	NEW JERSEY												
1881	**Cape May**	**Tr. 1881-1891**	**4 59 43.045**	**74 55 45.68**	−.17	+1.28	Pole on arbor, 1881	38 55 49.944	74 55 45.51	47.283	−1.77	+.7779	[1]−1.38
1847	Jersey City	Loomis's Observatory, Tr. 1847.	4 56 08.653	74 02 09.80				(40 43)					

[1] Topographic deflection computed. See p. 92.

[2] Approximate North American datum.

TABLE XXVI.—*Deflections of the vertical at longitude stations*—Continued

Astronomic station							Geodetic station						
Year	Name of station	Reference point	Astronomic longitude: Time	Astronomic longitude: Arc	Reduction to geodetic station: Longitude	Reduction to geodetic station: Latitude	Name of station	Geodetic latitude	Astronomic longitude A	Geodetic longitude G	A−G	Cos φ	A−G in prime vertical
			h. m. s.	° ′ ″	″	″		° ′ ″	° ′ ″	″	″		″
	NEW MEXICO												
1885	Albuquerque (U. S. G. S.)	Tr. 1885	7 06 36.924	106 39 13.86				(35 04.5)					
1892	Corner Boundary (United States and Mexico).	Tr. 1892	7 12 50.012	108 12 30.18	+0.03	+1.17	Monument No. 40 (United States and Mexico).	31 47 01.265	108 12 30.21	29.563	+0.65	+0.8500	+0.55
1882	Fort Selden	Tr. 1882	7 07 41.011	106 55 15.16				(32 29.4)					
1920	Glen Rio	Tr. 1920	6 52 09.978	103 02 20.67	−.40	−.02	Glen Rio, 1921	35 10 04.666	103 02 29.27	31.641	−2.37	+.8175	−1.94
1911	Jarilla	Tr. 1911	7 04 27.548	106 06 53.22	+.10	+.01	Jarilla, 1909	32 23 59.912	106 06 53.32	45.737	+7.58	+.8443	+6.40
1920	Los Lunas	Tr. 1920	7 06 56.799	106 44 11.98	+.03	+.28	Los Lunas, 1920	34 48 26.704	106 44 12.01	7.075	+4.94	+.8211	+4.06
1895	**Santa Fe**	**U. S. Engineers and U. S. Coast and Geodetic Survey, Tr. 1873–1895.**	**7 03 46.805**	**105 56 42.08**				(35 41.3)					
	NEW YORK												
1891	**Albany**	**Dudley Observatory, old site, dome.**	**4 54 59.902**	**73 44 59.88**	−.82	+.06	Dudley Observatory, Coast and Geodetic Survey longitude, 1858.	42 39 51.84	73 44 59.06	60.66	−1.60	+.7353	[1]−1.18
1896	do	Dudley Observatory, new site, meridian.	4 55 07.124	73 46 46.86				(42 39.2)					
1868	Buffalo (U. S. L. S.)	Tr. 1868	5 15 28.079	78 52 01.18	+16.22		Buffalo, intersection of axes of Exchange and Michigan Streets (U. S. L. S.).	42 52 40.98	78 52 17.40	13.25	+4.15	+.7328	[1]+3.04
1873	Carpenters Point	Tr. 1873	4 58 46.716	74 41 40.74				(41 21.4)					
1868	Dunkirk (U. S. L. S.)	Tr. 1868	5 17 17.979	79 19 29.68	+115.50		Dunkirk New Lighthouse (U. S. L. S.), 1876.	42 29 37.68	79 21 25.18	14.81	+10.37	+.7374	[1]+7.65
1914	Far Rockaway	Tr. 1914	4 55 00.078	73 45 01.17	.00	.00	Far Rockaway, Coast and and Geodetic Survey longitude pier, 1914.	40 36 00.249	73 44 61.17	58.628	+2.54	+.7593	+1.93
1877	Finn	Tr. 1877	5 03 02.203	75 45 33.04				(42 00.0)					
1896	Ithaca	College of Engineering, observatory, Tr. 1896.	5 05 56.471	76 29 07.06				(42 26.8)					
1908	Kit	Tr. 1908	4 55 56.394	73 59 05.91	.00	.00	Kit, 1905	[2]41 30 12.36	73 58 65.91	[2]59.00	+6.91	+.7490	[1]+5.18
1875	Mannsville (U. S. L. S.)	Tr. 1875	5 04 15.487	76 03 52.31	−26.22	+7.53	Mannsville (U. S. L. S.), 1874.	42 42 54.484	76 03 26.00	13.498	+12.59	+.7228	[1]+9.10
1858	New York City	Rutherford's observatory, Tr. 1858.	4 55 57.385	73 59 20.78	+.04	.00	Rutherford's observatory, 1848.	40 43 51.45	73 59 20.82	14.42	+6.40	+.7578	+4.85
1911	do	Manhattan Square, Tr. 1911.	4 55 54.429	73 58 36.44				(40 46.9)					
1868	Ogdensburg (U. S. L. S.)	Tr. 1868	5 01 59.359	75 29 50.38	+27.86		Ogdensburg Lighthouse, dome (U. S. L. S.)	44 41 52.44	75 30 18.24	14.71	+3.53	+.7108	[1]+2.51
1868	Oswego (U. S. L. S.)	do	5 06 01.549	76 30 23.24	+29.09	−69.47	Oswego (U. S. L. S.), 1875	43 26 37.313	76 30 52.33	49.281	+3.05	+.7261	[1]+2.21
1868	Rochester (U. S. L. S.)	do	5 10 30.619	77 37 39.28	−48.92		Rochester, city hall, statue, (U. S. L. S.), 1875.	43 09 18.05	77 36 50.36	49.60	+.76	+.7295	[1]+.55
1915	Rochester	Bausch and Lomb Observatory, M. C. pier, Tr. 1915.	5 10 29.639	77 37 24.58				43 10 30					
1875	Tonawanda (U. S. L. S.)	Tr. 1875	5 15 33.339	78 53 20.08	+.42	−.02	Tonawanda (U. S. L. S.), 1875	43 00 03.730	78 53 20.50	20.885	−.38	+.7313	[1]−.28
1877	Travis	Tr. 1877	5 01 25.613	75 21 24.20				(42 00.0)					
1868	Watertown (U. S. L. S.)	Tr. 1868	5 03 39.609	75 54 54.14	+7.14		Watertown, courthouse (U. S. L. S.), 1874.	43 58 32.311	75 54 61.28	52.959	+8.32	+.7196	[1]+5.99
	NORTH CAROLINA												
1918	Lee	Tr. 1918	5 16 41.971	79 10 29.56	−.65	−2.66	Lee, 1918	35 28 47.235	79 10 28.91	37.053	−8.14	+.8143	−6.63
1918	Littleton	do	5 11 39.623	77 54 54.34	+.29	−.22	Littleton, 1918	36 25 55.621	77 54 54.63	62.598	−7.97	+.8046	−6.41
1853	Raleigh	Tr. 1853–54	5 14 32.354	78 38 05.31	.00	.60	Raleigh longitude, 1853	35 46 46.90	78 38 05.31	19.00	−13.69	+.8113	−11.11
1878	Statesville	Tr. 1878	5 23 34.754	80 53 41.31	−.89	+1.39	Simonton College, center of cupola, 1879.	35 46 57.80	80 53 40.42	39.01	+1.41	+.8112	[1]+1.14
1854	Wilmington (De Rosset)	Tr. 1854–1856	5 11 46.449	77 56 36.74	+1.11	+.46	Wilmington, St. James Church, 1854.	34 14 06.835	77 56 37.85	45.659	−7.81	+.8268	−6.46
	NORTH DAKOTA												
1890	**Bismarck**	**Tr. 1890**	**6 43 07.938**	**100 46 59.07**				(46 48.5)					
1912	Bowman	Tr. 1912	6 53 36.440	103 24 06.60	−.56	−.27	Bowman, water tank, 1912	46 10 57.262	103 24 06.04	10.452	−4.41	+.6924	−3.05
1892	Jamestown (U. S. G. S.)	Tr. 1892	6 34 48.774	98 42 11.61				(46 54.2)					
	OHIO												
1868	Ashtabula (U. S. L. S.)	Tr. 1868	5 23 10.549	80 47 38.24				(41 52.6)					
1848	Cincinnati	Mount Adams Observatory, Tr. 1848.	5 37 59.129	84 29 46.94				(39 06.4)					
1881	**do**	**Mount Lookout Observatory dome.**	**5 37 41.398**	**84 25 20.97**	+.16	−.13	Observatory, 1889	39 08 20.787	84 25 21.13	21.540			
		Tr. 1881	5 37 41.435	84 25 21.52	−.39	−1.09	do	39 08 20.787	84 25 21.13	21.540	−.41	+.7756	[1]−.32
1868	Cleveland (U. S. L. S.)	Tr. 1868	5 26 47.809	81 41 57.14	+15.34		Cleveland Lighthouse (U. S. L. S.), 1877.	41 30 01.40	81 42 12.48	8.68	+3.80	+.7490	[1]+2.85
1871	Cleveland	Tr. 1871	5 26 45.943	81 41 29.14	−2.45	+2.24	Marine hospital, dome (U. S. L. S.).	41 30 23.12	81 41 26.69	26.76	−.07	+.7489	[1]−.05
1871	Columbus	do	5 31 58.904	82 59 43.56				(39 57.7)					
1891	Elizabethtown	Tr. 1891	5 39 13.499	84 48 22.48				(39 09.5)					
1849	Hudson	Western Reserve College Observatory, Tr. 1849.	5 25 44.239	81 26 03.58				(41 14.7)					
1859	Hudson (U. S. L. S.)	Western Reserve College Observatory, Tr. 1859.	5 25 45.079	81 26 16.18				(41 14.7)					
1868	Sandusky (U. S. L. S.)	Tr. 1868	5 30 53.410	82 43 21.29				(41 27)					
1864	South Point	Tr. 1864	5 30 21.853	82 35 27.80				(38 25.2)					
1881	Toledo (U. S. L. S.)	Tr. 1881	5 31 09.996	83 32 29.94	.00	.00	Toledo stone longitude post (U. S. L. S.), 1881.	41 39 04.36	83 32 29.94	31.00	−1.06	+.7472	[1]−.79
	OKLAHOMA												
1920	Allen	Tr. 1920	6 25 39.657	96 24 54.86	+.12	.00	Allen, 1920	34 53 26.592	96 24 54.98	64.299	−9.32	+.8202	−7.64
1920	Dill	do	6 36 30.860	99 07 42.90	−.41	.00	Dill, 1920	35 17 24.334	99 07 42.49	40.487	+2.00	+.8162	+1.63
1892	Guthrie (U. S. G. S.)	Tr. 1892	6 29 42.296	97 25 34.44	.00	.00	Guthrie (U. S. G. S.)	35 52 39.74	97 25 34.44	36.62	−2.18	+.8103	−1.77
1899	Marlow	Tr. 1899–1907	6 31 50.699	97 57 40.48	.00	.00	Marlow longitude, 1899	34 38 50.54	97 57 40.48	38.42	+2.06	+.8226	[1]+1.69
1907	Pond Creek	Tr. 1907–1920	6 31 11.255	97 47 48.82	.00	−.02	Pond Creek astronomic, 1906	36 40 07.573	97 47 48.82	51.586	−2.77	+.8021	[1]−2.22
1895	Savanna (U. S. G. S.)	Tr. 1895	6 23 21.435	95 50 21.52				(34 48.8)					
	OREGON												
1897	Baker (U. S. G. S.)	Tr. 1897	7 51 20.645	117 50 09.68				(44 46.7)					
1918	Baker (U. S. N.)	Tr. 1918	7 51 23.014	117 50 45.21				(44 47.4)					
1916	Echo	Tr. 1916	7 56 45.953	119 11 29.30	.00	−.10	Echo, 1916	45 44 38.385	119 11 29.30	20.222	+9.08	+.6979	+6.34
1894	Eugene (U. S. G. S.)	Tr. 1894	8 12 21.975	123 05 29.62	.00	.00	Eugene astronomic, 1894	44 03 30.319	123 05 29.62	28.438	+1.18	+.7186	[1]+.85
1911	Fort Stevens	Tr. 1911	8 15 52.336	123 58 05.04	.00	.00	Fort Stevens longitude, 1911	46 12 27.600	123 57 65.04	39.853	+25.19	+.6920	+17.43
1916	La Grande	Tr. 1916	7 52 22.488	118 05 37.32	−1.85	−2.47	La Grande, 1916	45 19 49.467	118 05 35.47	39.346	−3.88	+.7030	−2.73
1887	**Portland**	**Tr. 1887–88**	**8 10 42.838**	**122 40 42.57**	−.78	+4.39	Oregonian, 1903	45 31 13.209	122 40 41.79	38.967	+2.82	+.7007	[1]+1.98
1888	Yaquina	Tr. 1888	8 16 03.743	124 00 56.14				(44 36.6)					
	PENNSYLVANIA												
1869	Allegheny	Allegheny Observatory, old site, dome.	5 20 03.087	80 00 46.30	.00	.00	Allegheny Observatory, old site, dome (U. S. G. S.), 1900.	40 27 42.17	80 00 46.30	44.09	+2.21	+.7609	+1.68
1907	do	Allegheny Observatory, new site, transit pier.	5 20 05.392	80 01 20.88	−.73	.00	Allegheny Observatory, new site, center of main dome (U. S. G. S.), 1900.	40 28 57.26	80 01 20.15	16.94	+3.21	+.7606	+2.44
1890	Altoona	Tr. 1890	5 13 32.967	78 23 14.50	.00	.00	Altoona (U. S. G. S.), 1900	40 31 47.24	78 23 14.50	23.88	−9.38	+.7600	−7.13
1877	Burt	Tr. 1877	5 06 54.723	76 43 40.84				(42 00.1)					
1868	Erie (U. S. L. S.)	Tr. 1869	5 20 21.249	80 05 18.74	−32.40		Erie Lighthouse (U. S. L. S.)	42 09 11.66	80 04 46.34	39.22	+7.12	+.7414	[1]+5.28

[1] Topographic deflection computed. See p. 92.

[2] Unadjusted.

TABLE XXVI.—*Deflections of the vertical at longitude stations*—Continued

Astronomic station							Geodetic station						
Year	Name of station	Reference point	Astronomic longitude: Time	Astronomic longitude: Arc	Reduction to geodetic station: Longitude	Reduction to geodetic station: Latitude	Name of station	Geodetic latitude	Astronomic longitude A	Geodetic longitude G	A−G	Cos φ	A−G in prime vertical
	PENNSYLVANIA—continued		h. m. s.	° ′ ″	″	″		° ′ ″	° ′ ″	″	″		″
1912	Flower Observatory, University of Pennsylvania.	Dome	5 01 06.824	75 16 42.36				(39 58.0)					
1877	Harrisburg	Tr. 1877	5 07 31.359	76 52 50.38				(40 15.7)					
1847	Philadelphia	Central (old) High School, meridian circle, 1846-1849.	5 00 38.543	75 09 38.14	0.00	0.00	Central (old) High School Observatory.	39 57 47.188	[1]75 09 38.14	40.806			
1883	Smiths Ferry	Tr. 1883	5 22 00.246	80 30 03.69	.00	.00	Smiths Ferry (U. S. G. S.), 1900.	40 38 48.07	80 30 03.69	5.06	−1.37	+0.7587	−1.04
	SOUTH CAROLINA												
1907	Allendale	Tr. 1907	5 25 14.272	81 18 34.08	+.01	+.36	Allendale latitude, 1907	33 00 31.476	81 18 34.09	40.662	−6.57	+.8386	[1]−5.51
1918	Bethune I	Tr. 1918	5 21 01.588	80 15 23.82	.00	−.77	Bethune I, 1918	34 28 07.227	80 15 23.82	29.426	−5.61	+.8245	−4.63
1896	**Charleston**	**Tr. 1880-1896**	**5 19 44.076**	**79 56 01.14**	+8.48	−5.92	Orphan Asylum	[3]32 47 10	79 56 09.62				
1854	Columbia	Tr. 1854-1856	5 24 08.181	81 02 02.72				(34 00.0)					
	SOUTH DAKOTA												
1907	Howard	Tr. 1907	6 30 06.386	97 31 35.79	−.56	+.11	Howard, courthouse dome, 1903.	44 00 55.075	97 31 35.23	35.900	−.67	+.7191	[1]−.48
1912	Provo	Tr. 1912	6 55 18.516	103 49 37.74	−.06	−.40	Provo astronomic, 1912	43 11 44.159	103 49 37.68	41.058	−3.38	+.7291	−2.46
1890	Rapid City (U. S. G. S.)	Tr. 1890	6 52 52.045	103 13 00.68				(44 04.8)					
1896	Sioux Falls (U. S. G. S.)	Tr. 1896	6 26 54.004	96 43 30.06				(43 32.6)					
	TENNESSEE												
1883	Jellico	Tr. 1883	5 36 30.046	84 07 30.69				(36 35.4)					
1907	Knoxville	Tr. 1907	5 35 42.287	83 55 34.30	+.03	+1.53	Knoxville College, cupola, 1884.	35 57 26.295	83 55 34.33	33.100	+1.23	+.8095	[1]+1.00
1914	Martin	Tr. 1914	5 59 11.436	89 47 51.54	−.26	+.38	Martin, 1914	35 04 41.077	89 47 51.28	52.191	−.91	+.8184	−.74
1877	Memphis	Tr. 1877	6 00 13.143	90 03 17.14	+2.17	−5.70	Memphis (M. R. C.), 1879	(35 08.7)	90 03 19.31				
1877	Memphis (U. S. L. S.)	do	6 00 13.226	90 03 18.39	+1.25	+.42	do	(35 08.7)	90 03 19.64				
1879	**Nashville**	**Tr. 1877-1916**	**5 47 08.083**	**86 47 01.24**	+2.57	−.50	Nashville, capitol, 1879	36 09 57.068	86 47 03.81	02.819	+.99	+.8073	[1]+.80
1898	Waverly (U. S. G. S.)	Tr. 1898	5 51 10.458	87 47 36.87	.00	.00	Waverly (U. S. G. S.), 1896	36 04 58.7	87 47 36.87	43.5	−6.6	+.8082	−5.3
	TEXAS												
1906	Alice	Tr. 1906	6 32 17.889	98 04 28.34	.00	−.03	Alice, 1904	27 44 33.012	98 04 28.34	30.885	−2.54	+.8850	[1]−2.25
1895	**Austin**	**Tr. 1895-1906**	**6 30 57.024**	**97 44 15.36**	+5.02	+1.83	Austin, capitol, dome, star in hand of Liberty, 1903.	30 16 27.968	97 44 20.38	25.032	−4.65	+.8636	[1]−4.02
1911	Boracho	Tr. 1911	6 57 33.781	104 23 26.72	.00	+.21	Boracho, 1911	31 04 34.202	104 23 26.72	24.716	+2.00	+.8565	+1.71
1907	Bowie, northwest base	Tr. 1907	6 32 01.329	98 00 19.94	.00	.00	Bowie, northwest base, 1900	33 37 21.756	98 00 19.94	14.492	+5.45	+.8327	[1]+4.54
1885	Brownsville	Tr. 1885	6 29 58.248	97 29 33.72	.00	.00	Brownsville, 1885	25 53 52.910	97 29 33.72	31.202	+2.52	+.8996	[1]+2.27
1889	Cisco (U. S. G. S.)	Tr. 1889	6 35 55.797	98 58 56.96	.00	.00	Cisco astronomic (U. S. G. S.), 1908.	32 23 24.857	98 58 56.96	59.617	−2.66	+.8444	−2.25
1920	Conway	Tr. 1920	6 45 31.716	101 22 55.74	+27.05	−2.11	Conway, 1920	35 12 24.229	101 23 22.79	23.044	−.25	+.8171	−.20
1913	Donna	Tr. 1913	6 32 11.363	98 02 50.44	−1.14	−.01	Donna, 1913	26 09 40.459	98 02 49.30	45.414	+3.89	+.8976	+3.49
1918	Dryden, east base	Tr. 1918	6 48 23.397	102 05 50.96	.00	−.40	Dryden, east base, 1918	30 02 39.865	102 05 50.96	55.380	−4.42	+.8656	−3.83
1892	**El Paso**	**Tr. 1892-1899**	**7 05 57.386**	**106 29 20.79**	+2.51	+.63	West, 1911	31 45 36.435	106 29 23.30	29.968	−6.67	+.8503	−5.67
1885	**Galveston**	**Tr. 1895**	**6 19 09.928**	**94 47 28.92**	−1.88	+3.67	Galveston Cathedral, north tower, 1849.	29 18 13.831	94 47 26.04	26.290	−.25	+.8720	−.22
1903	Higgins (U. S. G. L. O.)	Tr. 1903	6 40 05.532	100 01 22.98				(36 30)					
1919	Jacksonville	Tr. 1919	6 21 07.381	95 16 50.72	.00	−.31	Jacksonville, 1918	31 57 54.475	95 16 50.72	50.743	−.02	+.8484	−.02
1919	Johnstone	do	6 43 04.720	100 46 10.80	−.24	+.09	Johnstone, 1918	29 22 38.529	100 46 10.56	11.628	−1.07	+.8714	−.93
1919	Laplace	do	6 41 58.193	100 29 32.90	.00	−.11	Laplace, 1918	28 42 46.426	100 29 32.90	33.719	−.82	+.8770	−.72
1895	Laredo	Tr. 1895-1919	6 38 04.164	99 31 02.46	−1.57	−2.04	Laredo, north wireless mast, 1917.	27 30 25.279	99 31 00.89	6.895	−6.00	+.8870	−5.32
1911	Matagorda	Tr. 1911	6 23 52.643	95 58 09.64	.00	−.07	Matagorda 2, 1911	28 41 35.247	95 58 09.64	8.092	+1.55	+.8772	+1.36
1903	Monahans (U. S. G. L. O.)	Tr. 1903	6 51 34.888	102 53 43.32				(32 00)					
1906	Point Isabel	Tr. 1906	6 28 49.737	97 12 26.05	+.38	−.77	Fronton, 1867	26 04 41.082	97 12 26.43	25.517	+.91	+.8982	[1]+.82
1902	Red River (U. S. G. L. O.)	Tr. 1902	6 40 01.244	100 00 18.66	.00	.00	Red River, longitude (U. S. G. L. O.), 1923.	34 22 18.19	100 00 18.66	21.29	−2.63	+.8254	−2.17
1911	Sabine Pass	Tr. 1911	6 15 33.309	93 53 19.64	+10.08	−6.48	Sabine Pass, Baptist Church spire, 1906.	29 44 03.208	93 53 29.72	31.731	−2.01	+.8683	−1.75
1890	Sierra Blanco (U. S. G. S.)	Tr. 1890	7 01 25.757	105 21 26.36				(31 10.5)					
1896	Spofford (U. S. G. S.)	Tr. 1896	6 41 38.499	100 24 37.48				(29 10.5)					
1911	Stanton	Tr. 1911-1919	6 47 05.362	101 46 20.43	.00	+.07	Stanton, 1909	32 07 33.087	101 46 20.43	24.746	−4.32	+.8469	−3.66
1920	Tehuacana	Tr. 1920	6 26 12.001	96 33 00.02	−.02	+.17	Tehuacana, 1918	31 44 16.472	96 32 60.00	56.794	+3.21	+.8505	+2.73
1903	Texline (U. S. G. L. O.)	Tr. 1903	6 52 04.372	103 01 05.58				(36 30)					
	UTAH												
1898	Green River	Tr. 1898	7 20 39.539	110 09 53.08	.00	+20.35	Green River, north meridian, 1898.	38 59 50.639	110 09 53.08	55.658	−2.58	+.7772	[1]−2.01
1916	Lund	Tr. 1916	7 33 44.196	113 26 02.94	+.04	+.87	Lund (proposed)	(38 00.4)					
1898	Oasis	Tr. 1898	7 30 31.694	112 37 55.41	.00	+.17	Oasis south meridian, 1898	39 17 38.149	112 37 55.41	44.336	+11.07	+.7702	[1]+8.53
1886	Ogden	U. S. E. Observatory, 1873-1886.	7 27 59.706	111 59 55.59	.00	.00	Ogden longitude, 1873-1886	41 13 12.554	111 59 55.59	37.990	+17.60	+.7522	[1]+13.24
1869	**Salt Lake City**	**Tr. 1869-1916**	**7 27 35.173**	**111 53 47.60**	+.04	−.81	Salt Lake City azimuth, 1893	40 46 11.574	111 53 47.64	27.343	+20.30	+.7574	[1]+15.38
	VIRGINIA												
1882	Charlottesville	McCormick Observatory, Tr. 1882.	5 14 05.340	78 31 20.10	.00	.00	Charlottesville, McCormick Observatory longitude, 1882.	38 01 58.06	78 31 20.10	20.62	−.52	+.7877	[1]−.41
1883-4	Covington	Tr. 1883-84	5 19 58.673	79 59 40.10				(37 47.3)					
1869	Goodson	Tr. 1869	5 28 44.993	82 11 14.90				(36 35.8)					
1907	Mount Weather	Tr. 1907	5 11 33.372	77 53 20.58	+.14	−.92	Mount Weather, 1907	39 03 48.556	77 53 20.72	16.503	+4.22	+.7764	[1]+3.28
1852	Roslyn (Petersburg)	Tr. 1852-1854	5 09 35.108	77 23 46.62	−.39	−.02	Roslyn, 1852	37 14 28.33	77 23 46.23	50.71	−4.48	+.7961	[1]−3.57
1869	Staunton	Tr. 1869	5 16 17.083	79 04 16.24	.00	.00	Staunton longitude, 1869	38 08 46.545	79 04 16.24	19.077	−2.84	+.7864	[1]−2.23
1881	Strasburg	Tr. 1881	5 13 26.380	78 21 35.70	.00	.00	Strasburg longitude, 1881	38 59 29.96	78 21 35.70	39.01	−3.31	+.7772	[1]−2.57
1919	Suffolk	Tr. 1919	5 06 17.878	76 34 28.17	+1.19	−.22	Suffolk, 1918	36 44 01.332	76 34 29.36	41.256	−11.90	+.8014	−9.54
	WASHINGTON												
1908	Blaine	Tr. 1908	8 11 00.720	122 45 10.80	−.03	−.11	Miller, 1905	48 59 20.348	122 45 10.77	2.771	+8.00	+.6562	[1]+5.25
1895	Ellensburg (U. S. G. S.)	Tr. 1895	8 02 09.774	120 32 26.61				(46 59.9)					
1873	Kalama	Tr. 1873	8 11 22.321	122 50 34.82	.00	.00	Kalama astronomic, 1872	[2]46 00 25.78	122 50 34.82	[2]26.44	+8.38	+.6946	+5.82
1888	Port Townsend	Tr. 1888	8 11 00.466	122 45 06.99	−2.89	−1.50	Port Townsend, 1908	48 07 05.604	122 45 04.10	14.929	−10.83	+.6676	[1]−7.23
1888	**Seattle**	**Tr. 1886-1894**	**8 09 20.358**	**122 20 05.37**	.00	.00	Seattle longitude, 1886-1888	47 36 32.215	122 20 05.37	2.189	+3.18	+.6742	[1]+2.14
1908	Seattle	University of Washington, new site, transit pier.	8 09 14.090	122 18 31.35	.00	.00	Seattle, University of Washington longitude, 1908.	47 39 39.12	122 18 31.35	30.47	+.88	+.6735	[1]+.59
1888	Spokane	Tr. 1888	7 49 43.226	117 25 48.39				(47 39.9)					
1894	Tacoma	Tr. 1894	8 09 47.517	122 26 52.76	.00	.00	Tacoma astronomic, 1892	47 15 47.911	122 26 52.76	51.446	+1.31	+.6786	[1]+.89
1887	**Walla Walla**	**Tr. 1887-88**	**7 53 23.331**	**118 20 49.96**				(46 03.9)					
	WEST VIRGINIA												
1864	Cameron	Tr. 1864	5 22 17.613	80 34 24.20				(39 49.8)					
1883	Charleston	Tr. 1883	5 26 32.130	81 38 01.95	.00	.00	Charleston astronomic, 1881	38 21 02.287	81 37 61.95	59.193	+2.76	+.7842	[1]+2.16
1863-4	Clarksburg	Tr. 1863-64	5 21 21.583	80 20 23.74				(39 16.9)					
1864	Gauley Bridge	Tr. 1864	5 24 51.943	81 12 59.14				(38 09.2)					
1864	Grafton	do	5 20 06.833	80 01 42.50				(39 20.6)					
1864	Martinsburg	do	5 11 49.613	77 57 24.20				(39 27.4)					
1864	Parkersburg	do	5 26 16.833	81 34 12.50				(39 16.0)					
1864	Point Pleasant	do	5 28 35.133	82 08 47.00				(38 50.5)					
1864	Wheeling	do	5 22 54.553	80 43 38.30				(40 04.1)					

[1] Topographic deflection computed. See p. 92. [2] Unadjusted. [3] Approximate North American datum. [4] Not accurate enough for deflection purposes.

TABLE XXVI.—*Deflections of the vertical at longitude stations*—Continued

Astronomic station							Geodetic station						
Year	Name of station	Reference point	Astronomic longitude		Reduction to geodetic station		Name of station	Geodetic latitude	Astronomic longitude A	Geodetic longitude G	A−G	Cos φ	A−G in prime vertical
			Time	Arc	Longitude	Latitude							
			h. m. s.	° ′ ″	″	″		° ′ ″	° ′ ″	″	″		″
	WISCONSIN												
1901	Fennimore	Tr. 1901	6 02 36.917	90 39 13.76				(42 59)					
1864	Fort Howard (U. S. L. S.)	Tr. 1864	5 52 03.869	88 00 58.04	+95.36	−48.23	Fort Howard (U. S. L. S.), 1872.	44 30 30.404	88 02 33.40	33.209	+0.19	+0.7132	[1]+0.14
1873	La Crosse	Tr. 1873	6 04 59.237	91 14 48.56				(43 48.8)					
1895	Madison	Washburn Observatory, meridian circle, 1873–1891.	5 57 38.085	89 24 31.28	+.11	.00	Madison latitude, 1873	(43 04.6)					
1865	Menominee (U. S. L. S.)	Tr. 1865	5 50 29.349	87 37 20.24	-113.08		Menominee (U. S. L. S.), 1874.	45 05 12.899	87 35 27.16	33.706	−6.55	+.7060	[1]−4.62
1873	Valley Junction (U. S. L. S.)	Tr. 1873	6 01 38.576	90 24 38.64				(44 03.2)					
1900	Yerkes Observatory	Meridian circle	5 54 13.008	88 33 15.12				(42 34.2)					
	WYOMING												
1896	Sheridan (U. S. G. S.)	Tr. 1896	7 07 47.108	106 56 46.62				(44 48.5)					
1872	Sherman	Tr. 1872	7 01 34.243	105 23 33.64				(41 07.8)					
1912	Wheatland	Tr. 1912	6 59 48.649	104 57 09.74	+1.10	+.21	Wheatland standpipe, 1912	42 02 43.815	104 57 10.84	26.898	−16.06	+.7426	−11.93
1892	Yellowstone Lake	Tr. 1892	7 21 34.954	110 23 44.31				(44 33.3)					
	CANADA												
1857	Fredericton	Toldervy's Observatory, Tr. 1857.	4 26 33.127	66 38 16.90				(45 59)					
1860	Goderich (U. S. L. S.)	Tr. 1860	5 26 51.099	81 42 46.48				(43 44.4)					
1851	Halifax	Naval Yard Observatory, Tr. 1851.	4 14 21.614	63 35 24.21				(44 39)					
1883–1892	**Montreal**	**McGill College Observatory, east transit pier.**	**4 54 18.634**	**73 34 39.51**				(45 30.3)					
	ENGLAND												
	Greenwich	**Royal Observatory, meridian circle.**	**0 00 00.000**	**0 00 00.00**				(51 28.6)					
	FRANCE												
1870–1872	**Brest**	**Tower of St. Louis**	**17 57.597**	**4 29 23.96**				(48 23)					
1872	**Paris**	**Observatory of Paris, meridian of France.**	**9 20.968E**	**2 20 14.52E**				(48 50.2)					
	GUAM ISLAND												
1903	Guam	Tr. 1903	9 38 35.466E	144 38 51.99E				(13 26.4)					
	HAWAII												
1903	Honolulu	Tr. 1903	10 31 27.732	157 51 55.98				(21 18.4)					
	IRELAND												
1866	**Follhommerum**	**Tr. 1866**	**0 41 33.409**	**10 23 21.14**				(51 55)					
	MEXICO												
1895	Tacubaya	National Observatory, meridian circle.	6 36 46.986	99 11 44.79				(19 24.3)					
	MIDWAY ISLAND												
1903–4	Midway	Tr. 1903–4	11 49 30.952	177 22 44.28				(28 13)					
	NEW FOUNDLAND												
1866	**Hearts Content**	**Tr. 1866**	**3 33 29.788**	**53 22 26.82**				(47 51)					
	PHILIPPINES												
1903	Manila	Tr. 1903	8 03 52.202E	120 58 03.03E	+3.36	−1.53	Manila, Cathedral dome, cross.	[2]14 35 34.25	120 58 06.39	20.27	−13.88	+.9678	−13.43
	ST. PIERRE ISLAND												
1872	**St. Pierre**	**Tr. 1872**	**3 44 42.427**	**56 10 36.40**				(46 46.9)					

[1] Topographic deflection computed. See p. 92.
[2] The astronomic latitude is 14° 35′ 30.00″. See U. S. Coast and Geodetic Survey Report for 1904, p. 270.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	ALABAMA		° ′ ″	° ′ ″	° ′ ″	″	″		″
1877	Aurora	Brandon	34 08 47.479	86 11 00.660	236 06 29.35	30.01	−0.66	−1.4744	[1] +0.97
1889	Bear Point	Inerarity	30 18 03.401	87 30 52.452	223 13 23.2				
1898	Ethridge	Lovers Leap	32 04 45.888	87 03 29.071	245 52 49.17	50.62	−1.45	−1.5954	[1] +2.31
1847	Fort Morgan (Laplace)	Cedar Point	30 13 42.236	88 01 23.255	143 59 45.61	49.26	−3.65	−1.7162	[1] +6.26
1892	Fort Morgan	Jacob	30 13 42.236	88 01 23.255	267 34 26.4				
1917	Girard	Ralston	32 26 58.934	85 00 41.011	223 23 52.29				
1898	Kahatchee	Horn	33 13 38.271	86 21 36.527	253 32 12.65	14.06	−1.41	−1.5266	[1] +2.15
1914	Madison (Laplace)	Capshaw 2	34 42 11.204	86 44 41.756	182 57 15.52	[2] 11.30	+4.22	−1.4440	−6.09
1890	Montgomery, north meridian stone.	Elongation mark			82 39 31.9				
1907	Perry	Parker	32 45 33.149	86 57 21.077	333 50 22.16	21.32	+.84	−1.5542	[1] −1.31
1907	Smithers	Rowe	34 48 58.906	86 36 58.267	344 36 07.52	5.58	+1.94	−1.4379	[1] −2.79
1878	Tanyard, 1878–1914	Penit	34 39 11.355	87 23 01.094	349 59 04.78	10.14	−5.36	−1.4467	[1] +7.75
1914	do	do	34 39 11.355	87 23 01.094	349 59 10.29	10.14	+.15	−1.4467	−.22
1869	West Gulfshore	East Gulfshore	30 13 48	87 48 17	260 17 22.2				
	ARIZONA								
1920	Boundary monument No. 204.	American	32 29 03.990	114 46 46.123	183 30 56.37	57.41	−1.04	−1.5707	+1.63
1910	Catalina	Superstition	32 26 34.063	110 47 18.163	152 06 05.48	13.95	−8.47	−1.5731	+13.32
1910	Chiricahua	Burro	31 52 23.561	109 17 01.339	225 00 52.57	55.31	−2.74	−1.6083	+4.41
1910	Graham (U. S. G. S.)	Catalina	32 42 06.048	109 52 15.894	71 48 57.50	52.98	+4.52	−1.5576	−7.04
1920	Granite	Pinto	32 25 39.817	113 18 27.142	50 31 49.65	53.00	−3.35	−1.5741	+5.27
1910	Harquahalla	Whitetank	33 48 42.659	113 20 47.388	290 08 17.25	24.27	−7.02	−1.4931	+10.48
1911	Kofa	Harquahalla	33 21 33.578	114 04 56.894	233 29 34.54	44.96	−10.42	−1.5190	+15.83
1919	Mazatzal	Baker	34 03 45.668	111 27 40.160	190 00 23.53	30.00	−6.47	−1.4790	+9.57
1910	Mohawk	American	32 35 22.608	113 38 56.720	106 18 44.27	48.80	−4.53	−1.5643	+7.09
1911	Pine	Powell	34 46 08.486	113 51 12.165	51 35 35.59	41.95	−6.36	−1.4405	+9.16
1920	Quitavaquita	Pinto	32 01 32.451	113 08 42.421	125 12 50.56	52.75	−2.19	−1.5988	+3.50
1920	Sheep	Boundary monument No. 204.	32 31 59.204	114 14 01.949	84 08 14.74	15.37	−.63	−1.5677	+.99
1919	Silver Bell	Black Mountain	32 25 03.844	111 30 18.906	231 39 09.97	17.3	−7.33	−1.5747	+11.54
1920	South Mountain	Sierra Prieta	31 59 58.890	112 08 47.814	201 46 03.36	4.97	−1.61	−1.6063	+2.58
1910	Superstition (U. S. G. S.)	Whitetank	33 24 39.852	111 24 01.480	99 27 48.20	54.81	−6.61	−1.5160	+10.02
1919	Union	Granite	34 24 54.320	112 24 14.536	151 04 49.96	56.24	−6.28	−1.4597	+9.17
1910	Whitetank	Harquahalla	33 34 02.053	112 33 28.731	110 34 36.56	38.87	−2.31	−1.5070	+3.48
1920	Williams Laplace (Laplace)	Frisco	35 15 08.448	112 11 25.628	257 14 07.11	13.28	−6.17	−1.4149	+8.73
	ARKANSAS								
1916	Danville	Magazine	35 03 13.904	93 19 47.179	110 57 18.40	16.73	+1.67	−1.4253	−2.38
1916	Devall	White	34 47 10.229	91 27 28.935	212 01 20.06	20.10	−.04	−1.4395	+.06
1916	Forrest	Becks	35 00 38.503	90 46 29.620	70 29 06.18				
1917	Hartford (Laplace)	Sugarloaf	35 01 14.490	94 23 12.488	94 45 22.30	[2] 21.82	+.48	−1.4271	−.68
1878	Helena	Battery Hindman	[2] 34 31 49	[2] 90 35 27	15 55 18.1				
1878	Helena mid base	Helena north base	[2] 34 29 32	[2] 90 35 28	188 04 18.6				
1879	Hopefield south base	Hopefield north base	35 07 51.602	90 04 55.385	211 32 36.12				
1916	Little Rock northwest base (Laplace).	Granite	34 45 27.786	92 13 43.792	36 12 22.34	[2] 21.03	+1.31	−1.4410	−1.89
	CALIFORNIA								
1876	Arguello	Gaviota	34 34 58.957	120 33 39.011	284 59 37.73	48.69	−10.96	−1.4505	[1] +15.90
1874	Avila	San Luis Obispo west base.	35 10 40.203	120 43 17.319	281 43 10.2	31.3	−21.1	−1.4187	[1] +29.93
1895	Boundary line T. 59	Azimuth mark	[2] 37 54 08	[2] 118 26 24	68 41 19.1				
1895	Boundary line T. 101 east	Rose	[2] 36 25 55	[2] 116 27 27	21 18 21.2				
1911	Butte	American	33 33 41.442	115 20 39.657	324 34 12.58	14.70	−2.12	−1.5073	+3.20
1885	Castle Mount	Hepsedam	35 56 21.338	120 20 22.908	133 51 11.08	16.62	−5.54	−1.3795	[1] +7.64
1893	Colorado River	Elongation mark	[2] 35 00 15	[2] 114 39 23	142 41 56.0				
1871	Crescent City	Smyth 2	41 44 49.567	124 12 00.553	272 08 40.0				
1870	Dominguez Hill	West Beach	33 51 55.639	118 14 11.638	95 17 41.48	48.03	−6.55	−1.4901	[1] +9.76
1871	Eureka	West Point	40 48 11.981	124 09 42.270	165 46 29.76				
1875	Gaviota	Santa Barbara	34 30 07.450	120 11 53.426	283 30 01.69	11.77	−10.08	−1.4549	[1] +14.67
1904	Gazelle astronomic (Laplace)	Soda	41 31 36.248	122 31 08.281	183 13 40.99	35.19	+5.80	−1.1292	[1] −6.55
1904	do	Spur	41 31 36.248	122 31 08.281	300 59 47.23	40.18	+7.05	−1.1292	[1] −7.96
1920	Goosenest	Eddy	41 43 12.863	122 13 17.033	25 49 12.52	21.68	−9.16	−1.1216	+10.27
1878	Harbor	Boulder	32 59 54.779	118 33 40.818	322 23 22.9				
1908	do	West Peak	32 59 54.779	118 33 40.818	179 17 37.37	37.72	−.35	−1.5400	[1] +.54
1885–6	Hepsedam	Santa Ana	36 18 53.603	120 49 26.362	150 57 18.58	28.97	−10.39	−1.3606	[1] +14.14
1904	Kent	Bally	39 58 01.752	122 44 14.449	185 58 09.84	3.60	+6.24	−1.1932	[1] −7.45
1893	Lake Tahoe, southeast end	Folsom Peak	[2] 38 58 02.84	[2] 119 56 55.00	177 56 19.13				(1)
1890	Los Angeles northwest base	Los Angeles southeast base	33 55 05.648	118.03 23.777	322 33 08.57	21.50	−12.93	−1.4871	[1] +19.23
1890	Los Angeles southeast base	Los Angeles northwest base.	33 47 34.646	117 56 30.319	142 36 57.58	71.84	−14.26	−1.4941	[1] +21.31
1883	Lospe	Tepusquet	34 53 38.475	120 36 19.944	267 09 51.78	62.14	−10.36	−1.4338	[1] +14.85
1904	Lyons	Round	40 18 06.101	121 38 21.007	154 22 14.40	27.03	−12.63	−1.1791	[1] +14.89
1904	Marysville Butte	Snow Mountain east	39 12 22.361	121 49 11.540	104 05 08.33	12.82	−4.49	−1.2258	[1] +5.50
1887	Mocho	Mount Diablo	37 28 39.696	121 33 18.781	144 57 35.71	40.03	−4.32	−1.3042	[1] +5.63

[1] Topographic deflection computed. See p. 92.
[2] Approximate North American datum.
[3] The azimuth angle was allowed to take a correction in the triangulation adjustment.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	CALIFORNIA—continued		° ′ ″	° ′ ″	° ′ ″	″	″		″
1907	Mocho	Mount Diablo	37 28 39.696	121 33 18.781	144 57 35.75	40.03	−4.28	−1.3042	[1] +5.58
1852	Monterey Bay	Elongation mark	36 35 30.811	121 52 59.195	116 01 11.8	15.9	−4.10	−1.3469	[1] +5.52
1880	Monticello	Mount Helena	38 39 50.645	122 11 22.327	91 04 25.30	27.64	−2.34	−1.2498	[1] +2.92
1890	Mount Conness	Round Top	37 58 02.590	119 19 14.227	142 39 19.46	27.37	−7.91	−1.2815	[1] +10.14
1876	Mount Diablo	Mount Helena	37 52 55.482	121 54 48.355	144 28 16.03	18.91	−2.88	−1.2854	[1] +3.70
1876	Mount Helena	Mount Diablo	38 40 11.080	122 37 57.817	324 01 24.96	34.82	−9.86	−1.2496	[1] +12.32
1879	Mount Lola	Mount Helena	39 26 00.061	120 21 51.594	67 22 02.36	3.42	−1.06	−1.2160	[1] +1.29
1882	Mount Tamalpais	Mount Diablo	37 55 27.507	122 35 45.242	274 15 15.06	19.46	−4.40	−1.2834	[1] +5.65
1907	do	Sonoma Mountain	37 55 27.492	122 35 45.228	182 25 36.49	39.93	−3.44	−1.2834	[1] +4.41
1885	Mount Toro	Loma Prieta	36 31 34.712	121 36 32.276	162 12 26.63	31.32	−4.69	−1.3501	[1] +6.33
1906–7	do	Santa Ana	36 31 34.742	121 36 32.284	218 31 02.04	6.92	−4.88	−1.3501	[1] +6.59
1873	New San Miguel	Arguello	34 02 23.753	120 23 09.472	165 05 11.05	23.69	−12.64	−1.4804	[1] +18.71
1897	Paxton	Mount Sanhedrin	39 08 09.197	123 18 43.253	203 47 05.77	14.64	−8.87	−1.2289	[1] +10.90
1851	Point Avisadero	Elongation mark	37 43 33.884	122 21 47.476	195 03 39.96	36.5	+3.46	−1.2926	[1] −4.47
1859–60	Ross Mountain	Azimuth mark	38 30 20.528	123 07 09.223	164 24 38.98	47.69	−8.71	−1.2570	[1] +10.95
1904	Round	Spur	40 48 19.882	121 57 26.873	159 54 03.23	13.91	−10.68	−1.1583	[1] +12.37
1879	Round Top	Mount Helena	38 39 50.316	120 00 01.126	90 58 53.89	57.20	−3.31	−1.2498	[1] +4.14
1869	San Buenaventura	Azimuth mark	34 15 54.801	119 15 57.154	114 04 28.80	42	−13.20	−1.4679	[1] +19.38
1851	San Diego	Fitchs Hill	32 42 03.954	117 14 31.290	187 53 14.18	35.0	−20.82	−1.5576	[1] +32.43
1908	San Diego astronomic (Laplace).	Point Loma Lighthouse (old).	32 43 30.482	117 09 28.650	52 46 50.51	66.46	−15.95	−1.5562	[1] +24.82
1910	San Jacinto	Santiago	33 48 53.459	116 40 44.187	81 56 10.97	15.41	−4.44	−1.4929	[1] +6.63
1874	San Simeon	Azimuth mark	35 38 33.958	121 11 51.788	160 42 50.6				
1885	Santa Ana	Mount Toro	36 54 19.368	121 13 57.738	38 44 26.21	33.91	−7.70	−1.3317	[1] +10.25
1869	Santa Barbara	Gaviota	34 24 17.596	119 42 53.086	103 46 26.11	36.35	−10.24	−1.4602	[1] +14.95
1854	Santa Cruz	Azimuth mark	36 58 42.023	122 03 18.694	165 14 18.33	28.9	−10.57	−1.3280	[1] +14.04
1874	Santa Cruz west	Santa Barbara	34 04 24.021	119 55 02.762	206 51 40.73	42.74	−2.01	−1.4784	[1] +2.97
1885	Santa Lucia	Mount Toro	36 08 45.328	121 25 05.937	157 58 51.50	56.29	−4.79	−1.3690	[1] +6.56
1904	Snow Mountain east	Kent	39 23 02.008	122 45 04.847	181 03 27.19	29.44	−2.25	−1.2181	[1] +2.74
1899	Soledad	Elongation mark	32 50 24.52	117 15 07.24	178 32 30.22	48.37	−18.15	−1.5493	[1] +28.12
1859	Sulphur Peak	Azimuth mark	38 45 54.278	122 50 40.221	81 28 35.63	50.88	−15.25	−1.2453	[1] +18.99
1882	Topusquet	Lospe	34 54 37.432	120 11 09.654	87 24 12.24	26.30	−14.06	−1.4330	[1] +20.15
1894	Turning Point	Folsom Peak	[2] 38 57 43	[2] 119 56 40	171 16 26.2				
1880	Vaca	Yolo southeast base	38 22 33.808	122 05 01.988	235 38 36.55	37.32	−.77	−1.2628	[1] +.97
1880	Yolo northwest base	do	38 40 44.806	121 51 28.553	343 05 02.07	7.93	−5.86	−1.2491	[1] +7.32
1880	Yolo southeast base	Yolo northwest base	38 31 42.185	121 47 58.518	163 07 13.11	18.98	−5.87	−1.2559	[1] +7.37
	COLORADO								
1912	Boulder	Morrison	39 57 37.355	105 17 40.611	348 40 48.52	25.56	+22.96	−1.1934	−27.40
1912	Dewey	Horsetooth	40 30 25.868	104 33 16.100	94 00 18.97	17.52	+1.45	−1.1706	−1.70
1879	El Paso east base	El Paso west base	38 57 22.331	104 27 41.954	102 47 63.46	59.87	+3.59	−1.2368	[1] −4.44
1895	Grand Junction	Chiquita	[4] 39 04 18.95	[4] 108 33 36.46	23 57 23.98	[4] 29.85	−5.87	−1.2318	[1] +7.23
1893	Gunnison (Laplace)	Uncompahgre	38 32 46.597	106 55 26.644	41 55 00.39	9.28	−8.89	−1.2551	[1] +11.16
1894	Mount Ouray	do	38 25 22.175	106 13 27.238	70 35 51.27	51.71	−.44	−1.2606	[1] +.56
1881	Overland	Eureka	39 02 20.344	103 10 15.645	284 10 32.62	31.14	+1.48	−1.2332	[1] −1.83
1895	Pikes Peak	Mount Ouray	38 50 26.293	105 02 37.268	66 05 16.70	8.20	+8.50	−1.2420	[1] −10.56
1891	Tavaputs	Patmos Head	39 32 23.946	109 00 19.148	88 17 40.85	44.93	−4.08	−1.2114	[1] +4.94
1893	Treasury Mountain	Mount Waas	39 00 51.931	107 05 54.688	74 45 04.71	16.88	−12.17	−1.2343	[1] +15.02
1895	Uncompahgre	Treasury Mountain	38 04 18.385	107 27 41.694	196 42 55.84	62.30	−6.46	−1.2767	[1] +8.25
1912	Watkins astronomic (Laplace)	Indian	39 44 43.813	104 36 18.915	350 08 06.83	3.53	+3.30	−1.2026	−3.97
	CONNECTICUT								
1862	Sandford	Ruland	41 27 42.801	72 56 59.304	5 50 25.28	16.88	+8.40	−1.1318	[1] −9.51
	DELAWARE								
1897	Cape Henlopen Lighthouse	Brandywine Shoal Lighthouse.	38 46 41.553	75 05 02.944	173 45 17.64	17.37	+.27	−1.2447	[1] −.34
	DISTRICT OF COLUMBIA								
1851	Causten	Soper	38 55 35.294	77 04 23.810	210 54 41.65	36.74	+4.91	−1.2381	[1] −6.08
1868–69	Washington, Seaton (Laplace).	Hill	38 53 28.962	76 59 59.541	265 32 53.61	42.71	+10.90	−1.2397	[1] −13.51
	FLORIDA								
1860	Apalachicola	St. Georges Lighthouse	29 43 13.066	84 59 07.560	22 04 52.6				
1897	Baldwin	Lane	30 17 59.096	81 58 31.808	18 28 34.0				
1860	Barkley Point 2	Plantation Hill	30 24 31.126	87 12 26.526	306 54 02.20				
1876	Bluff	Bigelow's north chimney	30 18 39.202	81 37 35.099	206 17 47.1				
1917	Boulogne (Laplace)	St. Mary	[4] 30 46 33.818	[4] 81 59 49.316	162 00 44.80				
1885	Bridgeport	Nine Mile Point	29 45 13.479	81 33 52.810	198 50 41.5				
1898	Bronson	Turn	29 26 53.858	82 38 13.360	50 19 33.1				
1850	Cape Florida (Key Biscayne, south base).	Soldier Key	25 39 55.230	80 09 21.996	3 30 56.93				
1886	Cape Romano	Caximbas	25 50 37.382	81 40 58.150	147 12 54.8				
1886	Cape Sable latitude	Palm Point	25 06 59.582	81 05 13.394	130 41 26.0				

[1] Topographic deflection computed. See p. 92. [2] Approximate North American datum. [4] Unadjusted.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	FLORIDA—continued		° ′ ″	° ′ ″	° ′ ″	″	″		″
1873	Clearwater Harbor astronomic.	Long Reach	27 56 36.588	82 48 40.107	194 54 09.79				
1871	Davis Point 2	Vista Buena	30 07 14.295	85 41 10.806	163 57 43.55				
1852	Depot Key	Sea Horse Key	29 07 27.095	83 01 54.795	44 51 32.5				
1874	Depot Key	Sea Horse Key Lighthouse (Cedar Key Lighthouse).	29 07 27.402	83 01 55.346	46 18 14.8				
1871	Eagle Point	Cape St. Blas Lighthouse	29 45 16.890	85 23 29.215	344 52 39.26				
1873	Esperanza	Oswald	29 22 15.561	81 05 37.960	338 48 33.93				
1874	Fog Island	Lamp	29 35 51.053	83 24 39.015	183 49 46.32				
1885	Harts Point (Hart)	Harding	29 38 30.932	81 37 04.645	172 05 41.6				
1855	Hurricane Island	Azimuth mark	[4]30 04 30.71	[4]85 39 29.47	178 09 41.9				
1917	Lancaster 2 (U. S. E.) (Laplace)	Spur	30 18 37.229	81 40 38.635	252 33 11.72	0.91	+10.81	−1.7106	−18.49
1883	Lauderdale	Midway	26 06 18.725	80 06 20.779	186 01 20.6	15.9	+4.7	−2.0409	−9.59
1866	Punta Rasa	Sword Point	26 29 12.127	82 00 48.081	146 31 16.45				
1849	Sand Key	West Crawfish Key	24 27 12.942	81 52 39.551	176 07 30.57				
1883	Ten 2	Jupiter Inlet Lighthouse	27 04 55.968	80 07 18.366	345 10 28.7				
1897	Waldo	Azimuth mark	29 47 30.839	82 09 51.611	181 24 24.9				
	GEORGIA								
1917	Albany	Court	[4]31 34 20.28	[4]84 07 23.66	104 59 27.52				
1917	Artesia	Acree	[4]31 32 57.80	[4]83 57 54.06	102 57 06.46				
1873	Atlanta middle base (Laplace)	Stone Mountain	33 54 21.460	84 16 37.63	312 22 28.94	31.39	−2.45	−1.4879	[1]+3.65
1918	Battle	Evelyn	[4]31 09 09.17	[4]83 46 16.41	306 26 33.38				
1919	Brook	News	[4]32 57 08.62	[4]83 48 26.14	308 39 41.72				
1917	Brunswick southeast base (Laplace).	Middle	31 09 26.259	81 29 55.290	163 06 39.37				
1872	Butler, St. Simon Island	Sapelo Lighthouse	31 17 39.330	81 20 48.875	208 23 37.3				
1917	Cochran (Laplace)	Zade	[4]32 23 19.73	[4]83 21 34.42	170 10 16.52				
1874	Currahee	Rabun	34 31 44.887	83 22 33.201	188 10 27.89	24.70	+3.19	−1.4535	[1]−4.64
1918	Danville	Pad	[4]32 36 20.08	[4]83 14 45.80	127 20 09.94				
1918	Fargo	Edith	[4]30 41 16.87	[4]82 33 58.75	306 24 09.63				
1918	Fay (Laplace)	Don	[4]32 30 37.70	[4]82 30 36.61	123 29 38.60				
1919	Forsyth east base	Whit	[4]33 02 07.92	[4]83 56 03.62	311 08 25.73				
1917	Harmon (Laplace)	Butler	[4]32 33 21.87	[4]84 13 18.30	94 23 08.77				
1917	Hump (Laplace)	Tobe	[4]32 47 34.78	[4]83 38 36.67	63 15 39.25				
1917	Jake	Jones	[4]31 30 48.09	[4]83 45 15.11	268 29 36.07				
1917	Joffre	Deenwood	[4]31 14 08.05	[4]82 25 58.49	288 44 01.15				
1917	Joint (Laplace)	Temple	[4]31 32 05.93	[4]82 35 58.61	156 34 18.86				
1917	Kimbrough (Laplace)	Lester	[4]32 00 13.83	[4]84 39 02.42	312 25 12.12				
1874	Lavender	Kenesaw	34 19 19.243	85 17 18.251	300 11 59.11	59.70	−.59	−1.4647	[1]+.86
1918	Lowndes (Laplace)	Valdosta	[4]30 49 49.04	[4]83 15 31.21	89 05 34.78				
1918	Meldrim	Keep	[4]32 08 34.73	[4]81 22 39.41	96 35 29.61				
1917	Mud (Laplace)	Eastman	[4]32 11 15.55	[4]83 10 17.53	162 38 34.88				
1907	Rose Hill	Dewey Rose	34 05 01.417	82 45 33.327	118 01 40.29	43.10	−2.81	−1.4779	[1]+4.15
1918	St. George	Cambria	[4]30 31 15.83	[4]82 02 09.93	269 01 33.43				
1851	Savannah Exchange	Savannah south base	32 04 51.475	81 05 28.310	248 59 57.4				
1873	Sawnee	Currahee	34 14 11.839	84 09 38.695	245 34 26.12	27.61	−1.49	−1.4695	[1]+2.19
1918	Telfair	Coast Line	[4]32 04 52.47	[4]81 08 51.01	328 32 30.02				
1918	Townsend	Warsaw	[4]31 32 24.39	[4]81 31 25.92	201 34 16.31				
1918	Turner (Laplace)	Box	[4]32 26 20.07	[4]81 47 04.10	36 36 14.22				
1917	Valley (Laplace)	Fort	[4]32 32 57.60	[4]83 53 21.06	102 16 22.78				
1917	Willacoochee (Laplace)	Paris	[4]31 20 30.67	[4]83 03 05.26	109 10 48.02				
	IDAHO								
1915	Big Butte	Picabo	43 23 47.288	113 01 18.580	82 25 25.48	25.71	−.23	−1.0576	+.24
1915	Cache	Big Butte	42 11 09.402	113 39 37.544	201 01 01.68	1.81	−.13	−1.1034	+.14
1915	Caribou	Putnam	43 05 37.440	111 18 39.407	73 36 14.75	19.32	−4.57	−1.0688	+4.88
1915	Flat	Picabo	42 43 48.702	114 24 52.624	199 03 25.09	28.85	−3.76	−1.0825	+4.07
1915	Mountain Home (Laplace)	Blue	43 07 44.382	115 41 36.050	332 31 15.31	17.89	−2.58	−1.0076	+2.75
1915	Nyssa	Mitchell	43 52 25.950	116 58 47.747	54 31 27.10	31.86	−4.76	−1.0402	+4.95
1915	Oxford	Putnam	42 16 11.766	112 05 49.972	177 53 25.41	29.64	−4.23	−1.1002	+4.65
1915	Silver	Blue	42 58 51.394	116 39 24.485	286 55 62.94	56.66	+6.28	−1.0731	−6.74
	ILLINOIS								
1882	Bording	Geoffrey	38 36 45.305	89 20 25.603	53 25 07.53	4.11	+3.42	−1.2521	[1]−4.28
1920	Cumberland	Dekob	42 18 35.352	89 04 20.721	43 27 09.39				
1920	De Witt	Douglas	42 13 53.221	89 04 57.833	144 00 53.08				
1920	Fred	Scarboro	41 45 54.131	89 01 52.996	172 30 33.18				
1920	Gallatin	Hocomb	42 02 44.049	89 05 42.784	181 20 45.33				
1920	Garner	Sturgess	38 59 00.577	89 06 24.343	352 10 10.13				
1920	Kerrick	Marshal	40 32 27.740	88 59 13.024	176 21 30.14				
1920	Latham	Carroll	42 22 10.826	89 03 33.354	195 20 02.21				
1920	Leach	Warren	39 11 37.088	89 06 33.579	179 42 26.48				
1920	Macon	Short	39 42 34.188	88 59 54.990	191 33 03.32				

[1] Topographic deflection computed. See p. 92.
[4] Unadjusted.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	ILLINOIS—continued		° ′ ″	° ′ ″	° ′ ″	″	″		″
1920	Mendota	Kendall	41 33 38.014	89 06 47.040	190 15 30.44				
1883	Newton	Claremont	38 55 28.587	88 09 50.322	321 29 05.30	4.59	+0.71	−1.2382	[1]−0.88
1920	Ospur	Weld	40 05 17.396	88 57 17.756	179 23 49.95				
1879	Parkersburg (U. S. L. S.) (Laplace).	Denver	38 34 51.518	88 01 49.004	143 16 15.55	15.64	−.09	−1.2535	[1]+.11
1920	Rockton	Shaw	42 27 40.937	89 04 11.875	209 11 11.53				
1908	St. Anne (U. S. L. S.)	Clifton	41 01 19.389	87 43 15.336	62 47 16.54	17.44	−.90	−1.1495	[1]+1.03
1920	Tonica	McLean	41 13 43.729	89 04 05.383	175 43 41.29				
1920	Vinson	Logan	41 21 02.739	89 05 46.572	180 05 58.82				
1874	Willow Springs (U. S. L. S.) (Laplace).	Shot Tower	41 43 36.903	87 51 05.629	224 29 41.24	40.94	+.30	−1.1213	[1]−.34
	INDIANA								
1920	Aman	States	41 31 05.265	86 16 55.777	102 08 35.98				
1920	Boon	Montgomery	40 53 04.765	86 24 13.363	179 48 00.38				
1908	Carlisle (U. S. L. S.)	Bertrand	41 40 05.097	86 29 38.037	218 03 46.09	53.23	−7.14	−1.1236	[1]+8.02
1920	Cassedy	Shope	40 33 31.626	86 10 22.756	153 04 37.90				
1920	Clay	Clark	39 12 31.588	85 55 22.328	149 45 19.58				
1920	Dubois	Delaware	39 28 38.463	86 02 51.714	310 36 23.88				
1920	Hancock	Harrison	40 00 02.908	86 00 31.721	179 45 25.72				
1920	Henry	Cicero	40 07 30.871	86 00 53.833	186 05 02.55				
1920	Jackson	New Hope	40 19 49.124	86 03 40.120	159 11 18.73				
1920	Joseph	Twin	41 19 49.471	86 19 56.400	36 43 53.04				
1920	Leonda	Vandalia	40 45 36.516	86 21 45.690	82 36 09.59				
1914	O. and M. (Laplace)	Marysville	38 29 00.278	85 40 11.497	189 18 01.15	1.27	−.12	−1.2579	+.15
1887	Osborn	Calvary	38 51 23.456	86 52 35.794	192 16 17.59	16.78	+.81	−1.2412	[1]−1.01
1920	Penn	South Bend east base	41 38 53.064	86 12 25.947	207 00 17.23				
1920	Porter	Posy	41 10 30.903	86 24 53.635	177 46 52.60				
1889	Reizin	Tanner	39 02 53.857	85 08 24.085	276 56 46.02	47.50	−1.48	−1.2328	[1]+1.82
1920	Sherman	Elevator	39 43 24.013	86 06 05.781	179 30 13.24				
1920	Tripp	Adams	38 59 58.155	85 38 37.560	183 40 12.88				
1889	Weed Patch	Fountain	39 10 00.634	86 13 00.771	7 33 21.28	20.48	+.80	−1.2276	[1]−.98
1920	Western	Gibson	39 50 58.310	86 07 08.467	221 37 03.62				
1881	Williams	Louisville north base	38 10 24.695	85 54 47.909	232 09 08.62	8.01	+.61	−1.2720	−.78
	IOWA								
1880	Sherrills Mound	Platte Mound	[2]42 36 15	[2]90 47 37	240 35 22.5				
	KANSAS								
1888	Adams	Clark	39 02 40.968	96 04 24.369	11 46 11.94	10.48	+1.46	−1.2329	[1]−1.80
1906	Brown	Lebanon	39 46 37.160	98 42 16.680	249 26 54.58	54.10	+.48	−1.2012	[1]−.58
1906	Quarry	Anthony southeast base	37 14 28.323	97 58 19.859	30 09 39.98	43.11	−3.13	−1.3155	[1]+4.12
1893	Russell southeast base	Russell northwest base	38 51 22.30	98 47 08.07	140 42 59.79	65.0	−5.21	−1.2412	[1]+6.47
1896	Salina west base (Laplace)	Salina east base	38 51 07.674	97 36 10.840	248 36 18.32	22.26	−3.94	−1.2414	[1]+4.89
1906	Sunflower	Partridge	37 51 40.281	97 51 28.036	122 57 12.63	15.35	−2.72	−1.2863	[1]+3.50
1908	Wallace latitude (Laplace)	Wallace Bluffs	38 54 44.339	101 35 31.505	353 19 50.61	53.30	−2.69	−1.2390	[1]+3.33
	KENTUCKY								
1887	Minerva	Ash Ridge	38 42 31.158	83 55 06.653	210 54 42.38	46.17	−3.79	−1.2478	[1]+4.73
	LOUISIANA								
1880	Baton Rouge Barracks	Baton Rouge south base	[2]30 27 24	[2]91 11 25	6 18 15.81				
1883	Blue Buck Ridge west base	Blue Buck Ridge east base	29 45 43.674	93 44 28.019	268 40 53.14				
1919	Boyce (Laplace)	Joyner	[4]31 22 53	[4]92 39 10	293 30 13.93				
1889	Chenier Tigre west base	Chenier Tigre east base	29 34 22.477	92 11 06.620	250 14 16.0				
1855	Deer Island	Pointe au Fer Light house	29 28 49.106	91 16 01.878	26 37 46.3				
1888	Deer Island	Little Hog	29 28 49.106	91 16 01.878	176 20 38.8				
1880	Depot	Bovard	[2]30 45 48	[2]91 23 19	36 26 54.26				
1878	Donaldsonville north base	Donaldsonville south base	30 06 06.591	90 57 55.006	7 14 41.44				
1919	Field	Man	31 59 39.779	93 43 11.227	184 29 59.38	59.21	+.17	−1.6006	−.27
1919	Flora	Rum	[4]31 37 00	[4]93 07 09	107 01 50.19				
1858	Head of Passes	Mississippi Delta south base.	[2]29 08 31	[2]89 15 06	221 21 53.70				
1896	Lake Pontchartrain east base	Lake Pontchartrain west base.	30 01 16.180	90 07 14.922	86 37 11.8				
1880	Lake Providence north base	Lake Providence south base.	[2]32 48 02	[2]91 10 27	354 43 23.56				
1880	Lums Point southwest base	Lums Point northeast base	[2]31 02 25	[2]91 35 17	224 20 44.38				
1872	Magnolia lower base	Magnolia upper base	29 32 25.192	89 46 37.081	147 44 17.71				
1919	Man (Laplace)	Field	32 01 18.589	93 43 02.100	4 30 03.03	[3]4.05	−1.02	−1.5990	+1.63
1919	Mansura	Amond	[4]31 03 27	[4]92 03 34	91 53 59.76				
1919	Marthaville	Peanut	[4]31 44 22	[4]93 24 07	83 51 32.90				
1899	Pass Manchac north base	Azimuth mark	30 17 20.064	90 24 02.164	350 04 19.7				
1919	Quary	Rock	[4]31 27 02	[4]93 45 25	305 48 46.03				

[1] Topographic deflection computed. See p. 92.
[2] Approximate North American datum.
[3] The azimuth angle was allowed to take a correction in the triangulation adjustment.
[4] Unadjusted.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	LOUISIANA—continued		° ′ ″	° ′ ″	° ′ ″	″	″		″
1888	Racoon	Ship Shoal Lighthouse	29 03 31.045	90 57 03.918	36 10 55.7				
1919	Sodus	Soto	[4]31 49 32	[4]93 31 08	134 39 59.32				
1898	South Point southwest base	South Point southeast base	30 06 14.124	89 54 56.564	214 51 24.9				
1919	Torras (Laplace)	Royal Oak	[4]30 59 23	[4]91 40 45	135 37 24.46				
1919	Zeman	Stafford	[4]31 16 07	[4]92 24 37	327 20 23.21				
	MAINE								
1847	Agamenticus	Thompson	43 13 24.630	70 41 32.907	2 36 55.53	58.26	−2.73	−1.0641	[1] +2.90
1851	Cape Small	Sebattus	43 46 43.217	69 50 44.221	155 19 03.51	1.96	+1.55	−1.0436	[1] −1.62
1859	Cooper	Howard	44 59 13.477	67 28 02.254	351 53 12.05	12.04	+.01	−1.1112	[1] −.01
1859	Howard	Pigeon	44 37 46.582	67 23 45.364	63 54 45.11	45.06	+.05	−1.0130	[1] −.05
1858	Humpback	Cooper	44 51 50.693	68 06 37.785	254 42 32.30	29.88	+2.42	−1.0048	[1] −2.43
1907	Mount Blue	Sebattus	44 43 41.437	70 20 33.157	341 59 15.69	13.88	+1.81	−1.0095	[1] −1.83
1856	Mount Desert	Ragged Mountain	44 21 05.234	68 13 37.648	78 30 46.77	48.09	−1.32	−1.0229	[1] +1.35
1855	Mount Harris	Humpback	44 39 54.874	69 08 54.668	254 35 10.73	8.43	+2.30	−1.0119	[1] −2.33
1849	Mount Independence	Agamenticus	43 46 33.764	70 19 14.341	26 55 48.64	50.74	−2.10	−1.0442	[1] +2.19
1851	Mount Pleasant	Mount Blue	44 01 36.693	70 49 21.940	205 59 21.51	19.58	+1.93	−1.0345	[1] −2.00
1907	Pole Hill	Kennedy	45 57 18.400	67 46 59.789	293 06 45.81	44.33	+1.48	−0.9672	[1] −1.43
1854	Ragged Mountain	Mount Pleasant	44 12 45.385	69 09 05.331	81 48 44.98	43.95	+1.03	−1.0279	[1] −1.06
1853	Sebattus	Mount Independence	44 08 37.833	70 04 43.738	24 31 23.58	22.95	+.63	−1.0303	[1] −.65
	MARYLAND								
1871	Calvert	Meekins Neck	38 21 34.290	76 23 34.922	252 06 09.18	.07	+9.11	−1.2635	[1] −11.51
1853	Davis	Quilling	38 20 28.53	75 06 21.63	13 37 05.95	6.10	−.15	−1.2644	[1] +.19
1850	Hill	Webb	38 53 54.908	76 52 49.762	219 46 58.11	50.05	+8.06	−1.2394	[1] −9.99
1849	Marriott	Hill	38 52 27.562	76 36 35.149	96 37 43.40	33.97	+9.43	−1.2404	[1] −11.70
1870	Maryland Heights	Bull Run	39 20 27.689	77 42 59.915	358 43 07.18	9.41	−2.23	−1.2200	[1] +2.72
1866	Principio	Turkey Point	39 35 36.692	76 00 16.407	1 34 43.50	36.41	+7.09	−1.2091	[1] −8.57
1850	Soper	Webb	39 05 11.843	76 57 00.726	268 49 23.60	17.06	+6.54	−1.2311	[1] −8.05
1879	Sugarloaf	Bull Run	39 15 44.545	77 23 36.882	32 29 16.97	21.17	−4.20	−1.2234	[1] +5.14
1850	Webb	Soper	39 05 26.556	76 40 30.166	88 59 49.38	41.63	+7.75	−1.2309	[1] −9.54
	MASSACHUSETTS								
1845	Blue Hill	Manomet	42 12 43.941	71 06 52.638	305 57 30.06	32.16	−2.10	−1.1024	[1] +2.32
1862	Cambridge Observatory, west transit (Laplace).	Blue Hill	42 22 53.481	71 07 44.478	356 22 57.95	56.27	+1.68	−1.0959	[1] −1.85
1844	Copecut	do	41 43 17.245	71 03 36.044	175 17 06.5	6.30	+.20	−1.1215	[1] −.22
1845	Indian	Copecut	41 25 46.744	70 40 40.699	135 35 58.82	64.33	−5.51	−1.1331	[1] +6.24
1862	Mount Tom	Monadnock	42 14 30.798	72 38 55.056	212 37 21.74	17.23	+4.51	−1.1012	[1] −4.97
1908	Sankaty Head Lighthouse	Great Point Lighthouse	41 17 01.217	69 57 56.535	150 21 49.68	43.0	+6.68	−1.1389	[1] −7.61
1845	Shootflying	Manomet	41 41 07.334	70 20 49.738	143 03 22.74	20.31	+2.43	−1.1229	[1] −2.73
1846	Thompson	do	42 36 41.924	70 43 49.164	351 21 41.85	42.68	−.83	−1.0871	[1] +.90
1860	Wachusett	Bald Hill (Conn.)	42 29 20.784	71 53 13.984	24 17 41.32	34.50	+6.82	−1.0917	[1] −7.45
	MICHIGAN								
1896	A Mackinac, west base (U. S. L. S.).	D St. Ignace	45 47 14.433	84 46 21.646	213 53 29.05	25.25	+3.80	−.9729	[1] −3.70
1873	Belle Isle azimuth post (U. S. L. S.).	Center of engine house, Detroit.	42 20 06.637	82 59 53.638	107 21 59.84	65.64	−5.80	−1.0976	[1] +6.37
1908	Bunday (U. S. L. S.) (Laplace).	Woodstock	42 03 15.911	84 27 41.295	294 08 17.65	21.25	−3.60	−1.1085	[1] +3.99
1874	Ford River (U. S. L. S.) (Laplace).	Cedar River	45 41 12.321	87 06 08.445	31 34 60.28	55.81	+4.47	−.9763	[1] −4.36
1873	Keweenaw Point, south base (U. S. L. S.).	Keweenaw Point, north base.	46 52 18.010	88 29 15.815	199 10 67.29	59.69	+7.60	−.9367	[1] −7.12
1894	Sault Ste. Marie Observatory, west pier (U. S. L. S.) (Laplace).	Azimuth	46 30 05.770	84 20 55.641	178 06 38.87	34.04	+4.83	−.9489	[1] −4.58
1908	Sherman (U. S. L. S.)	Van Buren	41 50 48.490	85 27 11.662	40 48 32.52	37.94	−5.42	−1.1166	[1] +6.05
1908	Vulcan (U. S. L. S.)	Triloba	47 26 40.915	87 47 37.163	345 59 11.47	9.01	+2.46	−.9180	[1] −2.26
	MINNESOTA								
1906	Dalton astronomic (Laplace)	Dalton	46 10 23.613	95 54 59.592	89 01 55.15	55.96	−.81	−.9599	[1] +.78
1905	Grindle	Kimberly	46 33 28.112	93 16 59.065	118 20 47.06	43.45	+3.61	−.9471	[1] −3.42
1904	Gull	Jones	46 26 35.923	94 22 34.480	282 13 32.64	28.48	+4.16	−.9508	[1] −3.96
1887	Minneapolis	Prospect Park	(44 58.6)	(93 14.1)	298 46 06.87				
1871	Minnesota Point, north base (U. S. L. S.) (Laplace).	Minnesota Point, south base.	46 45 28.225	92 04 42.521	323 52 24.32	15.65	+8.67	−.9404	[1] −8.15
1906	Morken	Keene	47 02 06.430	96 36 21.990	279 29 04.32	2.88	+1.44	−.9314	[1] −1.34
1904	Osakis	Leslie	45 49 27.288	95 07 51.988	192 08 04.42	.35	+4.07	−.9716	[1] −3.95
1904	Royalton, south base	Alberta	45 44 08.243	94 12 04.987	221 42 30.76	25.60	+5.16	−.9747	[1] −5.03
1905	Stephen, west base (Laplace)	Stephen, east base	48 27 23.134	96 51 21.101	253 19 10.31	7.52	+2.79	−.8861	[1] −2.47
1906	Tilden	Ives	47 42 13.392	96 19 48.882	160 31 06.37	5.44	+.93	−.9098	[1] −.85
	MISSISSIPPI								
1921	Ben	More	[4]31 13 51	[4]88 54 54	177 04 28.59				
1921	Big	Point	[4]30 34 06	[4]88 29 03	185 54 59.13				
1921	Camel	Nebo	[4]31 21 58	[4]88 56 22	128 17 24.01				
1855	Cat Island	Mississippi City	30 14 15.776	89 04 04.148	192 11 14.32	6.9	+7.42	−1.7156	−12.73
1847	East Pascagoula	Bayou Casotte	30 20 35.517	88 32 45.210	296 30 51.27	51.75	−.48	−1.7083	[1] +.82

[1] *Topographic deflection computed.* *See p. 92.*

[4] *Unadjusted.*

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	MISSISSIPPI—continued		° ′ ″	° ′ ″	° ′ ″	″	″		″
1878	Fort (Vicksburg)	Island	[3] 32 20 26	[3] 90 53 05	142 44 57.99				
1881	Greenville, south base	Greenville, north base	[3] 33 23 20	[3] 91 04 29	204 49 51.1				
1921	Hub	Mont	[4] 30 45 12	[4] 88 30 24	182 04 31.73				
1921	Jago	Bixley	[4] 30 57 25	[4] 88 39 24	120 38 37.00				
1921	Leaf	Brown	[4] 31 01 34	[4] 88 47 45	172 35 33.05				
1921	Moss Point	Bijou	[4] 30 24 43	[4] 88 32 03	273 27 04.24				
1878	Natchez, lookout near	Giles	[3] 31 33 14	[3] 91 25 08	203 18 43.2				
1921	Pascagoula, east base	Round	[4] 30 22 10	[4] 88 34 08	14 28 17.50				
1914	Strickland (Laplace)	Knob	34 51 38.306	88 25 44.527	295 11 26.58	27.90	−1.32	−1.4356	+1.89
1921	Vant	Dale	[4] 30 56 00	[4] 88 35 17	319 47 06.65				
	MISSOURI								
1878	Berger (Laplace)	Winter	38 35 58.120	91 17 27.984	39 12 05.64	1.33	+4.31	−1.2527	[1] −5.40
1880	Cottonwood Point, north base	Cottonwood Point, south base.	[3] 36 04 14	[3] 89 40 52	46 24 56.98				
1880	Hunter	Christian	38 25 45.210	92 46 24.373	221 48 [illegible].49	21.41	−.92	−1.2604	[1] +1.16
1879	Jefferson City	Cedar	38 33 41.161	92 09 45.553	199 55 37.47	34.35	+3.12	−1.2544	[1] −3.91
1871	Kleinschmidt	Insane asylum	38 30 19.817	90 19 29.663	200 09 31.81	29.05	+2.76	−1.2570	[1] −3.47
1871	Knob Noster (Laplace)	Normal	38 46 35.456	93 33 07.090	83 15 41.75	41.25	+.50	−1.2448	[1] −.62
	MONTANA								
1912	Blue	Flat	47 15 22.033	104 10 00.510	229 07 15.40	14.56	+.84	−.9242	−.78
1912	Mondak (Laplace)	Montana	48 00 10.435	104 02 48.867	171 45 18.66	17.45	+1.21	−.9003	−1.09
1912	Wymonkota	Harding	45 00 35.551	104 05 07.832	201 17 21.79	14.73	+7.06	−.9997	−7.06
	NEBRASKA								
1906	Daily	Custer	41 35 45.236	98 38 55.516	242 14 42.54	37.63	+4.91	−1.1264	[1] −5.53
1906	Page, southwest base (Laplace).	Page, northeast base	42 25 25.518	98 25 59.745	218 53 24.50	12.94	+11.56	−1.0943	[1] −12.65
1906	Shelton, east base	Shelton, west base	40 46 38.396	98 44 39.333	70 13 08.22	1.48	+6.74	−1.1595	[1] −7.82
	NEVADA								
1880	Carson Sink	Mount Callahan	39 35 00.232	118 14 05.093	262 20 25.50	28.69	−3.19	−1.2095	[1] +3.86
1881	Diamond Peak	do	39 35 06.910	115 49 04.960	98 27 13.82	17.09	−3.27	−1.2094	[1] +3.65
1902	Mill	Miller	38 57 47.314	118 13 33.388	355 19 02.7				
1881	Mount Callahan	Carson Sink	39 42 35.002	116 57 00.042	83 09 34.84	39.39	−4.55	−1.2041	[1] +5.48
1879	Mount Grant	Wassuck	38 34 14.439	118 47 26.593	171 02 58.43	60.02	−1.59	−1.2540	[1] +1.99
1889	Pilot Peak	Mount Nebo	41 01 17.240	114 04 36.286	303 40 14.15	16.61	−2.46	−1.1495	[1] +2.83
1883	Pioche	Tushar	37 59 10.901	114 03 04.823	250 58 50.29	56.09	−5.80	−1.2805	[1] +7.43
1880	Toiyabe Dome	Mount Grant	38 49 58.809	117 21 08.629	77 20 49.29	55.93	−6.64	−1.2423	[1] +8.25
1872	Verdi, east base	Point of Rocks	39 31 06.103	119 57 51.869	128 31 06.38				
	NEW HAMPSHIRE								
1875	Croydon	Observatory Hill	43 28 54.994	72 13 11.583	167 58 09.57				
1860	Gunstock	Mount Pleasant	43 31 04.319	71 22 11.378	217 43 33.53	29.75	+3.78	−1.0531	[1] −3.92
1873	Moosilauk	Prospect	44 01 24.22	71 49 55.49	327 32 18.8				
1874	Observatory Hill	Croydon	43 42 19.79	72 17 08.07	347 55 29.32				
1873	Prospect Mount	Moosilauk	43 46 42.620	71 36 57.158	147 31 36.9				
1848	Unkonoonuc	Gunstock	42 58 59.864	71 35 19.380	196 35 20.40	18.88	+1.52	−1.0730	[1] −1.63
	NEW JERSEY								
1907	Barnegat Inlet	Gowdy's house	39 45 53.636	74 06 24.587	164 08 32.82	27.49	+5.33	−1.2018	[1] −6.41
1875	Beacon Hill	Weasel	40 22 26.549	74 13 41.913	183 35 29.89	31.24	−1.35	−1.1761	[1] +1.59
1869	Chapel Hill	Sandy Hook Lighthouse	40 23 52.344	74 03 48.017	216 05 15.3	15.12	+.18	−1.1751	[1] −.21
1908	High Point	Culvers Gap	41 19 15.225	74 39 42.833	34 08 11.73	12.03	−.30	−1.1374	[1] +.34
1869	Leeds Point	Absecon Lighthouse	39 29 02.37	74 26 00.00	352 35 34.4	29.4	+5.0	−1.2138	−6.07
1852	Mount Rose	Mount Holly	40 22 03.410	74 43 25.769	7 46 55.59	60.17	−4.58	−1.1764	[1] +5.39
	NEW MEXICO								
1910	Burro	Line	32 35 26.637	108 25 56.758	118 50 51.55	53.68	−2.13	−1.5643	+3.33
1909	Cooks	Florida	32 32 09.548	107 43 52.419	348 00 16.03	14.97	+1.06	−1.5676	−1.66
1921	Glen Rio (Laplace)	Martin	35 10 04.666	103 02 31.641	58 19 07.03	5.66	+1.37	−1.4192	−1.94
1909	Jarilla (Laplace)	Kent	32 23 59.912	106 06 45.737	109 00 26.26	30.37	−4.11	−1.5757	+6.48
1920	Los Lunas (Laplace)	Sandia	34 48 26.704	106 44 07.075	210 13 32.16	34.98	−2.82	−1.4384	+4.06
	NEW YORK								
1873	Carpenters Point	Meridian mark	(41 21.4)	(74 41.7)	180 01 14.67				
1874	Cheever	Whitford	44 04 54.055	73 27 02.849	275 10 70.96	56.67	+14.29	−1.0326	[1] −14.76
1907	Dannemora	Bellevue	44 44 30.043	73 42 57.594	264 45 39.47	26.73	+12.74	−1.0091	[1] −12.86
1907	Gardiners Island	Little Gull Island Lighthouse.	41 06 05.596	72 06 22.310	179 33 50.27	45.4	+4.9	−1.146	[1] −5.6
1888	Howlett	Fenner	42 59 52.956	76 17 26.621	275 41 31.43	31.18	+.25	−1.0725	[1] −.27
1873	Jinks (U. S. L. S.)	Pine Tree	44 50 12.274	75 15 54.618	152 27 12.54	14.14	−1.60	−1.0057	+1.61
1907	Mannsville (U. S. L. S.) (Laplace.)	Sandy Creek	43 42 54.484	76 03 13.498	29 01 16.10	17.85	−1.75	−1.0459	[1] +1.83
1874	Mount Merino	Catskill	42 14 05.060	73 49 03.541	74 44 47.26	42.3	+4.96	−1.1015	[1] −5.46
1871	Ogdensburg Lighthouse (U. S. L. S.) (Laplace).	Windmill Point	44 41 52.43	75 30 14.29	206 54 47.00	47.85	−.85	−1.0106	[1] +.86
1878	Prospect Mountain	Mount Equinox	43 25 17.949	73 46 04.570	298 02 60.34	50.28	+10.06	−1.0567	[1] −10.63

[1] Topographic deflection computed. See p. 92.
[3] Approximate North American datum.
[4] Unadjusted.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	NEW YORK—continued		° ′ ″	° ′ ″	° ′ ″	″	″		″
1874	Rouses Point	Windmill Point Lighthouse	45 00 23.27	73 21 30.33	335 03 25.0				
1874	Sandy Creek north base (U. S. L. S.).	Sandy Creek south base	43 40 43.669	76 12 00.918	357 14 26.95	23.29	+3.66	−1.0472	[1] −3.83
1873	Sopers Hill (U. S. L. S.)	Maitland			93 00 15.71	12.06	+3.65		
1880	Tassel Hill	Fenner	42 56 29.134	75 19 00.511	92 55 44.13	41.75	+2.38	−1.0746	[1] −2.56
1875	Tonowanda (U. S. L. S.) (Laplace).	Buffalo Plains	43 00 03.730	78 53 20.885	314 22 40.61	37.18	+3.43	−1.0723	[1] −3.68
1865	West Hills	Wooster	40 48 55.188	73 25 32.405	174 57 38.32	35.76	+2.56	−1.1579	[1] −2.96
	NORTH CAROLINA								
1887	Alpha	"A"	[2]34 13 44	[2]77 55 32	299 18 09.8				
1846	Bodies Island	Roanoke Marshes	35 47 32.134	75 31 57.730	98 28 13.65	16.92	−3.27	−1.3869	+4.54
1918	Bridge (Laplace)	Union	34 15 30.458	77 56 51.737	4 20 44.12				
1914	Bumble	Beck	34 24 02.906	77 35 17.011	203 39 10.40				
1888	Canaday	Lighter			291 04 38.9				
1918	Cox (Laplace)	Cow	36 26 18.839	77 54 19.582	236 22 08.92				
1918	Cut	Isle	34 02 57.344	77 53 30.013	185 22 11.50				
1918	Dro	Farley	35 37 02.617	79 04 59.451	31 25 29.45				
1859	Fort Johnson Flagstaff	Three Cedars	33 55 03.03	78 01 01.20	314 36 32.4				
1866	Fort Spinola 2	Duck Creek	35 05 21.165	77 01 50.435	264 11 37.39				
1918	Greensboro	Guilford	36 04 28.663	79 47 26.139	96 12 52.11	55.99	−3.88	−1.3726	+5.33
1918	Hoffman	Carr	35 02 04.054	79 32 36.722	253 22 20.97				
1876	Hog Island	Ocracoke Lighthouse	35 21 49.584	76 03 40.445	346 24 53.26				
1888	Humphreys	Hummock	[2]34 40 11.89	[2]77 06 40.90	42 29 46.6				
1877	King	Benn	35 12 27.718	81 18 45.517	141 33 36.9	38.08	−1.18	−1.4172	[1] +1.67
1918	Lee	Brook	35 28 47.235	79 10 37.053	175 48 23.93				
1876	Long Shoal Point	Gull Island, 1873	35 34 34.533	75 46 54.593	295 10 04.66	8.59	−3.93	−1.3980	+5.49
1918	Mobile	Dec	36 19 08.808	78 24 29.637	354 24 49.66				
1887	Money Point	Berry	[2]34 12 04.48	[2]77 49 34.19	27 35 22				
1876	Moore	Buffalo	36 23 53.488	80 16 59.222	158 33 31.19	30.90	+.29	−1.3565	[1] −.39
1886	New Macon	Ocean View Hotel	34 41 47.193	76 40 44.593	206 25 42.3				
1886	New South Caswell	Prices Creek Bug Light	33 53 30.393	78 01 02.739	207 25 45.6				
1871	Ocracoke northeast base	Ocracoke Lighthouse	35 04 01.925	76 03 09.221	232 32 14.30	13.74	+.56	−1.4246	−.80
1918	Raleigh (Laplace)	Cary	35 46 37.232	78 38 21.139	92 50 17.33				
1907	Roan High Bluff	Big Butt	36 05 35.231	82 08 44.141	85 29 42.50	47.54	−5.04	−1.3717	[1] +6.91
1918	Roseboro	Hayne	34 57 22.746	78 30 43.442	110 45 45.37				
1876	Sand Island	Bodies Island south base	35 50 25.049	75 40 07.457	287 31 08.53	13.36	−4.83	−1.3845	+6.69
1919	Sanford (Laplace)	Jonesboro	35 27 06.071	79 10 25.365	250 18 28.32	23.54	+4.78	−1.4044	−6.71
1888	Sloop Point 2	Batson	[2]34 24 46	[2]77 35 39	234 19 18.2				
1848	Stevensons Point	Palmetto	36 06 19.023	76 11 24.936	342 30 67.30	58.27	+9.03	−1.3711	−12.38
1918	Tank	Dif	36 02 41.916	78 29 05.532	168 40 58.60				
1854	Wilmington, St. James Church.	Nutt	34 19 06.835	77 56 45.659	160 24 19.4				
1876	Young	Poore	35 44 14.356	80 38 51.122	126 52 53.69	51.43	+2.26	−1.3897	[1] −3.14
	NORTH DAKOTA								
1912	Bowie	Ambrose northeast base	48 59 56.626	103 44 00.295	273 03 43.69	40.65	+3.04	−.8693	−2.64
1912	Gladys	Howard	48 26 45.434	103 53 03.761	192 14 59.49	62.79	−3.30	−.8864	+2.93
1904	Hankinson	Foss	46 02 15.729	96 57 03.773	257 24 30.65	27.25	+3.40	−.9644	[1] −3.28
1912	Saddle	Cook	46 58 57.890	103 13 42.639	116 42 17.96	16.19	+1.77	−.9331	−1.65
	OHIO								
1885	Gould	Howland	38 38 27.582	82 49 56.728	84 49 13.61	9.90	+3.71	−1.2508	[1] −4.64
1877	Sandusky west base (U. S. L. S.).	Sandusky east base	41 29 02.111	82 40 57.571	319 36 38.60	42.87	−4.27	−1.1309	[1] +4.83
1890	Toledo	Mark	41 39 31.01	83 34 10.30	180 00 18.8				
	OKLAHOMA								
1920	Allen (Laplace)	Hawkins	34 53 26.592	96 25 04.299	182 11 32.57	[3]22.45	+10.12	−1.4340	−14.52
1919	Blue	Panther	35 01 56.712	95 10 06.726	99 44 06.74	1.39	+5.35	−1.4265	−7.63
1908	Carson	El Reno east base	35 16 24.848	97 57 32.760	185 11 32.25	36.25	−4.00	−1.4137	[1] +5.65
1921	Dill (Laplace)	Grebe	35 17 24.368	99 07 40.487	276 16 26.82	27.98	−1.16	−1.4129	+1.64
1920	Rosedale	Table Hill	34 52 07.591	97 10 38.640	53 08 00.65	.74	−.09	−1.4351	+.13
1919	Savanna south base	Savanna north base	34 46 56.879	95 52 59.719	213 42 53.23	43.70	+9.53	−1.4398	−13.72
1908	Wingard	Edmonds	35 56 47.428	97 29 20.129	356 13 03.31	7.79	−4.48	−1.3791	[1] +6.18
	OREGON								
1886	Balch	Harney	45 31 54.574	122 42 30.763	210 43 44.19	44.61	−.42	−.9817	[1] +.41
1903	Barnes	Larch	45 31 36.526	122 45 00.031	268 58 27.52	29.97	−2.45	−.9818	[1] +2.41
1903	do	Yam	45 31 36.526	122 45 00.031	30 59 00.90	6.87	−5.97	−.9818	[1] +5.86
1916	Beaver	Fanny	44 35 59.517	117 47 00.282	183 05 01.07	10.22	−9.15	−1.0141	+9.28
1920	Beulah	Star	43 52 13.065	118 05 44.572	349 23 33.63	47.02	−13.39	−1.0403	+13.93
1920	Burns	Jack	43 33 42.480	119 09 04.961	344 15 40.20	43.02	−2.82	−1.0515	+2.97
1916	Echo (Laplace)	Stanfield east base	45 44 38.385	119 11 20.222	110 20 13.34	19.99	−6.65	−.9744	+6.48
1916	Ella	Job	45 34 17.518	119 46 41.429	257 10 09.89	11.07	−1.18	−.9802	+1.16
1904	Eugene astronomic (Laplace).	Spencer	44 03 30.319	123 05 28.438	1 57 53.49	54.04	−.55	−1.0334	[1] +.57
1912	Fort Stevens (Laplace)	Scarboro Hill 2	46 12 27.600	123 57 39.853	211 48 17.66	35.6	−17.94	−.9587	+17.20

[1] Topographic deflection computed. See p. 92.
[2] Approximate North American datum.
[3] The azimuth angle was allowed to take a correction in the triangulation adjustment.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	OREGON—continued		° ′ ″	° ′ ″	° ′ ″	″	″		″
1916	John	Lookout	45 24 06.690	120 36 08.470	85 08 36.36	35.43	+0.93	−0.9861	−0.92
1920	Juniper	Burns	42 55 48.968	119 55 57.180	221 51 13.17	18.71	−5.54	−1.0750	+5.96
1916	La Grande (Laplace)	Emily	45 19 49.467	118 05 39.346	180 05 17.78	15.10	+2.68	−.9885	−2.65
1920	Lakeview bench mark M-16	Cougar	42 11 36.988	120 21 39.891	119 47 01.26	17.68	−16.42	−1.1031	[5]+18.11
1903	Mary	Spencer	44 30 17.369	123 33 05.732	327 37 57.27	54.62	+2.65	−1.0174	[1]−2.70
1904	Onion	Black	42 41 31.762	123 13 46.921	229 59 43.37	46.98	−3.61	−1.0840	[1]+3.91
1904	Onion	White	42 41 31.762	123 13 46.921	198 11 17.97	21.87	−3.90	−1.0840	[1]+4.23
1861	Pigeon	Azimuth mark	[2]43 21 42	[2]124 18 15	183 17 37.97				
1886	Rainier	Rinearson	46 05 11.963	122 55 28.342	119 26 38.69	33.80	+4.89	−.9628	−4.71
1920	Riddle	Crow	43 06 02.213	118 29 54.213	179 21 52.75	58.82	−6.07	−1.0686	+6.49
1904	Rust	Onion	42 37 10.930	122 20 50.147	96 38 83.00	45.29	−12.29	−1.0868	[1]+13.36
1904	Scott	Black	43 22 21.758	123 03 50.517	295 36 08.61	15.65	−7.04	−1.0585	[1]+7.45
1903	Spencer	Peterson	43 59 00.715	123 05 41.248	189 45 03.53	1.69	+1.84	−1.0361	[1]−1.91
1852	Tongue Point Neck	Grays Point	46 12 18.831	123 45 58.357	180 48 26.25	40.80	−14.55	−.9588	−13.95
1903	Yam	Hult	45 03 44.993	123 08 34.292	287 50 37.49	31.00	+6.49	−.9979	[1]−6.48
1920	Yonna	Cougar	42 19 36.000	121 16 05.935	272 06 55.10	59.96	−4.86	−1.0979	+5.34
	PENNSYLVANIA								
1908	Womelsdorff	White Horse	40 19 28.250	76 11 44.689	158 47 40.75	42.55	−1.80	−1.1782	[1]+2.12
1854	Yard	Lippincott	39 58 24.796	75 23 13.793	347 17 38.57	38.94	−.37	−1.1929	[1]+.45
	RHODE ISLAND								
1844	Beaconpole	Blue Hill	41 59 42.468	71 27 01.257	228 55 17.24	19.77	−2.53	−1.1108	[1]+2.81
1844	Spencer	Beaconpole	41 40 43.256	71 29 40.685	185 57 33.02	36.34	−3.32	−1.1232	[1]+3.73
	SOUTH CAROLINA								
1918	Allen (Laplace)	Extension	32 59 46.312	81 17 27.631	130 00 11.75				
1854	Allston	Bay	[2]33 21 38	[2]79 16 37	333 37 19.3				
1873	Battery	Pilot	[2]33 51 44	[2]78 34 30	352 55 28.3				
1918	Bethune I (Laplace)	Bethune J	34 28 07.227	80 15 29.426	201 11 42.03				
1849	Breach Inlet	Elliotts Cut	32 46 20.331	79 48 56.686	87 44 61.15	59.62	+1.53	−1.5534	−2.38
1918	Columbia	College	34 00 14.932	81 02 05.108	174 41 46.07				
1918	Denmark	Pete	33 18 57.940	81 08 41.073	6 29 44.36				
1850	Edisto Island east base	Edisto Island west base	32 33 15.425	80 13 33.993	61 21 20.2	19.55	+.65	−1.5664	−1.02
1918	Estill	Ben	[4]32 45 17.70	[4]81 14 29.64	1 26 06.93				
1890	Fort Johnson	Fort Sumter	[2]32 45 05	[2]79 53 53	266 26 47.9				
1852	New Cut	Edisto Island east base	32 41 51.711	80 11 36.685	10 53 36.32	35.33	+.99	−1.5578	−1.54
1875	Paris	Wofford	34 56 29.062	82 24 39.956	267 18 15.17	14.63	+.54	−1.4313	[1]−.77
1859	Port Royal	Beaufort Church	32 17 45.406	80 38 36.078	169 40 03.74	4.06	−.32	−1.5820	+.51
	SOUTH DAKOTA								
1906	Franklin	Elfring	44 53 52.549	96 56 18.679	67 47 14.60	13.34	+1.26	−1.0036	[1]−1.26
1906	Freeman	Silver Lake	43 18 47.711	97 27 06.857	189 32 48.85	49.86	−1.01	−1.0608	[1]+1.07
1906	Preacher Hill	Brown Valley southeast base.	45 28 14.847	97 06 18.457	247 56 33.89	32.08	+1.81	−.9837	[1]−1.78
1912	Provo astronomic (Laplace)	Provo west base	43 11 44.159	103 49 41.058	70 55 56.66	53.73	+2.93	−1.0651	−3.12
1912	Reva	Table	45 34 51.060	103 12 44.169	135 35 39.51	35.72	+3.79	−.9799	−3.71
	TENNESSEE								
1907	Bean	Roy	35 11 31.466	84 33 29.635	195 24 03.52	10.44	−0.92	−1.4180	[1]+9.82
1914	Hickory	Ebenezer	35 08 24.408	89 08 22.462	90 44 44.84	41.11	+3.73	−1.4207	−5.30
1878	Lebanon north base	Lebanon south base	36 12 46.893	86 18 24.558	6 00 48.76	48.39	+.37	−1.3657	[1]−.51
1907	Luper	Hinch Mountain	35 57 16.067	84 47 20.120	41 46 02.81	.58	+2.23	−1.3787	[1]−3.07
1914	Martin (Laplace)	White	35 04 41.077	89 47 52.191	108 00 15.27	[3]14.78	+.49	−1.4240	−.70
1907	Mount Lore	Chestnut	35 54 54.429	85 32 26.861	282 06 48.94	52.03	−3.09	−1.3807	[1]+4.27
	TEXAS								
1905	Alice (Laplace)	Wood	27 44 33.012	98 04 30.885	276 47 24.26	23.70	+.56	−1.9013	[1]−1.06
1919	Appleby	Enterprise	31 42 32.330	94 33 25.993	154 27 20.61	17.69	+2.92	−1.6186	−4.73
1906	Austin, Capitol dome, star in hand of Liberty (Laplace).	Barton	30 16 27.968	97 44 25.032	109 25 41.27	48.76	−7.49	−1.7130	[1]+12.83
1906	Bachelor	Lampasas southwest base	30 59 39.956	98 05 51.294	109 44 41.17	43.08	−1.91	−1.6646	[1]+3.18
1909	Black	Eagle	31 34 21.899	105 08 52.357	355 15 35.42	34.54	+.88	−1.6272	−1.43
1918	Blue	Babb	30 03 20.872	101 20 11.653	82 27 44.73	47.20	−2.47	−1.7282	+4.27
1906	Bowie northwest base (Laplace).	Bowie southeast base	33 37 21.756	98 00 14.492	322 44 09.58	19.80	−10.22	−1.5039	[1]+15.37
1913	Brenner	Yturria	26 28 48.067	97 51 58.090	217 02 26.99	28.59	−1.60	−2.0075	+3.21
1909	Bynum	Wolf	32 19 15.921	101 00 00.967	234 58 39.52	43.73	−4.21	−1.5805	+6.65
1906	Chamliss	Gibson	31 39 23.364	98 07 29.303	166 57 29.30	33.37	−4.07	−1.6219	[1]+6.60
1921	Conway (Laplace)	Washburn	35 12 24.229	101 23 23.044	80 57 44.27	44.13	+.14	−1.4172	−.20
1917	Dentonio	Carlow	28 18 32.500	99 56 12.573	175 26 45.61	45.65	−.04	−1.8566	+.07
1848	Dollar point	Azimuth mark	29 25 59.014	94 53 27.041	0 03 29.42				
1913	Donna (Laplace)	Rio	26 09 40.459	98 02 45.414	314 05 13.20	15.57	−2.37	−2.0358	+4.82
1918	Dryden east base (Laplace)	Hen	30 02 39.865	102 05 55.380	167 48 20.72	19.16	+1.56	−1.7290	−2.70

[1] Topographic deflection computed. See p. 92.
[2] Approximate North American datum.
[3] The azimuth angle was allowed to take a correction in the triangulation adjustment.
[4] Unadjusted.
[5] See footnote 3, p. 81.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	TEXAS—continued		° ′ ″	° ′ ″	° ′ ″	″	″		″
1909	Eagle	Diablo	30 55 16.688	105 05 06.790	207 58 16.43	19.02	−2.59	−1.6695	+4.32
1909	Estes	Aroya	31 29 50.428	102 57 44.531	155 29 35.75	39.90	−4.15	−1.6321	+6.77
1905	Fronton (Laplace)	Point Isabel south base	26 04 41.082	97 12 25.517	73 34 37.04	38.04	−1.00	−2.0433	[1] +2.04
1853	Galveston Island east base	Azimuth mark	29 12 49.123	94 55 50.147	70 36 00.92				
1906	Gilbert	Comanche	32 48 11.037	97 53 38.984	349 41 38.16	49.54	−11.38	−1.5515	[1]+17.66
1919	Jacksonville (Laplace)	Jacksonville south base	31 57 54.475	95 16 50.743	338 27 45.09	[2]44.50	+.59	−1.6025	−.94
1918	Johnstone (Laplace)	Hamilton	29 22 38.529	100 46 11.628	203 04 43.79	43.27	+.52	−1.7764	−.92
1853	Jupiter	Azimuth mark	28 54 44.269	95 20 33.860	235 09 28.91				
1904	Karnes	Ruckman	28 52 38.640	97 54 48.145	226 01 36.32	36.65	−.33	−1.8133	[1] +.60
1908	Lacasa	Pierce	32 39 05.105	98 41 30.374	12 49 46.54	55.10	−8.56	−1.5706	+13.44
1882	Laguna Madre north base	Laguna Madre south base	27 40 10.565	97 16 20.529	22 32 42.14	48.11	−5.97	−1.9072	[1]+11.39
1918	Laplace (Laplace)	Nine	28 42 46.426	100 29 33.719	167 44 41.71	41.32	+.39	−1.8256	−.71
1917	Laredo (Laplace)	Orvil	27 30 37.041	99 29 17.480	187 10 03.83	1.05	+2.78	−1.9202	−5.34
1868	Lavaca	Sand Point	28 37 33.765	96 37 18.543	285 26 56.9				
1919	Lee	Pilot	31 37 30.232	95 53 07.294	131 27 45.43	44.70	+.73	−1.6239	−1.19
1883	Matagorda south base	Matagorda north base	28 39 56.905	95 48 34.871	164 19 26.8				
1904	Miller	Beeville	28 18 06.751	97 48 22.538	190 33 46.88	47.75	−.87	−1.8572	[1] +1.62
1906	Mission	Tieken	29 42 52.761	98 09 52.996	268 42 08.06	8.45	−.39	−1.7621	[1] +.68
1917	Monument	Corpus	26 21 16.683	98 46 02.964	180 59 17.17	16.97	+.20	−2.0185	−.40
1906	Pilot	Comanche	32 15 38.086	98 08 20.098	247 38 19.51	26.18	−6.67	−1.5843	[1]+10.57
1886	Point Isabel east base	Point Isabel Lighthouse	26 04 44.012	97 15 11.957	272 05 41.2				
1917	Pyle	Madera	30 21 49.417	102 40 23.661	137 49 55.75	51.56	+4.19	−1.7068	−7.15
1913	Raymond	Brenner	26 28 55.781	97 44 20.953	88 57 11.90	15.05	−3.15	−2.0073	+6.32
1913	Robbins	Rivera	27 18 23.071	97 44 19.471	84 43 49.56	50.91	−1.35	−1.9370	+2.61
1909	Round	Ingle	31 28 54.637	103 53 11.902	245 31 28.40	26.35	+2.05	−1.6330	−3.35
1908	Sears	Allen	32 33 30.799	100 02 17.040	98 06 42.33	48.44	−6.11	−1.5662	+9.57
1909	Smith	Morris	31 58 35.288	102 27 49.901	242 18 25.87	24.75	+1.12	−1.6018	−1.79
1908	Springgap	Kennard	32 15 55.018	99 17 25.765	142 15 22.89	29.65	−6.76	−1.5840	+10.71
1909	Stanton (Laplace)	Evart	32 07 33.087	101 46 24.746	224 31 57.76	60.82	−3.06	−1.5926	+4.87
1917	Star	Baldy	30 46 38.779	103 47 39.306	66 40 50.54	53.00	−2.46	−1.6790	+4.13
1919	Tehuacana (Laplace)	Hubbard	31 44 16.472	96 32 56.794	108 16 53.92	[2]56.13	−2.21	−1.6167	+3.57
1881	Venado	Coyote	27 08 11.509	97 22 30.381	103 10 48.2	50.35	−2.15	−1.9511	[1] +4.19
1917	Zapata	Moleno	26 52 49.422	99 17 49.676	195 59 51.03	49.12	+1.91	−1.9728	−3.77
	UTAH								
1892	Antelope	Deseret	40 57 44.374	112 12 55.547	31 59 04.14	11.07	−6.93	−1.1519	[1] +7.98
1892	Deseret	Mount Nebo	40 27 35.301	112 37 32.551	314 14 01.38	12.20	−10.82	−1.1725	[1]+12.69
1889	Ibepah	Diamond Peak	39 49 42.459	113 55 08.933	81 11 28.49	33.73	−5.24	−1.1990	[1] +6.28
1891	Mount Ellen	Patmos Head	38 07 17.115	110 48 50.657	195 35 57.89	62.45	−4.56	−1.2744	[1] +5.81
1887	Mount Nebo	Tushar	39 48 39.113	111 45 56.918	20 05 23.06	38.64	−15.58	−1.1998	[1]+18.69
1893	Mount Waas	Mount Ellen	38 32 21.444	109 13 38.302	72 00 16.62	29.10	−12.48	−1.2554	[1]+15.67
1891	Ogden (Laplace)	Ogden Peak	41 13 12.406	111 59 37.959	283 08 44.70	59.55	−14.85	−1.1415	[1]+16.95
1888	Ogden Peak	Mount Nebo	41 12 00.762	111 52 53.072	356 19 30.37	41.73	−11.36	−1.1423	[1]+12.98
1890	Patmos Head	Wasatch	39 30 08.566	110 18 57.933	66 41 18.70	27.72	−9.02	−1.2130	[1]+10.94
1892	Promontory	Ogden Peak	41 17 53.690	112 25 09.269	283 24 02.64	.53	+2.11	−1.1384	[1]−2.40
1893	Salt Lake City (Laplace)	City Creek	40 46 11.574	111 53 27.343	192 02 50.50	66.51	−16.01	−1.1598	[1]+18.57
1892	Waddoup	Ogden Peak	40 54 26.002	111 53 10.499	180 42 32.55	54.07	−21.52	−1.1542	[1]+24.84
1890	Wasatch	Mount Nebo	39 06 54.362	111 27 11.915	160 54 02.73	9.87	−7.14	−1.2299	[1]+8.78
	VERMONT								
1870	Burlington	Juniper Island	44 28 09	73 12 34	67 54 08.42				
1907	Killington	Mount Equinox	43 36 17.504	72 49 14.285	26 21 42.23	42.45	−.22	−1.0499	[1]+.23
1907	Mount Mansfield	Bellevue	44 31 35.244	72 48 55.643	145 09 19.14	19.43	−.29	−1.0166	[1]+.29
	VIRGINIA								
1907	Big Knob	Roan High Bluff	36 39 52.635	82 30 21.435	332 52 31.53	32.39	−.86	−1.3433	[1]+1.16
1918	Boykins	Cay	36 35 01.286	77 12 06.827	73 12 36.27				
1871	Bull Run	Peach Grove	38 52 53.579	77 42 12.604	263 53 28.49	29.48	−.99	−1.2401	[1]+1.23
1907	Cahas	Smith Mountain	37 07 01.860	80 00 56.644	285 47 30.89	26.69	+4.20	−1.3214	[1]−5.55
1866	Cape Henry Lighthouse	Cape Charles Lighthouse	36 55 32.815	76 00 30.232	205 38 21.06				(1)
1918	Church (Laplace)	Suffolk	36 44 03.031	76 35 53.930	271 39 33.64				
1871	Clark	Bull Run	38 18 41.098	78 00 11.478	202 19 27.98	27.68	+.30	−1.2657	[1]−.38
1878	Elliott Knob	Humpback	38 09 59.328	79 18 51.328	303 25 24.46	21.08	+3.38	−1.2723	[1]−4.30
1869	Knott Island north end	Ragged Island	36 33 57.614	75 55 18.576	172 34 08.67	3.76	+4.91	−1.3481	[1]−6.62
1875	Long Mountain	Spear	37 17 27.586	79 05 10.230	223 28 41.64	45.44	−3.80	−1.3131	[1]+4.99
1907	Mount Weather (Laplace)	Sugarloaf	39 03 48.556	77 53 16.503	242 30 53.65	54.57	−.92	−1.2321	[1]+1.13
1907	Rogers	Poore	36 39 36.031	81 32 41.885	332 46 30.24	30.78	−.54	−1.3435	[1]+.73
1852	Roslyn (Laplace)	Finn	37 14 28.33	77 23 50.71	227 54 50.68				
1871	Tangier Island	Watts Island Lighthouse	37 47 57.702	75 59 14.996	282 48 37.72	32.2	+5.52	−1.2892	[1]−7.12
1907	White Rock	Short	36 39 54.173	83 27 05.070	322 14 43.56	45.15	−1.59	−1.3433	[1]+2.14
1871	Wolftrap	New Point Comfort Lighthouse.	37 24 04.746	76 14 42.975	14 37 04.94	6.5	−1.56	−1.3079	[1]+2.04

[1] Topographic deflection computed. See p. 92.
[2] The azimuth angle was allowed to take a correction in the triangulation adjustment.

TABLE XXVII.—*Deflections of the vertical at azimuth stations*—Continued

Year	Station occupied	Reference	Geodetic latitude	Geodetic longitude	Astronomic azimuth A	Geodetic azimuth G	A−G	−cot φ	A−G in prime vertical
	WASHINGTON		° ′ ″	° ′ ″	° ′ ″	″	″		″
1905	Bel	Min	46 47 04.983	121 56 22.841	15 43 55.75	70.73	−14.98	−0.9396	[1]+14.08
1908	Classet	Tatoosh Lighthouse	48 23 29.151	124 39 30.167	90 43 18.90	81.43	−12.53	−.8882	[1]+11.13
1911	Goose 2	Willapa Bay Lighthouse	46 38 13.223	123 57 34.553	136 32 59.82	84.2	−24.38	−.9445	+23.03
1873	Kalama	Drays Mound	46 00 24.61	122 50 36.97	162 55 21.30				
1906	Lam	Len	46 07 57.903	122 27 42.295	231 36 12.34	20.49	−8.15	−.9612	[1]+7.83
1911	Langley	Marsh	47 07 00.260	124 06 46.446	7 20 38.0	50.3	−12.30	−.9287	+11.42
1911	Pioneer	Delphi	46 49 48.549	123 27 56.162	237 20 16.51	35.7	−19.19	−.9381	+18.00
1860	Point Hanson	Azimuth mark	(46 53.8)	(124 06.7)	183 29 42.4				
1856	Point Hudson	Point Wilson	48 07 03.831	122 44 52.901	170 40 19.10	4.88	+14.22	−.8967	[1]−12.75
1908	Port Townsend (Laplace)	Kilisut 2	48 07 05.004	122 45 14.929	307 31 63.72	55.59	+8.13	−.8967	[1]−7.29
1911	Rain	Hurst	46 50 07.065	122 41 09.422	205 27 33.16	32.32	+.84	−.9379	−.79
1905	Takoma astronomic (Laplace)	Gull	47 15 47.911	122 26 51.446	197 20 34.51	35.49	−.98	−.9240	[1]+.90
	WEST VIRGINIA								
1880	Keeney	Bald Knob	37 46 24.843	80 42 19.179	257 04 35.89	32.52	+3.37	−1.2904	[1]−4.35
1883	Piney	Gebhart	38 26 39.588	82 03 28.996	119 04 31.84	31.38	+.46	−1.2597	[1]−.58
	WISCONSIN								
1871	Aminicon River (U. S. L. S.)	Lester River	46 41 32.466	91 51 42.845	153 36 66.15	56.53	+9.62	−.9426	[1]−9.07
1921	Babe	Dixe	[4]45 08 44	[4]88 28 19	335 15 23.05				
1872	Bruce (U. S. L. S.)	Long Tail Point Light	44 31 39.487	87 53 57.287	139 16 04.90	6.90	−2.00	−1.0166	[1]+2.03
1920	Buffalo	Clinton	42 32 26.687	88 53 50.708	245 43 28.99				
1920	Burlington	Oconto	42 40 05.511	88 16 53.209	59 51 00.99				
1921	Carter	Durgan	[4]45 22 57	[4]88 37 33	185 09 26.95				
1921	Chalmers	Dort	[4]45 33 16	[4]90 00 46	90 19 40.40				
1908	Detour (U. S. L. S.)	Clay Bank	46 56 36.988	90 58 08.506	62 00 49.85	44.78	+5.07	−.9343	[1]−4.74
1920	Dover (U. S. L. S.)	Midway	42 40 25.379	88 05 02.930	230 54 28.81				
1887	Fitzsimmons	Arlington	[3]43 25 40	[3]89 39 14	291 18 37.41				
1920	Fond	Elorence	42 39 20.360	88 35 07.181	55 41 55.91				
1921	Gordon	Phelps	[4]46 14 44	[4]91 47 43	164 49 48.97				
1880	Gratiots Grove	Azimuth mark	[3]42 32 32	[3]90 13 41	359 57 18.5				
1921	Green Bay east base	Bruce	44 31 42.893	88 00 54.665	270 36 43.41				
1921	Harding	Marie	[4]45 39 52	[4]89 12 03	272 54 58.64				
1921	High	Maiden	[4]45 17 13	[4]88 30 27	148 25 22.96				
1921	Lake	Over	[4]45 51 02	[4]91 32 52	177 51 56.08				
1921	Laona	Rock	[4]45 33 20	[4]88 40 22	179 01 21.78				
1921	Lem	Omaha	[4]45 46 03	[4]91 21 35	328 18 35.22				
1921	Long	Brownlee	[4]45 58 28	[4]91 35 37	326 18 13.47				
1921	Manson	Pat	[4]45 34 01	[4]89 39 25	255 21 32.62				
1921	Massive (Laplace)[5]	Jerome	[4]45 28 34	[4]91 06 43	151 39 15.10				
1873	Minnesota Junction (U. S. L. S.)	Horicon	43 28 28.537	88 43 46.782	272 30 45.03	48.99	−3.96	−1.0547	[1]+4.18
1921	Mount	Gravel	[4]45 11 09	[4]88 28 26	145 55 01.84				
1921	Night (Laplace)[5]	Good	[4]44 24 16	[4]89 50 01	130 27 11.47				
1921	North	Cranden	[4]45 39 29	[4]88 52 43	80 22 21.31				
1921	Owen	Pate	[4]44 57 02	[4]90 33 48	321 28 36.82				
1921	Park	Gilman	[4]45 09 27	[4]90 48 27	152 36 08.20				
1921	Point	Otto	[4]45 53 16	[4]88 19 29	178 07 25.23				
1921	Prentice	Jean	[4]45 32 21	[4]90 17 17	107 03 45.13				
1921	Pulaski	Lucy	[4]44 40 16	[4]88 13 54	151 52 47.03				
1875	Quarry Bluff	Big Hollow	[3]43 12 21	[3]90 03 31	102 28 04.06				
1921	Rhinelander (Laplace)[5]	Cabot	[4]45 38 53	[4]89 24 30	39 13 04.47				
1921	Robert	Laris	[4]44 41 35	[4]90 12 31	322 00 56.18				
1921	Smook	Hawkins	[4]45 30 43	[4]90 41 30	99 13 45.73				
1908	Somers (U. S. L. S.)	Caledonia	42 37 10.094	87 52 32.838	159 31 24.16	28.19	−4.03	−1.0868	[1]+4.38
1875	Spring Green east base	Stewarts Bluff	[3]43 09 39	[3]90 03 49	245 47 21.8				
1921	Wabeno	Forest	[4]45 26 23	[4]88 39 44	100 30 56.13				
1921	Way	Range	[4]46 34 49	[4]91 57 35	108 41 25.54				
	WYOMING								
1913	Alkali	Cambria	43 38 12.937	104 29 11.373	207 19 14.82	16.05	−1.23	−1.0488	+1.29
1913	Cambria	Alkali	44 02 43.952	104 11 36.919	27 31 18.95	26.43	−7.48	−1.0339	+7.73
1912	Ragged	Chugwater	41 26 20.835	105 20 39.192	212 56 35.29	23.95	+11.34	−1.1327	−12.84
1912	Twin	Horsetooth	41 02 54.064	105 16 02.530	353 54 38.69	24.76	+13.93	−1.1484	−16.00
1912	Willow	Coleman	42 41 10.995	104 39 50.037	46 48 47.61	49.49	−1.88	−1.0842	+2.04
	CANADA								
1908	Beechy Head	Discovery	48 19 47.724	123 39 22.215	251 19 17.22	12.73	+4.49	−.8899	[1]−4.00
1895	Gargantua (U. S. L. S.)	Mamainse	47 34 42.832	84 58 53.927	335 06 19.93	23.73	−3.80	−.9138	[1]+3.47
1873	Johnstown (U. S. L. S.)	Frazers	44 44 30.319	75 27 59.701	29 14 59.51	64.76	−5.25	−1.0091	+5.30

[1] Topographic deflection computed. See p. 92.
[3] Approximate North American datum.
[4] Unadjusted.
[5] Longitudes not yet published.

CHAPTER V.—DESCRIPTIONS OF STATIONS

Any desired description may be readily found by reference to the index. All azimuths given in the descriptions are reckoned continuously from true south around by west to 360°, south being 0°, north 180°, and east 270°. Where magnetic azimuths are given they are indicated as such.

In general, except where the contrary is specifically stated, the surface and underground marks at the stations are not in contact, so that a disturbance of the surface mark will not necessarily affect the underground mark. The underground mark should be resorted to only in cases where there is evidence that the surface mark has been disturbed.

The name and dates given in each description immediately after the county refer to the observer, usually the chief of party, by whom the astronomic station was established, the date of the establishment of the astronomic station, and the date when last recovered.

In each description the astronomic station is first described, then the connection, if there is one, with the geodetic station is given, and finally the geodetic station is described.

Any person who finds that one of the stations herein described has been disturbed or that the description no longer fits the facts, is requested to send such information to the Director, Coast and Geodetic Survey, Washington, D. C.

MARKING OF STATIONS

The standard station mark referred to in the following descriptions and notes (see fig. 14) consists of a disk and shank of brass cast in one piece. The disk is 90 mm. in diameter, with a hole at the center surrounded by a 20-mm. equilateral triangle, and has the following inscribed legend: "U. S. Coast and Geodetic Triangulation Station. For information write to the Director, Washington, D. C. $250 fine or imprisonment for disturbing this mark." The shank is 25 mm. in diameter and 80 mm. long. For most of the stations established since 1916 the name of the station and the year in which it was established are stamped on the station mark.

The standard reference mark, shown in Figure 14, is the same size and shape as the station mark, but has an arrow on the top in place of the triangle, which, when properly set, points to the station. The legend is the same, except the words "reference mark" take the place of the words "triangulation station."

STANDARD NOTES ON THE MARKING OF STATIONS

SURFACE MARKS

Note 1.—A standard bronze tablet set in the top of (*a*) a square block or post of concrete, (*b*) a concrete cylinder, (*c*) an irregular mass of concrete.

Note 2.—A standard bronze tablet wedged in a drill hole in outcropping bedrock, (*a*) and surrounded by a triangle chiseled in the rock, (*b*) and surrounded by a circle chiseled in the rock, (*c*) at the intersection of two lines chiseled in the rock.

Note 3.—A standard bronze tablet set in concrete in a depression in outcropping bedrock.

Note 4.—A standard bronze tablet wedged in a drill hole in a bowlder.

Note 5.—A standard bronze tablet set in concrete in a depression in a bowlder.

Note 6.—A standard bronze tablet set in concrete at the center of the top of a tile (*a*) which is embedded in the ground, (*b*) which is surrounded by a mass of concrete, (*c*) which is fastened by means of concrete to the upper end of a long wooden pile driven into the marsh, (*d*) which is set in a block of concrete and projects from 12 to 20 inches above the block.

UNDERGROUND MARKS

Note 7.—A block of concrete 3 feet below the ground containing at the center of its upper surface (*a*) a standard bronze tablet, (*b*) a copper bolt projecting slightly above the concrete, (*c*) an iron nail with the point projecting above the concrete, (*d*) a glass bottle with the neck projecting a little above the concrete, (*e*) an earthenware jug with the mouth projecting a little above the concrete.

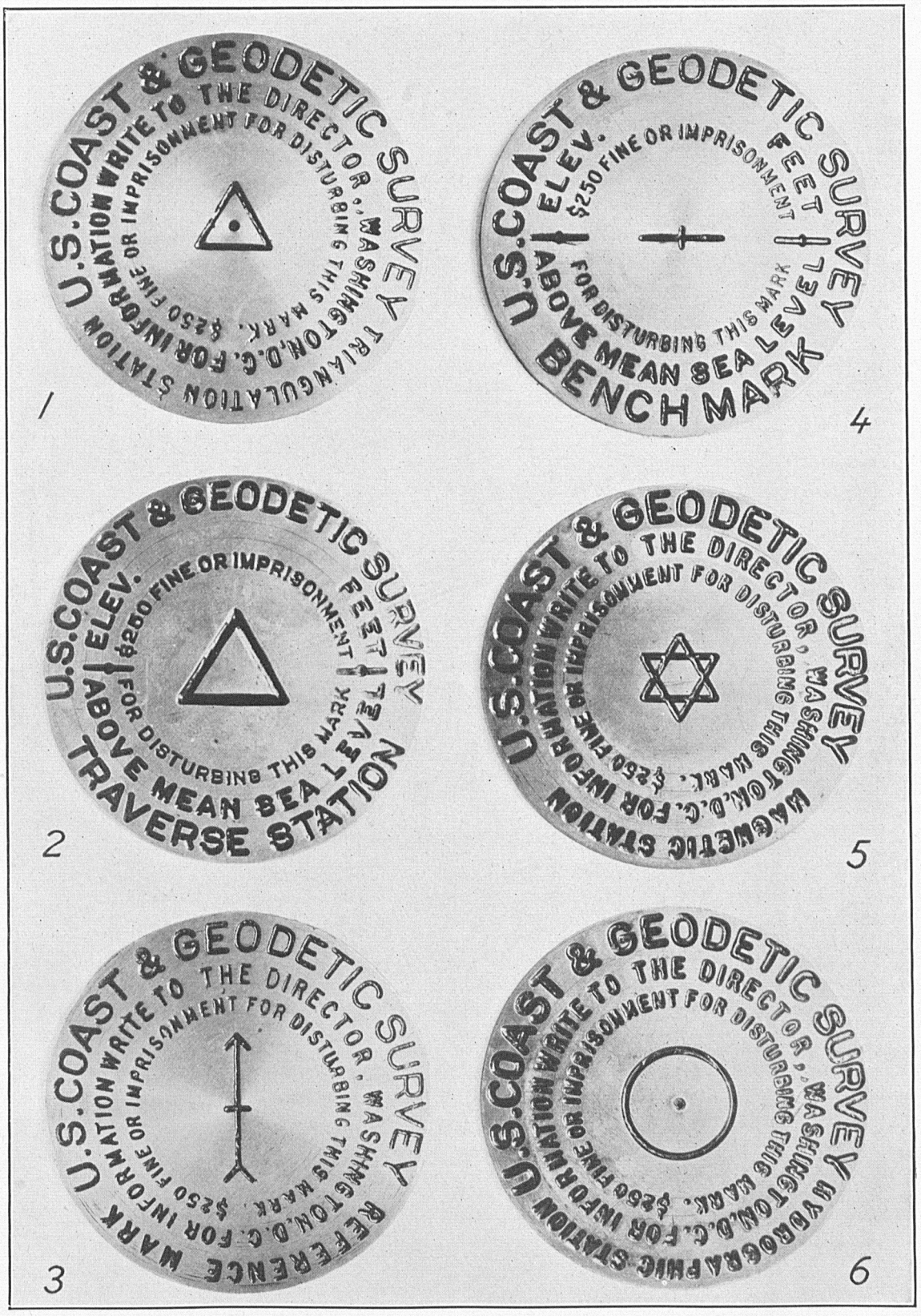


FIG. 14.—U. S. COAST AND GEODETIC SURVEY STATION MARKS

1, Triangulation station mark; 2, traverse station mark; 3, reference mark; 4, bench mark; 5, magnetic station mark; 6, hydrographic station mark

Note 8.—In bedrock, (*a*) a standard bronze tablet wedged in a drill hole, (*b*) a standard bronze tablet set in concrete in a depression, (*c*) a copper bolt set in cement in a drill hole or depression, (*d*) an iron spike set point up in cement in a drill hole or depression.

Note 9.—In a bowlder 3 feet below the ground, (*a*) a standard bronze tablet wedged in a drill hole, (*b*) a standard bronze tablet set in concrete in a depression, (*c*) a copper bolt set with cement in a drill hole or depression, (*d*) an iron spike set with cement in a drill hole or depression.

Note 10.—Embedded in earth 3 feet below the surface of the ground, (*a*) a bottle in an upright position, (*b*) an earthenware jug in an upright position, (*c*) a brick in horizontal position with a drill hole in its upper surface.

REFERENCE MARKS

Note 11.—A standard bronze tablet with the arrow pointing toward the station set at the center of the top of (*a*) a square block or post of concrete, (*b*) a concrete cylinder, (*c*) an irregular mass of concrete.

Note 12.—A standard bronze tablet with the arrow pointing toward the station, (*a*) wedged in a drill hole in outcropping bedrock, (*b*) set in concrete in a depression in outcropping bedrock, (*c*) wedged in a drill hole in a bowlder, (*d*) set in concrete in a depression in a bowlder.

Note 13.—A standard bronze tablet with the arrow pointing toward the station set in concrete at the center of the top of a tile, (*a*) which is embedded in the ground, (*b*) which is surrounded by a mass of concrete, (*c*) which is fastened by means of concrete to the upper end of a long wooden pile driven into the marsh, (*d*) which is set in a block of concrete and projects from 12 to 20 inches above the block.

WITNESS MARKS

Note 14.—A conical mound of earth surrounded by a circular trench.

Note 15.—A tree marked with (*a*) a triangular blaze with a nail at the center and each apex of the triangle, (*b*) a square blaze with a nail at the center and each corner of the square, (*c*) a blaze with a standard disk reference mark set at its center into the tree.

DESCRIPTIONS

ALABAMA

Aurora latitude (Etowah County, Ala., F. P. Weber, 1877).—Distant 7.873 meters (25.83 feet) (0".26 of latitude) due south of *Aurora azimuth.* (See below.) The instrument was mounted on a wooden pier.

Aurora azimuth (Etowah County, Ala., F. P. Weber, 1877; 1886).—Identical with triangulation station of the same name, on the highest part of Sand Mountain. The surface mark is a cross cut in the top of a granite post, 5 inches square, and lettered "U. S. C. S.," covered with earth and rock. The underground mark is an inverted bottle full of ashes buried 3 feet below the surface of the ground. The reference marks are as follows: A cross, with an arrow pointing to the station, in the top of a granite post, 1.83 meters (6.0 feet) due east; three granite posts, with their tops broken off, similarly placed, due south, due west, and due north.

Bear Point azimuth (Baldwin County, Ala., A. T. Mosman, 1889).—Identical with triangulation station *Bear Point.* Reported lost.

Coon latitude (Washington County, Ala., O. B. French, 1898).—Distant 7.315 meters (24.00 feet) in azimuth 98° 00′ (0".03 of latitude, north) from the triangulation station of the same name, 6½ miles west of McIntosh, on the crest of the ridge between Bilbows and Bates Creeks; at the SW. corner NW. ¼ NE. ¼ NE. ¼ sec. 8, T. 3 N., R. 1 W., St. Stephens meridian. The surface mark is the intersection of two perpendicular lines on the top of a stone post, 2½ feet long and 6 inches square, flush with the ground and marked "U. S. C. & G. S." The underground mark is an inverted gallon jug, with a hole in its center, buried 3 feet below the surface. The instrument was mounted on a wooden pier.

Ethridge azimuth (Dallas County, Ala., O. B. French, 1898).—Identical with the triangulation station of the same name about 2 miles southwest of Carlowville, 4 miles from Minter, and 9 miles from Snow Hill, on the highest point of a range of thickly wooded hills. The surface mark is a ¾-inch drill hole, 6 inches deep, in the center of a triangle cut in the top of an irregular limestone block, 2 feet by 2 feet by 2 feet, weighing 500 pounds and buried 9 inches below the surface of the ground. The underground mark is as described in note 10b.

Eufaula longitude (Barbour County, Ala., G. W. Dean, 1860).—At Eufaula, near the center of Forsyth Street, 104.5 meters (342.8 feet) north of Broad Street. The surface mark is a drill hole at the intersection of two lines on the top of a stone post 2½ feet long, marked "U. S. C. S." and set flush with the ground. The underground mark is as described in note 10a. The instrument was mounted on a wooden pier.

Eufaula latitude (Barbour County, Ala., E. Goodfellow, 1860).—Distant 1.81 meters (5.94 feet) west of *Eufaula longitude,* described above. The instrument was mounted on a wooden pier.

Fort Morgan longitude (Baldwin County, Ala., O. B. French, 1907).—Distant 6.89 meters (22.60 feet) north and 4.01 meters (13.16 feet) (0".15 of longitude) west of *Fort Morgan azimuth,* described below. The station is marked by a concrete pier on the top of an old gun carriage base.

Fort Morgan latitude (Baldwin County, Ala., R. H. Fauntleroy, 1847; 1918).—Identical with *Fort Morgan azimuth,* described below.

For notes in regard to marking of stations see p. 130.

Fort Morgan azimuth (Baldwin County, Ala., R. H. Fauntleroy, 1847; 1918).—Identical with triangulation station of the same name, at about the center of the northwest bastion of Fortress No. 2 at Fort Morgan. The station is marked by two spikes placed one over the other, the top of the uppermost being just beneath the brick floor; both spikes were set in cement in a section of drain-tile pipe inclosed by a nail keg filled with hydraulic cement concrete. In 1906 the uppermost nail had been uncovered and surrounded by a concrete mortise, 6 inches square, four other mortises being made around this. In 1918, a tripod had been built over the station. The underground mark is a spike set in cement in an earthenware cone, the top being 2½ feet below the surface.

Girard azimuth (Russell County, Ala., E. A. Gatje, 1917).—Identical with traverse station of the same name about 1 mile southwest of Girard, on the northeast edge of the summit of the highest and most prominent hill about 1,000 feet west of the Girard-Seale main highway. The station is marked according to notes 1c and 10a. The reference marks are: The 15-inch pipe, projecting 18 inches above the ground, of a deep well on the summit, distant 30.366 meters (99.6 feet) in azimuth 43° 38′; an iron pin in a mound of concrete, distant 15.35 meters (50.4 feet) in azimuth 81° 46′.

Kahatchee latitude (Talladega County, Ala., O. B. French, 1898).—Distant 15.24 meters (50 feet) in azimuth 321° 38′ (0″.39 of latitude, south) from *Kahatchee azimuth*, described below. The instrument was mounted on a wooden pier.

Kahatchee azimuth (Talladega County, Ala., O. B. French, 1898).—Identical with triangulation station of the same name, on the highest peak of the Kahatchee Range, about 4 miles south of Childersburg. The surface mark is the apex of a large rough stone, projecting about 6 inches above the ground and stamped "U. S." on its south face, at the point where it (the apex) is crossed by a north and south line cut into the stone. The underground mark is as described in note 10a. The reference marks are three crosses cut into the outcropping ledge rock, as follows: Distant 1.65 meters (5.42 feet) in azimuth 55° 53′; distant 2.42 meters (7.95 feet) in azimuth 301° 40′; distant 2.54 meters (8.33 feet) in azimuth 180° 51′. Albert J. Crumpler's house is ¾ mile distant in azimuth 214° 03′.

Lower Peach Tree longitude (Wilcox County, Ala., G. W. Dean, 1857; 1895).—Identical with triangulation station *Lower Peach Tree longitude*, on the west bank of the Alabama River, about ½ mile west of the landing and 50 meters west of R. A. Northrup's residence, in the NE. ¼ NW. ¼ sec. 14, T. 10 N., R. 5 E., St. Stephens meridian. McConnell's west chimney is 65.58 meters (215.2 feet) distant in bearing N. 56° W. (magnetic). The surface mark is the intersection of two lines on the top of a limestone post, 6 inches square and 2½ feet long, marked "U. S. C. & G. S." The underground mark is as described in note 10a. The instrument was mounted on a wooden pier.

Lower Peach Tree latitude (Wilcox County, Ala., E. Goodfellow, 1857).—Distant 1.676 meters (5.5 feet) east of *Lower Peach Tree longitude* described above. The instrument was mounted on a wooden pier.

Madison longitude (Madison County, Ala., O. B. French, 1914).—Distant 4.855 meters (15.93 feet) (0″.19 of longitude) due west of *Madison azimuth*, described below. The instrument was mounted on a wooden pier.

Madison latitude (Madison County, Ala., O. B. French, 1914).—Identical with *Madison longitude*, described above.

Madison azimuth (Madison County, Ala., E. H. Pagenhart, 1914).—Identical with the triangulation station of the same name, about ¾ mile north of the Southern Railway depot at Madison, on the summit of the most prominent hill in the neighborhood, about 200 meters northeast of a small cabin, 400 meters northeast of J. H. Landers' house, and 300 meters north of the cemetery on the south side of the main road. The station is marked according to notes 1a and 7a. The reference marks, note 11a, are situated as follows: In the field on the north slope of the hill, near the north fence line, distant 107.0 meters (351.05 feet) in azimuth 157° 58′; about 80 meters east of a tenant's cabin, near the south field fence line, on ground sloping to the eastward, distant 192.13 meters (630.35 feet) in azimuth 15° 38′.

Mobile longitude (Mobile County, Ala., E. Goodfellow, 1856;1911; E. Smith, 1907; 1911).—The station of 1856–1911 is identical with triangulation station *Mobile transit pier*, which is in the public square at Mobile. The transit pier is a heavy block of granite, 3 feet in length by 1 foot in thickness at the top, and the longitude station was marked by a drill hole in the middle of an excavation in the top of the pier. The meridian was marked by the intersection of two lines in the tops of 2 marble pillars nearly flush with the ground, the northern one near the gate on St. Francis Street and distant 192½ feet, and the southern one about 30 feet from the gate at the corner of Conception and Dauphin Streets. The spire of Christ Church is 365 meters (1,197 feet) from the station in azimuth 334° 41′ 05″. In 1907 a new station was established in the east side of Bienville Square by setting a block of concrete, 2 by 3 feet, about 2 feet in the ground and building upon it another block of concrete, 14 by 28 inches and 3 feet high. The station of 1907 is 18.29 meters (60.01 feet) north and 53.13 meters (174.31 feet) or 2″.00 of longitude (0s.133) east of the station of 1856.

Mobile latitude (Mobile County, Ala., E. Goodfellow, 1856).—Marked by a granite pier 1.067 meters (3.5 feet) east of *Mobile longitude* station of 1856, described above.

Montgomery longitude (Montgomery County, Ala., G. W. Dean, 1856; 1857).—The station is marked by a block of sandstone 6.638 meters (21.78 feet) (0″.22 of latitude) south and 28.569 meters (93.73 feet) (1″.09 of longitude) east of the center of the hall on the lower floor of the capitol. (Triangulation station *Montgomery*

For notes in regard to marking of stations see p. 130.

capitol, 1887–1892, is the center of the dome, and is probably identical with the center of this hall.) The meridian was marked by cross lines cut in the top of two marble posts, 7 by 4 inches at the top and lettered "U. S. C. S.", one set flush with the ground 39.0 meters (127.96 feet) north of the longitude station, and the other about 1 mile north.

Montgomery latitude (Montgomery County, Ala., G. W. Dean, 1856).—Identical with *Montgomery longitude*, described above.

Montgomery north meridian stone azimuth (Montgomery County, Ala., F. W. Perkins, 1890).—Known as Montgomery north meridian stone, and in the northwest part of the capitol grounds at Montgomery, 94.488 meters (310.0 feet) due north of the south meridian stone, and 63.06 meters (206.9 feet) northwest of the northwest corner of the north wing of the capitol. The stone shows as a truncated pyramid of sandstone, 14 inches square at the base and 8 inches at the top, projecting 10 inches above the ground, and lettered "U. S. C. & G. S." on top and "North Meridian" on its south face. The station is marked by a piece of $\frac{1}{16}$-inch silver wire set in a ¾-inch copper bolt, which is at the intersection of two V-shaped grooves. The south meridian stone is in the south west part of the capitol ground, 43.69 meters (143⅓ feet) southwest of the northwest corner of the north wing, and 28.30 meters (92.8 feet) northwest of the southwest corner of the capitol. It is similar to the north meridian stone except that it is lettered "South Meridian" on its south face.

Perry latitude (Chilton County, Ala., W. H. Burger, 1907).—Distant 4.71 meters (15.5 feet), or 0".14 of latitude north, in azimuth 156° 33′ 54″ from *Perry azimuth*, described below.

Perry azimuth (Chilton County, Ala., W. H. Burger, 1907).—Identical with the triangulation station of the same name in the NE. ¼ sec. 34, T. 21 N., R. 11E., St. Stephens meridian, on the southernmost high point of the highest part of the ridge at the head of Valley (Ockmulga) Creek, about 2 miles due south of Joseph Whateley's house and ¾ mile west of the end of the Twin Tree Lumber Co.'s logging railway at the foot of the ridge, on the crest of the divide between the Catawba River and Mulberry Creek. The surface mark is a drill hole 1 inch deep in the top of an irregularly shaped rock, whose upper surface is about 1 foot below the surface of the ground; the underground mark is as described in note 10a. Several pieces of charred wood and stones were placed around the rock and covered.

Smithers latitude (Madison County, Ala., W. H. Burger, 1907; 1914).—Identical with *Smithers azimuth*, described below. The instrument was mounted on a wooden pier.

Smithers azimuth (Madison County, Ala., W. H. Burger, 1907; 1914).—Identical with the triangulation station of the same name, on Smithers or Wade Mountain, about 7 miles northwest of Huntsville. The station is marked according to notes 1a and 8a, the underground mark being in a crevice extending in a westerly direction between two large flat rocks, 2½ feet below the surface. The reference mark, note 12a, is about level with the station mark and is 24.53 meters (80.48 feet) distant in azimuth 328° 44′. The station is the center of a triangle, 28 paces on a side, formed by 3 mounds of whitish stone, each mound being about 6 feet in diameter.

Tanyard latitude (Lawrence County, Ala., C. O. Boutelle, 1878).—Distant 4.83 meters (15.85 feet) (0".16 of latitude) south and 30.20 meters (99.08 feet) west of *Tanyard azimuth*, described below. The instrument was mounted on a wooden pier.

Tanyard azimuth (Lawrence County, Ala., C. O. Boutelle, 1878; 1914).—Identical with the triangulation station of the same name about 3 miles southeast of Town Creek, ¼ mile northeast of Kirks Gap, and about 300 meters from the northeast end of the spur making out from the gap. The station is on the highest knob of this spur, and is marked as described in notes 1a and 7a. The 4 stone reference marks of 1878 have been broken off about 1 foot below the ground; the new reference marks, note 11a, are flush with the ground, situated as follows: Near the wagon road leading along the spur, distant 30.78 meters (100.98 feet) in azimuth 155° 33′, and 2 meters below the station; distant 30.81 meters (101.08 feet) in azimuth 348° 11′, and 1 meter below the station. A small crooked, crotched chestnut tree stands on the south side of the road 18.9 meters (62 feet) southwest of the station. A large black gum, hollow at the base and with an opening on the east side about 3 feet above the ground, stands on the south side of the road 23.1 meters (76 feet) from the station.

Tuscaloosa (U. S. G. S.) longitude (Tuscaloosa County, Ala., S. S. Gannett, 1895).—On the grounds of the observatory connected with the State university, and 85 feet south of the meridian circle. The station is marked by a pier, and is also a geodetic point of the United States Geological Survey.

Tuscaloosa (U. S. G. S.) latitude (Tuscaloosa County, Ala., S. S. Gannett, 1895).—Identical with *Tuscaloosa (U. S. G. S.) longitude*, described above.

West Gulfshore azimuth (Baldwin County, Ala., J. G. Oltmans, 1869).—Identical with triangulation station of the same name, now lost.

ARIZONA

Azimuth (U. S. G. S.) latitude (Gila County, Ariz., C. V. Hodgson, 1914).—About 2 miles southeast of Globe, on the low grassy divide between the Salt and Gila Rivers, ¼ mile south of the wagon-road crossing on the Globe, Gila Valley & Northern Railroad. The station is 2.62 meters (8.6 feet) east of United States Geological Survey triangulation station *Azimuth*, which is a bronze tablet cemented in solid rock and centered under a rock monument. (See U. S. G. S. Bul. No. 216, p. 154.)

Boundary monument No. 204 azimuth (Yuma County, Ariz., C. L. Garner, 1920).—Identical with triangulation station of same name, an old monument repaired in 1894 by the United States and Mexican Bound-

For notes in regard to marking of stations see p. 130.

ary Commission. The monument is of cast-iron plates, having a concrete foundation, and is about ½ mile east of the road from Somerton to the village of San Luis, Mexico, at the place where it crosses the south end of a canal.

Catalina azimuth (Pima County, Ariz., J. S. Hill, 1910).—Identical with triangulation station of same name on the north spur of Lemon Mountain, the highest peak of the Catalina Mountains, about 22 miles in a direct line northeast of Tucson. The station is marked as described in note 2. The reference mark is a United States Geological Survey bench-mark tablet cemented into rock, and is 3.215 meters (10.55 feet) from the station in azimuth 206° 04′. The witness mark is a nail in a blazed tree, distant 8.29 meters (27.2 feet) from the station in azimuth 51° 22′.

Chiricahua azimuth (Cochise County, Ariz., J. S. Hill, 1910).—Identical with triangulation station of same name on the most northerly one of several high peaks on the crest of the Chiricahua Mountains, about 17 miles west of Rodeo, N. Mex., 8 miles from Postal, and 6 miles southwest of Paradise. The station is about 10 meters northwest of the highest point at the west end of the peak, being several feet lower, and is marked as described in note 2. The reference mark is a ½-inch drill hole, 2 inches deep, in the top of a rock on the highest point at the west end of the peak, and is 9.496 meters (31.15 feet) from the station in azimuth 329° 09′. The witness marks are: A tree with 3 nails in the blaze, distant 12.18 meters (41.0 feet) in azimuth 304° 21′; a tree with 4 nails in the blaze, distant 13.61 meters (44.6 feet) in azimuth 202° 10′.

Ehrenberg (U. S. G. S.) latitude (Yuma County, Ariz., C. V. Hodgson, 1914.)—About 2½ miles east of Ehrenberg, on the north bank of Weaver Wash which runs into the Colorado River about ¼ mile north of Ehrenberg, on top of a flat sand and gravel mesa, about 20 steps from the edge of the bluff. It is identical with United States Geological Survey triangulation station *Ehrenberg*, which is a bronze tablet cemented in a rock level with the surface of the ground. (See U. S. G. S. Bul. No. 216, p. 170.)

Graham (U. S. G. S.) azimuth (Graham County, Ariz., J. S. Hill, 1910).—Identical with triangulation station *Graham* (*U. S. G. S.*), the United States Geological Survey name for it being unknown. It is about 16 miles southwest of Safford, on the highest point of Graham Mountain, about 10 meters northeast of the southwest point of the mountain, and is marked by a bronze tablet of the United States Geological Survey cemented in the rock. The reference mark is a ½-inch drill hole in the top of a large rock and is 13.43 meters (44.1 feet) from the station in azimuth 248° 21′. The witness marks are two pine trees with a 40d. nail in the blaze; one 13.10 meters (43.0 feet) distant in azimuth 9° 45′; and the other 11.95 meters (39.2 feet) in azimuth 125° 25′.

Granite azimuth (Yuma County, Ariz., G. D. Cowie, 1920).—Identical with triangulation station of same name, on the highest point of the ridge, and marked as described in note 2a. The reference mark, note 12c, is 7.07 meters (23.2 feet) from the station in azimuth 208° 05′.

Harquahalla latitude (Maricopa County, Ariz., C. V. Hodgson, 1914).—Identical with *Harquahalla azimuth*, described below.

Harquahalla azimuth (Maricopa County, Ariz., J. S. Hill, 1910; 1914).—Identical with triangulation station of same name on the highest peak of the Harqua Hala Mountains, about 11 miles direct or 16 miles by road and trail east of Wenden. The station is marked as described in note 2. The reference mark, a cross cut in the top of a large boulder marked "R. P. C. & G. S., 1910," is 8.21 meters (26.9 feet) from the station in azimuth 88° 32′.

Kofa latitude (Yuma County, Ariz., C. V. Hodgson, 1914).—Identical with *Kofa azimuth*, described below.

Kofa azimuth (Yuma County, Ariz., J. S. Hill, 1911; 1914).—Identical with triangulation station of same name, on the highest and most westerly mountain at the west end of the Squaw Tank Mountains, about 9 miles northwest of Polaris and 5 miles west of the Squaw Tanks. The station is marked as described in note 2. The reference mark is a cross cut in the top of a rock and is 11.22 meters (36.8 feet) from the station in azimuth 227° 39′.

Maricopa longitude (Pinal County, Ariz., J. E. McGrath, C. H. Sinclair, 1899; 1910).—In Maricopa, northwest of the Southern Pacific Railroad depot, 10.64 meters (34.9 feet) west of the fifth telegraph pole north along the Santa Fe, Prescott & Phoenix Railway from the above-mentioned depot, and 20.64 meters (67.7 feet) west of the center of the track, 26.39 meters (86.6 feet) west of a danger post at a public road crossing, and 175.61 meters (576.2 feet) north of the Southern Pacific Railroad track. The station is marked by a standard bronze tablet in the top of a cemented brick pier, known as *Maricopa east pier*, the dimensions being 3 bricks east and west and 2 bricks north and south, extending about 2½ feet above the ground and 2½ feet underground. Triangulation station *Maricopa astronomic station, eccentric*, marked by a nail in the top of a stake, is distant 21.673 meters (71.11 feet) in azimuth 138° 07′ 20″ (0″.56 of longitude, west).

Maricopa latitude (Pinal County, Ariz., C. H. Sinclair, 1899; 1910).—Distant 1.85 meters (6.07 feet) due west of *Maricopa longitude* station (described above), and marked by a standard bronze tablet in the top of a cemented brick pier, known as *Maricopa west pier*, the dimensions being 2 bricks square, extending about 3 feet above the ground and 2½ feet underground. Triangulation station *Maricopa astronomic station, eccentric* (see under *Maricopa longitude* station above) is distant 20.544 meters (67.40 feet) in azimuth 141° 55′ 00″ (0″.52 of latitude, north).

For notes in regard to marking of stations see p. 130.

Mazatzal azimuth (Gila-Yavapai County line, Ariz., C. V. Hodgson, 1919).—Identical with triangulation station of same name, 11 miles direct or 18 miles by road and trail, southwest of Payson and 9 miles from the H-Bar ranch, which is on the Roosevelt-Payson wagon road. The station is on the highest point of the Mazatzal Mountains and is marked as described in note 5. The reference mark, note 12c, is 6.28 meters (20.6 feet) from the station in azimuth 248° 16′. The remains of a cairn are about 1 meter from the station in azimuth 311°.

Mohawk latitude (Yuma County, Ariz., C. V. Hodgson, 1914).—Identical with *Mohawk azimuth* described below.

Mohawk azimuth (Yuma County, Ariz., J. S. Hill, 1910; 1914).—Identical with triangulation station of same name on the highest and most southern peak of the Mohawk Mountains, about 11 miles south of Stoval and 16 miles by road from Mohawk. The station is marked as described in note 2. The reference mark, a cross cut in the top of a bowlder near the edge of a bluff, is 13.31 meters (43.7 feet) from the station in azimuth 186° 28′.

Nogales longitude (Santa Cruz County, Ariz., G. R. Putnam, C. H. Sinclair, 1892; 1893).—In Nogales, on the west side of the first street east of Morley Avenue, in the rear of the Montezuma Hotel and United States customhouse, about 108 meters southeast from the N. M. T. A. Railroad, and 124.6 meters (409 feet) north of the United States-Mexican boundary line at a point 171.7 meters (563 feet) east of the boundary monument, which is a heap of stones near the corner of International Street and Morley Avenue. The station is marked by a brick pier 17 inches by 25 inches in cross section and extending about 3 feet above the ground and 2½ feet underground. Triangulation station *Nogales astronomic station*, which is a nail in the top of a rectangular stake, is 2.22 meters (7.28 feet) due south of the longitude station.

Nogales latitude (Santa Cruz County, Ariz., G. R. Putnam, 1892; 1893).—Distant 1.27 meters (4.17 feet) due west of *Nogales longitude* station (described above), and marked by a brick pier 17 inches square, extending about 3 feet above ground and 2½ feet underground. Triangulation station *Nogales astronomic station* (see under *Nogales longitude* station, above) is 2.22 meters (7.28 feet) (0″.07 of latitude) south and 1.28 meters (4.20 feet) east of the latitude station.

Number Three (U. S. G. S.) latitude (Maricopa County, Ariz., C. V. Hodgson, 1914).—About 17 miles east of Mesa and 5 miles west of Goldfield, Pinal County, on a small isolated knob on the north side of the Mesa-Goldfield road. It is distant 1.08 meters (3.54 feet) in azimuth 298° 29′ 45″ (0″.02 of latitude, south) from United States Geological Survey triangulation station *Number Three*, which is marked by a bronze tablet cemented into solid rock under a small rock monument. (See U. S. G. S. Bul. No. 276, p. 173.)

Pantano railroad station (U. S. G. S.) latitude (Pima County, Ariz., C. V. Hodgson, 1914).—In Pantano and distant 35.05 meters (114.99 feet) in azimuth 263° 45′ 15″ (0″.12 of latitude, north) from United States Geological Survey triangulation station *Pantano railroad station*, which is the center of the Southern Pacific Railroad depot. (See U. S. G. S. Bul. No. 245, p. 168).

Parker School (U. S. G. S.) latitude (Yuma County, Ariz., C. V. Hodgson, 1914).—In Parker, on line between United States Geological Survey triangulation stations *Parker School* and *Black Butte*, and distant 7.26 meters (23.82 feet) in azimuth 290° 10′ (0″.08 of latitude, south) from station *Parker School*, which is the center of the cupola of the schoolhouse. (See U. S. G. S. Bul. No. 216, p. 166.)

Pima Church (U. S. G. S.) latitude (Graham County, Ariz., C. V. Hodgson, 1914).—In Pima, and distant 42.15 meters (138.3 feet) in azimuth 67° 31′ 30″ from station "Gate," unmarked, which is at the gate in front of the Mormon Church, and 38.62 meters (126.7 feet) in azimuth 89° 23′ (0″.01 of latitude, south) from United States Geological Survey triangulation station *Pima Church*, which is the spire of this church. (See U. S. G. S. Bul. No. 201, p. 133.)

Pine latitude (Mohave County, Ariz., C. V. Hodgson, 1914).—Distant 4.13 meters (13.55 feet) in azimuth 341° 06′ (0″.13 of latitude, south) from *Pine azimuth*, described below.

Pine azimuth (Mohave County, Ariz., J. S. Hill, 1911; 1914).—Identical with triangulation station of same name on the south knob of Pine Peak near the southern end of the Hualapai Mountains, about 18 miles direct, or 23 miles by road and trail, southeast of Yucca. The station is marked as described in note 4, being about 1½ feet above the surface of the ground. The reference mark is a large cross cut in the south side of a very large rock near the highest point of the peak, and is in azimuth 161° 13′ from the station.

Pusch (U. S. G. S.) latitude (Pima County, Ariz., C. V. Hodgson, 1914).—About 10 miles north of Tucson, on sharp white peak at southwest end of Santa Catalina Mountains, 2 miles southwest of steam pump on Pusch's ranch, on the Tucson, Oracle, and Mammoth road. It is distant 7.62 meters (25.0 feet) (0″.14 of latitude, north) n azimuth 124° 54′ 30″ from United States Geological Survey triangulation station *Pusch*, which is marked by bronze tablet under a rock monument. (See U. S. G. S. Bul. No. 245, p. 169.)

Quitavaquita azimuth (Pima County, Ariz., G. D. Cowie, 1920).—Identical with triangulation station of same name, west of the highest point of the mountain and marked as described in note 2a. The reference mark, note 12c, is 12.98 meters (42.6 feet) from the station in azimuth 118° 05′.

Sawmill (U. S. G. S.) latitude (Cochise County, Ariz., C. V. Hodgson, 1914).—About 6 miles west of Paradise and ¾ mile east of a sawmill in the Chiricahua Mountains, southeast of the pass traversed by the road, on a rock knob which has a bluff on its west side and is timbered on its east side. It is distant 11.15 meters

For notes in regard to marking of stations see p. 130.

(36.6 feet) in azimuth 13° 16′ 30″ (0″.35 of latitude, south) from United States Geological Survey triangulation station *Sawmill*, which is a chiseled cross on a big rock under the center of a rock monument. It is also distant 7.44 meters (24.4 feet) in azimuth 8° 45′ 30″ from Sawmill reference mark, which is a tablet cemented in solid rock 13 feet southwest of its station. (See U. S. G. S. Bul. No. 440, p. 21.)

Sheep azimuth (Yuma County, Ariz., C. L. Garner, 1920).—Identical with triangulation station of same name about 10 miles direct, or 12 miles by road, southwest of Wellton, on the highest peak of the Gila Mountain range in this vicinity. The station is marked as described in note 3. The reference mark, note 12b, is 15.204 meters (49.88 feet) from the station in azimuth 344° 41′.

Silverbell azimuth (Pima County, Ariz., G. D. Cowie, 1919).—Identical with triangulation station of same name, near the town of Silverbell, on the rocky peak just east of the terminal of the American Smelting & Refining Co. Railroad, about 1 mile north of a similar peak which is a little higher. The station is on the highest part of the peak, and is marked as described in note 1. The reference mark is a cross cut in solid rock, and is 11.91 meters (39.1 feet) from the station in azimuth 288° 37′ 53″.

South Mountain azimuth (Pima County, Ariz., G. D. Cowie, 1920).—Identical with triangulation station of same name, about 10 miles south of the Indian village of Quijotoa, on the south end of South (or Quijotoa) Mountain. The station is near the steep south face, about 100 feet south of the highest point, and is marked as described in note 2a. The reference mark, note 12c, is 16.43 meters (53.9 feet) from the station in azimuth 164° 54′.

Superstition (U. S. G. S.) azimuth (Pinal County, Ariz., J. S. Hill, 1910).—Identical with United States Coast and Geodetic Survey triangulation station *Superstition (U. S. G. S.)* and United States Geological Survey station *Superstition Point*. It is on the highest peak of the Superstition Mountains, about 25 miles north of Florence, 25 miles east of Mesa, Maricopa County, and about 3 miles northwest of the Criswell ranch (old Bark's ranch). The station is marked with a United States Geological Survey bronze tablet cemented into a drill hole in solid rock. The reference mark is a cross in the top of a large rock, and is 2.265 meters (7.43 feet) from the station in azimuth 110° 33′.

Union azimuth (Yavapai County, Ariz., C. V. Hodgson, 1919).—Identical with triangulation station of same name about 12 miles direct, or 18 miles by road and trail, south of Prescott, on the highest part of Mount Union. The station is marked as described in note 1a. The reference mark, note 12b, is 9.54 meters (31.3 feet) from the station in azimuth 127° 52′ 45″. A United States Geological Survey cairn, 8 feet high, is 10.35 meters (34.0 feet) from the station in azimuth 140° 57′.

Whitetank latitude (Maricopa County, Ariz., C. V. Hodgson, 1914).—Identical with *Whitetank azimuth*, described below.

Whitetank azimuth (Maricopa County, Ariz., J. S. Hill, 1910; 1914).—Identical with triangulation station of same name, about 22 miles west of Peoria, on a ridge peak about the middle of the Whitetank Mountain range, 1 mile southeast of the highest peak, which is conical, and 1 mile west of the cabin and spring of J. J. Meyer in Meyers Canyon. The station is marked as described in note 2, the tablet being stenciled "Whitetank 1919." The reference mark is a cross cut in the top of a large firm rock, and is 5.425 meters (17.80 feet) from the station in azimuth 203° 21′.

Williams Laplace longitude (Coconino County, Ariz., G. D. Cowie, 1920).—Distant 0.30 meter (0.98 foot) or 0″.01 of latitude south and 3.85 meters (12.63 feet) or 0″.15 of longitude west of the triangulation station of the same name which is 100 meters north of the east end of railroad station baggage room, at the northwest corner of the yardmaster's garden fence, and is marked as described in note 1a. Two reference marks, note 11a, are as follows: Distant 7.865 meters (25.80 feet) in azimuth 101°, and distant 6.238 meters (20.47 feet) in azimuth 183°; United States Coast and Geodetic Survey bench mark tablet in the corner of the Fred Harvey Hotel is distant 114.35 meters (375.2 feet) in azimuth 12° 45′.

Williams Laplace latitude (Coconino County, Ariz., G. D. Cowie, 1920).—Identical with *Williams Laplace longitude*, described above.

Williams Laplace azimuth (Coconino County, Ariz., C. L. Garner, 1920).—Identical with *Williams Laplace* triangulation station. See description of *Williams Laplace longitude* station above.

Yuma longitude (Yuma County, Ariz., G. R. Putnam, C. H. Sinclair, 1892).—In the east end of the old adobe building which forms the northwest corner of the corral on the Yuma quartermaster's depot reservation, now abandoned. The station is the center of a cemented brick pier, 17 inches by 26 inches in cross section, extending 3 feet above the ground and 2½ feet underground, and is at the following distances from the outside of the walls near it: On a line directly south, 2.75 meters (9.0 feet); on a line directly north, 2.94 meters (9.6 feet); and on a line directly east, 3.65 meters (12.0 feet). The meridian is marked by an iron pump fixture, which is a rod 2 feet long with a knob on its end projecting through an inverted cone, buried on the top of a small hill 214.3 meters (703 feet) due south of the station. A pine stub was set on the same line, in the middle of the corral, 32.84 meters (107.7 feet) south of the station. Triangulation station *Yuma latitude station*, is 0.23 meter (0.75 foot) north and 1.57 meters (5.15 feet) or 0″.06 of longitude west of the longitude station.

Yuma latitude (Yuma County, Ariz., C. H. Sinclair, 1892).—Identical with triangulation station *Yuma latitude station*, which is the center of a cemented brick pier, 17 inches square in cross section, extending 3 feet above the ground and 2½ feet underground, 1.587 meters (5.22 feet) from *Yuma longitude* described above.

For notes in regard to marking of stations see p. 130.

ARKANSAS

Danville azimuth (Yell County, Ark., E. H. Pagenhart, 1916).—Identical with the triangulation station of the same name, about 2½ miles east of Danville, on the highest point of a prominent rocky knob known as "Bunker Hill." The station is marked as described in note 2. Two reference marks, note 12a, are along the southern side of the top of the knob: Distant 9.47 meters (31.1 feet) in azimuth 8° 57′; distant 13.82 meters (45.3 feet) in azimuth 81° 30′. Plainview water tank is about 4 miles distant in azimuth 339° 15′.

DeVall azimuth (Prairie County, Ark., E. H. Pagenhart, 1916; 1920).—Identical with the traverse station of the same name, at DeValls Bluff, on the right of way of the Chicago, Rock Island & Pacific Railway, on the east end of the hill south of the depot. The station is marked as described in notes 1a and 7a. A reference mark, note 11a, is distant 19.902 meters (65.30 feet) in azimuth 176° 05′. Other distances and azimuths are: Semaphore pole at depot, about 70 meters, 162° 40′; northwest corner of lighting plant, 11.16 meters (36.6 feet), 323° 27′; center of well pipe under the center of lighting plant water tank, 12.91 meters (42.4 feet), 36° 51′.

Forrest azimuth (St. Francis County, Ark., E. H. Pagenhart, 1916; 1920).—Identical with the traverse station of the same name at Forrest City, about 325 meters north of the right of way of the Chicago, Rock Island & Pacific Railway, in a pasture lot, about 60 meters southeast of Dr. H. P. Dooley's residence and 20.7 meters (68 feet) south of the north fence line. The station is marked as described in notes 1a and 7a. A reference mark, note 11a, is 0.5 meter (1.6 feet) south of the north fence line and 20.184 meters (66.22 feet) from the station in azimuth 171° 50′ 19″.

Fort Smith longitude (Sebastian County, Ark., E. D. Preston, 1885; 1915).—In the western edge of Fort Smith, at the southwest corner of the old fort. It is distant 11.80 meters (38.7 feet) in azimuth 261° 39′ 08″ or 0″.06 of latitude north and 0″.46 of longitude east from *Initial Point*, which is an old State-line monument 15 feet north of the old stone building known as the Colonel LeFlore house, 150 meters south of the St. Louis, Iron Mountain & Southern Railway depot, and ⅗ mile west of the post office. The monument is of gray limestone, 4 feet high, 4 feet square at the base, and 17½ inches square at the top, and is surmounted by a capstone 17½ inches square and 17 inches high, marked: "Initial Point" on its north face, "Arkansas" on its east face, "Choctaw" on its west face, and "1858" on its south face. The longitude station is within the old walls (now removed) of the fort, 12.80 meters (42.0 feet) north of the northeast corner of the stone building mentioned above, 13.01 meters (42.7 feet) northeast of the junction of the northwest wall of the old fort and the northeast side of the stone building, 1 foot west of the edge of a cut on the St. Louis-San Francisco Railway, and is marked by a bottle, mouth upward, about 1 foot below the surface of the ground. The instrument was mounted on a wooden pier.

Hartford longitude (Sebastian County, Ark., W. B. Fairfield, 1920).—Distant 0.778 meter (2.55 feet) or 0″.03 of longitude west and 6.624 meters (21.73 feet) or 0″.22 of latitude south of *Hartford azimuth*, described below. The instrument was mounted on a wooden pier.

Hartford latitude (Sebastian County, Ark., W. B. Fairfield, 1920).—Identical with *Hartford longitude*, described above.

Hartford azimuth (Sebastian County, Ark., E. H. Pagenhart, 1917; 1920).—Identical with triangulation station *Hartford (Laplace)*, in the western part of Hartford, 500 meters west of the Chicago, Rock Island & Pacific Railway depot, 100 meters north of the track, and 200 meters southeast of the public-school building. The station is in the northeast corner of a lot owned by the Central Coal Co., 20 meters east of the Hartford-West Hartford road, 1.5 meters west of the rear fence line of the lots, and 2½ meters from the fence on the north side of the lot. The station is marked as described in note 2. Two reference marks, note 12a, are as follows: Distant 1.18 meters (3.9 feet) in azimuth 129° 15′; distant 5.86 meters (19.2 feet) in azimuth 98° 28′. Three witness marks are as follows: Distant 15.8 meters (52 feet) in azimuth 70° 29′; distant 15.8 meters (52 feet) in azimuth 183°; distant 18.75 meters (61.5 feet) in azimuth 145° 07′. Other azimuths are as follows: Ball on the southeast corner of Grandview Hotel, 263° 19′ 16″; northwesternmost of 4 stacks at mine No. 4, 316° 42′ 10″.

Helena longitude (Phillips County, Ark., E. Smith, 1878).—In the grounds of the county courthouse at Helena. The station is the center of a brick pier, 17 by 22 inches, extending 3 feet above the ground and 2½ feet underground, and is 20.568 meters (67.48 feet) or 0″.67 of latitude south and 15.426 meters (50.61 feet) or 0″.60 of longitude east of the pinnacle (not the lightning rod) of the *courthouse*.

Helena latitude (Phillips County, Ark., E. Smith, 1878).—Identical with *Helena longitude*, described above.

Helena azimuth (Phillips County, Ark., E. Smith, 1878).—Identical with *Helena* triangulation station, not described, and 17.6 meters (57.7 feet) due north of *Helena longitude*, described above.

Helena midbase azimuth (Phillips County, Ark., C. H. Boyd, 1878).—Identical with triangulation station *Helena midbase*, between triangulation station *North base*, about 1½ miles south of Helena courthouse, and triangulation station *South base*, about 3 miles south of the courthouse. The station is in the base line, on the property of Monroe Williamson, in the fence line on the south side of an open space fronting his house. The surface mark is a nail in the top of a 15-inch cypress post, covered with asphaltum, which extends 3⅓ feet above the ground and 2½ feet underground. The underground mark is a pottery pyramid 3 feet below the surface of the ground.

For notes in regard to marking of stations see p. 130.

Hopefield south base azimuth (Crittenden County, Ark., C. H. Boyd, 1879; 1914).—Identical with the triangulation station of the same name, at West Memphis, 300 meters west of the Mississippi River, 170 meters south of the railroad bridge approach, 50 meters north of the road leading west from the ferry landing, 47 meters east of J. A. Templin's store, in the rear of the house, on the lot belonging to Douglas Owens, 28 meters east of his west property line and 12 meters south of his north line. The surface mark is a limestone block, 1 foot square, extending 3 feet below the surface of the ground and projecting 1 foot above, marked on its east face "1879," on its south face "U. S. Coast Survey," and on its west face "S. Base." The monument was surmounted by a solid brick pier 2½ feet high, the bricks being placed in hydraulic cement and the pier coated with the same material. The underground mark is an earthenware pyramid 3½ feet below the surface of the ground. A limestone shaft, about 3 feet long and 6 inches square, with a cross cut in the top and the letters "U. S. C. S." on one face, is 90 meters distant in line to *North base.*

Little Rock longitude (Pulaski County, Ark., F. H. Parsons, 1882; C. H. Sinclair, 1885; 1920; G. R. Putnam, 1896; Fremont Morse, 1914; J. E. McGrath, 1920).—These stations are all in the western part of the grounds surrounding the customhouse and post office at Little Rock, near the corner of Second and Spring Streets. The station of 1882 was 13.278 meters (43.56 feet) or 0".43 of latitude north and 3.48 meters (11.4 feet) (0s.009 or 0".14) west from the station of 1885. In 1885 the 1882 pier could not be recovered and a cemented brick pier was constructed. This was used in 1893 and 1896. After each occupation the upper part of the pier was removed, leaving a part 3 feet by 14 inches, about 6 inches below the surface of the ground. This pier was 1.232 meters (4.04 feet) or 0".04 of latitude north and 40.131 meters (131.66 feet) or 1".58 of longitude west, in azimuth 91° 45′ 30″ from the flagpole over the Second Street entrance to the post office. The center of the pier was about 10½ meters, respectively, from the curb on Spring Street, the curb on Second Street, and the west wall of the post-office building; and 3¾ meters north of the prolongation of the south wall of the nearest part of the same building. In 1896 the transit was mounted on the western end of this pier about 0.13 meter (0.4 foot) (0s.000 or 0".005) west of its former position. In 1914 a new pier was established 16.55 meters (54.30 feet) or 0".54 of latitude north and 9.17 meters (30.09 feet) (0s.024 or 0".36) east of the pier of 1885. In 1920 the station was at an unmarked point 18.70 meters (61.35 feet) or 0".61 of latitude north and 6.35 meters (20.8 feet) (0s.017 or 0".25) east of the pier of 1885.

Little Rock latitude (Pulaski County, Ark., F. H. Parsons, 1882; C. H. Sinclair, 1893).—The station of 1882 is identical with the longitude station of the same date described above. The station of 1893 is 0.102 meter (0.33 foot) (0".00 of latitude) south and 1.27 meters (4.2 feet) west of the center of the brick pier of 1885 described above.

Little Rock northwest base azimuth (Pulaski County, Ark., E. H. Pagenhart, 1916; 1920).—Identical with triangulation station *Northwest base*, at Dixie Mills in Little Rock, about 1¼ miles east of the Chicago, Rock Island & Pacific Railway passenger depot at Argenta, in the southeast quarter of the crossing of the main track of this railroad and a spur track of the St. Louis Southwestern Railway, 20.66 meters (67.8 feet) south of the south rail of the former, and 9.76 meters (32.0 feet) east of the east rail of the latter. The station is marked according to notes 1a and 7a, the mark being stenciled "N. W. BASE." Distances and azimuths to prominent objects are: Railroad crossing, 30 meters, 98°; stack at Rose City Mill, ½ mile, 289°; concrete chimney at tie plant, 1 mile, 240°; new-capitol dome, 2½ miles, 77° 19′ 06″.

Texarkana longitude (Miller County, Ark., E. D. Preston, 1885).—At Texarkana, on State Line Avenue near Walnut Street, 62.27 meters (204.3 feet) (2".02 of latitude) south and 0.134 meter (0.44 foot) (0".005 of longitude) east of the mound that marks the ninety-eighth mile of the boundary between Texas and Arkansas north of the Sabine River. The station was marked according to note 10a. In 1915 it was reported that the station was probably lost on account of grading.

CALIFORNIA

Arguello latitude (Santa Barbara County, Calif., O. H. Tittmann, 1876).—Marked by a drill hole in the capstone of a stone and cement pier 27.57 meters (90.5 feet) distant in azimuth 69° 13′, or 0".32 in latitude south from station *Arguello azimuth*, described below.

Arguello azimuth (Santa Barbara County, Calif., O. H. Tittmann, 1875).—Identical with the triangulation station of the same name, about 10 miles northwest from Point Conception, near Point Arguello, on the highest part of Tranquillon Peak, the highest peak in the vicinity. The mark is a piece of rough stone 2½ feet high set on a foundation of concrete about 2 inches thick, which rests partially on the solid ledge of the station and partially on the earth. Four holes were drilled into the surrounding ledge and rocks and into each a copper tack, marked with cross lines was leaded. The distances and azimuths to these tacks were as follows: 1.137 meters (3.73 feet), 47° 59′; 2.265 meters (7.43 feet), 168° 29′; 3.331 meters (10.93 feet), 205° 57′; 2.106 meters (6.91 feet), 270° 06′.

Avila latitude (San Luis Obispo County, Calif., Geo. Davidson, 1874).—Distant 0.375 meter (1.23 feet) or 0".01 of latitude south and 4.77 meters (15.65 feet west of *Avila azimuth*, described below.

Avila azimuth (San Luis Obispo County, Calif., Geo. Davidson, 1874).—Identical with the triangulation station of the same name about ¼ miles from Mallagh Landing, on the northeastern end of the top of the highest hill west of the road running to People's Wharf. The station is marked according to note 9c, the surface mark

For notes in regard to marking of stations see p. 130.

being a tack in a redwood stub. Four stubs, each projecting 1 foot above the ground, were placed each 6 feet from the station.

Bodega latitude (Sonoma County, Calif., Geo. Davidson, 1853; 1860).—Identical with the triangulation station of the same name near the western end of the sand spit forming the southern boundary of the inner bay of Bodega. The station is marked by a bottle buried 2 feet below the surface of the ground, and by 3 stubs, each having a nail in the top, driven into the ground.

Boundary line T 59 azimuth (Mono County, Calif., C. H. Sinclair, 1895).—On the northwest side of the Carson & Colorado Railroad about 1,340 feet south from where the road from Bertrand's ranch to the Queen mine crosses the Carson & Colorado Railroad track and about 25 feet from the center of the track. The station is also the south end of the White Mountain base line. The station is marked by a drill hole in a large stone, covered by a cairn. The permanent boundary point, marked by a drill hole in a large stone and surmounted by a cedar post, with the inscription "Cal. Nev. 59", was put in at right angles to the line from the old station, to the eastward distant 41.34 meters (135.6 feet), thence northwest in the direction of the line 12.88 meters (42.3 feet) to a place point far enough from the railroad track. (See Report for 1900, app. 3, p. 427.)

Boundary line T 101 azimuth (Inyo County, Calif., C. H. Sinclair, 1895).—Distant 97.63 meters (320.3 feet) to the westward at right angles to the boundary line from the permanent boundary station No. 101, which is by a pine post marked "C. N. 101." A large stone with a drill hole in it was set just southeast of the post and a cairn of stone and sand built around post and stone. A circular trench was dug around the cairn. The marking of T 101 is unknown.

Bucksport latitude (Humboldt County, Calif., Geo. Davidson, 1853).—Distant 3.4 meters (11 feet) east of a 6 by 8 inch post, 11 feet long, sunk 4½ feet into the ground. The letters "U.S.C.S." are painted in black on the sides, and the post is painted black from the letters to the ground. A magnetic station is 4.6 meters (15 feet) due south of the station.

Buenavista longitude (Los Angeles County, Calif., Geo. Davidson, 1870).—Identical with triangulation station of the same name, in Los Angeles just behind the Episcopal Church. In 1884 the station had been covered by the Union School Building.

Butte latitude (Riverside County, Calif., C. V. Hodgson, 1914).—Identical with *Butte azimuth*, described below.

Butte azimuth (Riverside County, Calif., J. S. Hill, 1910).—Identical with triangulation station of the same name on the highest and most easterly knob of Black Butte Mountain, about 24 miles direct, or 32 miles by road and trail, N. 23° E. from Imperial Junction, a station on the Southern Pacific, and about 12 miles to the northward of the Chocolate Range of mountains. Black Butte Mountain can be seen from Imperial Junction through a gap in the Chocolate Mountains. The station is marked according to note 4 and is in a level spot about 5 meters east and 1 meter below the highest point of the ridge. The first reference mark, a cross cut in the top of the lowest and most eastern rock of a large ledge of rocks running west of the station, is 5.445 meters (17.86 feet) from the station in azimuth 21° 59′. The second reference mark, a cross cut in the east sloping face of an outcrop of rock is 1 foot lower than the station and 4.555 meters (14.94 feet) distant in azimuth 259° 35′.

Calexico (U. S. G. S.) latitude (San Diego County, Calif., C. V. Hodgson, 1914).—Distant 28.53 meters (93.6 feet) in azimuth 263° 20′, or 0″.11 of latitude north of United States Geological Survey triangulation station *Calexico*, which is the center of the top of a water tank in the town of Calexico. See United States Geological Survey bulletin "Primary Triangulation and Traverse in California," Bul. No. 276, p. 178.

Cape Mendicino latitude (Humboldt County, Calif., Geo. Davidson, 1869).—Identical with the triangulation station of the same name on the south side of the spur of the cape, about 540 feet above the sea and 135 meters (443 feet) from the lighthouse keeper's dwelling, in azimuth 241°. The station is south of east of the lighthouse and is marked by the transit pier.

Castle Mount latitude (Monterey-Fresno Counties, Calif., P. A. Welker, 1885).—Marked by a concrete pier 1.62 meters (5.3 feet) due east of *Castle Mount azimuth*, described below.

Castle Mount azimuth (Monterey-Fresno Counties, Calif., J. S. Lawson, 1885; 1886).—Identical with triangulation station of the same name, on a small rocky mound on the western end of a long flat ridge, the highest in the divide, between Fresno and Monterey Countries, and about 10 miles by trail on the Rock Corral road from the house of John Cahill. The local name for the peak is the "Black Rock." The Spanish name is "Zapato Chino." The station is marked by a drill hole in outcropping rock. Over this a concrete pier was built and the center marked by a copper bolt with a small hole drilled into it. Four reference marks consisting of copper tacks leaded into drill holes in outcropping rocks were put approximately north, south, east, and west at the following distances from the center: North tack, 1.37 meters (4.5 feet); south tack, 1.98 meters (6.5 feet); east tack, 1.07 meters (3.5 feet); west tack, 3.17 meters (10.4 feet). There is a wooden pier 10.642 meters (34.91 feet) to the northwest.

Colorado River, Von Schmidt's east latitude post, latitude (San Bernardino County, Calif., C. H. Sinclair 1892).—Distant 5.87 meters (19.3 feet) west of *Colorado River azimuth* station, described below.

For notes in regard to marking of stations see p. 130.

Colorado River azimuth (San Bernardino County, Calif., C. H. Sinclair and W. B. Fairfield, 1893).—On the west side of Colorado River, near the southeast end of the California-Nevada boundary, about 12 miles north of the town of Needles, on the sand and gravel bluff, about 50 feet above the water and about 40 feet from the shore. The station is the easternmost of two posts set by A. W. Von Schmidt in 1873 to mark the thirty-fifth parallel of latitude. The underground mark is a large stone with a drill hole in its center. The surface mark is a larger stone with drill hole. Over this is centered the post, which is surrounded by a large stone mound. This point also marks the northern end of a meridian line the southern end of which is marked by a 12 by 18 by 10 inch concrete block with a drill hole, 469 meters (1,538 feet) distant. The other post is 463 meters (1,519 feet) west of the station. A stone cairn magnetic station is 30 meters (98 feet) south of the station.

Corning latitude (Tehama County, Calif., W. H. Burger, 1908).—At an unmarked point on the vacant lot just west of the Maywood Colonization Building at Corning and distant 23.40 meters (76.8 feet) in azimuth 67° 24′, or 0″.29 of latitude south, from triangulation station *Corning Tower*, which is at the south end of the Maywood Colonization Building. To various parts of this building from the latitude station, the following distances and azimuths were measured: Northwest corner of the porchlike "arcade," 31.40 meters (103.0 feet), 207° 55′; southwest corner of the same "arcade" 16.64 meters (54.6 feet), 242° 18′.

Crescent City latitude (Del Norte County, Calif., Geo. Davidson, 1853).—Lost.

Crescent City azimuth (Del Norte County, Calif., Geo. Davidson, 1871).—Identical with the triangulation station of the same name on a bluff bank about 3 meters from the edge. The station is marked underground according to note 10a, and at the surface by a copper tack leaded into a drill hole in a stone block 4 inches square, which has the letters "U. S. C. S." carved on it. The stone is surrounded by 3 heavy posts and a fence to protect it from cattle.

Cuyamaca latitude (San Diego County, Calif., C. V. Hodgson, 1914).—Distant 0.1 meter (0.3 foot) or 0″.00 of latitude south of the triangulation station of the same name, which is about 10 feet south of the highest point of the backbone of the large ledge that forms the highest part of the southern and highest peak of Cuyamaca Mountain, about 60 miles northwest of San Diego and 4 miles from Cuyamaca Lake. The station is marked by a drill hole which originally contained a copper bolt. The reference marks, each consisting of a copper bolt at the intersection of a cross cut on the rock, are at the following distances and directions from the station: 2.340 meters (7.68 feet) north; 2.145 meters (7.04 feet) northeast; and 1.900 meters (6.23 feet) south. The rock containing the north reference mark has been broken, but by placing the broken segments together the approximate position of the rock may be obtained. In 1910 a cross was cut in the face of a large rock, almost directly under this old mark and at a distance of 2.448 meters (8.03 feet) from the station.

Dominguez Hill latitude (Los Angeles County, Calif., Geo. Davidson, 1870; 1917).—Two latitude piers were built, the first 25 by 13 inches, 2½ feet high and 2½ feet below the ground, of brick and cement, on which the zenith telescope was mounted, the second, a similar pier 3 feet high and 2½ feet below the ground, was used for the meridian telescope. The zenith telescope pier is 4.712 meters (15.46 feet) east and 0.223 meter (0.73 foot) or 0″.01 of latitude south of *Dominguez Hill azimuth* station described below. The meridian telescope pier is 0.250 meter (0.82 foot), or 0″.01 of latitude south, 6.392 meters (20.97 feet) east of the triangulation or azimuth station.

Dominguez Hill azimuth (Los Angeles County, Calif., Geo. Davidson, 1870; 1917).—Identical with triangulation station of the same name in the city limits of the city of Compton, on the northern edge of a flat-topped ridge running about east and west 286 meters (938 feet) east of the east line of Dominguez Street and 217 meters (712 feet) south of the south line of Compton Street, in a cultivated field. The station is marked by an octagonal brick pier, extending 3 feet below the surface and 3 feet above, with a hollow shaft in the center and 2 arches about 8 inches high. Into the center of this pier and projecting about 3 inches above the ground was built a gravelstone, in the top of which was an irregular depression marking the station. Two reference marks, note 11c, were set as follows: No. 1 near telephone pole No. 1216, on the south side of Compton Street, distant 217.4 meters (713 feet), in azimuth 218° 21′ 14″; No. 2, near telephone pole No. 1220, on the south side of Compton Street, distant 148.0 meters (486 feet), in azimuth 271° 27′ 51″.

Eureka azimuth (Humboldt County, Calif., Geo. Davidson, 1871).—Identical with the triangulation station of the same name on the west side of the plaza or public square in Eureka (between Fourth, Fifth, I, and J Streets) 8.586 meters (28.17 feet) from the west fence of the plaza. From the point where the measure touches the fence to the southwest corner of the plaza is 29.947 meters (98.25 feet), and to the northwest corner is 42.468 meters (139.33 feet). The true meridian of the station was marked on the north and south fences by saw cuts in the upper rail, the south mark being 3.20 meters (10.5 feet) from the west fence and the north mark 16.60 meters (54.5 feet) from the west fence. The station was marked by a block of wood. In 1919 the station was searched for and not found.

Fresno (U. S. E.) latitude (Fresno County, Calif., J. H. Clark, 1878).—On a swell of ground about ½ mile south of the town of the same name. The station is marked by a cemented brick pier.

Gaviota latitude (Santa Barbara County, Calif., O. H. Tittman, 1875).—Distant 29.74 meters (97.6 feet) in azimuth 200° 10′, or 0″.91 of latitude north, from *Gaviota azimuth*, described below. The station is marked by a copper tack, leaded into an irregular shaped stone, about 18 inches square, buried flush with the ground.

For notes in regard to marking of stations see p. 130.

Four wooden stubs with copper tacks in their tops were placed as follows: To the north, 2.432 meters (7.98 feet) distant; to the south, 2.219 meters (7.28 feet) distant; to the east, 1.981 meters (6.50 feet) distant; to the west, 2.512 meters (8.24 feet) distant.

Gaviota azimuth (Santa Barbara County, Calif., O. H. Tittman, 1875).—Identical with the triangulation station of the same name on the top of one of the high peaks to the eastward of Gaviota Pass. The peaks to the eastward are between 150 and 300 feet higher than the one on which the station is located. The station is marked by a cross on a copper tack leaded into a large stone 20 inches below the surface. Over this was placed a large rock, flush with the surface, in which was leaded a copper tack to mark the center, and on it a pier, 2 feet square, 2.6 feet high, was built of large blocks of cut sandstone, cemented together. The reference marks were as follows: To the north a wooden stub with a copper tack, 2.356 meters (7.73 feet) from center; to the east, a wooden plug with a nail in a drill hole in the rock, 2.198 meters (7.21 feet); and to the west a hole bored into the rock, holding a wooden plug (no nail in this plug), 4.048 meters (13.28 feet). See *Gaviota latitude*, described above.

Gazelle longitude (Siskiyou County Calif., E. Smith, 1908; 1919).—The longitude pier is 0.186 meter (0.61 foot) or 0".01 of latitude north and 8.73 meters (28.6 feet) or 0".38 of longitude east of *Gazelle astronomic azimuth* station described below. It consists of a solid block of concrete 2 feet by 3 feet and 2 feet below the ground, surmounted by another solid block of concrete, 16 inches by 28 inches, the top of which is 32 inches above the ground, with an iron spike to mark the center. East reference mark of the azimuth station is 11.54 meters (37.9 feet) southeast of the longitude station.

Gazelle latitude (Siskiyou County, Calif., W. H. Burger, 1908; 1919).—Identical with *Gazelle longitude*, described above.

Gazelle astronomic azimuth (Siskiyou County, Calif., O. B. French, 1904; 1908).—About 250 yards north by east from the Gazelle railroad station, near the center of the top of a very prominent knoll, and about 40 feet northeast of the largest bowlder on the knoll. The station is marked according to notes 8c and 2, the bolt and disk being in the same drill hole. The disk has a polished center surrounded by the raised letters "U. S. C. S." A cross in the top of the copper bolt and another in the polished center of the disk mark the center of the station. Two reference marks, drill holes in the tops of ⅜-inch copper bolts leaded or cemented in drill holes in rocks, with the top of the bolt flush with the surface, are at the following distances and azimuths from the station: East reference mark, 19.20 meters (63.0 feet), 290° 12′; southwest reference mark, 16.60 meters (54.5 feet), 83° 13′.

Goosenest azimuth (Siskiyou County, Calif., E. O. Heaton, 1920).—Identical with the triangulation station of the same name on the highest point of Goosenest Mountain, about 20 miles east of Montague, at the east edge of an old crater. The station is marked according to note 2. Two reference marks were set; the first, note 12a, is 31.12 meters (102.1 feet) from the station in azimuth 343° 15′; the other an arrow cut in native rock is 16.05 meters (52.7 feet) in azimuth 171° 29′.

Harbor latitude (San Clemente Island, Calif., W. H. Burger, 1908).—Distant 0.082 meter (0.27 foot) west of *Harbor azimuth*, described below.

Harbor azimuth (San Clemente Island, Calif., D. B. Wainwright, 1878; 1908).—Identical with the triangulation station of the same name on the top of a conspicuous hill on the north face of the island, south of a cove. The center was marked by a stone 3 by 6 inches on the top, with lead bolt, buried even with the surface of the ground. The wooden latitude and azimuth pier was filled with rocks and left over the station. Two reference marks were placed as follows: Drill hole in rock to eastward, 8.41 meters (27.6 feet), drill hole in rock to southward, 6.73 meters (22.1 feet).

Havens Anchorage latitude (Mendocino County, Calif., Geo. Davidson, 1853).—At a point nearly one-third of the length of the long beach from the northward and on the top of the bluff to the left of the first arroya and to the north of the anchorage. The station is not marked and probably can not be recovered.

Hepsedam latitude (San Benito County, Calif., P. A. Welker, 1885.)—A concrete pier 1.57 meters (5.15 feet) due east of *Hepsedam azimuth*, described below.

Hepsedam azimuth (San Benito County, Calif., J. S. Lawson, 1885; 1886).—Identical with the triangulation station of the same name on the sharp rocky top of a very prominent peak of the same name, in the Mount Diablo Range of mountains in the southern part of San Benito County; it is the highest and sharpest peak in the vicinity. The station was marked by a copper tack leaded into a hole drilled into outcropping bedrock over which a concrete pier was constructed with a copper bolt with a small hole in its head. Three similar marks were made approximately north, south, and west at the following distances: North 2.103 meters (6.90 feet), south 2.432 meters (7.98 feet), and west 2.042 meters (6.70 feet).

Kent azimuth (Tehama County, Calif., J. S. Hill, 1904).—Identical with the triangulation station of the same name on a high ridge about 8 or 10 miles east by south from Mount Linn, and about 18 miles by road in a northwesterly direction from Paskenta, on a peak locally known as Bald Rock, on a ledge on the east side of the summit and about 8 or 10 feet lower than its highest part. Four or five hundred feet to the west of the station and about 50 or 60 feet lower is a large prominent rocky knob. The station is marked by a ⅜-inch copper bolt, 3 inches long, cemented into a drill hole in the rock. Directly above the bolt in the same drill hole is a brass disk, with a polished center, surrounded by the raised letters "U.S.C.&G.S." A cross in the top of the copper

For notes in regard to marking of stations see p. 130.

bolt and another in the polished center of the disk mark the station. Three reference marks were set, each a drill hole in a ⅝-inch copper bolt, 3 inches long, which is leaded or cemented into a drill hole in a rock with the top of the bolt flush with the surface. The first one is in a large rock distant 5.01 meters (16.4 feet) in azimuth 212° 40′, the second in a flat ledge distant 70.19 meters (230.3 feet) in azimuth 285° 50′, and the third on the largest part of the ledge distant 47.72 meters (156.6 feet) in azimuth 5° 17′.

Lake Tahoe, southeast end, longitude (Eldorado County, Calif., C. H. Sinclair, 1893).—On the east side of the road from Bijou to Glenbrook, near the Lakeside tavern. The station is 18.745 meters (61.50 feet) or 0″.61 of latitude south and 10.06 meters (33.0 feet) or 0″.42 of longitude west of the second granite monument of Von Schmidt, which is just in front of the hotel. The pier was built of brick and cement surmounted by a granite slab, coated with cement and containing a copper bolt. Von Schmidt's monument is marked "211 miles 30 chains"; "California"; "Nevada"; "1873." The longitude station is a geodetic point.

Lake Tahoe, southeast end, latitude (Eldorado County, Calif., C. H. Sinclair, 1893).—The latitude pier was similar to the longitude pier described above and 1.271 meters (4.17 feet) due west of it. Only the foundation of this pier remains.

Lake Tahoe, southeast end, azimuth (Eldorado County, Calif., Geo. Davidson, 1893).—On the southeast shore of Lake Tahoe, about 1⅓ miles south of Folsoms Neck, on the Edgewood Farm, owned by Wales Averill, and situated on the north side of the creek, known on the Wheeler maps as Smalls Creek. The station is about 150 feet north of the creek and about 400 feet south of a blind slough, with willows on the beach. The station is marked by a copper bolt firmly cemented into a brick and cement pier and covered by a cement coating.

Los Angeles longitude (Los Angeles County, Calif., C. H. Sinclair, R. A. Marr, 1889; C. H. Sinclair, G. R. Putnam, 1892; J. E. McGrath, 1906).—The station of 1889 was a brick pier laid in Portland cement, 3 feet above the ground and 3 feet below, 47.04 meters (154.3 feet) north and 56.77 meters (186.3 feet), or 2″.21 of longitude (0ˢ.148) west of the flagpole of the normal school on Fifth Street, Los Angeles. In 1892 it was reported covered by the new gymnasium of the school. The station of 1892 was a pier 1.55 meters (5.1 feet) or 0″.05 of latitude south and 46.18 meters (151.5 feet) or 1″.80 of longitude (0ˢ.120) west of the flagpole on the normal school mentioned above. Neither of these stations could be recovered in 1906. A new station was established, near the west line of the school grounds in the rear, at the southern end of a ridge known as Bunker Hill. The observatory was about 45 feet north of the north line of pathway leading to Flower Street, 40 feet from the nearest point in the southwest tower of the rear addition to the main building, and about 16 feet east of the top of the slope which connects the main playgrounds with the tennis courts. The concrete pier is 100.119 meters (328.47 feet) or 3″.90 (0ˢ.260) west and 49.144 meters (161.23 feet) north of the flagpole of the normal school.

Los Angeles latitude station (Los Angeles County Calif., C. H. Sinclair, 1892).—A pier of brick laid in cement 1.28 meters (4.2 feet) due west of *Los Angeles longitude station of 1892*, described above.

Los Angeles northwest base latitude station (Los Angeles County, Calif., J. J. Gilbert, 1890).—A pier 13.75 meters (45.1 feet) in azimuth 264° 49′ 28″ or 0″.04 latitude north, from *Los Angeles northwest base azimuth* station, described below.

Los Angeles northwest base azimuth (Los Angeles County, Calif., J. J. Gilbert, 1890; 1922).—Identical with the triangulation station of the same name on the rising ground, about 1½ miles northeast of the little village of Norwalk, and about 200 yards east of the Southern Pacific Railroad, in a grove of eucalyptus trees. The surface mark was a small hole in a ⅝-inch copper bolt, set in a granite block 26 inches square, flush with the surface of the ground, and built in the brick foundation of the pier. Over this was cemented a sloping granite monument, 24 inches square at the base and 12 inches square 2 feet above the base, with a pyramidal top, in the apex of which a small drill hole marks the center. On the side toward the base the monument is lettered as follows: "U.S.C.&G.S.N.W.BASE, 1889." The subsurface mark is a hole in the head of a copper bolt, ⅝ inch in diameter, fixed with melted sulphur into a granite block, squared on top and 3 feet long, directly under the foundation pier. This copper bolt was covered with a glass disk, cemented on the block. The top of the granite block is 1 foot square and bears, beside the station mark, the letters "U.S.C.&G.S." Four reference marks, each a ⅝-inch copper bolt covered by an inverted glass cemented over it and each leaded into the upper face of a 1-foot granite cube buried about 18 inches below the surface of the ground and surrounded by brick in cement, were set as follows: Two in line of the base and two at right angles with it to the northwest at distances of 10 and 100 feet from the station. The following inscriptions are on the heads of the bolts: "Southeast witness 100 feet"; "Southeast witness 9.995 feet"; "Southwest witness 100 feet"; and "Southwest witness 10 feet." A brick pier 15 feet high was erected and left standing.

Los Angeles southeast base azimuth (Los Angeles County, Calif., J. J. Gilbert, 1890; 1922).—Identical with the triangulation station of the same name about 100 meters west of the main road from Anaheim to Garden Grove, and 1 mile east from the latter place. The surface and subsurface marks are similar in every particular to those at *Los Angeles northwest base azimuth*, described above, and the granite monument is lettered on the side toward the base line, "U.S.C.&G.S.S.E.Base, 1889." The reference marks are at distances of 10 and 100 feet from the station, two in the line of the base and two 90° north from it, and are marked "S. W. witness, 100.003 feet"; "S. W. witness 10.02 feet"; "N. W. witness 100 feet"; and "N. W. witness 10 feet." A brick pier 35 feet high was erected and left standing.

Lospe latitude station (Santa Barbara County, Calif., J. S. Lawson, 1883).—A brick pier 1.588 meters (5.21 feet) in azimuth 89° 55′, or 0″.00 of latitude from *Lospe azimuth* station, described below.

For notes in regard to marking of stations see p. 130.

Lospe azimuth (Santa Barbara County, Calif., J. S. Lawson, 1883).—Identical with the triangulation station of the same name on the highest ridge of hills rising from the shore at Point Sal, just back of and about 500 feet above the house of Henry Dolcini. The station is on top of the ridge and about 250 meters to the right of the right-hand canyon and is marked by a drill hole in a flat stone buried about 2 feet below the surface, and at the surface by a copper bolt with a cross, covered by a substantial brick pier in such a way that the surface mark is not accessible. The center of the station was marked on top of the pier. In addition to the latitude pier, described above, a concrete pier for the vertical circle was placed 18.9 meters (62 feet) from the station in azimuth 300° 17′ 36″. Four stones with cross lines were placed approximately north, south, east, and west at the following distances from the station: South, 1.643 meters (5.39 feet); east, farthest hole, 1.8 meters (6 feet); north, 1.326 meters (4.35 feet); and west, 1.56 meters (5.1 feet).

Lyons azimuth (Tehama County, Calif., J. S. Hill, 1904).—About 5 miles east of Lyonsville post office on a ridge known locally as Bald Hill, about 300 yards from the summit of the ridge on the shoulder extending toward Lyonsville, and in the middle of a large group of bowlders. A lone fir tree stands about 50 meters south by east from the station, which is marked by a ⅜-inch copper bolt 3 inches long, cemented into a drill hole in the rock. Directly above the bolt and in the same drill hole is a bronze disk with a polished center and the raised letters, "U.S.C.&G.S." A cross in the top of the bolt and another in the polished center of the disk mark the station. Two reference marks, each a ⅜-inch copper bolt, leaded or cemented in a drill hole in the rock, with the top of the bolt flush with the surface, are at the following distances and azimuths from the station: 29.69 meters (97.4 feet) 126° 59′ and 20.22 meters (66.3 feet) 332° 22′.

Mare Island (U. S. N.) longitude (Solano County, Calif., R. H. Tucker and R. F. Sanford, 1908).—The station was the east pier of Mare Island Observatory, 2.36 meters (7.75 feet) east of the west pier, 7.09 meters 23.25 feet) north and 4.01 meters (13.17 feet) east of Craven's transit pier, which is a granite block 16 by 19 inches, projecting 12 inches out of the ground, with the inscription "Position of observatory Lat. 38° 05′ 59″ north, Long. 122° 15′ 15″ west, in time 8h. 09m. 01s.2 W," painted on it in black letters; and 7.09 meters (23.25 feet) or 0″.23 of latitude north and 2.36 meters (7.75 feet) or 0″.10 of longitude east of triangulation station *Observatory*, which is marked by a bottle buried 2 feet below the surface of the ground. The bottle bears the inscription: "Vincent Hathaway & Co., Boston, Ginger Ale."

Marysville longitude (Yuba County, Calif., C. H. Sinclair and R. A. Marr, 1889).—At Marysville in Cortez Square, which is bounded by Fifth, Sixth, B, and C Streets. The station is two blocks west of the Southern Pacific Railroad depot and one block east of the courthouse. The station is 38.4 meters (126 feet) east of C Street and 49.7 meters (163 feet) north of Fifth Street. It is marked by a brick pier, resting on bedrock 22 inches below the surface of the ground. The courthouse flagpole on D Street is 14.15 meters (46.4 feet) north and 169.03 meters (554.6 feet) or 7″.04 of longitude west of the station. The spire of the Presbyterian Church on the corner of Fifth and D Streets is 103.06 meters (338.1 feet) south and 150.85 meters (494.9 feet) (6″.28 of longitude) west of the station.

Marysville latitude (Yuba County, Calif., C. H. Sinclair, 1898).—Near the corner of H and Fourth Streets, 18 paces from the south fence line of Fourth Street and 10 paces from the west fence line of H Street. The station is marked by the foundation of a brick pier and is 310.05 meters (1,017.2 feet) or 10″.05 of latitude south and 520.36 meters (1,707.2 feet) west of Marysville courthouse flagpole. The station is also 192.73 meters (632.3 feet) or 6″.25 of latitude south and 538.5 meters (1,767 feet) west of the spire of the Presbyterian Church at the corner of D and Fifth Streets.

Marysville Butte azimuth (Sutter County, Calif., O. B. French, 1904; 1922).—Identical with the triangulation station of the same name about 15 miles west from Marysville and 4 miles northwest from Sutter on the southeastern summit of the south and highest butte of the Marysville Buttes, now generally known as Sutter Buttes, about 6 meters northeast of the highest part of the summit and near the cliff on the north side. The station is marked by an old-type brass station mark, with a polished center and the raised letters "U.S. C.&G.S." and a raised flange around its edge, set in a drill hole in a small rock embedded in the concrete that fills a depression in the solid rock. Below the concrete and directly under the station mark is a ⅜-inch copper bolt, 3 inches long set in a drill hole in the solid rock. Three reference marks, each of which is a ⅜-inch copper bolt, 3 inches long set in a drill hole in the rock, are at the following distances and azimuths from the station: Distant 2.495 meters (8.19 feet), 247° 09′; 2.683 meters (8.80 feet), 5° 05′; and 2.92 meters (9.6 feet), 102° 52′. Two standard disk reference marks are, respectively, 2.514 meters (8.25 feet) distant in azimuth 24° 30′ and 7.96 meters (26.1 feet) in azimuth 94° 52′.

Mendocino City latitude (Mendocino County, Calif., Geo. Davidson, 1853; 1871).—Identical with the triangulation station of the same name on the north point of Mendocino Bay, on the narrowest part of the neck formed by the cove from the outside and the bight inside the chute or landing point; in the midst of lumber piles. The station was marked by a wooden pier, and in 1919 was reported probably lost.

Mocho latitude (Santa Clara County, Calif., Geo. Davidson, 1887; 1922).—Marked by a concrete pier, 1.605 meters (5.27 feet) due east of *Mocho azimuth* station, described below. In 1922 a standard disk reference mark was placed in the pier.

Mocho azimuth (Santa Clara County, Calif., J. S. Lawson, 1887; 1922).—Identical with the triangulation station of the same name, about 11½ miles northeast from the Lick Observatory, on Mount Hamilton, and

For notes in regard to marking of stations see p. 130.

about 20 miles south-southeast from the town of Livermore, on the summit of Eylar Mountain, the highest peak of the group of mountains lying to the eastward of Santa Clara Valley, on the eastern flank of the Mount Diablo Range, and overlooking the San Joaquin Valley. The station is marked by a copper bolt sunk in the rock, over which was built a concrete pier. In addition to the reference mark in the latitude pier two others were set, one 7.795 meters (25.57 feet) distant in azimuth 187° 56′ and the other 8.698 meters (28.54 feet) distant in azimuth 190° 15′.

Monterey Bay azimuth (Monterey County, Calif., J. L. Ruth, 1852).—No description is available. The station is probably not recoverable.

Monticello latitude (Yolo County, Calif., J. S. Lawson, 1880).—Distant 9.57 meters (31.41 feet) or 0″.31 of latitude north and 2.68 meters (8.8 feet) east of *Monticello azimuth*; described below. The station is marked by a pier of stone and cement.

Monticello azimuth (Yolo County, Calif., Geo. Davidson, 1880; 1922).—Identical with the triangulation station of the same name in the extreme northeast corner of sec. 4, T. 9 N., R. 3 W. of the Diablo meridian, on the highest summit of the mountain range lying between the Sacramento and Berryessa Valleys, about 6 miles northward from the town of Monticello, in the lower portion of the Berryessa Valley. The lower underground mark was a loaded metallic cartridge, placed ball downward, in a half-inch hole 1 foot deep excavated in the sandstone rock, the top of the cartridge being 2½ feet below the surface. Over this was placed a stone about 4 inches square and 1 foot long, with a copper bolt in the top, its top being 1.1 feet below the surface. A rough stone foundation was laid over this and crowned with a large stone coming even with the surface. As a surface mark a copper bolt ⅝ inch by 5 inches, with a silver pin in it, was set in cement, in a hole drilled in this stone. The bolt projects about ¼ inch above the stone. A rough stone pier was then built to a height of 3.84 feet and capped with a flat stone 32 inches square, having cross lines on it. Besides the latitude pier, described above, additional references are the transit pier, 9.537 meters (31.29 feet) north and 1.125 meters (3.69 feet) east of the station, and the vertical circle pier, 19.786 meters (64.91 feet) from the station in azimuth 321° 43′.

Monument 28, California-Nevada boundary, latitude (Mono County, Calif., C. V. Hodgson, 1914).—On the southeast side of the west branch of Walker River, Antelope Valley, about 2 miles southeast of the stream and about 1 mile northwest of the edge of the foothills. The station is 3.7 meters (12 feet), or 0″.12 of latitude, almost due south of boundary monument 28, the position of which is marked by the center of a circle of stones, which formerly surrounded a cedar post.

Monument 41, California-Nevada boundary, latitude (Mono County, Calif., C. V. Hodgson, 1914).—On the north side of the small canyon that enters the valley at Sunshine, or Davidson's, ranch, and across the canyon from the high rocky bluff just north of Bodie Creek. There is a trail or old wood road about three-fourths of the way up the canyon, but very steep. The canyon ends on the tableland about 200 yards southwest of the station. The latitude station is on the State boundary line, 6.12 meters (20.1 feet) or 0″.13 of latitude north from monument 41 in azimuth 131° 59′ 30″. This monument is marked by a drill hole in solid rock; over this is a pine pole with the inscription "C. N. 41." A cairn is around the pole.

Monument 59, California-Nevada boundary, latitude (Mono County, Calif., Mineral County, Nev., C. V. Hodgson, 1914).—On the boundary line 5.25 meters (17.2 feet) or 0″.11 of latitude north, in azimuth 131° 58′, from boundary monument No. 59, which is 21 meters (69 feet) northwest of the center of the Carson & Colorado Railroad track, about 3 miles east of Bertrand's ranch and 1,340 feet south of the point where the road from the ranch to the Queen mine crosses the track. The monument is marked by a drill hole in a large stone set flush with the surface of the ground and over which is set a cedar post 7 inches in diameter and 6 feet long marked "Cal. Nev. 59." A large cairn was built around the post. The latitude station is a few feet southeast of a Geological Survey iron post triangulation mark.

Monument 74, California-Nevada boundary, latitude (Inyo County, Calif., Esmeralda County, Nev., C. V. Hodgson, 1914).—On the boundary line 2.75 meters (9.0 feet) or 0″.06 of latitude south, in azimuth 312° 33′, from California-Nevada boundary monument No. 74, which is in Fish Lake Valley, on the east side and about ½ mile from the foothills on the east side of the valley, about 150 feet north of the road across the valley from Piper's main ranch to Silver Peak. The monument is marked by a pine post 4 inches square and 5⅓ feet long, marked "C. N. 74." A small stone with a drill hole in it was set 2 feet in the ground just southeast of the post and a mound of earth was thrown up around the stone and post.

Monument 88, California-Nevada boundary, latitude (Inyo County, Calif., Esmeralda County, Nev., C. V. Hodgson, 1914).—On the boundary line distant 6.38 meters (20.9 feet) or 0″.14 of latitude north, in azimuth 132° 59′ 30″, from California-Nevada boundary monument No. 88, which is on a black lava ridge, about 4 miles from Stainingner's ranch on the road to Thorpe's mill and the Amargosa Desert. The station is on the second black lava ridge south of the road, the second ridge being separated from the first by a deep canyon. The station is a short distance to the east of two small lava peaks on the ridge. The monument is marked by a drill hole in solid rock, over which a pine post 4 inches square 4 feet long was set and marked "C. N. 88." A cairn was placed around the post.

Monument 97, California-Nevada boundary, latitude (Inyo County, Calif., Nye County, Nev., C. V. Hodgson, 1914).—On the boundary line 2.93 meters (9.6 feet) or 0″.06 of latitude north, in azimuth 132° 45′, from California-Nevada boundary monument No. 97, which is about 2 miles from the flat desert on the open mesa, on the slope that rises from the Amargosa Desert up to the pass between the Grape Vine and Funeral

For notes in regard to marking of stations see p. 130.

Mountains, and about ¾ mile south of the road which goes through the pass from the mouth of the Little Amargosa River across the upper part of the Amargosa Desert and over into Death Valley. The monument is marked by a 4-foot pine post, 4 inches square, marked "C. N. 97," and surrounded by a cairn of stone and gravel.

Monument 120, California-Nevada boundary, latitude (San Bernardino County, Calif., Clark County, Nev., C. V. Hodgson, 1914).—The latitude station is 3.64 meters (11.9 feet), in azimuth 314° 12′ 30″, or 0″.08 of latitude south, from monument 120, which is in Mesquite Valley, in a level sandy plain covered with sagebrush and greasewood, about 1½ miles from Sandy post office. This monument is 7.0 meters (23 feet) southeast from the center of the road running westward from Sandy post office and 37.0 meters (121 feet) from the road running from Pahrump to Manville through State Line Pass and is marked by a 4-foot redwood post, 4 inches square, marked "C. N. 120." A rock with a drill hole is just southeast of the post and a mound of earth was thrown up around rock and post.

Monument 129, California-Nevada boundary, latitude (San Bernardino County, Calif., Clark County, Nev., C. V. Hodgson, 1914).—The latitude station is 3.95 meters (13.0 feet) in azimuth 121° 38′ 30″, or 0″.07 of latitude north from monument 129, which is on the east slope of the first high ridge north of the New York Range, on the southeast side of Ivanpah Valley, on the first high peak up from the valley. This monument, is marked by a drill hole in solid rock, over which is a 4-foot redwood post, 4 inches square, marked "C. N. 129." A cairn 5 feet in diameter at the base and 4 feet high was built around the post.

Mount Conness latitude (Tuolumne County, Calif., Isaac Winston, Fremont Morse, and J. J. Gilbert, 1890).—Identical with triangulation station *Mount Conness latitude station.* Marked by a concrete pier 194.5 meters (638 feet) in azimuth 301° 59′ or 3″.34 of latitude south from *Mount Conness azimuth,* described below. The station is on the first level bench at the foot of the steep trail down from the azimuth station.

Mount Conness azimuth (Tuolumne County, Calif., Geo. Davidson, 1890).—Identical with the triangulation station of the same name, on a lofty peak of the Sierra Nevada Range, about 25 miles a little east of north from the Yosemite Valley, about 10 miles north of Soda Springs in the Tuolumne Meadows, and about 30 miles southwest of the California-Nevada boundary; on the highest pinnacle of the summit, which is a very small irregular crag. The station was marked by a cross cut on the top of a copper bolt, ⅝ inch in diameter by 6 inches long, projecting 3½ inches above the solid rock. Above this was built a solid concrete pier 26 inches in diameter and about 40 inches high. In its upper surface was embedded a copper bolt ⅝ inch in diameter by 4 inches long, having a broad spherical head with a small silver pin in the center. A cross cut on the head of the bolt, a little to one side of the silver pin, marks the station. A magnetic pier is 180.4 meters (592 feet) from the station in azimuth 298° 20′; a vertical circle pier 8.72 meters (28.6 feet) west and 24.81 meters (81.4 feet) south of the magnetic pier; and a transit pier 1.545 meters (5.07 feet) west of the latitude pier, described above.

Mount Diablo latitude (Contra Costa County, Calif., William Eimbeck, 1876).—A brick pier 51.15 meters (167.8 feet) distant in azimuth 89° 02′ or 0″.03 of latitude south from *Mount Diablo azimuth,* described below.

Mount Diablo azimuth (Contra Costa County, Calif., William Eimbeck, 1876; 1922).—Identical with triangulation station of the same name, 15 miles by road northeast from Danville, 1 foot west of the highest point on the summit of Mount Diablo, the second peak of Mount Diablo standing to the eastward. The subsurface mark is a cross on a ½-inch copper bolt projecting ⅛ inch above bedrock. Above this mark is a hollow pier of soft brick with 3 openings at the base to permit access to the mark. The pier now has been raised to the height of 4 feet by a concrete cap, 20 inches deep on top of the bricks, in which cap there is a hole 6 inches square. Beside the latitude pier and station pier there are 2 other piers, namely, the pier from which vertical angles were observed (later reported in ruins), inside the curve of the road, 44.11 meters (144.7 feet) west of the station and 8.44 meters (27.7 feet) northeast of the latitude pier; the transit pier 9.9 meters (32.5 feet) southwest of the vertical circle pier.

Mount Hamilton longitude (Santa Clara County, Calif., C. H. Sinclair, 1888).—Identical with the triangulation station of the same name, about 1,400 feet east of Lick Observatory, upon the east side of the small knoll which is south of the main road running along the ridge. Two piers built of brick and cement, with foundation in solid rock, are 2.019 meters (6.625 feet) from center to center and the west pier is the longitude station. The station is 1ˢ.085 or 16″.27 of longitude east of the meridian of reference, or the Fauth transit, of Lick Observatory. The Fauth transit is 22.37 meters (73.4 feet) or 0ˢ.061 of longitude east and 5.79 meters (19.0 feet) or 0″.19 of latitude south of *Lick Observatory small dome.*

Mount Hamilton latitude (Santa Clara County, Calif., C. H. Sinclair, 1888).—The east pier described above. See *Mount Hamilton longitude.*

Mount Helena latitude (Napa County, Calif., William Eimbeck, 1876).—Identical with triangulation station of the same name, which is a brick pier just east of the transit pier and 17.74 meters (58.2 feet) in azimuth 330° 10′ from *Mount Helena azimuth,* described below.

Mount Helena azimuth (Sonoma County, Calif., William Eimbeck, 1876; 1922).—Identical with the triangulation station of the same name on the summit of Mount Helena, about 7 miles to the northward of Calistoga, and 4 miles from Lawley Bros. tollhouse. The station was marked by a fine drill hole and a cross cut in the top of a ½-inch copper bolt 5 inches long, cemented into a ½-inch hole in the bedrock, and projecting ¼ inch. The collimator pier, 61 inches high and 2 bricks square, is 2.27 meters (7.45 feet) northwest of the station; the transit pier, 39 inches high and 2 bricks by 3 bricks, 17.04 meters (55.9 feet) southwest of the station;

For notes in regard to marking of stations see p. 130.

and the vertical circle pier, 33.31 meters (109.3 feet) southeast of the station and 16.92 meters (55.5 feet) southeast of the latitude pier. Two standard reference marks are, respectively, 2.502 meters (8.21 feet) distant in azimuth 164° 15′ and 10.48 meters (34. 4 feet) distant in azimuth 65° 35′.

Mount Lola latitude (Nevada County, Calif., B. A. Colonna, 1879; 1922).—Distant 6.80 meters (22.3 feet) or 0″.22 of latitude north and 6.68 meters (21.9 feet) east of *Mount Lola azimuth*, described below. The station is marked by a brick pier.

Mount Lola azimuth (Nevada County, Calif., Geo. Davidson, 1879; 1893).—Identical with the triangulation station of the same name about 22 miles by road and trail north of Truckee, about 5½ miles west, northwest of the hotel at Independence Lake and about 25 feet northwest of the highest part of the southernmost summit of the high ridge between Weber and Independence Lakes and the town of Meadow Lake. The station was marked by a cross cut on the top of a ⅝-inch copper bolt, set in a drill hole in a heavy capstone firmly embedded in a rough stone pier laid in cement. The capstone was about 15 inches above the natural surface of the ground and 3¾ feet above the base of the pier. The pier was then built higher and surmounted by another capstone, 24 inches square with a hole drilled through it, marking the point. This pier is surrounded by a stone wall 6 feet distant. Besides the latitude pier, two brick piers on stone foundations were left as reference marks, one north 36° east, distant 86.15 meters (28.26 feet); and one 5.25 meters (17.2 feet) north 28° west. A large wooden post is 16.19 meters (53.1 feet) distant in azimuth 346° 26′ and a standard disk reference mark 14.67 meters (48.1 feet) distant in azimuth 354° 53′.

Mount Tamalpais latitude (Marin County, Calif., J. F. Pratt, 1882; 1922).—A concrete pier, 18 inches square, having its base well embedded in the ground, and located 5.60 meters (18.4 feet) in azimuth 103° 13′, or 0″.04 of latitude north from *Mount Tamalpais azimuth* station, described below.

Mount Tamalpais azimuth (Marin County, Calif., Geo. Davidson, 1882, J. F. Pratt, 1907; 1922).—Identical with the triangulation station of the same name, about 3 miles northwest from Mill Valley, 1¼ miles west from Mount Tamalpais Tavern, and ½ mile north and directly above West Point Inn, on the western and highest summit of Mount Tamalpais. The center of the station was marked by a stone bottle, set in concrete, with the neck 20 inches below the surface of the ground. Over this was built a stone and concrete pier, surmounted by an irregular-shaped stone, containing copper bolt to mark the center of the station. Upon this was built a hexagonal pier containing a stone bottle. In the top was put a ⅝-inch copper bolt, with a hole marking the center of the station. The reference marks were three stones, with drill hole on the top, on the surface of the ground, each 6 feet from the center, one along the ridge to the east, one to the south, and the other to the west. In a rock 5.73 meters (18.8 feet) distant from the center was a mass of lead. Beside the latitude pier described above, there were two other concrete piers, one bearing N. 79° 48′ W. (true), distant 7.07 meters (23.2 feet), and one N. 5° 54′ E. (true), distant 12.53 meters (41.1 feet) from the center. A standard reference mark is 30.01 meters (98.5 feet) distant in azimuth 204° 06′ 30″, and a second reference mark is in the first of the two piers mentioned above.

Mount Toro latitude (Monterey County, Calif., Fremont Morse, 1885).—A concrete pier, distant 19.81 meters (65.0 feet), or 0″.46 of latitude north, in azimuth 135° 55′ from *Mount Toro azimuth station*, described below.

Mount Toro azimuth (Monterey County, Calif., Fremont Morse, 1885; 1907).—Identical with the triangulation station of the same name on the smooth untimbered range of mountains bordering the Salinas Valley on the west; on the smooth grassy hill about 500 yards south of A. B. Parson's house, and on his land. The station is marked by a copper bolt set in a flat-topped rock 2 feet beneath the surface of the ground, and by a cross in a copper bolt in top of a pier built of concrete and topped with brick and cement. In 1907 two of three reference piers northwest of the station were recovered.

Needles longitude (San Bernardino County, Calif., R. A. Marr and C. H. Sinclair, 1889; 1920).—On the northwest corner of the St. Anne's Catholic Church lot at Needles, and directly east of a cemetery. The station is about 300 meters from the main track of the Atchison, Topeka & Santa Fe Railway and bears southwest from the depot, hotel, and offices of the railroad. It is marked by a pier of adobe bricks and cement, topped by a layer of cement, the foundation being 3 feet below the surface. This station is also a geodetic point.

Needles latitude (San Bernardino County, Calif., R. A. Marr, 1889; C. H. Sinclair, 1895).—The station of 1889 was similar in construction to the longitude pier of 1889, described above, and was 8.47 meters (27.8 feet) or 0″.27 of latitude, south and 0.98 meter (3.2 feet) east of the longitude station. In 1895 it had disappeared. The station of 1895 was a wooden pier, 1.28 meters (4.2 feet) due west of the longitude pier. *Needles longitude* is a geodetic point. The observations at each station were reduced to *Needles longitude* and a weighted mean taken.

New San Miguel latitude (San Miguel Island, Calif., O. H. Tittman, 1873).—The station is 5.867 meters (19.25 feet), or 0″.16 of latitude south, in azimuth 324° 56′ from *New San Miguel azimuth*, described below, and marked by a copper tack leaded into the top of an irregular-shaped sandstone block, which rested on a foundation of bricks and was surrounded by bricks. The top of the stone was 6 inches below the surface of the ground.

New San Miguel azimuth (San Miguel Island, Calif., O. H. Tittman, 1873).—Identical with the triangulation station of the same name on the highest part of Green Mountain and about 177 meters to the southeast of triangulation station *Green Mountain*. The station is marked by a rectangular brick pier, whose foun-

For notes in regard to marking of stations see p. 130.

dation was laid about 2½ feet in the ground. Set in the foundation was a smooth stone about 8 by 8 by 8 inches in size, having in its center a leaden bolt and copper tack to mark the station.

Oakland, Chabot Observatory, longitude (Alameda County, Calif., C. H. Sinclair, 1889).—The center between the two stone piers of the transit instrument of Chabot Observatory at Oakland. The only other instrument in the observatory is the equatorial.

Paxton azimuth (Mendocino County, Calif., C. H. Sinclair, 1897).—Identical with the triangulation station of the same name on Pine Ridge, west of Ukiah, on the highest hill in the vicinity. The hill is wooded on the sides and clear on the top and has been known as "Bald Mountain." The station is on the ranch of Mr. Paxton, and 2⅔ miles from the house of John Remstead. The center was marked by a 1-inch drill hole, 2 inches deep, in the top of an irregular-shaped stone. The stone had a rooflike top and the part corresponding to the ridge of the roof was placed in the direction of Mount Sanhedrin. The top of the stone was flush with the ground. Broken glass was mixed with the earth around the stone. A white earthenware bottle was buried with its top 22½ inches below the stone. Over the stone was built a hexagonal concrete pier with an iron rod running through the center, carefully plumbed over the mark in the stone. The reference marks are as follows: A stone with a triangular flat top and a somewhat pointed bottom, having a drill hole in its top, 6 feet from the station in the direction of Mount Sanhedrin; a stone in the opposite direction from Mount Sanhedrin, buried big end down, with a pointed top in which was a drill hole, 1 inch deep; a stone at right angles to these stones in the direction of *Great Caspar* station, somewhat square and with a 1-inch drill hole, 1 inch deep. An oak stump, 7 feet high and 1 foot in diameter, and marked with a triangle, stood a little to the right of the line of *Mount Sanhedrin* station and 16.70 meters (54.8 feet) distant, and a large oak tree, marked with a triangle, stood a little to the right of the line to *Cold Springs* station and 31.5 meters (103.3 feet) from the station.

Pine Hill latitude (Eldorado County, Calif., W. H. Burger, 1908; 1922).—Identical with the triangulation station of the same name about 13 miles by road east of Folsom City, 12 miles by road northwest of Shingle Springs, 1½ miles east of Marcus Starbuck's house, in the foothills of the Sierra Nevada, on the outcropping rock on the top of the prominent summit locally known as "Pine Hill." The center was marked by a ½-inch drill hole in a large rock, in which was placed a copper bolt. The station pier is built over the bolt for a height of 1.845 meters, and the center of the station is marked on the pier by a nail in concrete. Reference marks are as follows: A cross in outcropping rock distant 4.07 meters (13.4 feet) distant in azimuth 130° 43′; drill hole in outcropping rock 10.62 meters (34.8 feet) distant in azimuth 23° 59′; center of highest rock 11.60 meters (38.1 feet) distant in azimuth 38° 09′; standard reference mark 4.506 meters (14.78 feet) distant in azimuth 23° 59′.

Point Arena longitude (Mendocino County, Calif., C. H. Sinclair, R. A. Marr, 1889; 1891).—Identical with the triangulation station of the same name about 200 meters east of the town of Point Arena, upon the hill where stands the tanks of the town waterworks. The station is marked by a spike in the center of the top of a brick pier, even with the surface of the ground.

Point Arena latitude (Mendocino County, Calif., Geo. Davidson, 1870; 1906).—Identical with triangulation station *Arena latitude station*, about ⅛ mile north of the northern point of Point Arena Cove, near the edge of the bluff and north of the first small stream. The bluff has an earthquake crack, about 50 feet inshore from the station. The station was marked by a nail in the remains of a brick pier. The reference mark is a 3-inch terra-cotta pipe set in the direction of station *Clark* and 33.47 meters (109.8 feet) distant.

Point Avisadero azimuth (San Francisco County, Calif., R. D. Cutts, 1851; 1920).—Identical with the triangulation station of the same name about 4½ miles south of San Francisco on the summit of a symmetrical, round-topped hill, about 169 feet high. The station was marked underground by a leaden bolt, in a stone block, sunk 3 feet in the ground and covered with cinders. On this mark is a standard bronze tablet. A reference mark, note 12d, is 14.651 meters (48.07 feet) from the station in azimuth 311° 09′; a stone block at the surface, marking *Point Avisadero 2* is 1.838 meters (6.03 feet) from the station in azimuth 340° 52′.

Point Conception latitude (Santa Barbara County, Calif., Geo. Davidson, 1850; 1904).—Identical with triangulation station *Point Conception astronomic station*, about 259 meters north and 1,710 meters east of triangulation station *Point Conception*, which is about 10 meters from the east corner of the lighthouse and about 20 meters from the south corner near the highest point of Point Conception. The latitude station is marked by a brick monument. References are two oak stakes, one 8 feet north and the other 8 feet south of the station, and two bottles, one 5 feet and the other 10 feet west of the station, and pointing toward the station. *Point Conception* triangulation station is marked at the surface by a redwood stub.

Point Pinos latitude (Monterey County, Calif., Geo. Davidson, 1851; 1904).—Identical with triangulation station of the same name on the northeasterly part of Point Pinos, 680 meters (2,231 feet) east of the lighthouse and 200 meters (656 feet) from the shore. The center of a rocky knoll, with a pine tree standing on the western edge, bearing N. 15 E. by compass, is distant 46.6 meters (153 feet) from the center of the station, and is in range with and south of another rocky knoll and a large broken rock on the beach, the first large rock east of triangulation station *Luces Point*. From the center of the station another rocky knoll bears N. 73° W. by compass and is distant 31.7 meters (104 feet). This knoll is in the direction of and in range with the whistling buoy off triangulation stations *Point Pinos* and *White Rock*. The station is marked by a stone block, the top of which was even with the surface and had in it a drilled hole, filled with lead. West of the station 1.98 meters (6.5 feet), east 1.8 meters (6 feet), and south 2.4 meters (8 feet) are bottles buried with the necks even with the ground; 5.5 meters (18 feet) southwest and the same distance southeast are stones with holes drilled in the top.

For notes in regard to marking of stations see p. 130.

The center and each of the reference marks were covered with a pile of stones; 5.73 meters (18.8 feet) northeast was a hole drilled in a large rock. A copper nail in a double pine tree was 23.07 meters (75.7 feet) S. 55° W. of the station.

Point Reyes latitude (Marin County, Calif., Geo. Davidson, 1853).—Identical with the triangulation station of the same name about 1,240 meters from the eastern extremity of Point Reyes, about 40 feet above the water on the ridge, forming the north side of the first gully inside the point, about 12 meters from the edge of the bluff toward Point Reyes Hill, about 75 meters from a large pile of rocks on the ridge to the west-southwest 140 meters (459 feet) S. 36° W. from a large black rock in the water. The station was marked by a ½-inch hole in a rock below the surface. The reference marks were three stubs with iron nails, each 6 feet from the station, two in line with the station and Point Reyes Hill and the third to the westward, nearly at right angles.

Prisoners Harbor latitude (Santa Cruz Island, Calif., Geo. Davidson, 1852).—Reported lost in 1875.

Red Bluff latitude (Humboldt County, Calif., Geo. Davidson, 1854; 1869).—Identical with the triangulation station of the same name on the highest part of Red Bluff, about 100 feet high, on the western side and opposite the entrance to Humboldt Bay, 9 meters from the west edge of the bluff and 19 meters from the north edge. The station was marked by a granite block set even with the surface of the ground, having a copper bolt leaded in the upper end and marked with a cross, which is 0.85 inch east of the center of the station. A stub with a nail in the top was set in line to Humboldt Bay Lighthouse. In 1919 the station was searched for and not found; it is now probably lost.

Redding latitude (Shasta County, Calif., W. H. Burger, 1908).—Almost due west of *Redding astronomic station* and distant 15.825 meters (51.92 feet) or 0″.00 in latitude. *Redding astronomic station* is described as follows: "On a prominent hill about ¾ mile south by west from the railroad depot at Redding. The station is on the brow of a hill somewhat toward the south edge and not quite at the highest point, and is marked by a ⅜-inch copper bolt 3 inches long, cemented into a drill hole in a large bowlder projecting 4 inches above the ground, and directly above the bolt in the same drill hole is a bronze tablet with a polished center surrounded by the raised letters 'U. S. C. & G. S.' and a raised flange around the edge; crosses in tablet and bolt mark center of station. Two reference marks, each a hole in copper bolt, set in a drill hole in a rock and flush with the surface are at the following distances and azimuths from the station: 20.22 meters (66.34 feet) 115° 49′; 9.99 meters (32.8 feet) 188° 17′." The first of these reference marks is 8.935 meters (29.31 feet) northwest from the latitude station.

Rocky Butte latitude (San Luis Obispo County, Calif., Geo. Davidson, 1885; 1890).—Distant 1.564 meters (5.13 feet) due west from triangulation station of the same name, on the top of the peak of that name in the Santa Lucia Range of mountains, about 14 miles from Cambria, about 1½ miles west from the house of Newton Mathers, at the foot of the mountain, and about 6 miles from the house of J. P. Coffee. The triangulation station is marked by a copper tack leaded into the top of a stone, about 1 foot long and 8 inches square on top, buried 2 feet below the surface of the ground. A concrete pier covers the station mark. Four reference stones with leaden bolts and copper tacks were placed approximately north, south, east, and west. Their distances from the triangulation station were: North, 1.198 meters (3.93 feet); south, 1.128 meters (3.70 feet); east, 0.792 meters (2.60 feet); and west, 1.061 meters (3.48 feet).

Ross Mountain latitude (Sonoma County, Calif., Geo. Davidson, 1859).—A solid square block 3½ feet in the ground and resting on solid rock. The station is 9.68 meters (31.75 feet) or 0″.00 of latitude in azimuth 269° 50′ from *Ross Mountain* azimuth, described below.

Ross Mountain azimuth (Sonoma County, Calif., Geo. Davidson, 1860; 1922).—Identical with the triangulation station of the same name, about 4 miles west of Cazadero, about 3 miles northeast of the Russian River, on the mountain locally known as Pole Mountain, on land belonging to Baker & Sons. The station is marked by a copper bolt in the top of a concrete pier. Two standard disk reference marks were set, one in the pier 0.193 meter (0.63 foot) distant in azimuth 115° and the other in a small surface bowlder 3.51 meters (11.5 feet) distant in azimuth 218° 09′.

Round azimuth (Shasta County, Calif., O. B. French, 1904; 1919).—Identical with the triangulation station of the same name, on the highest part of what is known as Round Mountain, just north of the post office of the same name. The station mark, described in note 1, is in a large bowlder which projects about 6 inches out of the ground. Two reference marks, described in note 4, are at the following distances and azimuths from the station: 28.72 meters (94.2 feet), 345° 30′; and 6.43 meters (21.1 feet), 57° 13′. The south reference mark is in the most eastern rock of a prominent group of rocks near the south end of the summit.

Round Top latitude (Alpine County, Calif., B. A. Colonna, 1879; 1922).—The latitude station is 0.36 meter (1.17 feet) or 0″.01 of latitude south and 10.70 meters (35.1 feet) west of *Round Top azimuth* station described below. The station is marked by a rough stone pier built up from the solid rock, with its foundation 4 or 5 feet below the floor of the observatory, the west end of which rests on a wall of stone extending solidly back to and around the pier.

Round Top azimuth (Alpine County, Calif., Geo. Davidson, 1879; 1922).—Identical with the triangulation station of the same name, 35 miles southwest of Carson City, 4 miles south of Carson Pass, and 2½ miles south of Woods Lake, on the crest of the Sierra Nevada Range of mountains, on the highest and most easterly pinnacle, popularly known as "Round Top." The station is marked by a copper bolt ⅝-inch in diameter, set in

For notes in regard to marking of stations see p. 130.

a drill hole in the rock. Above this was built a pier of rough stone masonry. In addition to the latitude pier mentioned above, two other piers, one 5.39 meters (17.7 feet) distant in azimuth 197° 07′ and the other 12.10 meters (39.7 feet) distant in azimuth 85° 43′, were left standing as references. A standard disk reference mark is 9.27 meters (30.4 feet) distant in azimuth 347° 43′.

Sacramento longitude (Sacramento County, Calif., C. H. Sinclair, 1888; 1908).—On the east side of the capitol in the capitol grounds. The station is marked by a granite pier 14 by 25 inches and 6½ feet long, marked "U. S. C. & G. S. 1888," and is 124.99 meters (410.1 feet) southeast of the capitol dome, being 78.196 meters (256.55 feet) south and 97.504 meters (319.89 feet), or 4″.03 of longitude east.

San Buenaventura latitude (Ventura County, Calif., Geo. Davidson, 1870).—A made block firmly embedded in the ground 93.3 meters (306 feet) from the edge of the bluff and 135.51 meters (444.6 feet) or 4″.40 of latitude, north of *San Buenaventura azimuth* station, described below.

San Buenaventura azimuth (Ventura County, Calif., Geo. Davidson, 1869).—Identical with the triangulation station of the same name, about 2 miles southeast of the San Buenaventura Mission, and on a perpendicular bluff about 40 feet high, on the road to the house of Raimundo Olivas. It is close to the bluff at the point where the road approaches nearest it. The station is marked by a red stone monument sunk 1½ feet in the ground, with the letters "U. S. C. S." cut in the form of a square. Ranging north, south, east and west from this are eight cedar stubs with copper tacks in the tops, the nearest of which is 1.19 meters (3.9 feet) and the farthest 1.78 meters (5.83 feet) distant. All the marks were covered with earth.

San Diego longitude (San Diego County, Calif., Geo. Davidson, 1871; C. H. Sinclair, 1892).—The station of 1871, now lost, was 4.8 meters (16 feet) or 0″.18 of longitude due east of triangulation station *San Diego 2*. The station of 1892 is a geodetic point, determined by traverse from a temporary triangulation station. It is now lost.

San Diego latitude (San Diego County, Calif., Geo. Davidson, 1851; C. H. Sinclair, 1892).—The station of 1851 was 1.75 meters (5.75 feet) east of the triangulation station *San Diego latitude 1851*. It was reported lost in 1903. The station of 1892 was 1.28 meters (4.2 feet) due west of the longitude station of 1892, described above. It was destroyed at the same time the longtitude station was destroyed.

San Diego azimuth (San Diego County, Calif., Geo. Davidson, 1851, W. H. Burger, 1908).—The azimuth station of 1851 is now lost. The station of 1908 is identical with triangulation station *San Diego astronomic* and is near the site of the old longtitude station of 1892, described above, on the south brow of the ridge in the park near the intersection of Seventh and Fir Streets produced. The station was removed when the observations were completed and is referenced as follows: A 16-inch marble post with its top dressed to 4 by 6 inches and lettered "U. S.," is located 6.452 meters (21.17 feet) from the triangulation station in exact line with the highest or south tower of the Coronado Hotel, northeastward from the station. It is 1.86 meters (6.1 feet) south of a small pepper tree, almost in line with the center of Seventh Street produced northward, and about 3 meters south of the center of Fir Street produced eastward. The top of the post projects eastward and the center of the post marks the reference point.

San Francisco, Lafayette Park, longitude (San Francisco County, Calif., Geo. Davidson, 1882; 1896).—Identical with triangulation station *Lafayette Park*, just north of the intersection of Clay and Octavia Streets. The station is the west one of two piers, the east one being the latitude pier. These piers are 1.58 meters (5.2 feet) or 0″.06 of longitude (0s.004) apart nearly due east and west. The eastern pier was occupied for longitude work in 1888, 1889.

San Francisco, Lafayette Park, latitude (San Francisco County, Calif., Geo. Davidson, 1888; 1896).—The latitude pier is 0.008 meter (0.025 foot) north and 1.58 meters (5.2 feet) east of the longitude pier described above.

San Francisco, Presidio (New) longitude (San Francisco County, Calif., A. F. Rogers, 1896; 1903).—Identical with triangulation station *Presidio longitude* station, on what is known as Drill Plain Knoll, in the northeast part of the Presidio military reservation at San Francisco, and about 130 meters southwest from the terminus of the Union Street car line. The station is 20 paces from the highest part of the knoll and about 8 feet below it. Nearly in line to Point Cavallo and 53 paces from the station is a small building used as a range station by the military. Two small eucalyptus trees are marked with small triangles just above the ground; from one of these the station is distant 11.24 meters (36.9 feet) and nearly in line with Arch Rock; from the other tree the station is distant 8.90 meters (29.2 feet) and is in line with the nubbin of the ridge over Horseshoe Bay. The Station is marked by a granite pier with a copper bolt in its top. This pier is the middle one of 3 piers.

San Francisco, Presidio, latitude (San Francisco County, Calif., Geo. Davidson, 1852; O. B. French, 1896, 1903).—The latitude station of 1852 was 0.10 meter (0.33 foot) or 0″.003 of latitude north and 1.68 meters (5.5 feet) west of triangulation station *Presidio magnetic station of 1852*, which was situated at the Presidio, San Francisco. Both the magnetic station and the latitude station were reported lost in 1904. The latitude station of 1896–1903 is 1.475 meters (4.84 feet) east of the longitude station of 1896, described above, and 12″.22 of latitude north of the 1852 pier. It is marked by a solid masonry pier.

San Francisco, Washington Square, longitude (San Francisco County, Calif., Geo. Davidson, 1869; E. Smith and C. H. Sinclair, 1887).—Identical with triangulation station *Washington Square*, on the eastern side of Washington Square. Two piers were placed on a foundation of brick laid in cement and coated on the

For notes in regard to marking of stations see p. 130.

outside with cement. The transit pier is one piece and the clock pier also one shaft. Between the bottom of the transit block and the brick work was placed a flat granite cap 8 inches thick. In 1887 the point occupied was a brick pier (later removed) 3.124 meters (10.25 feet) south and 0.405 meters (1.33 feet) or 0".02 (0m.001) of longitude east of the 1869 station.

San Francisco, Washington Square, latitude (San Francisco County, Calif., Wm. Eimbeck, 1873).—Identical with *San Francisco Washington Square longitude* station of 1869, described above.

San Jacinto latitude (Riverside County, Calif., C. V. Hodgson, 1914).—Identical with *San Jacinto azimuth*, described below.

San Jacinto azimuth (Riverside County, Calif., J. S. Hill, 1910).—Identical with the triangulation station of the same name on the highest and most northern peak of San Jacinto Mountain, 33 miles by road and trail from San Jacinto, a town on the Southern California Railway, and 18 miles by road and trail from Idyllwild, a summer resort in Strawberry Valley. The station is marked by a bronze tablet in the top of a large bowlder 4 meters (13 feet) from the top of the highest bowlder on the peak. The reference marks, 4 drill holes, each 1¼ inches in diameter and 3 inches deep in rocks on the top of the peak, are at the following distances and azimuths from the station: 17.19 meters (56.4 feet), 21° 19′ 14″; 8.75 meters (28.7 feet), 162° 26′ 04″; 3.44 meters (11.3 feet), 252° 55′ 09″; 10.42 meters (34.2 feet), 332° 59′ 09″.

San Luis Obispo latitude (San Luis Obispo County, Calif., Geo. Davidson, 1852).—Near the edge of the bluff at the first valley or break west of Fossil Point and about ½ mile from San Luis Creek. In 1871 no trace of the 1852 station could be found, but from the contracted space which the vicinity admits for locating a station it is not likely that the triangulation station of 1871 called *San Luis Obispo latitude* can differ in position from that of 1852 to exceed 10 meters; and, indeed, it is very probable that not more than one-half that discrepancy exists. The 1871 station was marked by a stone with a hole drilled in the top, in which a copper tack was driven, with or without a lead bolt. The stone was buried 3 feet below the surface of the ground. On it rested a redwood stub, projecting 1 foot above the surface, with a tack in the top marking the center.

San Nicolas latitude (San Nicolas Island, Calif., Geo. Davidson, 1852; W. H. Burger, 1908).—The station of 1852 was reported lost in 1860. The station of 1908 is on the north shore of the island, about 40 paces back from the edge of the bluff overlooking the east end of the rocky reef, extending eastward from Corral Harbor. It is about 15 feet above mean tide, on a shelf dotted with sand dunes covered with grass. The station was not marked, but the wooden latitude pier was left standing. Triangulation station *Magnetic*, 9 paces from the edge of the bluff and 16 paces from the shore bluff to eastward, marked by a 12 by 13 by 5 inch stone lettered "U. S.," and underground by a drill hole in a rock, lies almost due north of the latitude station, distant 30.021 meters (98.49 feet), or 0".97 of latitude.

San Pedro latitude (Los Angeles County, Calif., Geo. Davidson, 1852).—Identical with triangulation station of the same name on the bluff just on the left of the south road up from the landing, about 20 yards from the north side of Alexander and Banning's office. The station was marked only by 2 stakes each 5 feet distant north and south. In 1920 it was not found and is probably lost.

San Simeon latitude (San Luis Obispo County, Calif., Geo. Davidson, 1852; Geo. Davidson, 1874).—The latitude station of 1852 is lost. The station of 1874 is 6.1 meters (20 feet) west of *San Simeon azimuth*, described below. The approximate reduction of the 1852 station to the 1874 station is −2".4 in latitude and +25".4 in longitude.

San Simeon azimuth (San Luis Obispo County, Calif., Geo. Davidson, 1874).—Identical with the triangulation station of the same name on the top of the first hill northwest of San Simeon Bay landing. The station was marked by a drill hole in a flat stone buried 3 feet below the surface. Over this was a redwood stub with copper tack in the top, driven even with the surface of the ground. One foot below the surface and 1.8 meters (6 feet) from the center, three glass bottles were buried, with their necks pointing toward the center. Three redwood stubs were driven even with the surface, each with a copper nail in the top, 1.2 meters (4 feet) from the center, approximately north, south, and east.

Santa Ana latitude (San Benito County, Calif., Fremont Morse, 1885).—A concrete pier 11.43 meters (37.5 feet) in azimuth 129° 07′ 01″ or 0".23 of latitude north from *Santa Ana azimuth*, described below.

Santa Ana azimuth (San Benito County, Calif., E. F. Dickins, 1885).—Identical with the triangulation station of the same name, on the western summit of a double-topped peak, very rocky and covered with oaks, locally known as Henrietta Peak, about 2 miles from the one known as Santa Ana. The station is marked by an irregular-shaped rock with a copper bolt in the top, surmounted by a hexagonal concrete pier. A copper bolt, with a cross cut in the top, was set in the top of the pier to mark the center of the station, 5.2 feet above the subsurface mark.

Santa Barbara latitude (Santa Barbara County, Calif., Geo. Davidson, 1852; 1870; Geo. Davidson, 1869).—The station of 1852 was originally marked by the center of an equilateral triangle formed by three stubs driven into the ground, and is a geodetic point. In 1870 a redwood block was located underneath the ground that was believed to mark the station, and a new station established 1 meter west of this point and marked by a stone bearing the letters "U. S. C. S.," with its top 3 inches below the surface of the ground. This point was determined as a geodetic point. The station of 1869 was not permanently marked. It is 2.039 meters (6.69 feet) or 0".07 of latitude north and 5.160 meters (16.93 feet) east of *Santa Barbara azimuth* station, described below.

For notes in regard to marking of stations see p. 130.

Santa Barbara azimuth (Santa Barbara County, Calif., Geo. Davidson, 1869).—Identical with the triangulation station of the same name on La Vigia, the southern one of two conspicuous smooth round hills to the west of Santa Barbara and of Honda Valley. The station is marked by a stone with the letters "U. S. C. S." cut in the form of a square; the stone is even with the surface of the ground and embedded in a brick pier 2 by 2 feet and surrounded by concrete to 4 by 4 feet. Over the stone a pier of concrete was built and the center marked by an iron nail in the top. Two reference marks, 2-foot sections of 4-inch tile drain pipe, filled with concrete in which a nail was set, were placed at the intersection of a fence line and the lines to triangulation station *Santa Cruz east* and triangulation station *Santa Barbara Lighthouse*. The distances and azimuths to these reference marks are: The pipe toward *Santa Cruz east*, 39.07 meters (128.2 feet), 340° 16′; the pipe toward *Santa Barbara Lighthouse*, 106.80 meters (350.4 feet), 37° 03′. A triangular concrete pier for the vertical circle was 14.81 meters (48.6 feet) distant in azimuth 204° 18′.

Santa Catalina Island latitude (Santa Catalina Island, Calif., Geo. Davidson, 1852; 1875).—Identical with the triangulation station of the same name on the rise back of the beach at the northern anchorage, about 23 meters from low water. The western side of the harbor is about 2° or 3° to the west of north. A piece of iron, circular in form, 3 inches in diameter and an inch and a half thick, with leaden bolt and copper tack with a cross on top, was sunk about 18 inches below the surface of the ground. Above this was placed a piece of iron kentledge, about 16 inches long and 4 inches square, with a leaden bolt and iron spike with a cross on it, surrounded by the letters "U. S. C. S. A. S." cut with a cold chisel on its top. Four brickbats, with a copper tack leaded into the top of each, were placed to the north, south, east, and west of the station, each 2 feet from the center.

Santa Cruz latitude (Santa Cruz County, Calif., Geo. Davidson, 1852).—At the top of the bluff where goods are hoisted up from the top of the pier. The station is marked by 2 stubs having a copper nail in each and each 5 feet from the station, nearly east and west of it and in line with it. The flagstaff of Santa Cruz warehouse is 13.47 meters (44.2 feet) distant in azimuth about 202°. The azimuth is uncertain.

Santa Cruz azimuth (Santa Cruz County, Calif., R. D. Cutts, 1854; 1906).—Identical with the triangulation station of the same name on the heights back of the village of Santa Cruz, on a round smooth hill, about 170 yards southwest of Gordon's limekiln on ground claimed by Medear. The station is 2 miles N. 69° 30′ W., from the embarcadero and ½ mile S. 74° W. from the Mission Church. The station was marked by a stone buried 3 feet below the surface of the ground and having in its top a lead bolt marked with cross lines. Three stones similarly marked were placed at or near the surface of the ground, 1.83 meters (6.0 feet) from the center two in line with center and the third at right angles to that line.

Santa Cruz west latitude (Santa Cruz Island, Calif., O. H. Tittman, 1874).—Distant 15.76 meters (51.7 feet) in azimuth 255° 03′ or 0″.13 of latitude north from *Santa Cruz west azimuth*, described below. The station is marked by a large stone with a lead bolt and copper tack in the top surrounded by brick and cement.

Santa Cruz west azimuth (Santa Cruz Island, Calif., O. H. Tittman, 1874; 1906).—Identical with the triangulation station of the same name on the high bluff forming the western extremity of the island. The station was marked by a copper tack leaded into a hole drilled in the ledge. A brick pier was built over the station.

Santa Lucia latitude (Monterey County, Calif., B. A. Colonna, 1880; Fremont Morse, 1885).—The station of 1880 is a pine post 22 inches in diameter, located 56.1 meters (184 feet), or 1″.82 of latitude north and 157.6 meters (517 feet) west of *Santa Lucia azimuth*, described below. The station of 1885 is a concrete pier 13.44 meters (44.1 feet) in azimuth 227° 28′, or 0″.29 of latitude north from *Santa Lucia azimuth*, described below.

Santa Lucia azimuth (Monterey County, Calif., E. F. Dickins, 1885; 1890).—Identical with the triangulation station of the same name, on the eastern summit of the highest peak of the Santa Lucia Range, which consists of two rocky knobs about 200 yards apart, with a depression of 20 feet between them. The station is marked by a cross cut in the projecting end of a copper bolt set in the solid rock. Over this is a concrete foundation 3 feet square and 10 inches deep, and upon it a hexagonal concrete pier. A copper bolt with a cross cut in it was set in the top of the pier to mark the center of the station. The reference marks are copper tacks leaded in drill holes in outcropping rocks and distant as follows: North, 2.097 meters (6.88 feet); south, 2.188 meters (7.18 feet); east, 1.80 meters (5.91 feet); and west, 3.072 meters (10.08 feet).

Shelter Cove latitude (Humboldt County, Calif., Geo. Davidson, 1853).—Reported lost in 1871.

Snow Mountain east azimuth (Glenn County, Calif., O. B. French, 1904).—Identical with the triangulation station of the same name on the northernmost rock croppings at the edge of the summit of the eastern peak of Snow Mountain, about 5 miles south of Mount St. John and near the corner of Lake Colusa and Glenn Counties. The station is marked by a ½-inch copper bolt cemented in a drill hole in a hollow at about the middle of the highest point of rocks, with the top of the bolt about ½ inch above the surface and marked by a cross. The reference marks are all drill holes in rocks, the first being 5.16 meters (16.9 feet) in azimuth 59° 57′; the second 3.33 meters (10.9 feet) in azimuth 165° 39′; and the third 6.89 meters (22.6 feet) in azimuth 248° 38′ from the station.

Soledad latitude (San Diego County, Calif., Fremont Morse, 1899).—Marked by a brick pier 18.02 meters (59.1 feet), or 0″.58 of latitude north, in azimuth 178° 32′ 48″, from triangulation station *Soledad*, which is on the highest part of the hill back of La Jolla Beach. The triangulation station is marked by a bottle

For notes in regard to marking of stations see p. 130.

32 inches below the surface of the ground, and a 3-inch pipe 24 inches long placed above the bottle and filled with concrete, in which was embedded a copper bolt ¾ inch in diameter and 4 inches long, with a cross on top marking the center of the station. This pipe is surrounded to a depth of 1 foot by a triangular bed of concrete. Reference marks are as follows: In line to Point Loma Lighthouse (old), distant 1.783 meters (5.85 feet); in prolongation of that line, distant 1.8 meters (6 feet); at 90° to westward, distant 1.89 meters (6.2 feet); and at 90° to eastward, distant 1.8 meters (6 feet). The mark to the westward has been destroyed to slightly below the surface.

Soledad azimuth (San Diego County, Calif., A. T. Mosman, 1899).—Identical with *Soledad latitude*, described above.

Sulphur Peak latitude (Sonoma County, Calif., Geo. Davidson, 1859).—Distant 5.537 meters (18.17 feet) or 0".01 of latitude south, in azimuth 271° 21′ from *Sulphur Peak Azimuth*, described below.

Sulphur Peak azimuth (Sonoma County, Calif., Geo. Davidson, 1859).—Identical with the triangulation station of the same name on Sulphur Peak, sometimes called Goodwin or Geyser Peak, about 30 miles from the coast, directly inland from Fort Ross. It lies on the eastern side of Russian River Valley, abreast of the town of Geyserville. The station is marked by a hole in a flat rock level with the surface and by three reference marks consisting of holes in stones each 6 feet from the station and placed one in line to Sanel Mountain, one in line to Mount Helena, and the third in line to Ross Mountain.

Summit longitude (Placer County, Calif., B. A. Colonna, 1878).—On a knoll 97 feet above the highest point of the Central Pacific Railroad tracks and distant 206 meters (675 feet) N. 8° W. from the telegraph office and 8.5 meters (28 feet) east of the northeast end of the railroad water tank. The station is marked by a fir log 2 feet in diameter and 7½ feet long, buried 4 feet in the ground. To the south and distant 2.41 meters (7.9 feet) a square bottle about 8 inches long was buried about 18 inches in the ground and over it was placed a stone about 2 feet long and of irregular shape, with a drill hole 2 inches deep in its upper surface. A yellow earthenware bottle with a handle on it was buried in a similar manner to the east and a ½-pint beer bottle to the north. A similar pier for latitude was placed 10 feet west of this pier but was not used, the longitude pier being used in lieu thereof.

Summit latitude (Placer County, Calif., B. A. Colonna, 1878).—Identical with *Summit longitude*, described above.

Tepusquet latitude (Santa Barbara County, Calif., J. S. Lawson, 1882).—Marked by a concrete pier 20.659 meters (67.78 feet), or 0".59 of latitude north, in azimuth 152° 14′ 38″ from *Tepusquet azimuth*, described below.

Tepusquet azimuth (Santa Barbara County, Calif., P. A. Welker, 1882).—Identical with the triangulation station of the same name on the top of Tepusquet Range. The station is marked by a hole drilled in the outcropping ledge of rock on the top of the mountain. Over this was built a concrete pier with a copper bolt in the top marking the center of the station. Four reference stones, each marked by a tack leaded into a drill hole, were placed about level with the surface. Two were 6 feet from the station, approximately north and south, and the other two 5 feet, approximately east and west.

Trinidad latitude (Humboldt County, Calif., Geo. Davidson, 1853).—The station is up from the landing and is marked by a post 6 by 6 and 6 feet above ground.

Turning Point azimuth (Eldorado County, Calif., C. H. Sinclair, 1894).—About ¼ mile from the shore of Lake Tahoe, near the boundary line between California and Nevada between stones 1 and 2. The station is marked by a copper bolt in a granite monument projecting 12 inches above the ground.

Ukiah longitude (Mendocino County, Calif., C. H. Sinclair, 1897).—Near the southeast corner of the lumber yard of F. M. Mason, in Ukiah, 12 feet from the street south and 4 feet from the street east building line The station is 105.20 meters (345.1 feet) south and 36.99 meters (121.4 feet) or 1".54 of longitude west of the flagpole on the courthouse cupola.

Ukiah latitude (Mendocino County, Calif., C. H. Sinclair, 1897).—Near the southeast corner of the lumber yard of F. M. Mason, in Ukiah. The station is 105.37 meters (345.7 feet) or 3".42 in latitude south and 39.245 meters (128.76 feet) west of the flagpole on the courthouse and 2.248 meters (7.375 feet) west and 0.178 meters (0.58 feet) south of the *Ukiah longitude* station, described above.

Vaca latitude (Solano County, Calif., J. S. Lawson, 1880; 1922).—Distant 11.40 meters (37.4 feet) or 0".37 of latitude south and 18.78 meters (61.6 feet) east of *Vaca azimuth*, described below. The station is marked by a concrete pier.

Vaca azimuth (Solano County, Calif., Geo. Davidson, 1880; 1922).—Identical with the triangulation station of the same name, about 5½ miles west of Vacaville, on the top of the first summit to the south of the culminating ridge of the Vaca Range of mountains bordering on the Sacramento Valley and Putah Creek, on a bold escarpment of sandstone whose western front is quite steep for some distance. The station is on a point about 2 miles south of the highest point on the ridge. The underground mark is a soda-water bottle of flint glass, filled with sand and buried neck up, with the top 1.18 feet below the surface, a copper nail in the center of the neck marking the station. Over this is a rough stone pier laid in Portland cement. The center mark at the surface is a copper bolt ⅝ inch in diameter and 5 inches long, projecting about ¼ inch and having a silver pin in it, set in cement in a large stone in the center of the pier. The top of the pier is 3.44 feet above the underground mark. In addition to the latitude pier described above, the vertical circle pier, built of concrete

For notes in regard to marking of stations see p. 130.

and 15.9 meters (52.2 feet) distant and bearing S. 6° 02′ E. (true), will serve as a reference. Two standard disk reference marks were set, one 16.03 meters (52.6 feet) distant in azimuth 354° 28′, the other 21.88 meters (71.8 feet) distant in azimuth 306° 19′.

Wilson Peak longitude (Los Angeles County, Calif., E. Smith, 1905; 1922).—The longitude station is 151.91 meters (498.4 feet) south and 347.88 meters (1,141.3 feet), or 13″.59 of longitude, east of triangulation station *Wilson Peak*, which is located on Wilson Peak, in the Sierra Madre Range, about 60 meters south-southwest of the Mount Wilson Hotel and 4 feet south of the back porch of the first building southwest of the hotel. The subsurface mark is a cross on a copper bolt leaded into a drill hole in a rock 20 inches below the surface of the ground. The surface mark is a cross in a copper bolt set in the top of a hexagonal concrete pier, 26 inches in diameter and projecting 3.2 feet above the surface of the ground, constructed over the subsurface mark. The following are true azimuths and distances to reference marks: Big pine, wire nail in blaze, 61° 24′, 12.65 meters (41.5 feet); southwest corner of the hotel porch, 149° 24′, 6.49 meters (21.3 feet); nail in the center of the hotel doorsill, 213° 44′, 3.54 meters (11.6 feet); southeast corner of hotel porch, 286° 44′, 5.85 meters (19.2 feet); big pine, wire nail in blaze, 299° 19′, 33.2 meters (109 feet). The longitude station is the center one of three concrete piers. It is 18 by 26 inches and is built upon a massive concrete pier 146.15 meters (479.5 feet) south and 75.35 meters (247.2 feet) or 2″.94 of longitude east of the Snow telescope pier of the solar observatory of the Carnegie Institute; 9 meters south of the south side of a 10-inch telescope building, and about 50 meters north of the monastery.

Wilson Peak latitude (Los Angeles County, Calif., E. Smith, 1905; 1922).—Identical with *Wilson Peak longitude* pier described above, and 4″.93 of latitude south of triangulation station *Wilson Peak* and 4″.74 of latitude south of the telescope pier of the solar observatory of the Carnegie Institute.

Yolo, northwest base, latitude (Yolo County, Calif., E. F. Dickins, 1880).—Distant 5.95 meters (19.52 feet) in azimuth 131° 45′ or 0″.13 of latitude north from *Yolo northwest base azimuth*, described below. The station is marked by a brick and cement pier, with its base 3 feet below the surface of the ground, and is 1.7 meters (5.5 feet) east of a similar pier.

Yolo, northwest base, azimuth (Yolo County, Calif., Geo. Davidson, 1880).—Identical with the triangulation station of the same name in the extreme southeast corner of the SE. ¼ of sec. 28, T. 10 N., R. 1 E. Diablo meridian, 4⅓ miles west of the railroad passing through Woodland, and just north of the country road running west toward Madison and Copay Valley. The marking at this station is practically the same as that at *Yolo southeast base azimuth*, described below, except that the hollow brick pier was carried to a height of only about 12 feet above the surface and the letters "N. W." were substituted for "S. E." on the granite blocks. No reference marks were placed.

Yolo, southeast base, latitude (Yolo County, Calif., J. J. Gilbert, 1880).—Distant 48.71 meters (159.8 feet) in azimuth 253° 37′ or 0″.45 of latitude north from station *Yolo southeast base azimuth*, described below The station is marked by a brick and cement pier, with its base 3 feet below the surface of the ground, and is 1.49 meters (4.9 feet) east of a similar pier.

Yolo, southeast base, azimuth (Yolo County, Calif., Geo. Davidson, 1880).—Identical with the triangulation station of the same name in the NW. ¼ of sec. 19, T. 8 N., R. 2 E, Diablo meridian, 3⅛ miles west and 1⅛ miles south of Davisville and about 25 meters from the left bank of Putah Creek. The subsurface mark is a fine needle hole in a German-silver plug inserted in a copper bolt in the top of a granite block 35 inches long by 20 inches square at the base and dressed to 12 inches square at the top and having the letters "U. S. C. G. S." cut on it. The top of the block is 4½ feet below the surface and a glass hemisphere is over the copper bolt. The surface mark is a fine needle hole in a copper bolt set in lead in the top of a granite block 25 inches square and 26 inches deep, having the letters "U. S. C. S. S. E. YOLO BASE" cut on it. The top of this block is even with the surface of the ground, and the block itself is the center of a solid brickwork pier carried up as a hollow pier to a height of 33¼ feet above the ground and capped with a granite slab with a 1¼-inch hole in the center. Charcoal and charcoal dust were mixed with the earth in filling around subsurface part of the structure. Four reference marks were set, consisting of granite blocks 1 foot square and 1¼ feet high, with copper bolts and drill holes in the top. They were incased in brickwork, with their tops 18 inches below the surface. Two were set in line to *Yolo northwest base* at distances of 5.76 meters (18.9 feet) and 99.91 meters (327.8 feet) from the center and two at right angles thereto eastwardly at distances of 6.10 meters (20.0 feet) and 100.10 meters (328.4 feet) from the center.

COLORADO

Adobe latitude (Lincoln County, Colo., O. H. Tittmann, 1881; 1922).—Distant 6.43 meters (21.1 feet) in azimuth 271° 45′ (0″.01 of latitude south) from triangulation station of the same name, on the highest point of a prominent rounded bluish-colored bluff, known locally as "A Government high point," on the south side of the head of Adobe Creek, about 35 miles south of Hugo, 4 miles south and 1 mile west of Karval, in the NW. ¼ of sec. 10, T. 17 S., R. 55 W., on land of T. B. Hershberger, who lives ½ mile north of the station. The station is marked as described in notes 1a, 7a, 11a, the reference mark being due north 243.90 meters (800.2 feet) from the station and 272.5 meters (894 feet) east from the northwest corner of section 10, and directly on the section line.

For notes in regard to marking of stations see p. 130.

Boulder azimuth (Boulder County, Colo., C. V. Hodgson, 1912).—Identical with United States Geological Survey triangulation station of the same name, 4 miles direct and 9 miles by road and trail, from the town of Boulder, on the northeastern one of two peaks, known locally as "South Boulder Peak," between South Boulder and Bear Canyons. The station is marked by a United States Geological Survey bronze tablet set in solid rock. The reference marks are: A bronze tablet as described in note 12a, 1.4 feet above the station, distant 4.454 meters (14.61 feet) in azimuth 8° 59′; a cross cut in the solid rock 3 feet above the station and ¼ foot below the highest point on the peak, distant 1.88 meters (6.2 feet) in azimuth 90° 51′.

Brighton latitude (Adams County, Colo., C. V. Hodgson, 1913).—Distant 0.285 meter (0.94 foot) west and 14.256 meters (46.77 feet) (0″.46 of latitude) south of triangulation station *Brighton bench mark eccentric*, about 1 mile north of Brighton, on the south side of the base line road, near the fence line, and about 47 meters west of the Union Pacific Railroad track. The triangulation station has for reference marks: A bronze tablet as described in note 11b, in the fence line north of the base line road and 1 meter west of the west fence line of the county road, distant 21.978 meters (72.11 feet) in azimuth 149° 42′; United States Geological Survey bench mark R_3, a 3½-inch iron pipe with a cap inscribed with the figures "4966," projecting about 1 foot above the ground, 1 meter north of the fence line on the south side of the base line road, and 7.25 meters (23.8 feet) west of the west rail of the Union Pacific Railroad, distant 39.832 meters (130.68 feet) in azimuth 269° 22′.

Colorado-New Mexico boundary latitude station No. 1 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1902).—The station was 210.80 meters (691.7 feet) or 6″.84 of latitude due south of the boundary monument, which is at the twentieth mile corner east of the southwest corner of Colorado; the monument is a sandstone shaft, 12 inches by 12 inches by 6 feet, set 3 feet in the ground. The shaft is inscribed as follows: On the north "COLO."; on the east, "37° N. L."; on the south, "N. MEX."; and on the west, "20 M. 1902." A circular mound of earth and stone is around the base of the shaft, and 3 pits, each 36 by 36 by 18 inches, are, respectively, 6 feet north, south, and west from the station. The west pinnacle of Ship Rock bears S. 22° 06′ W. A cedar tree, 10 inches in diameter, marked "COLO. 20 M., B. T.," is 38 meters (125 feet) N. 8° E. from the station; a cedar tree 8 inches in diameter, marked "N. M. 20 M. B. T.," is 7.8 meters (26 feet) S. 44° E. from the station; and a cedar tree 10 inches in diameter, marked "COLO. 20 M. B. T.," is 20.3 meters (67 feet) N. 68° 40′ W.

Colorado-New Mexico boundary latitude station No. 2 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1902).—The station was 292.7 meters (960 feet) or 9″.50 of latitude due south of the boundary monument, which is located 64.843 miles east of the southwest corner of Colorado, on a rocky east slope, about 365 feet west and in sight of the Durango road. The monument is a sandstone shaft, 12 by 18 inches and 6½ feet long, set 2½ feet in the ground on bedrock. The shaft is marked as follows: On the north, "COLO."; on the east, "37° N. L."; on the south, "N. MEX."; and on the west, "64.843 M., 1902." A circular mound of stone is around the base. A piñon tree, 10 inches in diameter, and marked "COLO., 64.843 M., B. T." bears N. 10° W. and is distant 16.3 meters (53 feet) from the station. A point on the high bluff down the river on the east side bears S. 7° E.

Colorado-New Mexico boundary latitude station No. 3 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1902).—The station was 589.20 meters (1,933.1 feet) or 19″.12 of latitude due south of the boundary monument, which is at the south edge of an adobe ruin, 117.075 miles east of the southwest corner of Colorado. The monument is a sandstone shaft, 12 by 14 inches, 6½ feet long, set 3 feet in the ground. The shaft is marked as follows: On the north, "COLO."; on the east, "37° N. L."; on the south, "NEW MEX."; and on the west, "117.075 M. 1902." Four pits, each 36 by 36 by 18 inches, are 6 feet distant, north, south, east, and west from the station. A circular mound of stones is around the shaft. The following bearings and distances are from the station: Southwest corner of Archuleta grist mill, N. 24° 55′ E., distant about 1,450 feet; top of high bluff on south side of Navajo River Canyon, N. 75° 22′ E., about 3 miles distant; highest smokestack on New Mexico Lumber Co. sawmill at Edith, S. 79° E., about ½ mile distant; lone monument in Archuleta Cemetery on top of round hill, S. 50° 31′ E. about ¼ mile distant.

Colorado-New Mexico boundary latitude station No. 4 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1902).—The station was 455.44 meters (1,494.2 feet) or 14″.78 of latitude due south of the boundary monument, which is at the foot of a lava bluff about 75 feet high and at the east edge of F. Duran's meadow, 166.73 miles east of the southwest corner of Colorado. The monument is a white limestone shaft, 12 by 12 inches, 6½ feet long, set 3 feet in the ground and marked as follows: On the north, "COLO."; on the east, "37° N. L."; on the south, "N. MEX."; and on the west, "166.73 M., 1903." A circular mound of stone is around the base of the shaft and 4 pits, each 36 by 36 by 18 inches, are, respectively, 6 feet north, south, east, and west.

Colorado-New Mexico boundary latitude station No. 5 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1902).—The station was 741.36 meters (2,432.3 feet) or 24″.05 of latitude due south of the boundary monument, which is located 217.25 miles east of the southwest corner of Colorado. The monument is a sandstone shaft, 12 by 14 inches, 6 feet long, set 3 feet in the ground, and marked as follows: On the north, "COLO."; on the east, "37° N. L."; on the south, "N. MEX."; and on the west, "217.25 M., 1903." A circular mound of stone is around the base, and pits 36 by 36 by 18 inches are 6 feet, respectively, north, south, east, and west from the station. Vermejo Peak is about 20 miles S. 27° 20′ W.; middle one of 3 rocky peaks about 1½ miles N. 60° 15′ W.; and a rocky peak about 2 miles distant is S. 76° 35′ W. from the station.

For notes in regard to marking of stations see p. 130.

Colorado-New Mexico boundary latitude station No. 6 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1902).—The station was 240.5 meters (789.4 feet) or 7″81 of latitude due south of the boundary monument, which is on Trinchera Creek flat, west of a road and north of a trap dyke, 274.158 miles east of the southwest corner of Colorado. The monument is a sandstone shaft, 12 by 12 inches, 6 feet long, set 3 feet in the ground, and marked as follows: On the north, "COLO."; on the east, "37° N. L."; on the south, "N. MEX."; and on the west, "274.158 M., 1903." A circular mound of earth and stone is around the base, and pits 36 by 36 by 18 inches are 6 feet, respectively, north, south, east, and west from the station. The following bearings and distances are from the station: Spire of church in plaza, N. 22° 53′ E., about 2 miles; volcanic cone, N. 50° 18′ E., south one of twin cones, S. 88° 40′ E., about 1¾ miles; notch in top of timbered cone, S. 67° 50′ E. about 1 mile.

Colorado-New Mexico boundary latitude station No. 7 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1902).—The station was 55.80 meters (183.0 feet) or 1″81 of latitude due south of the boundary monument, which is at the edge of the Cimarron Valley, at the mouth of Sheep Pen Canyon, about 1½ miles north of Alexander McKenzie's ranch house and 325 miles east of the southwest corner of Colorado. The monument is a sandstone shaft, 12 by 12 inches, 7 feet long, set 3 feet in the ground, and marked as follows: On the north, "COLO."; on the east, "37° N. L."; on the south, "N. MEX."; and on the west, "325 M., 1903.". A circular mound of stones surrounds the base and 4 pits, each 36 by 36 by 18 inches, are 6 feet, respectively, north, south, east, and west from the station. The following bearings and distances are from the station: West salient of mesa, capped with lava, N. 38° 30′ E. about ½ mile; west end of sandstone cropping on rocky butte, across Cimarron River, S. 7° 20′ E. about 3 miles, and a cone-shaped butte, across the Cimarron River, S. 26° 40′ W. about 3 miles.

Colorado-Oklahoma boundary latitude station No. 8 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1902.—The station was 669.1 meters (2,195 feet) or 21″71 of latitude due south of the boundary monument, which is on a low ridge that bears north and south and 370.88 miles east from the southwest corner of Colorado. The monument is a sandstone shaft, 12 by 12 inches, 6 feet long, set 3 feet in the ground, and marked as follows: On the north, "COLO."; on the east, "37° N. L."; on the south, "OKLA."; and on the west, "370.88 M., 1903." A circular mound of earth and stone is around the base, and 4 witness pits, each 36 by 36 by 18 inches, are 6 feet, respectively, north, south, east, and west from the station. Metcalf's pasture fence is about 670 meters south and Major's seventeenth-mile corner is 644 meters (2,112 feet) S. 0° 14′ E. from the station.

Colorado-Oklahoma boundary latitude station No. 9 (U. S. G. L. O.) (Arthur D. Kidder and Augustus MacConnel, 1903).—The station was identical with the boundary monument, which is the closing corner on the line between Colorado and Oklahoma, on the west boundary of Kansas, 388.096 miles east of the southwest corner of Colorado and 812 meters (2,664 feet) north of the southwest corner of Kansas. The monument is a sandstone shaft, 12 inches by 12 inches, 5 feet long, set 2½ feet in the ground and marked as follows: On the northeast, "KAN."; on the southeast, "C. C., 1903"; on the southwest, "OKLA."; and on the northwest, "COLO.; 388.096 M." A circular mound of earth and stone is around the base and 3 witness pits, each 36 by 36 by 18 inches, are 6 feet, respectively, north, south, and west of the station. The following bearings and distances are from the station: Point of rocks on Cimarron River, N. 38° 56′ E. about 10 miles; top of low sand hill, S. 45° 05′ E. about ¼ mile; east edge of low bluff, S. 1° 39′ E. about ½ mile.

Colorado Springs (U. S. E.) latitude (El Paso County, Colo., F. Kampf, 1873; 1879).—Identical with triangulation station *Colorado Springs astronomic*, on a rise of ground southeast of the freight depot of the Denver & Rio Grande Railroad at Colorado Springs. The station is marked by a drill hole in the top of a solid stone pier. The north face of the pier is inscribed "U. S. Meridian and Latitude Mark. Explorations west of the 100th meridian. War Department." The south face is inscribed with the latitude, longitude, and altitude, followed by the additional inscription "U. S. Engineers, 1873."

Colorado Springs longitude (El Paso County, Colo., G. W. Dean, 1873; E. Smith, 1885; 1886).—The station of 1873 is identical with triangulation station *Colorado Springs latitude and longitude*, which is at Colorado Springs, on the grounds in the rear of The Antlers Hotel. The transit pier was of white sandstone, 2 by 1½ feet at the top, extending 3 feet below the surface of the ground, and the meridian was marked by the intersection of 2 lines on the tops of 2 sandstone posts, 9 inches square and 5 feet long, 4½ feet in the ground and placed, respectively, 198 meters (650 feet) north and 125 meters (410 feet) south of the station, on land belonging to the Colorado Springs Land Co. The flagstaff on the clock tower of the Colorado Springs public schoolhouse is distant 310.8 meters (692 feet) in azimuth 215° 37′ 24″ from the longitude station. In 1885 a sandstone and lava pier was constructed 0.127 meter (0.42 foot) north and 11.214 meters (36.79 feet) (0″46 of longitude, or 0ˢ031 of time) east of the south meridian stone.

Colorado Springs latitude (El Paso County, Colo., G. W. Dean, 1873; 1879).—Identical with *Colorado Springs longitude* station of 1873, described above.

Denver longitude (Denver County, Colo., G. W. Dean, 1873).—At Denver, about 50.6 meters (166 feet) north of the Denver & Rio Grande Railroad depot. The station is the center of a brick pier, and is 651.16 meters (2,136.3 feet) (21″11 of latitude) north and 240.27 meters (788.3 feet) (10″09 of longitude) west of the central spire of the public schoolhouse.

For notes in regard to marking of stations see p. 130.

Denver latitude (Denver County, Colo., G. W. Dean, 1873).—Identical with *Denver longitude* station, described above.

Dewey latitude (Weld County, Colo., C. V. Hodgson, 1913).—Identical with *Dewey azimuth*, described below.

Dewey azimuth (Weld County, Colo., C. V. Hodgson, 1912).—Identical with the triangulation station of the same name, 8 miles east of Eaton and 1¾ miles southeast of Galeton, on a round-topped knoll on the open prairie, near the center of the north side of sec. 9, T. 6 N., R. 64 W. It is marked by a United States Geological Survey iron-pipe bench mark projecting about 1½ feet above the ground. A reference mark, note 11b, encased in a 5-inch iron pipe, is 136.19 meters (446.8 feet) from the station in azimuth 309° 56′.

Elbert latitude (Elbert County, Colo., C. V. Hodgson, 1913).—Distant 0.045 meter (0.15 foot) (0″.00 of latitude) north and 0.025 meter (0.08 foot) east of the triangulation station of the same name about 2½ miles west of Elbert, in a cultivated field ¼ mile north of a large square house, on the highest knoll in the vicinity. The triangulation station is marked as described in notes 1b and 7b. A reference mark, note 11b, encased in a 5-inch iron pipe, is 0.4 meter (1.3 feet) west of a fence line, 0.9 meter (3 feet) south of the fence corner, where there is a flag left by the United States Geological Survey, and 92.053 meters (302.01 feet) from the station.

El Paso east base latitude (El Paso County, Colo., O. H. Tittmann, 1879).—Distant 4.758 meters (15.61 feet) or 0″.15 of latitude due south of station *El Paso east base azimuth*, described below.

El Paso east base azimuth (El Paso County, Colo., O. H. Tittmann, 1879; 1922).—Identical with the triangulation station of the same name, in the SE. ¼ of the SE. ¼ sec. 32, T. 12 S., R. 63 W., and 215.5 meter (707 feet) north of the center of the road on the south side of section 32 and 168.2 meters (552 feet) west of the east line of section 32. The west gable of a barn is 376.6 meters (1,235.6 feet) north 14° 35′ east (magnetic) from the station. The surface mark is a standard disk station mark, containing the name and date of the station, set in the top of a granite post, 1 foot square, and 2½ feet long, set in concrete and inscribed "ASEB." The underground mark, 3½ feet below the surface of the ground, is a copper tack in a lead plug, set in the top of a granite post. The reference mark, note 11a, is in the fence line on the north side of the public road, on the south side of section 32, and is distant 225.61 meters (740.2 feet) from the station N. 140° E. (magnetic).

Georgetown (U. S. E.) latitude (Clear Creek County, Colo., F. Kampf, 1873).—On the eastern side of the valley at the foot of Griffiths Mountain, on a knoll overlooking the town of Georgetown. Republican Mountain is on the opposite side of the valley and Democrat and Upper Empire Peaks rise to the northward. The station is marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155), the faces being set in a diagonal position.

Grand Junction longitude (Mesa County, Colo., C. H. Sinclair, 1886; 1905).—Identical with triangulation station *Grand Junction longitude and latitude*, at Grand Junction, near the northwest corner of Cottonwood Park, which is between Ute and Pitkin Avenues and Fourth and Fifth Streets. Reported lost in 1906.

Grand Junction latitude (Mesa County, Colo., C. H. Sinclair, 1886).—Identical with *Grand Junction longitude* station, described above.

Grand Junction azimuth (Mesa County, Colo., William Eimbeck, 1895).—At Grand Junction, distant 12.03 meters (39.47 feet) in azimuth 166° from triangulation station *Grand Junction standpipe*, which is the center of the standpipe, 10 feet in diameter and about 100 feet high. The instrument was mounted upon a brick pier.

Gunnison longitude (Gunnison County, Colo., E. Smith, 1886; 1893).—Distant 13.983 meters (45.88 feet) (0″.45 of latitude) north and 0.048 meter (0.16 foot) (0″.002 of longitude) west of *Gunnison azimuth*, described below. The pier is of sandstone, about three times as wide as thick, and is hollowed out in the middle. The longitude station is 6.629 meters (21.75 feet) west of the fence on Taylor Street, 67.34 meters (220.93 feet) north of the south edge of the fence on Virginia Avenue, and 31.724 meters (104.08 feet) southeast of the northeast corner of the jail. The distances to other points of reference are: United States Land Office astronomical station, established by Messrs. Major, at the northeast corner of Wisconsin Street and Virginia Avenue, 62.17 meters (203.97 feet) (2″.02 of latitude) south and 302.08 meters (991.1 feet) (12″.47 of longitude, or 0ˢ.832 of time) west; southwest corner of the courthouse, 27.62 meters (90.6 feet) south and 43.03 meters (141.2 feet) west; spire of Colorado Street schoolhouse, 63.67 meters (208.9 feet) north and 169.134 meters (554.90 feet) east; northeast corner of the courthouse, 30.352 meters (99.58 feet) in azimuth 59° 15′. A stub for meridian stone was placed in the courthouse grounds 66.65 meters (218.67 feet) due south of the longitude station.

Gunnison latitude (Gunnison County, Colo., William Eimbeck, 1893).—Identical with *Gunnison longitude*, described above.

Gunnison azimuth (Gunnison County, Colo., William Eimbeck, 1893; 1894).—Identical with triangulation station of the same name at Gunnison, in the west side of the courthouse grounds, between Georgia and Virginia Avenues and Taylor and Iowa Streets, being distant 13.984 meters (45.88 feet) in azimuth 359° 48′ from *Gunnison longitude* station, described above. The station is marked by a brass screw in an 8-inch cedar stub, 1½ feet long, driven flush with the surface of the ground, and is 6.642 meters (21.79 feet) west of the fence on Taylor Street. The northeast corner of the courthouse is distant 26.175 meters (85.88 feet) in azimuth 86° 38′.

Hughes (U. S. E.) latitude (Adams County, Colo., F. Kampf, 1873).—About 135 feet from the Denver Pacific Railroad and about the same distance from the Boulder Valley Railroad. To the south of the station is the railway station, northward are two frame dwellings, and northeastward is the water tank. The station is marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

For notes in regard to marking of stations see p. 130.

Julesburg (U. S. E.) latitude (Sedgwick County, Colo., J. H. Clark, 1874).—Distant about 45 feet from the sidetrack of the Union Pacific Railroad and about 27 feet from the southwest corner of the railroad company's warehouse. The station is marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Labran (U. S. E.) latitude (Fremont County, Colo., F. Kampf, 1873).—Distant 157 feet from the southwest corner of the depot at Labran. The station is marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Loveland latitude (Larimer County, Colo., C. V. Hodgson, 1913).—At Loveland, 190.44 meters (624.8 feet) or 6″17 of latitude north and 47.2 meters (154.9 feet) east of triangulation station *Loveland tall white chimney*, the azimuth being 13° 55′ from the latitude station, which is not marked. A large, low, red-brick chimney, triangulation station *Loveland red-brick chimney*, is 185.32 meters (608.0 feet) or 6″01 of latitude south and 86.94 meters (285.2 feet) west of the station in azimuth 25° 08′. Both chimneys belong to the Loveland sugar factory.

Morrison latitude (Jefferson County, Colo., C. V. Hodgson, 1913).—Distant 3.71 meters (12.17 feet) in azimuth 322° 13′ (0″10 of latitude, south) from the triangulation station of the same name, about 3 miles northwest of the town of Morrison, on the highest point of Mount Morrison, 40 meters northwest of the upper landing of the cable railway. The triangulation station is marked as described in note 4; the copper bolt marking the eccentric station occupied by the United States Geological Survey is 3.130 meters (10.27 feet) distant in azimuth 311° 45′.

Mount Ouray latitude (Saguache County, Colo., William Eimbeck, 1894).—Distant 20.514 meters (67.30 feet) in azimuth 188° 23′ (0″66 of latitude, north) from *Mount Ouray azimuth*, described below. The latitude station is the center of a hollow brick pier filled with concrete.

Mount Ouray azimuth (Saguache County, Colo., William Eimbeck, 1894).—Identical with triangulation station of the same name on the summit of Mount Ouray, about 2½ miles northeast of Marshall Pass. The underground mark is as described in note 8c. The surface mark is a drill hole in a brick laid north and south, the hole being filled with charcoal and covered with plaster of Paris; the brick is embedded in concrete, which fills in between 3 brick piers 15 inches high, the whole being surrounded by a circular wall of loose stones, 4 feet high and 1½ feet thick at the top, having an inner diameter of 11 feet. Four reference marks, bricks set on end with a drill hole in the top filled with plaster of Paris, are just outside of the stone wall, at the following distances and azimuths from the station: 2.75 meters (9.0 feet), 5° 31′; 2.80 meters (9.2 feet), 96° 46′; 2.74 meters (9.0 feet), 186° 11′; 2.73 meters (9.0 feet), 275° 54′. A cairn of rubblestone, in the shape of a frustum of a cone, 2½ feet in diameter and 5 feet high, is distant about 6 miles in azimuth 357° 04′ 07″.

Overland azimuth (Lincoln County, Colo., O. H. Tittmann, 1881; 1922).—Identical with triangulation station of the same name about 12⅞ miles north 22° west (magnetic) from Aroya. It is on the north side of the old stage road, on one of the highest spurs near the south end of the ridge forming the divide between Big Sandy and Republican Creeks, about 1½ miles east of the ranch house of Thomas Backsdale. The station is marked as described in notes 1a and 7a, the name and date of the station being stamped on each disk. The reference mark is a standard bronze mark of the United States General Land Office, set in an iron post encased in concrete. This post marks the corner of Tps. 11 and 12 S., Rs. 51 and 52 W. It is 733.72 meters (2,407.2 feet) south 83° east from the station. A point due south from the station on the line between sections 36 and 1 is 85.3 meters (280 feet) from the station.

Pikes Peak latitude (El Paso County, Colo., William Eimbeck, 1895).—Distant 5.517 meters (18.10 feet) in azimuth 91° 18′ (0″004 of latitude north) from *Pikes Peak azimuth*, described below. The station is marked by a stone pier.

Pikes Peak azimuth (El Paso County, Colo., William Eimbeck, 1895; 1912).—Identical with the triangulation station of the same name on the summit of Pikes Peak, just north of the first northward bend in the burro trail leading west from the Summit Hotel and the terminus of the cogwheel railway. The nearest point of the precipice is distant about 25 meters in azimuth 155° from the station, and the northwest corner of the hotel is 160 meters distant in azimuth 273° 29′. The station is marked by a wire nail leaded in a drill hole in the concrete foundation of an old masonry pier, only a part of which remains; it is also marked by a nail in a 4 by 4 inch scantling at the top of the remnants of this pier, about 1 meter above the foundation. A United States Geological Survey triangulation station mark is on the southwest corner of the pier, distant 0.467 meter (1.53 feet) in azimuth 50° 46′ from the station. A United States Geological Survey bench mark tablet is in the top of a large bowlder, 13.594 meters (44.60 feet) from the station in azimuth 99° 52′; in the south face of the same bowlder is an aluminum tablet inscribed with the latitude and longitude, but it is badly defaced with bullet marks.

Tavaputs latitude (Garfield County, Colo., William Eimbeck, 1891).—Distant 19.22 meters (63.1 feet) in azimuth 171° 34′ 42″ (0″62 of latitude, north) from *Tavaputs azimuth station*, described below. The station is marked by a brick and stone pier.

Tavaputs azimuth (Garfield County, Colo., William Eimbeck, 1891).—Identical with triangulation station of the same name about 3 miles east of the Colorado-Utah boundary line, on the southern edge of the Book Mountains. The station is about 3 miles northwest and west of West Salt Wash and ¾ mile east of Bitter Creek, which has its source in a fresh-water spring 1¼ miles to the north of the station. The station is marked as described in note 8c, and also by a drill hole, 4 inches above the underground mark, in a brick

For notes in regard to marking of stations see p. 130.

embedded in a layer of concrete connecting the bases of 3 small brick piers, the whole being surrounded by a circular rock wall, 4 feet high, with an inner diameter of 11 feet. Three reference marks, holes drilled in rocks and filled with lead, are at the following distances and azimuths from the station: 2.43 meters (8.0 feet), 74° 41′; 2.4 meters (7.9 feet), 196° 31′; 2.43 meters (8.0 feet), 322° 12′.

Treasury Mountain latitude (Gunnison County, Colo., William Eimbeck, 1893).—Distant 31.13 meters (102.1 feet) in azimuth 327° 43′ (0″.85 of latitude, south) from *Treasury Mountain azimuth*, described below. The station is marked by a brick pier.

Treasury Mountain azimuth (Gunnison County, Colo., William Eimbeck, 1893).—Identical with triangulation station of the same name about 2 miles southeast of the mining town of Crystal, on the summit of Treasury Mountain, a prominent peak of the Elk Mountain Range. The station is marked as described in note 8c, and by a hole 6 inches above the underground mark drilled in a brick and filled with plaster of Paris, the brick being embedded in a layer of masonry built between the bases of 3 small brick piers, and the whole being surrounded by a circular rock wall, with an inner diameter of 10 feet. Four reference marks, drill holes in the surface rock, are at the following distances and azimuths from the station: 2.39 meters (7.8 feet), 81° 45′; 2.39 meters (7.8 feet), 177° 20′; 2.31 meters (7.6 feet), 267° 10′; 2.25 meters (7.4 feet), 351° 25′.

Trinidad longitude (Las Animas County, Colo., G. W. Dean, 1873).—At Trinidad, behind the United States Hotel and just north of the jail, on land belonging to the county. The center of the tower of the Methodist Church is 49.93 meters (163.8) or 1″.61 of latitude south and 6.06 meters (19.9 feet) or 0″.27 of longitude west from the station. The station is marked by a drill hole in the center of a white sandstone pier.

Trinidad latitude (Las Animas County, Colo., G. W. Dean, 1873).—Identical with *Trinidad longitude*, described above.

Trinidad (U. S. E.) latitude (Las Animas County, Colo., F. Kampf, 1873).—On a hill near the surveyed line of the railroad, at the northeast corner of the township in which Trinidad is located and about ⅔ mile from that village. The station is marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Uncompahgre latitude (Hinsdale County, Colo., William Eimbeck, 1895).—Distant 15.275 meters (50.11 feet) in azimuth 305° 54′ 42″ (0″.29 of latitude south) from *Uncompahgre azimuth*, described below. The station is marked by a brick pier on a concrete foundation.

Uncompahgre azimuth (Hinsdale County, Colo., William Eimbeck, 1895).—Identical with the triangulation station of the same name about 8 miles west of Lake City, on the summit of Uncompahgre Peak. The station is about 10 feet from the perpendicular cliff on the north side, and is marked as described in note 8c, and also by a drill hole, 4 inches above the underground mark, in a brick embedded in a layer of concrete which connects the bases of 3 small brick piers, the whole being surrounded by a circular rock wall, with an inner diameter of 11 feet. Four reference marks, holes drilled in the surface rock and filled with lead, are at the following distances and azimuths from the station: 2.48 meters (8.1 feet), 3° 36′; 2.85 meters (9.4 feet), 89° 58′; 2.65 meters (8.7 feet), 179° 49′; 2.86 meters (9.4 feet), 269° 56′.

Watkins longitude (Adams County, Colo., C. V. Hodgson, 1912).—In the northwest corner of the field just east of E. D. Trout's hotel, and 48.64 meters (159.6 feet) south and 4.60 meters (15.1 feet) or 0″.19 of longitude east of *Watkins astronomic azimuth* described below.

Watkins astronomic azimuth (Adams County, Colo., C. V. Hodgson, 1912).—Identical with triangulation station *Watkins astronomic*, at Watkins, on the Union Pacific Railroad right of way, 35.2 meters (115.5 feet) south of the main-line track, and on the north side of the Watkins-Denver wagon road. The station is marked as described in notes 1b and 7b. A reference mark, consisting of a nail set in the concrete encased in a 5-inch iron pipe, is on the south side of the wagon road running southeast from Watkins, nearly on a line with the north-and-south section fence, and is 289.603 meters (950.14 feet) from the station in azimuth 308° 51′. Other distances and azimuths are: A United States Geological Survey iron-pipe bench mark, which is also United States Coast and Geodetic Survey bench mark G 2, is 266.017 meters (872.76 feet), 244° 16′; southeast corner of the depot, 27.85 meters (91.4 feet), 142° 54′; railroad water tank, about 175 meters (574 feet), 103° 09′.

CONNECTICUT

Camp Columbia (C. U.) longitude (Litchfield County, Conn., William Bowie, 1912).—Identical with triangulation station of the same name, which is on the top of the steep slope east of the south end of Lake Bantam, in the east end of the observatory at Camp Columbia, a summer camp under Columbia University. The transit was mounted upon a concrete pier, about 2 feet square, resting on bedrock.

Camp Columbia (C. U.) latitude (Litchfield County, Conn., William Bowie, 1912).—Identical with *Camp Columbia longitude* station. (See above.)

Sandford latitude (New Haven County, Conn., Edwin Goodfellow, 1862).—It is 12.091 meters (39.67 feet) (0″.39 of latitude) north and 12.610 meters (41.37 feet) west of *Sandford azimuth* station. (See below.)

Sandford azimuth (New Haven County, Conn., G. W. Dean, 1862).—Identical with triangulation station *Sandford*, which is on the highest and most western summit of Sandford Mountain, near the northwest corner of Hamden Township, 35 feet northeast of a pile of stones marking the boundary between Hamden and Bethany Townships. The surface mark is a nail in a cedar stub, placed with its top flush with the ground; the

For notes in regard to marking of stations see p. 130.

underground mark, 1½ feet below the surface of the ground, is a copper bolt in a drill hole at the intersection of cross lines on the top of a granite post, 2½ feet long and 1 foot square, marked "U. S. C. S." Four granite posts similarly marked, each 2½ feet long and 6 inches square, were placed flush with the ground at points about 6 feet to the north, east, south, and west of the station.

DELAWARE

Cape Henlopen latitude (Sussex County, Del., O. B. French, 1897).—It is 1.219 meters (4.00 feet) due north of *Cape Henlopen L. H. azimuth* station. (See below.) Triangulation station *Cape Henlopen Lighthouse*, the center of the lantern of the old lighthouse, is 4.05 meters (13.3 feet) east and 17.25 meters (56.6 feet) (0″.56 of latitude) south of the latitude station. The station was marked by a solid brick pier, about 2 by 3 feet at its base and 4 feet long, showing about 3 feet above the surface of the sand.

Cape Henlopen L. H. azimuth (Sussex County, Del., O. B. French, 1897).—It is about 15 meters north of triangulation station *Cape Henlopen Lighthouse*, and is slightly west of the line from Cape Henlopen Lighthouse to Brandywine Shoal Lighthouse. The station was marked by a solid brick pier on the summit of a sand ridge, extending 2 feet below the surface of the sand and 4 feet above. The azimuth has been reduced to triangulation station Cape Henlopen Lighthouse above. (See p. 74 of this publication.)

Dover longitude (Kent County, Del., C. H. Sinclair, 1897).—At Dover, in the adjoining vacant lot east of the county courthouse, on the south side of the park in the central part of the city. The station is 14.63 meters (48.0 feet) from the southeast corner of the courthouse, being 0.94 meter (3.08 feet) south of the eastward prolongation of the south side, and 7.02 meters (23.03 feet) from the northeast corner of the brick closets, being 0.33 meter (1.08 feet) east of the northward prolongation of the east side of the closets. It is marked by a drill hole in a stone, 16 by 25 inches and 6 inches thick, marked "U. S. C. & G. S. Long. Sta. 1897," and placed so as to be read from west to east, the stone resting on a solid brick pier extending 3 feet above the ground and 4 feet underground. Triangulation station *Dover courthouse cupola* is 15.90 meters (52.2 feet) (0″.52 of latitude) north and 30.87 meters (101.3 feet) (1″.29 of longitude) west, the azimuth being 117° 15′ 14″ from the longitude station.

Dover latitude (Kent County, Del., C. H. Sinclair, 1897).—It is 1.295 meters (4.25 feet) due west of *Dover longitude* station. (See above.)

DISTRICT OF COLUMBIA

Causten latitude (District of Columbia, G. W. Dean, 1851).—On the west side of the Georgetown-Rockville road, 10.36 meters (34.0 feet) or 0″.34 of latitude south and 53.13 meters (174.3 feet) west of *Causten azimuth*, described below. The station is marked by the intersection of the diagonals on the top of a granite post, 2 feet long and 4 inches square, set flush with the surface of the ground.

Causten azimuth (District of Columbia, G. W. Dean, 1851).—Identical with the triangulation station of the same name, on the summit of Causten's Hill, also known as Georgetown Heights, about 1½ miles north of Georgetown, on the east side of the Georgetown-Rockville road (Wisconsin Avenue). The station is marked by a drill hole in the center of the top of a 5-inch stone post, sunk 2 feet into the ground. Three similar stones, with diagonal grooves running north-south and east-west, are placed 5 feet from the station, respectively, north, east, and south. The center of the dome of the United States Capitol is in azimuth 306° 15′ 23″.

Washington, Four-and-one-half Street latitude (District of Columbia, Chas. A. Schott, 1852).—In the yard of a house on the east side of Four-and-a-half Street NW., 62.5 meters (205 feet) north and 26.2 meters (86 feet) east of the northeast corner of Pennsylvania Avenue and Four-and-a-half Street. The station is 335.4 meters (1,100 feet) or 10″.88 of latitude north and 693.9 meters (2,277 feet) west of the center of the *United States Capitol dome*.

Washington, Georgetown College Observatory latitude (District of Columbia, Georgetown College, 1846).—On a hill about ½ mile north of the Potomac River and about 1,200 feet N. 70 W. of Georgetown University. The station is in the east room of the observatory, 6.86 meters (22.5 feet) due east of the center of *Georgetown College Observatory dome*. The center of the dome is 1,471.9 meters (4,829 feet) or 47″.73 of latitude north and 2,240.9 meters (7,352 feet) west of the center of the dome of the *Old Naval Observatory*.

Washington, Seaton longitude (District of Columbia, Sears C. Walker, 1849; 1869).—Identical with the triangulation station of the same name, 6.43 meters (21.1 feet) east of the west side of Fifth Street NE., 37.49 meters (123.0 feet) north of the north side of A Street, and 54.74 meters (179.6 feet) south of the south side of B Street. The station was marked by a brick pier about 6 by 4 by 2 feet, with its top about 1½ feet below the surface of the ground. In 1869 street improvements destroyed the station marks, but a portion of the brick foundation was left beneath the sidewalk and curb. The curb bears an east and west cut on its upper surface at very nearly the location of the station.

Washington, Seaton latitude (District of Columbia, L. F. Pourtales, 1850).—Identical with *Seaton longitude*, described above.

Washington, Seaton azimuth (District of Columbia, C. O. Boutelle, 1868, 1869).—Identical with *Seaton longitude*, described above.

Washington, United States Coast and Geodetic Survey office longitude (District of Columbia, C. H. Sinclair, 1896, 1915; C. H. Swick, 1915, 1922).—The station of 1896, now lost, was 27.75 meters (91.0 feet)

For notes in regard to marking of stations see p. 130.

or 1″15 of longitude west of the flagstaff of the main building of the Coast and Geodetic Survey. In 1915 a new pier was built in the parkway 14.92 meters (49.0 feet) east of the center line of South Capitol Street This pier is a few meters south of the south wall of the main rear wing of the Coast and Geodetic Survey office, 26.04 meters (85.4 feet) north and 18.76 meters (61.5 feet) or 0″78 of longitude (0ˢ.052) west of the old pier. The northwest corner of Congress Hall Hotel is 51.93 meters (170.4 feet) south and 4.81 meters (15.8 feet) east of the new pier. The flagpole on the office of the United States Coast and Geodetic Survey is 15.43 meters (50.6 feet) or 0″50 of latitude north and 46.51 meters (152.6 feet) or 1″93 of longitude east of the station.

Washington, United States Coast and Geodetic Survey office latitude (District of Columbia, E. G. Fischer, 1891, 1915).—Distant 41.47 meters (136.1) feet or 1″34 of latitude south and 29.89 meters (98.1 feet) west of the *United States Coast and Geodetic Survey office flagpole.* The station is now lost.

Washington, United States Naval Observatory (old site) longitude (District of Columbia, S. C. Walker, 1846, 1869; B. F. Sands, 1869, 1878; J. R. Eastman, 1871; E. Smith, 1878, 1896).—On ground about 100 feet above the Potomac River, at the intersection of D Street and Twenty-fourth Street NW. Observations were made prior to May, 1869, at a point 0ˢ.033 west of the center of the small equatorial dome of the observatory. From July, 1869, until the latter part of 1878, except in 1871, observations were made at a point 23.71 meters (77.8 feet) or 0″98 of longitude (0ˢ.066) west of the center of the dome. In 1871, in the exchange of signals with Detroit, observations were made at a point 13.02 meters (42.7 feet) or 0″54 of longitude (0ˢ.036) east of the center of the dome. In the latter part of 1878 a brick pier, 12 by 31 inches at the top, extending 3 feet above and 2½ feet below the ground, was built 14.63 meters (48.0 feet) south and 44.71 meters (146.7 feet) or 1″86 of longitude (0ˢ.124) west of the center of the dome. The distances from the center of this pier to the northwest and southwest corners of the naval observatory building were 26.5 meters (87 feet) and 18.0 meters (59 feet), respectively. This pier was torn down and rebuilt on the same base in 1883; in 1890, 2 sandstone slabs, 3 by 10 by 20 inches, were cemented on its top. The station was abandoned in 1896.

Washington, United States Naval Observatory (old site) latitude (District of Columbia, S. Newcomb, 1861, 1864; J. R. Eastman, 1866, 1888; A. Hall, 1883, 1893).—The station of 1861–1864 was in the same latitude as the center of the central dome; that of 1866–1888 was at another point, also in the same latitude. The station of 1883–1893 was at a point 14 meters (46 feet) or 0″45 of latitude south of the center of the transit circle.

Washington, United States Naval Observatory (new site) longitude (District of Columbia, C. H. Sinclair, 1897, 1914; O. B. French, 1913, 1914).—The new site of the Naval Observatory is a little southeast of the intersection of Wisconsin Avenue and Massachusetts Avenue NW. A pier of a single block of granite, 54 by 50 by 12 inches, set in concrete, was erected 157.93 meters (518.1 feet) or 5″12 of latitude south and 25.0 meters (82 feet) or 1″04 of longitude (0ˢ.069) east of the center of the clock room of the observatory. In 1914 the east instrument pier of the French and American observers of 1913 was used. This station was 12.20 meters (40.0 feet) north and 4.53 meters (14.9 feet) or 0″19 of longitude (0ˢ.013) west of the 1897 station. The pier was of concrete, 28 by 45 inches, extending about 3 feet above the ground and on a common foundation with the collimator piers to the north and south. The center of the clock room is 1″69 of latitude north and 3″48 of longitude west of triangulation station *United States Naval Observatory* (*new site*) center of small dome on main building.

Washington, United States Naval Observatory (new site) latitude (District of Columbia, William Harkness and G. A. Hill, 1893, 1896; O. B. French, 1897).—Prior to 1897 two piers were used, the meridian pier being 123.96 meters (406.7 feet) or 4″02 of latitude south of the prime vertical pier and the latter being 0″52 of latitude north of the center of the clock room. In 1897, the longitude pier of that date, described above, was used, a marble slab 1 inch thick being cemented on its top. The observations at each station were reduced to the United States Naval Observatory, center of clock room and a weighted mean taken.

FLORIDA

Apalachicola longitude (Franklin County, Fla., G. W. Dean, 1860).—Marked by a stone pillar with its top 2 feet below the surface of the ground and 3.606 meters (11.83 feet) south and 25.24 meters (82.8 feet), or 0″94 of longitude west of *Apalachicola azimuth*, now lost.

Apalachicola latitude (Franklin County, Fla., Edwin Goodfellow, 1860).—Distant 3.606 meters (11.83 feet) or 0″12 of latitude, south and 22.95 meters (75.3 feet) west of *Apalachicola azimuth*, now lost.

Apalachicola azimuth (Franklin County, Fla., G. W. Dean, 1860).—Identical with triangulation station *Apalachicola*, now lost.

Baldwin azimuth (Duval County, Fla., H. G. Ogden and A. L. Baldwin, 1897).—Identical with the triangulation station of the same name on the railway company's reservation at Baldwin Junction, near the southeast corner of the reclaimed land on which the office building stands. The station is 10.12 meters (33.2 feet) west of the east rail of the north and south line and 63 meters (207 feet) south of the south rail of the east and west line, and is marked by an 8-inch terra-cotta pipe, set in the ground and projecting a few inches; this pipe is filled with cement mortar in which is embedded a ¼-inch iron rod to mark the station.

Barkley Point 2 latitude (Escambia County, Fla., Edwin Goodfellow, 1861).—Distant 2.4 meters (8 feet), or 0″08 of latitude north and 6.77 meters (22.2 feet) west of *Barkley Point 2 azimuth*, now lost.

Barkley Point 2 azimuth (Escambia County, Fla., G. W. Dean, 1860).—Identical with triangulation station *Barkley Point 2*, now lost.

For notes in regard to marking of stations see p. 130.

Belleview longitude (Marion County, Fla., O. B. French, 1907, 1910).—The station is 0.814 meter (2.67 feet) north of triangulation station *Belleview*, which is about 2 miles south of the town of Clearwater near the center of a circle of palm trees, 100 paces south-southwest of the southwest corner of Belleview Hotel. The longitude station is marked by the foundation of a concrete pier which is just below the surface of the ground The triangulation station is marked by a nail in the top of a 4-inch tile which is filled and surrounded by concrete and underground by a nail in the cement stopper of a bottle. The top of the surface mark is slightly below the surface of the ground. The reference mark is a nail in the top of a 4-inch tile which is filled and surrounded with concrete. It is in the line from the triangulation station to the eastern one of the gables on the south side of the hotel and is 43.36 meters (142.2 feet) from the triangulation station in azimuth 252°. It is in a small plot of ground which separates two parts of the roadway along the west side of the hotel, about 60 paces south of the walk along the south side of the hotel, and 8 paces west of the line of the west gable of the hotel.

Bluff azimuth (Duval County, Fla., H. G. Ogden, 1876, 1909).—Identical with the triangulation station of the same name, on the right bank of St. Johns River, on the bluff opposite Commodore Point, 8 meters (26 feet) from the edge of the bluff on the north. The underground mark is a bottle 4 feet below the surface of the ground. Above this is a piece of sandstone 5 by 12 inches and 20 inches long set in cement, and having in its top a drill hole in which is a nail set in cement to mark the center. The reference mark is a 4-inch terra-cotta pipe 2 feet long placed near the line fence between the Halliday and Eustis properties, and 18.32 meters (60.1 feet) from the station in azimuth 1° 58′. Other distances and azimuths are as follows: Four live oak trees each marked with a triangle, 4.3 meters (14 feet), 207° 56′; 19.3 meters (63 feet), 290° 26′; 25.2 meters (83 feet), 6° 20′; 15.3 meters (50 feet), 36° 17′; cedar tree marked with triangle, 13.9 meters (46 feet) 359° 34′.

Boulogne azimuth (Nassau County, Fla., E. H. Pagenhart, 1917).—Identical with the traverse station of the same name at Boulogne on the Atlantic Coast Line Railroad right of way, on the curve at the depot at the intersection of the prolongation of the northward tangent of the east rail of the east main track and the southward tangent of the west rail of the west main track. The station is 12.65 meters (41.5 feet) east of the west fence line, 15.75 meters (51.7 feet) west of the west rail of the main track, and about 4 meters above the level of the track, and is marked according to notes 1a and 7c. The reference mark, a mound of concrete with a ½-inch iron pin for center, is 0.6 meter (2 feet) east of the west fence line and is 13.04 meters (42.8 feet) from the station in azimuth 80° 43′.

Bridgeport azimuth (Putnam County, Fla., Eugene Ellicott, 1885, 1909).—Identical with the triangulation station of the same name in the town of Bridgeport on the west bank of St. Johns River. The history of the station mark of 1909 is not known. It does not agree with the old mark of 1885, but is in the position of the station as determined from two witness trees. The station is now marked by a 3-inch iron pipe driven into the ground till but 10 inches of it projects above the surface of the ground. This is surrounded by a concrete block 15 inches square and 2 feet deep, its upper side being heaped up around the pipe for about 4 inches. The pipe is probably about 7 feet in the ground. The reference mark is a bottle set in cement 3 feet below the surface. Over the bottle is a 4-inch terra-cotta pipe 2 feet long set in cement, above which it projects about 3 inches. It is back on the bluff and is 29.55 meters (96.9 feet) from the station in azimuth 67° 59′ 12″. An oak blazed with a triangle is 6.1 meters (20 feet) from the station in azimuth 37°, and another oak much larger and blazed with a triangle is 14.8 meters (49 feet) from the station in azimuth 94°. Four large oaks were blazed with triangles on the sides facing the reference mark. They are at the following distances from the reference mark: (*a*) 8.12 meters (26.6 feet), (*b*) 14.0 meters (46 feet), (*c*) 5.56 meters (18.2 feet), (*d*) 13.15 meters (43.1 feet). The distances between the various trees are: (*a*) to (*b*), 19.20 meters (63.0 feet); (*b*) to (*c*) 11.60 meters (38.1 feet); (*c*) to (*d*), 15.20 meters (49.9 feet); (*d*) to (*a*), 15.60 meters (51.2 feet).

Bronson azimuth (Levy County, Fla., H. G. Ogden, 1898).—Identical with the triangulation station of the same name, 303 meters (994 feet) northeast of the northeast end of the railroad station at Bronson, 16.5 meters (54 feet) north of the south rail of the Seaboard Air Line Railroad at a point opposite a curve in the track and in the prolongation of the south rail of the tangent from *Turn*. The station is 13.8 meters (45 feet) from the southeast corner of J. F. Jackson's lot and 16.8 meters (55 feet) from the southwest corner of Mrs. L. U Coulter's lot, which is across the street, and 8.1 meters (27 feet) east of the first-mentioned lot. The station is marked by a ¼-inch iron rod at the center of a 6-inch tile which is filled and surrounded by concrete, and underground by an inverted bottle.

Cape Florida latitude (Dade County, Fla., J. E. Hilgard, 1849).—Identical with *Cape Florida azimuth*, described below.

Cape Florida azimuth (Dade County, Fla., J. E. Hilgard, 1849).—This station is identical with triangulation station *Cape Florida* or *Key Biscayne south base*. It was marked by a drill hole filled with lead in a stone monument. Reported lost in 1908.

Cape Romano azimuth (Lee County, Fla., E. D. Preston, 1886; 1887).—Identical with triangulation station of the same name, on Cape Romano 20 feet back of high-water line and 315 meters north of the most southern point of the cape. The station is marked by a hole in the top of a marble post. A tile is buried 16.04 meters (52.6 feet) due north of the station and another 15.50 meters (50.9 feet) east by north. A large buttonwood tree marked with a blazed cross is at the edge of the woods and about 125 meters north-northeast from the station and a large red mangrove tree similarly marked is at the edge of the woods about 160 meters east by north.

For notes in regard to marking of stations see p. 130.

Cape Sable latitude (Monroe County, Fla., E. D. Preston, 1886; 1909).—Identical with triangulation station *Cape Sable latitude station*, in a large grove of coconut trees about 70 meters from the sand beach. The concrete tombstone of Guy M. Bradley is 300 meters (984 feet) east and 80 meters (262 feet south) of the station and a coconut tree marked with a triangular blaze is 41 meters (135 feet) from the station. The north gable of the nearest of several deserted houses is 38 meters (125 feet) S. 71° E. from the station and an old deep ditch is about 20 feet distant. The station is marked by a brick pier 18 by 24 inches in cross section, which in 1909 was found leaning to the north.

Cape Sable azimuth (Monroe County, Fla., E. D. Preston, 1886; 1909).—Identical with *Cape Sable latitude*, described above.

Cedar Keys longitude (Levy County, Fla., Edwin Smith, 1874).—The station was just west of the railroad and between the express office and Gulf House, 70.8 meters (232 feet) or 2″30 of latitude north and 132.9 meters (436 feet) or 4″92 of longitude west of *Way Key north base*, which is now reported lost. Cedar Keys was a transit of Venus station.

Clearwater Harbor latitude (Hillsboro County, Fla., Edwin Smith, 1873).—Distant 0.52 meter (1.7 feet) or 0″02 of latitude north and 6.46 meters (21.2 feet) west of *Clearwater Harbor azimuth*, now lost.

Clearwater Harbor azimuth (Hillsboro County, Fla., Edwin Smith, 1873).—Identical with *Clearwater Harbor astronomical station*, now lost.

Davis Point 2 latitude (Calhoun County, Fla., A. T. Mosman, 1871).—Distant 0.79 meter (2.6 feet) or 0″03 of latitude north and 2.44 meters (8 feet) east of *Davis Point 2 azimuth*, now lost.

Davis Point 2 azimuth (Calhoun County, Fla., A. T. Mosman, 1871).—Identical with triangulation station *Davis Point 2*, now lost.

Daytona longitude (Volusia County, Fla., O. B. French, William Bowie, J. S. Hill, and Edwin Smith, 1907).—On the north end of The Marsh Island, in the Halifax River opposite the town of Daytona. The station is 2.70 meters (8.9 feet) north and 8.95 meters (29.4 feet) or 0″33 of longitude east of triangulation station *Daytona*. The longitude station is marked by a concrete pier bearing the inscription "U. S. C. G. S. 07," and the center of the space between the letters C. G. S. marks the station. The triangulation station is marked by a terra-cotta pipe set in concrete.

Depot Key latitude (Levy County, Fla., J. E. Hilgard, 1852).—About 5 feet east of Depot Key azimuth of 1852, described below.

Depot Key azimuth (Levy County, Fla., J. E. Hilgard, 1852; A. T. Mosman, 1874).—About the center of Depot Key near the tall pine on the middle of the hill about ¼ mile east of the settlement. The 1852 station is marked by a nail in the top of a large Bermuda stone and the west corner of a house is 15.9 meters (52 feet) distant; a small cabbage tree blazed and marked with copper nails is 16.2 meters (53 feet) in a northerly direction from the station. Four poles marked with copper nails are near the station. The station of 1874 is 9.5 meters (31.2 feet) north, and 14.9 meters (48.9 feet) west of the 1852 station. Both azimuth stations are geodetic points.

Eagle Point azimuth (Calhoun County, Fla., A. T. Mosman, 1871).—Identical with the triangulation station of the same name, now lost.

Esperanza latitude (Volusia County, Fla., Edwin Smith, 1873).—Distant 0.3 meter (1 foot), or 0″01 of latitude north, 6.58 meters (21.6 feet) west of the azimuth station of the same name described below.

Esperanza azimuth (Volusia County, Fla., Edwin Smith, 1873; 1906).—Identical with the triangulation station of the same name, on a sand ridge about 6 meters wide, between the marsh and the west bank of the Halifax River, and about ½ mile south of the house of J. S. Bryan. The station was marked by two 4-inch terra-cotta sewer pipes, placed one above the other in contact, with a mass of concrete or cement mortar around their junction and around the bottom of the lower pipe, and both pipes filled with cement. The following distances and directions are from the station: Lone palmetto to the south, 0° 00′; palmetto marked with triangles, 13.15 meters (43.1 feet), 15° 03′; tall pine, ½ mile, 86° 25′; palmetto marked with triangle, 19.61 meters (64.3 feet), 171° 56′; lone palmetto, 191° 12′; end of Bryan's wharf, 188° 03′; center pile, end of Baker's wharf 328° 52′.

Fernandina longitude (Nassau County, Fla., William Bowie, J. S. Hill, 1907; 1917).—On the south side of Center Street, between Fourth and Fifth Streets, on the west side of the courthouse and in the courthouse grounds. It is about 15 meters south of the Center Street curb and about 9 meters west of the west side of the courthouse. The station is marked by a concrete pier, 19 by 34 inches, 2 feet in the ground and 3 feet above. The upper surface of the pier is lettered "U. S. C. G. S. '07." The center of the pier is 11.90 meters (39.0 feet) from the northwest corner of the courthouse, 4 feet above the ground, and 23.29 meters (76.4 feet) from the southwest corner of the courthouse, 4 feet above the ground. It is 4.29 meters (14.1 feet) south and 17.50 meters (57.4 feet), or 0″66 of longitude west of *Fernandina courthouse spire*.

Fernandina latitude (Nassau County, Fla., Edwin Goodfellow, 1856; 1905).—Identical with triangulation station *Fernandina Astronomical station*, which is in the town of Fernandina and 544.04 meters (1,784.9 feet) south of triangulation station *Fernandina*. A meridian line about ¼ mile long was established and its ends marked by marble pillars, 5 inches square and 34 inches long, their tops even with the surface of the ground. The letters "U. S. C. S." and a cross were cut in the top of each block. In 1897 the north meridian stone was

For notes in regard to marking of stations see p. 130.

recovered, being 24.6 meters (80.7 feet) south of the corner of Calhoun and Second Streets and 6 meters (20 feet) back from the west building line of Second Street. In 1905 it was under a small two-story frame house, No. 227 Second Street. The south meridian stone was 33.23 meters (109.0 feet) north of the station.

Fog Island azimuth (La Fayette County, Fla., F. W. Perkins, 1874).—Identical with the triangulation station of the same name, near the western end of Fog Island, a small island near the entrance to a small creek about 6 miles north of Pine Point. The station is marked by a cedar block, 14 inches square and 6 feet long, projecting 39 inches above the ground. The lower end of the cedar block is in a hole in the solid rock, which has a spike driven into its center for the underground mark.

Fort St. Marks latitude (Wakulla County, Fla., J. E. Hilgard, 1852).—Reported lost.

Gainesville longitude (Alachua County, Fla., C. H. Sinclair, 1890; 1897).—On the eastern side of the Western Union telegraph office in the inclosure formed by the Porter Block, a cross fence, and Mechanic Street. It is 4.8 meters (15.8 feet) from the rear wall of the Porter Block at a point 21.18 meters (69.5 feet) from its north end and 26 meters (85 feet) from its south end; it is 9.63 meters (31.6 feet) from an outhouse and 20.67 meters (67.8 feet) from the northwest corner of J. D. Matheson's brick store. The cupola of the courthouse is 103.82 meters (340.6 feet) or 3″37 of latitude south and 77.95 meters (255.7 feet) or 2″90 of longitude west of the station, which is marked by a brick pier 25 by 16½ inches, 2½ feet in the ground and 3 feet above.

Gainesville latitude (Alachua County, Fla., C. H. Sinclair, 1890; 1907).—Identical with *Gainesville longitude*, described above.

Garden Key latitude (Monroe County, Fla., J. G. Oltmans, 1854).—At Garden Key, Dry Tortugas distant 20 meters (66 feet) due east of the center of the lighthouse.

Harts Point azimuth (Putnam County, Fla., Eugene Ellicott and J. E. McGrath, 1885; 1909).—Identical with triangulation station *Hart*, on the right bank of St. Johns River, opposite the town of Palatka. The station is 3.6 meters (12 feet) from the water's edge and 14.3 meters (47 feet) north-northwest of the marine railway over the high-water mark. An oak stump stands 21.26 meters (69.8 feet) from the station bearing N. by W. ½ W. The station was marked in 1909 by a bottle set in cement 2½ feet below the surface of the ground, over which has been placed a 4-inch terra-cotta pipe, set in cement and projecting 1 inch above it. The reference mark was set back of the station among some palmettos, and consists of the upper part of a small fruit jar set in cement, above which was placed a cement post 8 inches square, having diagonal lines on its top. It is 29.60 meters (97.1 feet) from the station in azimuth 201° 10′ 44″. Two oak trees marked with triangles are at the following distances and azimuths from the station: 25.88 meters (84.9 feet), 192° 35′; and 7.39 meters (24.2 feet), 8°. The azimuth of beacon 70 from the station is 58° 53′.1.

Hurricane Island latitude (Calhoun County, Fla., J. G. Oltmans, 1855).—Not described. Identical with *Hurricane Island azimuth* station.

Hurricane Island azimuth (Calhoun County, Fla., J. G. Oltmans, 1855).—Not described.

Jupiter Inlet longitude (Palm Beach County, Fla., William Bowie and J. S. Hill, 1907).—Distant 24.85 meters (81.5 feet) south and 39.35 meters (129.1 feet), or 1″43 of longitude east of Jupiter Inlet Lighthouse and 19.88 meters (65.2 feet) from the southwest corner of the kitchen of the keeper's residence and 24.16 meters (79.3 feet) from the northeast corner of the fence surrounding the assistant keeper's residence. The station is marked by a concrete pier 19 by 34 inches and 5 feet high, being 3 feet above and 2 feet below the surface of the ground.

Jupiter Inlet latitude (Palm Beach County, Fla., W. H. Burger, 1906).—Distant 46.83 meters (153.6 feet) or 0″84 of latitude south, in azimuth 303° 26′ from Jupiter Inlet Lighthouse. The station is very near the longitude station described above, the longitude pier being placed in the same hole the latitude station formerly occupied.

Key West longitude (Monroe County, Fla., Edwin Smith, 1873; C. H. Sinclair and G. R. Putnam, 1896; J. S. Hill, 1907).—The original station (1873–74) was marked by a brick pier, 143.71 meters (471.5 feet) south and 89.93 meters (295.0 feet) or 3″20 of longitude east of *Tift's observatory* and 7.3 meters (24 feet) north and 1.8 meters (6 feet) west of the center of the naval monument in front of the naval depot on Clinton Street. In 1896 the old pier could not be reoccupied and a new station was established, marked by a brick pier, 17 by 26 inches, set 2 feet in the ground and 3 feet above. The 1896 pier was 48.89 meters (160.4 feet) south and 52.49 meters (172.2 feet) (0ˢ.125 or 1″87) west of the pier of 1872, being 1″33 of longitude east of *Tift's observatory*. In 1907 the pier used in 1896 could not be recovered, but the point it had occupied was reestablished from reference marks and a new brick pier was built, 34 by 20½ inches 2½ feet below and 3 feet above the ground. In the center of the pier is embedded a copper bolt, its top flush with the cement, and in its center a punch hole which marks the station. This pier is 1.35 meters (4.4 feet) south and 0.97 meter (3.2 feet) (0ˢ.002 or 0″03) east of the station of 1896. It is southwest of the post-office and customhouse building, being 15.10 meters (49.5 feet) from the southwest corner and 27.48 meters (90.2 feet) from the southeast corner and 5 feet north of the Green Street fence. It is also 29.54 meters (96.9 feet) from a cross cut in the cement walk which forms the breakwater extending north from Green Street. The cross is in the extreme southeast corner of the concrete, about 6 inches from both the east and south edges of the walk.

Key West latitude (Monroe County, Fla., C. H. Sinclair, 1896).—Distant 1.28 meters (4.2 feet) due west of the longitude station of 1896, described above. The station is now lost.

For notes in regard to marking of stations see p. 130.

Lancaster 2 (U. S. E.) longitude (Duval County, Fla., W. B. Fairfield, 1917).—The longitude pier is 5.75 meters (18.9 feet) or 0".19 of latitude north and 2.06 meters (6.8 feet) or 0".08 of longitude east of the azimuth station described below.

Lancaster 2 (U. S. E.) latitude (Duval County, Fla., W. B. Fairfield, 1917).—Identical with the *Lancaster 2 U. S. E. longitude*, described above.

Lancaster 2 (U. S. E.) azimuth (Duval County, Fla., E. H. Pagenhart, 1917).—Identical with the triangulation station of the same name in Jacksonville in the south part of the city, on Lancaster Terrace, on land belonging to Mr. Merrill. The station is on the extreme point, less than 1 meter from the inner edge of the sea wall, and is marked underground by a terra-cotta chimney pot set in cement 2½ feet below the surface of the ground. The surface mark is a terra-cotta pipe, 2 feet long, set in cement with its top flush with the surface of the ground. In this is centered a 2-inch galvanized iron pipe 3 feet long and projecting above the surface. Three witness marks were made in the sea wall as follows: A hole surrounded with a triangle, 1.03 meters (3.4 feet) to the east; a hole with an arrow 10 meters (33 feet) to the north; a hole with an arrow 9.99 meters (32.8 feet) to the south.

Lauderdale azimuth (Dade County, Fla., J. B. Weir, 1883).—Lost.

Miami longitude (Dade County, Fla., William Bowie and J. S. Hill, 1907).—Identical with the triangulation station of the same name, in the northeast corner of the courthouse grounds at Miami, about 8.7 meters (28.5 feet) from the street curbing on the north, and about 6 meters (20 feet) east of the center of the walk leading to the courthouse from the north. The station is marked by a cross cut on the upper face and near the center of a concrete block, 19 by 32 inches, extending 3 feet above and 1½ feet below the ground and resting on solid rock. The letters "U. S. C. & G. S. Long. Sta. Feb. 1907" were cut on the west face of the pier. The east reference mark is a ½-inch copper bolt, set in cement horizontally and not projecting, in the north face of the courthouse. It is 0.3 meter (1 foot) from the northeast corner of the building, 0.6 meter (2 feet) above the ground, 6.78 meters (22.2 feet) east from the east edge of the stone doorsill of the north entrance, and is 22.79 meters (74.8 feet) from the station. The west reference mark is similar to the east reference mark and is 0.3 meter (1 foot) from the northwest corner of the courthouse, 0.6 meter (2 feet) above the ground, 6.73 meters (22.1 feet) west from the west edge of the stone doorsill, and is 26.54 meters (87.1 feet) from the longitude station.

Pensacola longitude (Escambia County, Fla., G. W. Dean, 1860; 1861).—Distant 8.35 meters (27.4 feet) west of *Barkley Point 2 azimuth*, now lost.

Pensacola latitude (Escambia County, Fla., J. G. Oltmans, 1858).—Distant 0.45 meter (1.5 feet) 0".01 of latitude north and 7.236 meters (23.74 feet) east of *Pensacola public square flagstaff*.

Punta Rasa longitude (Lee County, Fla., Edwin Smith, 1874; 1909).—Identical with the triangulation station *Punta Rasa astronomic*, which is the center of the brick pier in the corner of the cowpen belonging to George R. Shultz, east of the Punta Rasa Hotel.

Punta Rasa latitude (Lee County, Fla., A. T. Mosman, 1866).—The latitude station was 5.49 meters (18.0 feet) or 0".18 of latitude south and 11.83 meters (38.8 feet) east of *Punta Rasa azimuth*. Both latitude and azimuth stations are now lost.

Punta Rasa azimuth (Lee County, Fla., A. T. Mosman, 1866).—Identical with triangulation station *Punta Rasa*. Now lost.

St. Augustine longitude (St. John County, Fla., E. D. Preston, 1882).—In the middle of the north wall of Fort Marion. The station is near the center of the chapel. *Fort Marion northeast tower* is 44.2 meters (145 feet) or 1".46 east distant (approximate) in azimuth 242° 58′.

St. Augustine latitude (St. John County, Fla., W. H. Berger, 1906).—On the wireless telegraph reservation of the United States Navy on Anastasia Island near St. Augustine, and 201.3 meters (660 feet) or 6".28 of latitude north from St. Augustine Lighthouse (new) in azimuth 196° 18′. The reference mark is a ¼-inch copper wire, bent at the lower end, and set in the southeast corner of the concrete pier about 150 meters north of the lighthouse. The wire is set in cement and projects about ¼ inch. It is 0.165 meter (0.54 foot) from the east edge of the pier and 0.177 meter (0.58 foot) from its south edge. The pier is 12 by 16 feet on base, 12 feet in ground, and 4 feet square on top, which is 5 inches above the surface of the ground. The latitude station is 3.70 meters (12.1 feet) southeast of the reference mark; from the latitude station the reference mark is 115° 23′ to the right of the line to St. Augustine Lighthouse.

St. Marks longitude (Wakulla County, Fla., Edwin Smith, 1907).—In the village of St. Marks, on property belonging to Mellen Bros. The longitude station is 0.87 meter (2.9 feet) south and 0.04 meter (0.1 foot) or 0".00 of longitude west of triangulation station *Long* which is 23.68 meters (77.7 feet) southeast of the southeast corner post of the lot of William H. Harrell and 84.66 meters (277.8 feet) from the east rail of the railway, measured along the line passing just to the north of Jackson's shanty. The triangulation station is marked by a 4-inch tile with its top 2 inches below the surface. The longitude station is marked by the center of a concrete pier consisting of a solid block, 2 by 4 feet and 2 feet in the ground, surmounted by another solid block, 14 by 28 inches and 3 feet above the ground.

St. Marks latitude (Wakulla County, Fla., J. E. Hilgard, 1852).—Lost. Distant 0".04 of latitude south of *St. Marks Lighthouse 1859*.

Sand Key latitude (Monroe County, Fla., J. E. Hilgard, 1849).—Identical with azimuth station of the same name, and now reported lost.

For notes in regard to marking of stations see p. 130.

Sand Key azimuth (Monroe County, Fla., J. E. Hilgard, 1849).—Identical with triangulation station of the same name, and now reported lost.

Sebastian longitude (St. Lucie County, Fla., William Bowie and J. S. Hill, 1907).—Marked by a brick pier 2.38 meters (7.8 feet) south and 1.74 meters (5.7 feet) or 0″06 of longitude west of triangulation station *Sebastian 2* at Sebastian, northeast of the depot, on land of the Florida East Coast Railway Co. *Sebastian 2* is 50.30 meters (165.0 feet) northeast of the northeast corner of the northeast brick column supporting the main portion (not platform) of the railway station house; 34.16 meters (112.1 feet) southeast of corner of Mr. Kitching's general merchandise store; and is 13½ paces south of the center of the shell road leading from north of the depot to the fish wharf. The underground mark is the center of the top of a bottle encased in concrete, with its top 30 inches below the surface of the ground. The surface mark is the point of a 40d. nail in a 4-inch terra-cotta pipe, 2 feet long, filled with concrete and encased in a concrete cylinder 18 inches in diameter and projecting about 2 inches above the surface of the ground. The concrete around the top of the pipe is lettered "U. S. C. & G. S. 1906." The reference mark, similar to the surface mark, is 12.35 meters (40.5 feet) north of the switch rod, just south of the crossing at the north end of the depot, and 13.68 meters (44.9 feet) east of the east-rail of the main track. It is 59.820 meters (196.26 feet) from the station in azimuth 103° 36′. A magnetic station is 122.52 meters (402.0 feet) from the station in azimuth 186° 24′. It is marked underground by a copper nail in the concrete stopper of a bottle filled with white sand and buried 18 inches below the surface of the ground. The surface mark of the magnetic station is similar to that of the triangulation station, a copper nail marking the point, and the concrete around the pipe being lettered "U. S. C. & G. S. M. S. 1906."

Sebastian latitude (St. Lucie County, Fla., W. H. Burger, 1906).—Marked by a pier 3.71 meters (12.2 feet) west of triangulation station *Sebastian 2*, described above in connection with *Sebastian longitude*.

Ten 2 azimuth (Palm Beach County, Fla., B. A. Colonna, 1883).—Identical with triangulation station *Ten 2*. Now reported lost.

Titusville latitude (Brevard County, Fla., W. H. Burger, 1906).—Distant 44.80 meters (147.0 feet) or 0″80 of latitude south from *Indian River Hotel flagstaff* in azimuth 57° 37′. The reference mark is a nail set head down in the cement filling a sewer pipe, which was also set in cement. It is in the southeast corner of the open plot in front of and west of the Indian River Hotel, almost in the center of a triangle formed by two cabbage palmettos and a telephone pole, and is in line with the telephone pole and electric-light pole. It is 3.06 meters (10.0 feet) from palmetto to northwest; 3.42 meters (11.2 feet) from palmetto to northeast; 2.76 meters (9.1 feet) from telephone pole to south; 15.680 meters (51.44 feet) from the southwest corner of the hotel; and 11.369 meters (37.30 feet) from the southwest corner of the post of the fence surrounding the hotel. The latitude station is 20.310 meters (66.63 feet) from the reference mark, the angle at the reference mark between the station and the flagpole on the hotel is 108° 27′.

Waldo azimuth (Alachua County, Fla., H. G. Ogden, 1897).—Identical with triangulation station of the same name in the town of Waldo about ¼ mile from the depot, in an orange orchard belonging to Mr. Stevens and very close to the intersection of the Waldo-Starke and the Waldo-Fairbanks tangents of the Florida Central & Peninsula Railroad. The southwest corner of Mr. Steven's house is 123.5 meters (405 feet) from the station in azimuth (magnetic) 258° 17′. The underground mark is a bottle filled with cement. The surface mark is an iron rod embedded in the cement mortar which fills a section of 6-inch sewer pipe set in the ground.

GEORGIA

Albany azimuth (Dougherty County, Ga., M. E. Lutz, 1917).—Identical with traverse station of same name, on the hill about 100 meters west of the Seaboard Airline Railway right of way at Albany Junction, which is about 1.8 miles south of Albany depot. The station is 50 meters west from the highest point of the hill and about 15 meters above the railroad, and is marked according to notes 1a and 7d. A reference mark, note 11c, is about 10 meters northeast from the highest point of the hill and is distant 27.65 meters (90.7 feet) from the station in azimuth 347° 48′. Other azimuths are as follows: Albany city water tank, 108° 00′; F. C. O. Co. water tank, 145° 52′.

Artesia azimuth (Worth County, Ga., E. H. Pagenhart, 1917).—Identical with traverse station of same name, on the Atlantic Coast Line Railroad right of way at the curve in the cut 1 mile north of Artesia depot. The station is at the intersection of the tangents to the curve of the east rail of the main track, 13.85 meters (45.4 feet) (inclined) west of the west rail and 1½ meters above the rail, and is marked according to notes 1a and 7d. The reference mark, note 11c, is 0.6 meter (2 feet) east of the fence on the east side of the right of way, 8.57 meters (28.1 feet) west of the first telegraph pole south of the station, and 24.45 meters (80.2 feet) from the station in azimuth 281° 16′.

Atlanta longitude (Fulton County, Ga., Edwin Smith, 1874; 1917; William Bowie, 1907; 1917).—The station of 1874–1917 is in the State capitol grounds near the Washington Street entrance. The position can be recovered by the following measurements if the pier should be destroyed: Inner (nearest) edge of coping on retaining wall, Washington Street, 10.4 meters (34 feet); inner (nearest) edge of cement walk, front of capitol, 11.5 meters (38 feet); nearest corner of main entrance of capitol, 18.8 meters (62 feet); north corner of capitol (middle corner of three), 48.9 meters (160 feet). The station is marked by a granite pier with a cross and the inscription "U. S. Coast Survey, 1874," and a space for the latitude and longitude. A second granite post is

For notes in regard to marking of stations see p. 130.

about a foot to the east of the station. The point occupied in 1879–1896 was 0.38 meter (1.25 feet) or 0".015 (0s.001) east of the station of 1874, and 13.39 meters (43.93 feet) or 0".43 of latitude north and 29.52 meters (96.9 feet) or 1".15 of longitude west of triangulation station *Atlanta city hall cupola* (1872). In 1907, in the exchange of signals with Fernandina, Fla., a point 0.364 meter (1.19 feet) or 0".014 (0s.001) of longitude east of the station of 1874 was used. The station of 1907 is on the capitol grounds 33.990 meters (111.52 feet) south and 11.12 meters (36.5 feet) or 0s.029 of longitude west of the station of 1874. It is just south of the walk leading to the Washington Street entrance to the capitol, and close to the cannon mounted on the same side of this walk. The following measurements were taken: Center of pier to old station, 35.76 meters (117.3 feet); center of breech of cannon, 3.70 meters (12.1 feet); south edge of walk to capitol entrance, 4.70 meters (15.4 feet); right-hand corner of Washington Street entrance to capitol 1 foot above ground, 7.43 meters (24.4 feet); left-hand corner of Washington Street entrance to capitol, 1 foot above ground, 25.22 meters (82.7 feet). The station of 1907 is marked by a pier of cement and sand approximately 19 by 39 by 68 inches.

Atlanta latitude (Fulton County, Ga., C. H. Sinclair, 1880).—Distant 2.59 meters (8.5 feet) or 0".08 of latitude south and 1.878 meters (6.16 feet) west of the longitude station of 1874, described above. The latitude station is therefore 10.8 meters (35.4 feet) or 0".35 of latitude north and 31.40 meters (103.0 feet) west of triangulation station *Atlanta city hall cupola (1872)*.

Atlanta middle base latitude (Dekalb County, Ga., F. P. Webber, 1872).—Distant 12.23 meters (40.1 feet) or 0".40 of latitude south and 57.7 meters (189 feet) east of *Atlanta middle base azimuth*, described below.

Atlanta middle base azimuth (Dekalb County, Ga., C. O. Boutelle, 1873; 1907).—Identical with triangulation station of same name on the southeast slope of a small knoll about 1,100 feet northeast of the station at Doraville and 110 feet northwest of the nearest rail of the Southern Railway track measured from a point in a deep cut opposite the seventh telegraph pole from Doraville. A road crossing is 63 paces northeast of this point. The station is marked by a small drill hole in a copper bolt set at the intersection of two cross lines in the top of a granite post, 1 foot square and 3 feet long, which projects slightly above the ground. The underground mark is a bottle filled with ashes, about 2½ feet below the surface. The reference marks are 4 granite posts each 7 inches square and 3 feet long and each marked with diagonal groove and an arrowhead pointing toward the station. Each is 1.5 meters (5 feet) from the station, and together they form a square whose sides are, respectively, parallel to and at right angles to the base line. The diagonals of this square intersect at the station.

Augusta longitude (Richmond County, Ga., C. H. Sinclair, 1890).—In the post-office grounds 7.60 meters (24.9 feet) from the south fence, 23.80 meters (78.1 feet) from the Ninth, or Champlain, Street fence and 27.85 meters (91.4 feet) from the west fence. The station is 48.795 meters (160.1 feet) or 1".58 of latitude south and 37.27 meters (122.3 feet) or 1".44 of longitude west of *Augusta post-office flagpole*, and is marked by the foundation of brick and cement pier, 10 inches below the ground.

Augusta latitude (Richmond County, Ga., C. H. Sinclair, 1890).—Identical with *Augusta longitude*, described above.

Battle azimuth (Colquitt County, Ga., E. A. Gatje, 1917; 1922).—Identical with traverse station of same name on the right of way of the abandoned Valdosta, Moultrie & Western Railway at the first cut about ½ mile south of the Georgia Northern Railway crossing, south of Moultrie, 170 meters (558 feet) south from a private road crossing, 10 meters (33 feet) east of the track, and about 3 meters above the track. The land east of the station is cultivated. The station is marked as described in notes 1a and 7d. A reference mound, note 11, is 17 meters (56 feet) east of the track, 12.4 meters (41 feet) south of the first telegraph pole south of the station, and 24.18 meters (79.3 feet) from the station. It is about ½ meter below the station in elevation.

Brook azimuth (Monroe County, Ga., E. D. Bromley, 1919).—Identical with traverse station of the same name about ½ mile north of Bolingbroke 3½ telegraph poles north of semaphore signal board No. 2066, 3.675 meters (12.06 feet) to the right of the rail. The station is on the extension of the back tangent of the right rail and is marked as described in notes 1a and 7c. A reference mark, note 11a, is distant 7.895 meters (25.90 feet) in azimuth 31° 12′ 58″.

Brunswick southeast base longitude (Glynn County, Ga., W. B. Fairfield, 1917).—Distant 12.50 meters (41.0 feet) or 0".41 of latitude south and 0.71 meter (2.3 feet) or 0".03 of longitude east of *Brunswick southeast base azimuth*, described below.

Brunswick southeast base latitude (Glynn County, Ga., W. B. Fairfield, 1917).—Identical with *Brunswick southeast base longitude*, described above.

Brunswick southeast base azimuth (Glynn County, Ga., C. V. Hodgson, 1917; 1922).—Identical with traverse station of same name in the northwest edge of Brunswick, between the railroad tracks and the bay, midway between K and L Streets, and about 200 meters north of Glynn Ice Co. and 12.125 meters (39.78 feet) from the left rail (facing away from Brunswick) of the main line of the Atlantic Coast Line Railroad. The station is marked as described in notes 1a and 7c. A reference mark, a square concrete post with a large nail embedded point upward in the concrete, is 39.845 meters (130.72 feet) from the station in azimuth 299° 49′.

Butler latitude (Glynn County, Ga., A. T. Mosman, 1872; 1873).—Distant 6.49 meters (21.3 feet) or 0".21 of latitude south of *Butler azimuth* described below.

For notes in regard to marking of stations see p. 130.

Butler azimuth (Glynn County, Ga., A. T. Mosman, 1872).—Identical with triangulation station of same name in the northwest edge of a cultivated field at the north end of St. Simon Island. The station was marked by a copper tack in a live-oak stump. In 1872 the center of the stump was found rotted away.

Butler longitude (Taylor County, Ga., W. B. Fairfield, 1918).—In the town of Butler on the Central of Georgia Railway right of way on the north side of the track and about 15 meters from the main line. The station is 23.073 meters (75.70 feet) or 0".75 of latitude due north of traverse station *Butler*, which is about 245 meters east of Butler depot, 3 meters (10 feet) east of the signal for passing track of the Central of Georgia Railway, and 4.50 meters (14.8 feet) to the left from the rail, and is marked as described in notes 1a and 7c. A reference mark, note 11c, is distant 15.825 meters (51.92 feet) from the triangulation station in azimuth 192° 39′.

Butler latitude (Taylor County, Ga., W. B. Fairfield, 1918).—Identical with *Butler longitude*, described above.

Cochran longitude (Bleckley County, Ga., W. B. Fairfield, 1917).—Distant 10.670 meters (35.01 feet) or 0".35 of latitude south and 4.605 meters (15.11 feet) or 0".18 of longitude west of *Cochran azimuth* described below.

Cochran latitude (Bleckley County, Ga., W. B. Fairfield, 1917).—Identical with Cochran longitude, described above.

Cochran azimuth (Bleckley County, Ga., C. V. Hodgson, 1917; 1922).—Identical with traverse station of same name about 100 meters southwest of the depot, on the west side of the tracks of the Hawkinsville branch line, between the railroad and wagon road paralleling the railroad and 14.13 meters (46.4 feet) from the west rail of the main line. The station is marked as described in notes 1a and 7c, with a reference mark, note 11a, in the fence line along the sidewalk to the west of the street along the railroad, distant 8.253 meters (27.08 feet) from the station in azimuth 94° 54′.

Columbus E longitude (Muscogee County, Ga., J. E. McGrath, 1918).—In Columbus almost at the southwest corner of lot 15, block 31, at the northeast corner of the intersection of Tenth Street and Eighth Avenue. The station is between the switch track which stops at Tenth Street and the Central of Georgia Railway track. The traverse station *Columbus E*, which is marked according to notes 1a and 7d, is 55.20 meters (181.1 feet) or 1".79 of latitude north and 29.27 meters (96.0 feet) or 1".12 of longitude west of the longitude station. The traverse station is about 240 feet north of Tenth Street on the west side of the right of way and 50 feet from the center of the main track. It is also about 150 feet southeast of the power plant of the Golden Foundry & Machine Co. and 1.77 meters (5.8 feet) west of the west rail of their switch. A reference mark, note 11, with the arrow pointing about 10° east of the station, is on a concrete mound 20.30 meters (66.6 feet) from the triangulation station in azimuth 154° 57′.

Columbus E latitude (Muscogee County, Ga., J. E. McGrath, 1918).—Identical with *Columbus E longitude*, described above.

Currahee latitude (Stephens County, Ga., J. B. Boutelle and H. W. Blair, 1874).—Distant 191.17 meters (627.2 feet) or 6".20 of latitude south and 205.74 meters (675.0 feet) east of *Currahee azimuth*, described below.

Currahee azimuth (Stephens County, Ga., C. O. Boutelle, 1874; 1902).—Identical with triangulation station of same name about 4 miles south of Toccoa on a small isolated peak, the most southeastern elevation near the Savannah River. The station is marked by a large nail embedded in concrete, with the point projecting ½ inch at the center of a 4-inch or 6-inch tile, which is set in a block of concrete 2½ feet in diameter and about 3 feet long, the top of which is flush with the surface of the ground. The surface mark is inscribed "U. S. C. & G. S. 1902." The underground mark is a brass tack in a pine plug driven in a drill hole in solid bedrock. Four reference marks, each a stone with an arrow pointing toward the station, are at the following distances from the station: 1.74 meters (5.7 feet) north; 1.46 meters (4.8 feet) east; 1.43 meters (4.7 feet) south; and 1.55 meters (5.1 feet, west. Four additional reference marks, each consisting of a 1-inch drill hole 5 inches deep in the solid rock ledge, are at the following distances and azimuths from the station: 6.89 meters (22.6 feet), 38° 44′; 6.04 meters (19.8 feet), 186° 16′; 6.55 meters (21.5 feet), 186° 16′; and 6.89 meters (22.6 feet), 357° 38′.

Danville azimuth (Twiggs County, Ga., E. D. Bromley, 1918; 1922).—Identical with traverse station of same name, on the south side of the Macon, Dublin & Savannah Railroad track, 2.73 meters (9.0 feet) from the nearest rail, 27.67 meters (90.8 feet) from the edge of the depot platform. The station is at the same elevation as the top of the rail and is marked as described in notes 1a and 7c. The reference mark is in the northwest corner of the Maxwell Building, "1918," and its north face is 0.21 meter (0.7 foot) east of the corner of the building and 0.914 meter above the ground. It is 29.826 meters (97.85 feet) from the nearest rail and 18.40 meters (60.4 feet) from the edge of the depot platform and is in azimuth 235° 13′ from the station.

Darien longitude (McIntosh County, Ga., J. S. Hill, 1907).—Distant 2.58 meters (8.5 feet) north and 0.18 meter (0.6 foot) or 0".01 of longitude west of triangulation station *Darien proposed longitude station*, which is in a small octagonal plot of ground owned by the city of Darien and used as a park, situated between the Episcopal and Methodist Churches, one block east of the city fire house. The triangulation station is in the southeast quarter of the park in a direct line between the spire of the Methodist Church and the cross of the Episcopal Church, 6.61 meters (21.7 feet) from the corner of the park nearest the Episcopal Church, 15.20

For notes in regard to marking of stations see p. 130.

meters (49.9 feet) east of the eastern one of the two north and south walks in the park, and 24.50 meters (80.4 feet) south of an east and west walk. The triangulation station is marked by a copper nail embedded in concrete at the center of a 4-inch tile, which is also surrounded by concrete and projects 4 inches above the ground. The longitude station is marked by a concrete pier.

Doraville longitude (Dekalb County, Ga., J. S. Hill, 1907).—Marked by a concrete pier with the letters "U. S. C. & G. S., 07," and distant 1.954 meters (6.41 feet) south and 0.094 meter (0.31 foot) or 0″.00 of longitude west of *Atlanta middle base* azimuth, described above.

Fargo azimuth (Clinch County, Ga., M. E. Lutz, 1917).—Identical with traverse station of same name on the property of the Georgia Southern & Florida Railway, 300 meters north of the depot, 115 meters (377 feet) south of milepost 198, and 16.16 meters (53.0 feet) west of the west rail of the main track and on the prolongation of the southward tangent to the curve of the east rail. The station is on the lot occupied by the section foreman's house and is marked according to notes 1a and 7d. The reference mark, note 11, in a concrete mound, is 125 meters south of milepost 198, 9.78 meters (32.1 feet) west of the west rail of the track and 13.48 meters (44.2 feet) from the station.

Fay azimuth (Emanuel County, Ga., E. D. Bromley, 1918; 1922).—Identical with traverse station of same name, 6½ telegraph poles east of the whistling post "S" for Norristown and 1 mile west of the town of Norristown, on the south side of the track on a high bank at the west end of the cut, on the extension of the east and west tangent of the south rail, 21.0 meters (69 feet) from the nearest rail and 3½ meters above the top of the rail. The station is marked as described in notes 1a and 7c, with a reference mark, note 11a, distant 12.985 meters (42.60 feet) from the station in azimuth 307° 22′.

Folkston longitude (Charlton County, Ga., J. E. McGrath, 1918).—About ½ mile north of Folkston, on the right of way of the Atlantic Coast Line Railroad, at the junction of the Waycross branch and the Savannah main line, and nearly abreast of the signboard marking the north yard limits. A section house stands on the east of the Jesup line and on the west of the Waycross line. The longitude station is between the two lines of the railroad and is 1.999 meters (6.56 feet) south and 3.853 meters (12.64 feet) or 0″.14 of longitude west of traverse station *Folkstown*. The traverse station is 3.32 meters (10.9 feet) west of the west rail of the Savannah main line, 13.08 meters (42.9 feet) east of the east rail of the Waycross branch line, and 23.85 meters (78.2 feet) west of the east fence line of the right of way, and is marked as described in notes 1a and 7c. The reference mark, a ½-inch iron pin in a mound of concrete, is ½ meter west of the east fence line, 24.47 meters (80.3 feet) from the triangulation station in azimuth 276° 33′. The south water tank of Folkston is in azimuth 344° 01′ 30″.

Forsyth East base azimuth (Monroe County, Ga., E. D. Bromley, 1919).—Identical with traverse station of the same name one rail north of the Central of Georgia Railway baggage shed, between the main line and the coal-yard track, 9.75 meters (32.0 feet) north of semaphore signal board No. 2144 and 7.28 meters (23.9 feet) from the main line. The station is marked as described in notes 1a and 7c, with a reference mark, note 11a, distant 11.285 meters (37.02 feet) in azimuth 213° 23′.

Harmon longitude (Taylor County, Ga., J. E. McGrath, 1918).—On the top and south side of a bank bounding a cut through which the railroad runs, and south of a point on the north bank of this cut which is approximately 16 meters (52 feet) west of the sixth telegraph pole east of milepost marked "B 207" and "S 241." The station is 5.954 meters (19.53 feet) or 0″.19 of latitude due south of *Harmon azimuth*, described below.

Harmon latitude (Taylor County, Ga., J. E. McGrath, 1918).—Identical with *Harmon longitude*, described above.

Harmon azimuth (Taylor County, Ga., G. D. Cowie, 1917; 1922).—Identical with traverse station of same name about 1 mile east of Butler, on the high sandy embankment on the south side of the Central of Georgia Railway, 225 meters (738 feet) east of a road crossing and nearly in front of a small farmhouse. The station is marked as described in note 7c. The reference mark, a large nail imbedded in a square concrete post, projecting about 1 inch above the surface, is in azimuth 184° 20′.

Hump longitude (Bibb County, Ga., J. E. McGrath, 1917).—Distant 5.755 meters (18.88 feet) south and 0.394 meter (1.29 feet) or 0″.02 of longitude west of *Hump azimuth*, described below.

Hump azimuth (Bibb County, Ga., C. V. Hodgson, 1917; 1922).—Identical with traverse station of same name about 3 miles southwest of Macon, 13 rails southwest of a steel overhead crossing of the Gantt City road, 300 meters northeast of the point of tangency of a curve of the Central of Georgia Railway, on the left side (facing away from Brunswick) of the railroad, on property of John T. Moore, 20.45 meters (67.1 feet) from the left rail of the outbound track. The station is also 17 meters east of the fourth telegraph pole, counting westward from the south end of the overhead bridge, and was originally marked as described in notes 1a and 7c. The reference mark, note 11a, is 15.665 meters (51.39 feet) from the station in azimuth 79° 46′. The station mark had been removed in 1922, but the reference mark was in place.

Jake azimuth (Worth County, Ga., E. H. Pagenhart, 1917).—Identical with traverse station of same name on the Atlantic Coast Line Railroad right of way about ⅞ mile north of Sumner railway station on the west side of a cut, 80 meters north from a private road crossing, 9.3 meters (31 feet) west of the west rail of the main track, and about 2 meters above the rail. The station is marked as described in notes 1a and 7d. The reference mark, an iron pin, is 0.5 meter (1.6 feet) east of the fence on the west side of the right of way and about 80 meters north of the fence gate. It is 18.96 meters (62.2 feet from the station in azimuth 11° 50′. The semaphore at the depot is in azimuth 268° 38′ 32″ from the station.

For notes in regard to marking of stations see p. 130.

Jesup longitude (Wayne County, Ga., J. E. McGrath, 1917).—Distant 12.278 meters (40.28 feet) south and 1.044 meters (3.43 feet) or 0".04 of longitude west of the traverse station of the same name, which is on the left side of the main-line tracks of the Southern Railway at Jesup, almost opposite the ice plant, 56 meters south of the south end of the iron Southern Railway Bridge over the tracks of the Atlantic Coast Line Railway, and 5.79 meters (19.0 feet) from the left rail of the track. The traverse station is marked as described in notes 1a and 7c. The reference mark, a square concrete post with a large nail embedded point upward in the concrete, projecting about 1 inch above the surface, is near the south fence line on top of the bank and 40.225 meters (131.97 feet) from the traverse station in azimuth 114° 29′. A cross cut in the right railing of the Southern Railway bridge over the Atlantic Coast Line tracks is 60.638 meters (198.94 feet) from the station in azimuth 143° 52′.

Joffre azimuth (Ware County, Ga., E. A. Gatje, 1917).—Identical with traverse station of same name on the Atlantic Coast Line right of way, about 3 miles south of Waresboro, 20 meters south of the first road crossing south of milepost 64, 5.453 meters (17.89 feet) west of the west rail of the main-line track. The station is marked as described in notes 1a and 7c. The reference mark, a mound of concrete with a 1-inch iron pin in the center, is 12.829 meters (42.09 feet) west of the west rail of the main track, 1 meter west of the line of telephone poles west of the track, and distant 17.34 meters (56.9 feet) from the station in azimuth 313° 56′ 30.″

Joint longitude (Jeff Davis County, Ga., W. B. Fairfield, 1917).—In the town of Hazlehurst, on the right of way of the Southern Railroad, about 400 meters northwest of the depot, and some 25 feet west of the main track and between it and the main road. The station is 3.380 meters (11.09 feet) or 0".11 of latitude north and 0.665 meter (2.18 feet) or 0".03 of longitude east of *Joint azimuth* described below.

Joint latitude (Jeff Davis County, Ga., W. B. Fairfield, 1917).—Identical with *Joint longitude*, described above.

Joint azimuth (Jeff Davis County, Ga., C. V. Hodgson, 1917; 1922).—Identical with traverse station of same name, in the town of Hazelhurst, on the left side of the tracks (facing away from Brunswick) about 50 meters south of the north switch post and opposite a derail switch, about 10 meters west of the tracks of the Southern Railway on the backward prolongation of the tangent formed by the right rail of the southern track leading to the northwest. The station is 68 meters southeast of the west switch post and is marked as described in notes 1a and 7c. The reference mark, a square concrete post with a large nail embedded point upward in the concrete projecting about 1 inch above the surface, is 11.79 meters (38.7 feet) from the station in azimuth 57° 37′. The center of the standpipe at Hazelhurst is in azimuth 354° 42′ from the station.

Jones longitude (Worth County, Ga., W. B. Fairfield, 1918).—Distant 6.22 meters (20.4 feet) or 0".20 of latitude south and 6.34 meters (20.8 feet) or 0".24 of longitude west of traverse station *Jones*, which is in the town of Sumner, on the Atlantic Coast Line Railroad right of way, at the curve just south of the depot, 19.51 meters (64.0 feet) east of the east rail of the main track, and 3.4 meters (11 feet) east from the middle of the public road which parallels the track, 303 meters (994 feet) northwest from the switch stand at the south end of the house track. The traverse station is on the prolongation of the northward tangent to the curve of the west rail and is marked as described in notes 1a and 7d. The reference mark is 49.49 meters (162.4 feet) east of the east rail, 0.5 meter (1.6 feet) south from the south side fence of a cultivated field just east of the right of way, and 37.25 meters (122.2 feet) from the triangulation station in azimuth 228° 42′ 39″. The semaphore at the depot is in azimuth 86° 52′ 42″ from the triangulation station.

Jones latitude (Worth County, Ga., W. B. Fairfield, 1918).—Identical with *Jones longitude*, described above.

Kimbrough longitude (Webster County, Ga., W. B. Fairfield, 1918).—Distant 11.38 meters (37.3 feet) or 0".37 of latitude north and 2.04 meters (6.7 feet) or 0".08 of longitude east from *Kimbrough azimuth*, described below.

Kimbrough latitude (Webster County, Ga., W. B. Fairfield, 1918).—Identical with *Kimbrough longitude*, described above.

Kimbrough azimuth (Webster County, Ga., C. L. Garner, 1917; 1922).—Identical with traverse station of the same name in the town of Kimbrough, on cultivated land owned by J. M. Jones, 51.4 meters (168.6 feet) south from the south corner of his dwelling house, 18.37 meters (60.3 feet) southwest from the south corner of his barn, and 300 meters west from the Seaboard Air Line Railway depot. The station is on the prolongation of the southward tangent to the curve of the west rail of the Seaboard Air Line main track, and about 800 meters from the point of tangency, and is marked as described in notes 1a and 7d. The reference mark, note 11c, is 16.2 meters (53 feet) south from Mr. Jones's well, 0.65 meter (2.1 feet) east from the east corner post of his garden lot, 19.07 meters (62.6 feet) northwest from the northwest corner of his barn, and 32.32 meters (106.0 feet) from the station in azimuth 173° 06′.

Lavender latitude (Floyd County, Ga., F. P. Webber, 1874).—Distant 293.29 meters (962.2 feet) or 1".24 in latitude south, in azimuth 82° 29′ 53″ from *Lavender azimuth*, described below.

Lavender azimuth (Floyd County, Ga., F. P. Webber, 1874; 1875).—Identical with triangulation station of same name on the summit of the highest peak of the Lavender ridge. The station is marked by a cross surrounded by the letters "U. S. C. S." in the top of a granite post 5 inches square which projects slightly above the ground. The underground mark is a jug filled with ashes. The reference marks are 4 granite posts, each marked with a cross and an arrowhead pointing toward the station. They are 6 feet from the station, north, east, south, and west, respectively.

For notes in regard to marking of stations see p. 130.

Lowndes azimuth (Lowndes County, Ga., M. E. Lutz, 1917; 1919).—Identical with traverse station of same name on the right of way of the Georgia Southern & Florida Railway, 315 meters north of milepost 153, 1 mile south of Valdosta, 7.23 meters (23.7 feet) east of the east rail, and about 1 meter above the rail. The station is marked according to notes 1a and 7d. The reference mark, note 11, is 1½ meters east of the right of way fence east of the tracks, 17 meters east of the east rail, and 9.71 meters (31.9 feet) from the station. A line from the reference mark to the station is about normal to the track.

Macon longitude (Bibb County, Ga., G. W. Dean, 1855; 1860).—About 200 meters southwest from the right bank of the Ocmulgee River, in the northwestern part of the grounds connected with and belonging to the Bibb County Male Academy. The station is marked by a granite pier and is 28.29 meters (92.8 feet) north and 57.3 meters (188 feet) west from the cupola of the academy.

Macon latitude (Bibb County, Ga., G. W. Dean, 1855).—Identical with Macon longitude, described above.

Meldrim azimuth (Effingham County, Ga., E. D. Bromley, 1918; 1922).—Identical with traverse station of same name on the north side of the Seaboard Air Line Railway track, at Meldrim, 22 meters east of the depot. The station is almost 4 meters from the nearest rail and about midway between the Central of Georgia and the Seaboard Air Line tracks and is marked as described in notes 1a and 7c. The reference mark, note 11a, was set 29.988 meters (98.39 feet) from the station in azimuth 202° 13′, but in 1922 no trace of the reference mark was found.

Mud longitude (Dodge County, Ga., J. E. McGrath, 1917).—Near the north line of the roadway (the one nearest the south line of the town of Eastman) which gives access from College Street to the Dodge Fertilizer factory and the county penal farm, and 20.17 meters (66.2 feet) north and 0.184 meter (0.60 foot) or 0″.01 of longitude east of *Mud azimuth*, described below.

Mud azimuth (Dodge County, Ga., C. V. Hodgson, 1917; 1922).—Identical with traverse station of same name near the south edge of Eastman, on the left side of the tracks (when going north) of the Southern Railway, 14 rails north of the city limit signboard, along the tracks on the forward extension of the right rail tangent, 21.78 meters (71.5 feet) from the left rail of the tracks. The station is just north of the property of Lee Parkeson and is marked as described in notes 1a and 7c except that the point of a nail was used instead of a station mark. The reference mark, a square concrete post with a large nail embedded point upward in the concrete, with the point projecting about 1 inch above the surface, is distant 9.982 meters (32.75 feet) from the station in azimuth 250° 58′.

Norris longitude (Emanuel County, Ga., W. B. Fairfield, 1918).—On the right of way of the Central of Georgia Railway, on the south side of the main line, about 200 meters west of the Norristown depot and some 30 meters east of the twentieth milepost from Brewton. The station is 13.16 meters (43.2 feet) or 0″.43 of latitude south and 7.79 meters (25.6 feet) or 0″.30 of longitude west from *Norris* traverse station, which is on a bank at the east end of a cut, on the north side of the railroad, 4.10 meters (13.5 feet) from the nearest rail, and is marked as described in notes 1a and 7c. The reference mark, note 11a, is 11.450 meters (37.57 feet) from the traverse station in azimuth 179° 50′.

Norris latitude (Emanuel County, Ga., W. B. Fairfield, 1918).—Identical with *Norris longitude*, described above.

Riley longitude (Taylor County, Ga., W. B. Fairfield, 1918).—About 1½ miles east of Butler depot, on the right of way of the Central of Georgia Railway, about 15 meters north of the track and 10 meters south of the county road on what is known locally as the Red Hill. The station is 26.465 meters (86.83 feet) or 0″.86 of latitude due north of *Riley* traverse station, which is at the west end of the first cut west of the road crossing, 9 rails east of the forward tangent of the right (facing away from Brunswick) rail of the Central of Georgia Railway, and 6.235 meters (20.46 feet) to the left of the rail. The triangulation station is marked as described in notes 1a and 7c. The reference mark, a concrete post with a large nail embedded point upward, projecting about 1 inch above the surface, is 12.875 meters (42.24 feet) from the triangulation station in azimuth 176° 23′ 48″.

Riley latitude (Taylor County, Ga., W. B. Fairfield, 1918).—Identical with *Riley longitude*, described above.

Rose Hill latitude (Elbert County, Ga., W. H. Burger, 1907).—A pier 8.306 meters (27.25 feet) or 0″.00 of latitude in azimuth 270° 22′ from station *Rose Hill azimuth*, described below.

Rose Hill azimuth (Elbert County, Ga., W. H. Burger, 1907).—Identical with triangulation station of same name, about 1 mile south of the depot at Middletown, on the highest point of the Rose Hill estate, owned by E. B. Heard, and about 400 meters south of his dwelling. The station is about 30 meters south of the old Petersburg road and is marked by a large nail embedded in concrete, with the point projecting ½ inch at the center of a 4-inch tile which is set in a block of concrete 2½ feet in diameter and about 3 feet long, the top of which is flush with the surface of the ground. The underground mark is the same as the surface mark except that the block of concrete in which the tile is embedded is smaller. The surface mark is inscribed "U. S. C. & G. S. 1902." A reference mark, a large nail embedded in concrete at the center of a 6-inch tile, which in turn is set in a block of concrete 15 inches in diameter, is 28.68 meters (94.1 feet) from the station in azimuth 350° 00′. The west gable of Heard's house is in azimuth 230° 51′, and the chimney of a negro tenant cabin is 30 meters (98 feet) from the station in azimuth 104° 06′.

For notes in regard to marking of stations see p. 130.

St. George azimuth (Charlton County, Ga., M. E. Lutz, 1917).—Identical with traverse station of same name on the Georgia Southern & Florida Railway right of way at the curve at St. George depot, on the prolongation of the northward tangent to the curve of the west rail of the main track, 50 meters north from the switch stand at the south end of the sidetrack, 6.57 meters (21.6 feet) east of the east rail of the main track. The station is marked as described in notes 1a and 7d, with a reference mark, note 11, distant 17.59 meters (57.7 feet), which is 17.90 meters (58.7 feet) east of the east rail of the main track, near the chute used for loading stock.

Savannah longitude (Chatham County, Ga., C. O. Boutelle, 1851; 1874).—Originally marked by a granite pier 5.30 meters (17.4 feet) or 0".17 of latitude south and 21.56 meters (70.7 feet) or 0".82 of longitude east of the center of the tower of the *Savannah Exchange*. Reported lost in 1914.

Savannah latitude (Chatham County, Ga., C. O. Boutelle, 1851; 1874).—Identical with *Savannah longitude*, described above.

Savannah Exchange azimuth (Chatham County, Ga., C. O. Boutelle, 1851; 1894).—The center of the tower of the *Savannah Exchange*. In 1918, reported destroyed.

Sawnee latitude (Forsythe County, Ga., H. W. Blair and A. H. Scott, 1873).—Distant 212.31 meters (696.6 feet) or 6".89 of latitude south and 59.40 meters (194.9 feet) west of *Sawnee azimuth*, described below.

Sawnee azimuth (Forsythe County, Ga., C. O. Boutelle, 1873).—Identical with triangulation station of same name on the highest point of the central and most prominent one of three peaks of the Sawnee Mountain. The station is marked by a copper tack in a wooden stub. Four other stubs are at the following distances from the station: 6.04 meters (19.8 feet) northeast, 2.07 meters (6.8 feet) southeast, 6.10 meters (20.0 feet) southwest, and 3.93 meters (12.9 feet) northwest. The diagonal lines connecting these stubs intersect at the station.

Sylvester D longitude (Worth County, Ga., J. E. McGrath, 1918).—Distant 17.69 meters (58.0 feet) or 0".57 of latitude south and 12.118 meters (39.76 feet) or 0".46 of longitude east of traverse station *Sylvester D*, which is about 40 meters west of the depot at Willingham, on the Atlantic Coast Line Railroad right of way, about 45 meters from the point of tangency of a curve. The station is marked as described in notes 1a and 7d. A reference mark, U. S. Coast and Geodetic Survey B. M. W. 7, is 16.48 meters (54.1 feet) from the station in azimuth 328° 15′40″, and is 3.48 meters (11.4 feet) north and 3.77 meters (12.4 feet) west of the longitude station. The longitude station is about 10 meters north of the front fence line of Mr. E. K. Gully's residence and 1 meter west of the prolongation of the east line of the interior fence bounding on the east of the road giving access to his house and other buildings.

Sylvester D latitude (Worth County, Ga., J. E. McGrath, 1918).—Identical with *Sylvester D longitude*, described above.

Telfair azimuth (Chatham County, Ga., E. A. Gatje, 1918; 1922).—Identical with traverse station of same name on the Atlantic Coast Line Railroad right of way between Central Junction and Telfair Junction, about 300 meters south of milepost 6 and 410 meters north of Telfair Junction, 2 meters south of a whistling post, and 2.26 meters (7.4 feet) east of the east rail of the northbound main track. The station is marked according to notes 1a and 7b. The reference mark, note 11, in a concrete mound, is 5 meters north of the whistling post and 16.44 meters (53.9 feet) west of the east rail of the northbound main track, and 21.14 meters (69.4 feet) from the station in azimuth 86° 24′ 50". In 1922 the station was reported probably lost.

Townsend azimuth (McIntosh County, Ga., E. A. Gatje, 1918).—Identical with traverse station of same name on the Seaboard Air Line Railway right of way, 50 meters north of the depot, 6.12 meters (20.1 feet) east of the east rail of the main track and 3 meters (10 feet) north from the middle of a public road. The station is marked according to notes 1a and 7b. United States Geological Survey bench mark, marked "Elevation 21 feet," is distant 25.14 meters (82.5 feet) in azimuth 124° 25′ 10".

Turner longitude (Bulloch County, Ga., J. E. McGrath, 1918).—Distant 34.35 meters (112.7 feet) or 1".12 of latitude south and 4.31 meters (14.1 feet) or 0".16 of longitude west from *Turner azimuth*, described below.

Turner latitude (Bulloch County, Ga., J. E. McGrath, 1918).—Identical with *Turner longitude*, described above.

Turner azimuth (Bulloch County, Ga., E. D. Bromley, 1918; 1922).—Identical with traverse station of same name on the south side of the Central of Georgia Railway tracks, 1 mile west of the depot at Statesboro. The station is 3.672 meters (12.05 feet) from the south rail, 5 meters west of the Statesboro & Savannah Railway track, which crosses the Central of Georgia Railway track at right angles, 12 meters from the Dixie Overland Highway, and 7 meters east of the yard-limit sign, and is marked according to notes 1a, 7c, and 11a. The reference mark is 14.253 meters (46.76 feet) from the station in azimuth 79° 22′ 28".

Valdosta longitude (Lowndes County, Ga., W. B. Fairfield, 1918).—On the Atlantic Coast Line Railroad right of way, in the city of Valdosta, 3.7 meters (12 feet) south of the main line, about opposite and 50 feet from the east end of the depot, and about halfway between *Valdosta* traverse station and the railroad signal tower, and 5.45 meters (17.9 feet) south and 10.63 meters (34.9 feet) or 0".40 of longitude west from *Valdosta* traverse station. The traverse station is 5.5 meters (18 feet) south of the main track, 16.58 meters (54.4 feet) south of the southeast corner of the passenger station, and 13 meters west from the middle of Ashley Street, and is marked as described in notes 1a and 7d. The northeast corner of the brick building owned by Armour & Co.

For notes in regard to marking of stations see p. 130.

is 17.64 meters (57.9 feet) distant from the traverse station in azimuth 327° 04′ 36″. The reference mark is 60.73 meters (199.2 feet) distant from the triangulation station in azimuth 72° 31′ 22″.8.

Valley longitude (Houston County, Ga., W. B. Fairfield, 1917).—On the right of way of the Central of Georgia Railway between two lines of tracks, about 25 feet east of the main line and 12 feet west of a branch line. The station is 1.947 meters (6.39 feet) or 0″.06 of latitude south and 1.018 meters (3.34 feet) or 0″.04 longitude east of *Valley azimuth*, described below.

Valley latitude (Houston County, Ga., W. B. Fairfield, 1917).—Identical with *Valley longitude*, described above.

Valley azimuth (Houston County, Ga., G. D. Cowie, 1917; 1922).—Identical with traverse station of same name about 400 meters west of the depot at Fort Valley, 8½ rails east of the crossing of the Dixie Highway, 9½ rails east of the switch stand of the west freight track, and 7.30 meters (24.0 feet) south of the south rail of the Central of Georgia track. The station is marked according to notes 1a, 7c, and 11a, the reference mark being 14.60 meters (47.9 feet) from the station in azimuth 147° 12′ 25″.

Waresboro longitude (Ware County, Ga., W. B. Fairfield, 1918).—In the western part of Waresboro, about 200 meters northeast of the Baptist Church, on the right of way of the Altantic Coast Line Railroad. The station is 7.30 meters (24.0 feet) north and 1 meter (3 feet) or 0″.04 of longitude west of traverse station *Waresboro*, which is at the intersection of the prolongation of the southward tangent to the curve of the east rail of the main track and the northward tangent to the curve of the west rail of the main track, and is 9.97 meters (32.7 feet) east of the east rail of the main track. The traverse station is marked as described in notes 1a and 7c, with a reference mark, a mound of concrete with a 1-inch iron pin in the center, 20.589 meters (67.55 feet) from the station in azimuth 176° 14′ 51″.

Willacoochee longitude (Coffee County, Ga., J. E. McGrath, 1918).—At Willacoochee on the south side of the Atlantic Coast Line Railroad track, near the west end of the main switch, which runs westward and eastward from Willacoochee depot, and about 25 feet south and 10 feet east of the switch target post which controls connection of the main switch tracks. The station is 14.018 meters (45.99 feet) south and 2.082 meters (6.83 feet) or 0″.08 of longitude east of *Willacoochee azimuth* described below.

Willacoochee azimuth (Coffee County, Ga., E. A. Gatje, 1917).—Identical with traverse station of same name at Willacoochee on the Atlantic Coast Line Railway right of way, about 650 meters north of the passenger depot, 6.42 meters (21.1 feet) east of the switch stand at the north end of the passing track, 2.40 meters (7.9 feet) east of the east rail of the main track, and about 33 meters (108 feet) from the front door of the Baptist Church. The station is marked as described in notes 1a and 7c, with a reference mark, a mound of concrete with a 1-inch iron pin in the center, 13.74 meters (45.1 feet) distant in azimuth 224° 47′ 37″. The reference mark is 1 meter (3 feet) east of the line of telephone poles east of the track, 14.81 meters (48.6 feet) east of the east rail of the main track and 24.0 meters (79 feet) from the front door of the Baptist Church. The red water tank at Willacoochee is in azimuth 321° 22′ 50″.

IDAHO

Big Butte azimuth (Bingham-Blaine Counties, Idaho, C. V. Hodgson, 1915).—Identical with triangulation station *Big Butte* on the highest point of the mountain of the same name, 23 miles southeast of Arco and 7 miles southwest of Cerro Grande. The station is on or near the boundary line between Bingham and Blaine Counties and is marked according to note 4. The reference mark, a 1-inch hole 3 inches deep in the top of a large bowlder which projects 6 inches above the surface of the ground, is 2.72 meters (8.9 feet) distant in azimuth 287° 05′. A United States Geological Survey cairn is near by.

Blackfoot longitude (Bingham County, Idaho, J. E. McGrath, 1916).—In the eastern portion of the town of Blackfoot, near the intersection of the western boundary of the Oregon Short Line Railroad and the eastern line of a road which runs along the city limits. The cottage of Mrs. Edwards is about 175 feet north of the station. The fence line separating the Kennedy farm from the road and railroad property if produced across the road would pass about over the station. The line of telephone poles (running northward from Taylor Street, on the east side of the county road) would intersect the prolonged fence line about 4.5 feet east of the station. Edwards's west fence line produced passes about 14.5 feet northeast of the station. The station was not marked at the surface, but a very dark and highly vitrified brick was buried at a depth of about 32 inches. The station is connected by traverse with triangulation station *Blackfoot B. M. Q. 6*.

Blackfoot latitude (Bingham County, Idaho, J. E. McGrath, 1916).—Identical with *Blackfoot longitude*, described above.

Boise (U. S. G. S.) longitude (Ada County, Idaho, R. S. Woodward, 1889).—On the plain south of Boise, about 1,000 feet southwest of the terminus (1900) on the Boise Branch of the Union Pacific Railway, near the road leading from this terminus across the irrigation ditch. The station is south of and within 300 feet of the bridge across this ditch and is marked by a pier, similar to that at *Spearville (U. S. G. S.) longitude* (Kansas). (See p. 183.)

Boise (U. S. G. S.) latitude (Ada County, Idaho, R. S. Woodward, 1889).—Identical with *Boise (U. S. G. S.) longitude*, described above.

For notes in regard to marking of stations see p. 130.

Cache azimuth (Cassia County, Idaho, C. V. Hodgson, 1915).—Identical with triangulation station of the same name, on Independence Peak, about 12 miles southwest of Elba. The station is marked by a copper bolt embedded in the rock. Four reference marks consisting of holes drilled in the rock 1 meter (3 feet) from the center mark are approximately north, east, south, and west of the station.

Caribou azimuth (Bonneville County, Idaho, C. V. Hodgson, 1915).—Identical with the triangulation station of the same name, on the highest point of Caribou Mountain. The station is about 35 miles (air line) N. 25° E. of Soda Springs and 7 miles by trail northeast of Gray post office. It is marked according to note 5, with a reference mark, note 12d, on the south slope of the peak 9.43 meters (30.9 feet) from the station in azimuth 12° 37′. A United States Geological Survey cairn is near by.

Flat azimuth (Lincoln County, Idaho, C. V. Hodgson, 1915).—Identical with the triangulation station of the same name, about 6 miles north of east from Jerome, ⅜ mile north of the automobile road leading east from Jerome toward Burley, and 1¼ miles south of Jerome reservoir on the highest part and near the center of Flattop Butte and about 8 paces from the southeast edge of a cuplike depression near its middle. The station is marked according to note 5, the bowlder being about 4 inches above the surface of the ground. The reference mark, note 12d, is 3.51 meters (11.5 feet) distant in azimuth 135° 33′.

Mountain Home longitude (Elmore County, Idaho, W. B. Fairfield, 1916).—Distant 7.495 meters (24.59 feet) or 0″.33 of longitude due west of *Mountain Home azimuth*, described below.

Mountain Home latitude (Elmore County, Idaho, W. B. Fairfield, 1916).—Identical with *Mountain Home longitude*, described above.

Mountain Home azimuth (Elmore County, Idaho, C. V. Hodgson, 1915).—Identical with the triangulation station of the same name, at Mountain Home, southeast of the railroad water tank, on the right of way of the Oregon Short Line Railroad, about 20 paces southwest of the track. The station is marked according to notes 1a and 7a, with the reference mark, note 11a, in the fence line on the opposite side of the street, distant 30.29 meters (99.4 feet) in azimuth 64° 03′.

Nyssa azimuth (Canyon County, Idaho, C. V. Hodgson, 1915; 1920).—Identical with the triangulation station of the same name, ¾ mile east of Nyssa, Oreg., on a small sand hill on the east bluff of Snake River, and about ⅛ mile south of the east end of the wagon bridge across Snake River at Nyssa. The station is marked according to notes 1a and 7a. The reference mark, note 11a, is distant 9.66 meters (31.7 feet) in azimuth 146° 54′.

Oxford azimuth (Oneida County, Idaho, C. V. Hodgson, 1915).—Identical with the triangulation station of the same name on Oxford Peak, about 6 miles west of Oxford and about 15 miles east of Malad City. The station is marked by a copper bolt embedded in the rock. Four reference marks, holes drilled in the rock 0.76 meter (2.5 feet) from the center, are approximately north, east, south, and west of the station.

Silver azimuth (Owyhee County, Idaho, C. V. Hodgson, 1915).—Identical with the triangulation station of the same name, about 5 miles southeast of Silver City, and 2½ miles southeast of War Eagle Mountain, on the highest point of what is known locally as Cinnabar or Quicksilver Mountain. The station is marked according to note 5, the bowlder projecting 5 inches above the surface of the ground. The reference mark, note 12d, is distant 11.63 meters (38.2 feet) in azimuth 337° 14′.

ILLINOIS

Bording latitude (Clinton County, Ill., G. A. Fairfield, 1882).—Marked by a wooden pier 10.31 meters (33.8 feet) due east of *Bording azimuth*, described below.

Bording azimuth (Clinton County, Ill., G. A. Fairfield, 1882).—Identical with the triangulation station of the same name, about 1½ miles east of the town of Carlyle, in the SE. ¼ SW. ¼ sec. 17, T. 2 N., R. 2 W., on the top of Bording Hill, in the middle of a cultivated field owned by Mrs. Catherine Corcoran, whose house is south of the station and just north of the main road. The station is about 200 meters north of the road and is marked by a cross in the top of a white marble post, about 6 inches square and 30 inches long, projecting about 6 inches above the ground and marked "U. S. C. & G. S." The underground mark is the apex of an earthenware pyramid, 6 inches on a side, with the raised letters "U. S. C. S.," buried about 3 feet below the surface of the ground. Two reference marks of white marble, 5 inches square, projecting about 2 inches and with arrows pointing toward the station, are located as follows: One just east of the house of Mrs. Corcoran, 216.88 meters (711.5 feet) south by east from the station; and the other near the road fence southeast of the house, 248.77 meters (816.2 feet) from the station, and in range with the first reference mark and the station.

Cairo (U. S. L. S.) longitude (Alexander County, Ill., D. W. Lockwood, 1876).—Distant 9.36 meters (30.7 feet) or 0″.30 of latitude north and 12.98 meters (42.6 feet) or 0″.54 of longitude west of triangulation station *Defiance* of the Mississippi River Commission. The triangulation station is on the site of Fort Defiance and is marked by a cross cut in the top of a stone post 1½ feet long and set 3 feet below the surface of the ground. Another stone post, 5 inches square at the top and 3½ feet long, with a ½-inch hole in the top, is set directly over the first, projecting 6 inches above the surface. The longitude station is marked by a post.

Cairo (U. S. L. S.) latitude (Alexander County, Ill., D. W. Lockwood, 1876).—Identical with *Cairo U. S. L. S. longitude*, described above.

Cairo longitude (Alexander County, Ill., William Eimbeck, 1877).—In the southeast corner of the customhouse block at Cairo, between Washington Avenue and Poplar Street and Fourteenth and Fifteenth Streets.

For notes in regard to marking of stations see p. 130.

The station is marked by a stone with a hole drilled in its center, placed between two columns of brick, 8 inches apart, built up on a solid brick foundation extending about 2 feet below the surface of the ground. It is near the flag mast, 6.660 meters (21.85 feet) south and 9.383 meters (30.78 feet) east of the southeast corner of the customhouse.

Cairo latitude (Alexander County, Ill., A. T. Mosman, 1865; William Eimbeck, 1877).—The station of 1865 was at the northeast reentrant angle, on the parapet of Fort Cairo, near the junction of the Ohio and Mississippi Rivers. A bottle sunk 2 feet marks the station. The station of 1877 is identical with the longitude station of 1877, described above. (See also *Cairo, U. S. L. S. latitude*, p. 173.)

Chicago (U. S. L. S.) longitude (Cook County, Ill., O. B. Wheeler, 1864).—No description. The station is 35″.55 of longitude west of *Chicago Lighthouse*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 756.)

Chicago (U. S. L. S.) latitude (Cook County, Ill., O. B. Wheeler, 1864).—No description. The station is 21″.19 of latitude south of *Chicago Lighthouse*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 750.)

Chicago longitude (Cook County, Ill., F. H. Parsons, 1883).—Just east of Rhodes Avenue and south of College Place, in the grounds of Chicago University, 33.87 meters (111.1 feet) (1″.10 of latitude) north and 0.0075 meter (0.025 foot) (0″.00) west of the meridian circle of Dearborn Observatory, and 47.457 meters (155.70 feet) (1″.54 of latitude) north and 108.671 meters (356.53 feet) (4″.71 of longitude) west of *Chicago University tall entrance tower* a triangulation station of the United States Lake Survey.

Chicago latitude (Cook County, Ill., F. H. Parsons, 1883).—Identical with *Chicago longitude*, described above.

Chicago longitude (Cook County, Ill., C. H. Sinclair and G. R. Putnam, 1891).—In the grounds of the Chicago city waterworks, at Chicago Avenue and Pine Street, by triangulation 2ˢ.252 west of the station of 1883, described above and 27.80 meters (91.2 feet) (0″.90 of latitude) south and 106.85 meters (350.6 feet) (4″.64 of longitude) east of the center of the stone *tower of Chicago waterworks*, a triangulation station of the United States Lake Survey. The station is the center of a brick pier extending 3 feet above the ground and 2½ feet underground, and is situated as follows: 10.68 meters (35.0 feet) north of the north curb line of Chicago Avenue, 12.83 meters (42.1 feet) west of the west side of the brick machine shops building, 17.35 meters (56.9 feet) east of the east wall of the scale house, 44.10 meters (144.7 feet) east of the east wall of the pump room, and 14.75 meters (48.4 feet) south of the south wall of the boiler room and brick coal sheds.

Chicago latitude (Cook County, Ill., C. H. Sinclair, 1891).—Marked by a brick pier 1.27 meters (4.2 feet) due west of the longitude station of 1891, described above.

Cumberland azimuth (Winnebago County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name on the east side of the Chicago, Milwaukee & St. Paul Railway track, about 2⅞ miles north of Rockford, 10 yards west of the Rockford Country Club golf links, 435 yards north of a road crossing, this road being an extension of North Main Street, Rockford, on the east bank of the first cut north of the above road crossing, and 5.36 meters (17.6 feet) east of the east and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, 11a. The reference mark is on the same side of the track, near the fence line, 7.96 meters (26.12 feet) from the station in azimuth 295° 00′. The elevation of the station mark is 224.435 meters (736.33 feet) and of the reference mark 223.648 meters (733.75 feet).

Dewitt azimuth (Winnebago County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name about 2¾ miles south of Rockford, on the east side of the Chicago, Burlington & Quincy Railroad track, 80 yards north of a wagon road crossing, 100 yards north of a semaphore signal, and 6.82 meters (22.4 feet) east of the east and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track near the fence line, 7.27 meters (23.9 feet) from the station in azimuth 242° 56′. The elevation of the station mark is 223.259 meters (732.48 feet).

Fairmount (U. S. L. S.) latitude (Vermillion County, Ill., G. Y. Wisner, 1880).—Distant 1.06 meters (3.5 feet) or 0″.03 of latitude north and 7.96 meters (26.1 feet) east of triangulation station *Fairmount* of the United States Lake Survey, in the SE. ¼ SE. ¼ sec. 8, T. 18 N., R. 13 W., Vance Township, about 2½ miles southwest of Fairmount, a station on the Wabash Railway. The triangulation station is marked by a stone post set 3 feet below the surface with a surface stone set directly over it. Three stone reference posts are set along the north side of the road just south of the station as follows: One S. 67° 43′ E, distant 24.6 meters (81 feet); one S. 2° 40′ W., distant 9.1 meters (30 feet), and one S. 65° 22′ W., distant 22.9 meters (75 feet) from the triangulation station. The southeast corner of section 8 is S. 86° 50′ E. and is distant 278.5 meters (914 feet). The latitude station is marked by an oak post, 19 inches in diameter.

Fred azimuth (Lee County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name about 1 mile south of Scarboro, on the west side of the Chicago, Milwaukee & St. Paul Railway track, 30 yards south of a sign marked "Station 1 mile," 100 yards east of R. J. Herman's barn, and just north of where a lane from a wood lot back of a barn crosses the track. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on

For notes in regard to marking of stations see p. 130.

the opposite side of the track near the fence line, 9.84 meters (32.3 feet) from the station in azimuth 264° 39′. The elevation of the station mark is 249.344 meters (818.06 feet).

Galena (U. S. L. S.) longitude (Jo Daviess County, Ill., S. W. Robinson, 1873).—No description. The station is 18″.42 west of the section corner at the intersection of the fourth principal meridian with the State line between Wisconsin and Illinois. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 762.)

Galena (U. S. L. S.) latitude (Jo Daviess County, Ill., S. W. Robinson, 1873).—No description. The station is 316″.60 south of the section corner at the intersection of the fourth principal meridian with the State line between Wisconsin and Illinois. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 748.)

Gallatin azimuth (Ogle County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name about 1½ miles south of Holcomb, on the west side of the Chicago, Burlington & Quincy Railroad track, 75 yards north of a road crossing, ⅜ mile south of a sign marked "Holcomb station 1 mile," on the bank of a cut near the fence line and 4.59 meters (15.1 feet) west of the west and nearest rail. The station, underground, and reference marks are bronze tablets, set in concrete as described in notes 1a, 7a, 11a. The reference mark is on the same side of the track, near the fence line, 14.83 meters (48.7 feet) from the station, in azimuth 264° 54′. The elevation of the station mark is 270.177 meters (886.41 feet) and of the reference mark 269.574 meters (884.43 feet.)

Garner azimuth (Fayette County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name about 1 mile north of the railroad station at Vandalia, on the west side of the Illinois Central Railroad track, 30 yards southwest of the signposts marked "Yard limit" and "Station 1 mile," ¼ mile north of the fourth road crossing south of Vera, and 15.65 meters (51.3 feet) west of the west and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track, near the fence line, 23.76 meters (78.0 feet) from the station in azimuth 28° 24′. The elevation of the station mark is 159.440 meters (523.10 feet) and of the reference mark 158.688 meters (520.63 feet).

Kerrick azimuth (McLean County, Ill., E. C. States, 1920, 1921).—Identical with the traverse station of the same name about 1 mile south of Kerrick, on the west side of the Illinois Central Railroad track, ¼ mile south of the first road crossing south of Kerrick, on the bank of a cut, and 4.86 meters (15.9 feet) west of the west and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track, near the fence line, 23.94 meters (78.5 feet) from the station in azimuth 92° 27′. The elevation of the station mark is 266.444 meters (874.16 feet) and of the reference mark 266.178 meters (873.29 feet).

Latham azimuth (Winnebago County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name at Latham Park, 4 yards north of the north end of the railroad station, on the east side of the Chicago, Milwaukee & St. Paul Railway track, 25 yards northwest of the northwest corner of a large ice house, 80 yards north of the section toolhouse, and 2.07 meters (6.8 feet) east of the east and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the opposite side of the track, just north of the northwest corner of the station platform, 13.86 meters (45.5 feet) from the station in azimuth 309° 13′. The elevation of the station mark is 220.974 meters (724.98 feet) and of the reference mark 220.701 meters (724.08) feet.

Leach azimuth (Fayette County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name about 3 miles north of Ramsey, on the east side of the Illinois Central Railroad tracks, 3 yards southwest of section A-14 toolhouse, 18 yards northeast of milepost 706, and 4.15 meters (13.6 feet) east of the east and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track near the fence line, 22.57 meters (74.0 feet) from the station, in azimuth 259° 12′. The elevation of the station mark is 197.539 meters (648.09 feet) and of the reference mark 197.698 meters (648.61 feet).

Macon azimuth (Macon County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name at Macon, on the east side of the Illinois Central Railroad track, in the south end of the railroad station platform, 0.73 meter (2.4 feet) north of the north edge of a sidewalk, 28.65 meters (94.0 feet) south of the southeast corner of the railroad station, and 3.29 meters (10.8 feet) east of the east and nearest rail. The station and underground marks are bonze tablets set in concrete, as described in notes 1a and 7a, and the reference mark is a bronze tablet set in the north abutment of a concrete culvert. The reference mark is on the opposite side of the track, 13.87 meters (45.5 feet) from the station, in azimuth 100° 59′. The elevation of the station mark is 220.023 meters (721.86 feet) and of the reference mark 219.978 meters (721.71 feet).

Mattoon longitude (Coles County, Ill., E. P. Austin, 1869).—On the north side of the West Side School grounds on level ground about ⅜ mile north-northwest of the railroad crossing. The station is marked by a block of sandstone, 12 inches square and 3½ feet long, a copper bolt 1 inch in diameter being placed in the center and marked with a cross. Due south of this stone and about 375 feet distant, also in the school grounds, is a similar stone with a cross cut in the copper bolt marking the meridian. The stone marking the station is inscribed "N. U. S. C. S. 1869 S," and the one marking the meridian is inscribed "N. U. S. C. S. S."

For notes in regard to marking of stations see p. 130.

Mattoon latitude (Coles County, Ill., E. P. Austin, 1869).—Identical with *Mattoon longitude*, described above.

Mendota azimuth (La Salle County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name in the northern part of Mendota, 80 yards north of the Mendota High School and in the school grounds, about 6 yards west of the intersection of Lincoln Avenue and High Street. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of Lincoln Avenue at the edge of the high-school running track, 6.23 meters (20.4 feet) from the station in azimuth 85° 38′. The elevation of the station mark is 231.920 meters (760.89 feet).

Newton latitude (Jasper County, Ill., G. A. Fairfield, 1883).—Marked by a brick pier similar to and about 50 feet due west of *Newton azimuth* station, described below.

Newton azimuth (Jasper County, Ill., F. W. Perkins, 1883).—Identical with the triangulation station of the same name in Smallwood Township, about 4½ miles south of the town of Newton, in the northwest corner of the SE. ¼ SW. ¼ sec. 25, T. 6 N., R. 9 E. The station is marked by a cross in a white marble post inscribed with the letters "U. S. C. & G. S."encased in the foundation of a brick pier which extends about 3 feet both above and below the ground and is capped with a marble slab 2½ inches thick and 16½ inches square, with a small drill hole in the center directly above the cross on the post. The pier is hollow above the top of the post and has openings in the side to allow access to the station mark on the post. Two reference marks, white marble posts similar to the one that marks the staion having an arrow pointing toward the station, are in range in azimuth 89° 59′ at distances of 67.48 meters (221.3 feet) and 459.88 meters (1,508.8 feet), respectively, from the station. The following azimuths and distances are from the station: Southwest corner of section 25, 607.4 meters (1,993 feet), 50° 59′; McMurray's house chimney, about ⅓ mile, 125° 34′; schoolhouse chimney, about ⅔ mile, 133° 39′; Weaver's house chimney, about ¾ mile, 157° 27′; I. Wilson's house, east lightning rod, about ½ mile, 9° 13′.

Olney west base (U. S. L. S.) latitude (Jasper County, Ill., G. Y. Wisner, 1880).—Distant 16.31 meters (53.5 feet) in azimuth 268° 36′ (0″ .01 of latitude north) from Olney west base (U. S. L. S.) triangulation station, which is in Fox Township, in the NW. ¼ NE. ¼ sec. 21, T. 5 N., R. 10 E. The latitude station is marked by an oak post. The triangulation station is marked by a stone post surrounded by a bed of brickwork 3 feet square and 4 feet below the surface of the ground. Two other stones, similar to the station mark, but without the brickwork, are 4 feet below the surface of the ground, one 8.02 meters (26.3 feet) north of the station and the other 8.06 meters 26.4 feet) south. Three stone reference posts are located as follows: Two on the south side of the road north of the triangulation station, one 246.7 meters (809 feet) in azimuth 177° 15′, the other 356 meters (1,168 feet) in azimuth 225° 32′, and the third 302 meters (991 feet) in azimuth 299° 00′. The northeast corner of section 21 is about 727 meters from the station in azimuth 247° 19′.

Ospur azimuth (De Witt County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name on the west side of the Illinois Central Railroad track, in the railroad station platform, 6.30 meters (20.7 feet) southeast of the southeast corner of the railroad station, and 3.56 meters (11.7 feet) west of the west and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track near the fence line, 28.13 meters (92.3 feet) from the station in azimuth 60° 22′. The elevation of the station mark is 221.573 meters (726.94 feet) and of the reference mark 220.915 meters (724.79 feet).

Parkersburg (U. S. L. S.) longitude (Richland County, Ill., P. M. Price, 1879).—In the city of Olney, 37.86 meters (124.2 feet) in azimuth 304° from the high-school building, and 439.77 meters (1,442.8 feet) in azimuth 81° 49′ 04″ from the spire of the Emmanuel Church of the Evangelical Society, and 17,026.22 meters (55,861.2 feet) in azimuth 163° 21′ 24″.6 (3′ 21″.92 of longitude) (13s.461) west from *Parkersburg azimuth* (U. S. L. S.) described below. The station is marked by a stone pier.

Parkersburg (U. S. L. S.) latitude (Richland County, Ill., P. M. Price, 1879).—The zenith telescope was mounted on a heavy oak post 22 inches in diameter sunk 3 feet in the ground, distant 34.68 meters (113.8 feet) in azimuth 92° 16′ 30″ (0″.04 of latitude north) from *Parkersburg azimuth* (U. S. L. S.), described below.

Parkersburg (U. S. L. S.) azimuth (Richland County, Ill., A. R. Flint, 1879).—Identical with the triangulation station of the same name, which is about 11 miles south of Olney, on a rise of ground about 80 feet above the general level, in sec. 30, T. 2 N., R. 11 E. The station is marked by 2 stone posts, one at the surface and the other directly beneath it. There are four stone reference posts at the following distances and azimuths from the station: 48.7 meters (160 feet), 290° 06′; 74.0 meters (243 feet), 111° 33′; 44.7 meters (147 feet), 263° 22′; and 93.0 meters (305 feet), 208° 40′; the first two are on the south side of the road north of the station, and the third on the north side of the same road. The northwest corner of section 30 is 848.5 meters (2,784 feet) in azimuth 124° 20′ 14″ from the station.

Rock Island (U. S. L. S.) longitude (Rock Island County, Ill., C. F. Powell, 1878).—No description. The station is 05″.90 of longitude east of the southeast corner of the guard house. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 763.)

Rock Island (U. S. L. S.) latitude (Rock Island County, Ill., C. F. Powell, 1878).—No description. The station is 01″.90 of latitude north of southeast corner of guard house. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 751.)

For notes in regard to marking of stations see p. 130.

Rockton azimuth (Winnebago County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name which is at Rockton, about 15 yards east of the Chicago, Milwaukee & St. Paul Railroad station, 40 yards north of a siding switch signal, which is southeast of the railway station, 140 yards south of a coal tipple, and 6.81 meters (22.3 feet) west of the west and nearest rail. The station and underground marks are bronze tablets set in concrete, as described in notes 1a and 7a. The reference mark is a bronze tablet set in the edge of the concrete sidewalk. The reference mark is on the same side of the track, 2.69 meters (8.8 feet) from the station in azimuth 235° 23′. The elevation of the station mark is 227.647 meters (746.87 feet), and of the reference mark 227.486 meters (746.34 feet).

St. Anne (U. S. L. S.) latitude (Kankakee County, Ill., William Bowie, 1908).—Marked by a wooden pier 4½ feet high, distant 8.357 meters (27.42 feet) or 0″.09 of latitude north of and in azimuth 109° 44′ from *St. Anne azimuth*, described below.

St. Anne (U. S. L. S.) azimuth (Kankakee County, Ill., William Bowie, 1908).—Identical with the triangulation station of the same name of the United States Lake Survey, in the town of St. Anne, on the Chicago & Eastern Illinois Railroad, in sec. 4, T. 29 N., R. 12 W. The station is in the high-school grounds, just to the south of the walk to the entrance of the building, and about 10 meters inside the edge of the grounds. It is marked by a stone post about 4 inches underground. The reference mark, a dressed stone marked "U. S.", projecting about 6 inches above the ground, is 20.190 meters (66.24 feet) from the station in azimuth 20° 42′. Other distances and azimuths are as follows: St. Anne high school, southeast corner, 29.644 meters (97.26 feet) 124° 14′; northwest corner of Presbyterian Church, 60.370 meters (198.06 feet) 250° 27′. A Coast and Geodetic Survey magnetic station, marked by a stone with a drill hole, 30 inches below the surface of the ground, and surmounted by a column of cement 2 feet long and 15 inches in diameter, set flush with the surface of the ground, with a 10d nail in the center of a drain pipe centered in the cement, is 112.09 meters (367.75 feet) from the station in azimuth 91° 04′ 30″.

Springfield longitude (Sangamon County, Ill., E. P. Austin, 1869; 1882).—In the west side of the grounds of the new statehouse, the center of the dome of which is 54.25 meters (178.0 feet) from the station in azimuth 270° 18′ 22″ (0″.01 of latitude, south, and 2″.28 of longitude east). The station is marked by a copper bolt in a block of limestone, 14 inches square and 7 feet long, sunk in the ground for its whole length, and surmounted by another stone, 15 by 18 inches and 2 feet high. The meridian is marked by a similar stone with a copper bolt, and is 110.49 meters (362.5 feet) due north of the station, just within the inclosure.

Springfield latitude (Sangamon County, Ill., E. P. Austin, 1869).—Marked by a temporary wooden pier about 10 feet east of *Springfield longitude*, described above.

Tonica azimuth (La Salle County, Ill., E. C. States, 1920).—Identical with the traverse of the same name about 1 mile north of Tonica railroad station, on the west side of the Illinois Central Railroad track, ¾ mile north of the stock pens, 30 yards north of the north switch signal for a siding, and 5.16 meters (16.9 feet) west of the west and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the opposite side of the track near the fence line, 20.63 meters (67.7 feet) from the station in azimuth 260° 45′. The elevation of the station mark is 205.340 meters (673.69 feet) and of the reference mark 205.033 meters (672.68 feet).

Urbana longitude (Champaign County, Ill., G. W. Myers and G. C. Comstock, 1898).—The 3-inch transit pier of the University of Illinois Observatory, 435.19 meters (1,427.8 feet) or 14″.11 of latitude south and 103.63 meters (340.0 feet) or 4″.38 of longitude east of the center of the east tower of *Illinois Industrial University* (*U. S. L. S.*).

Urbana latitude (Champaign County, Ill., W. C. Brenke, 1899).—Identical with *Urbana longitude*, described above.

Vinson azimuth (La Salle County, Ill., E. C. States, 1920).—Identical with the traverse station of the same name about 1½ miles north of La Salle, 15 yards northwest of the intersection of St. Vincents Avenue and Edwards Street, and 6.30 meters (20.7 feet) west of the center of St. Vincents Avenue. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the opposite side of the street, 14.39 meters (47.2 feet) from the station in azimuth 262° 16′. The elevation of the station mark is 192.928 meters (632.96 feet) and of the reference mark 193.038 meters (633.33 feet).

Willow Springs (U. S. L. S.) longitude (Cook County, Ill., D. W. Lockwood, 1876).—Near the railway station Mount Forest, on the Chicago & Alton Railway and distant 1,370.1 meters (4,495 feet) north and 1,076.2 meters (3,531 feet) or 46″.57 of longitude west from *Willow Springs, U. S. L. S. azimuth*, described below. The station is marked by a stone pier.

Willow Springs (U. S. L. S.) latitude (Cook County, Ill., A. R. Flint, 1874).—Distant 10.78 meters (35.4 feet) or 0″.35 of latitude north and 4.54 meters (14.9 feet) west from *Willow Springs U. S. L. S. azimuth* described below. The station is marked by a solid oak stump about 3 feet in diameter.

Willow Springs (U. S. L. S.) azimuth (Cook County, Ill., A. R. Flint, 1874).—Identical with triangulation station *Willow Springs*, of the United States Lake Survey, in the NW. ¼ sec. 3, Palos Township, about 1 mile southeast of Mount Forest station, on the Chicago & Alton Railway. The station is marked by a stone post set with its upper end 4 feet below the surface of the ground, with a second stone post set directly over it as a surface mark. Two reference stones are set, one S. 49° 46′ W. distant 38.20 meters (125.3 feet) and the other N. 51° 53′ W. distant 38.78 meters (127.2 feet) from the station.

For notes in regard to marking of stations see p. 130.

INDIANA

Aman azimuth (St. Joseph County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, about ¾ mile south of Lakeville, on the west bank of the first cut south of Lakeville, 70 yards south of N. Eldred's residence, 25 yards from Lakesville-Lapaz highway, 165 yards south of a road crossing, 46.740 meters (153.35 feet) west of the west and nearest rail. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. Reference mark is on the same side of the track, 29.47 meters (96.69 feet) from the station in azimuth 331° 48′.

Boon azimuth (Cass County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, about 1¼ miles north of Lucerne, on the west side of the track, ½ mile north of milepost T. H. 125, 500 yards south of the first road crossing north of Lucerne railroad station, 330 yards south of A. W. Cary's residence, 4.810 meters (15.78 feet) west of the west and nearest rail. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. Reference mark is on the same side of the track, 9.270 meters (30.41 feet) from the station in azimuth 132° 50′.

Butler longitude (Dekalb County, Ind., C. H. Sinclair, 1891).—In the town of Butler, on the grounds of the Lake Shore & Michigan Southern Railway, about 80 meters north and a little west of the passenger station. It is 40 meters west of the west side of East Avenue, and 8.5 meters (28 feet) south of the south side of Depot Street, opposite the lumber yard of A. J. Mason & Son (lot 118), and 8.5 meters (28 feet) east of a lumber shed. The station is 60.53 meters (198.6 feet) north and 144.03 meters (472.5 feet) west from a tank; 241.26 meters (791.5 feet) south and 4.11 meters (13.5 feet) east from a Lutheran Church spire; 134.58 meters (441.5 feet) south and 75.69 meters (248.3 feet) west from the Disciples' Church tower, 104.30 meters (342.2 feet) south and 184.13 meters (604.1 feet) west from the Church of God cupola, and 203.24 meters (666.8 feet) south and 385.20 meters (1,263.8 feet) west from the Methodist Episcopal Church tower. Station marked by a brick pier, 16 by 25 inches and 5½ feet long, projecting 3 feet above surface of ground.

Butler latitude (Dekalb County, Ind., C. H. Sinclair, 1891).—Distant 1.28 meters (4.2 feet) due west of *Butler longitude*, described above. Marked by a brick pier 17 inches square and 5½ feet high, projecting 3 feet above surface of ground.

Carlisle (U. S. L. S.) latitude (St. Joseph County, Ind., W. Bowie, 1908).—Station is 12.63 meters (41.4 feet) or 0″.41 south and 22.86 meters (75.0 feet) east of *Carlisle (U. S. L. S.) azimuth*, described below. Marked by a wooden pier about 4½ feet high.

Carlisle (U. S. L. S.) azimuth (St. Joseph County, Ind., W. Bowie, 1908).—Identical with the triangulation station of the United States Lake Survey of the same name, about 2 miles southwest of Carlisle, on the highest point of the wooded hill known as Jarrett's Hill, on the property of Clark Rodgers, who lives about 150 meters north of the station. Station is in the SE. ¼ sec. 11, T. 37 N., R. 1 W., at an elevation of 332.2 feet above the mean level of Lake Michigan. The station is marked by a stone post. There are two stone reference posts, one S. 86° 16′ E., distant 14.4 meters (47.2 feet) and the other S. 18° 24′ W., distant 8.7 meters (28.5 feet). The corner of sections 2, 3, 10, 11 is N. 39° 09′ 30″ W., distant 1,640.9 meters (5,383.5 feet). Another reference mark is Carlisle magnetic station, which is 80 meters N. 40° E. from the latitude station and is marked by a stone with drill hole set 15 inches below surface of the ground, and a surface mark consisting of a dressed stone 6 inches square and 12 inches long projecting 6 inches above ground. In top of the stone is a drill hole and the letters "U. S."

Cassedy azimuth (Howard County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, about 3½ miles north of Kokomo, on the west side of the railroad track, ¼ mile north of milepost C–164, ⅜ mile south of County Line interurban station, 2.820 meters (9.25 feet) west of the west and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the opposite side of the track, 15.145 meters (49.69 feet) from the station in azimuth 241° 25′.

Clay azimuth (Bartholomew County, Ind., C. A. Mourhess, 1920).—Identical with the traverse station of the same name, in the northern part of Columbus, on land owned by Francis Overstreet, on a prolongation of the west curb line of Jackson Street, at a point where the street has no curb and about 150 yards north of the point where the main line of the Pennsylvania Railroad leaves Jackson Street and 16.475 meters (54.05 feet) east of the east and nearest rail of the main line. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. Reference mark is just outside the concrete walk on the opposite side of the street, 10.46 meters (34.3 feet) from the station in azimuth 124° 43′.

Dubois azimuth (Johnson County, Ind., C. A. Mourhess, 1920).—Identical with the traverse station of the same name, in the town of Franklin, on the west side of the Pennsylvania Railroad, 12.59 meters (41.3 feet) from the west and nearest rail, 20 yards west of the point where the Madison highway crosses the railroad, and between the railroad and the interurban line, 6.90 meters (22.6 feet) from the east rail of the interurban, and 3 yards south of interurban section house No. 3. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. Reference mark is on the opposite side of the railroad and near the street, 19.44 meters (63.8 feet) from the station in azimuth 216° 19′.

Hancock azimuth (Hamilton County, Ind., C. A. Mourhess, 1920).—Identical with the traverse station of the same name, about 3 miles south of Noblesville, on the west side of the Lake Erie & Western Railroad right

For notes in regard to marking of stations see p. 130.

of way, 8 yards north of a road crossing, and 5.86 meters (19.2 feet) west of the west and nearest rail. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a and 11a. Reference mark is on the same side of the track and near the right of way fence line, 8.305 meters (27.25 feet) from the station in azimuth 140° 30′.

Henry azimuth (Hamilton County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, about ¼ mile south of Cicero, on the east side of the Lake Erie & Western Railroad, 14 telegraph poles north of semaphore signal M-27. The residence of Mr. Sealy is 30 yards east of the station. The station is 4.165 meters (13.66 feet) east of the east and nearest rail. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. Reference mark is north of the station, on the east side of the track, 8.67 meters (28.4 feet) from the station in azimuth 197° 44′.

Indianapolis longitude (Marion County, Ind., F. H. Parsons, 1882).—In the grounds of the State capitol building, 0.29 meter (1 foot) or 0″.01 north, and 54.25 meters (178.0 feet) or 2″.28 west of the center of the dome of capitol. Instrument mounted on 2 posts, 8 by 15 inches by 8½ feet, set 5½ feet in the ground, and about 20 inches apart.

Indianapolis latitude (Marion County, Ind., F. H. Parsons, 1882).—Identical with *Indianapolis longitude*, described above.

Jackson azimuth (Tipton County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, 3 miles north of Tipton, on the west side of the track, about 220 yards north of Jackson elevator, about 130 yards north of a road crossing which leads to Jackson interurban station, 30 yards southwest of W. H., Ansbury's residence, 7.115 meters (23.34 feet) west of the west and nearest rail. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a and 11a. Reference mark is on the opposite side of the track, 18.11 meters (59.4 feet) from the station in azimuth 285° 57′.

Joseph azimuth (Marshall County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, 2 miles south of Plymouth, on the west side of the track, ¼ mile south of milepost T. H. 158, 200 yards east of J. M. Black's barn, 25 yards north of the lane leading from said barn, 6.355 meters (20.85 feet) west of the west and nearest rail. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a, The reference mark is on the same side of the track, 13.195 meters (43.29 feet) from the station in azimuth 72° 36′.

Leonda azimuth (Cass County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, ¾ mile north of the Vandalia Railroad depot, 6 yards west of the center of Michigan Avenue, in the west end of the concrete sidewalk, 3.525 meters (11.56 feet) north of the north and nearest rail of the Michigan division track of the Vandalia Railroad. The station is marked by a bronze tablet set in the concrete walk. There is no reference mark.

Logansport longitude (Cass County, Ind., F. H. Parsons, 1883).—In Logansport, in the grounds southwest of the Central High School building, between Broadway and Market, Thirteenth and Fourteenth Streets, 17.52 meters (57.5 feet) south and 15.91 meters (52.2 feet) west of the center of the clock tower over main entrance of school building. The station is marked by two pieces of timber sunk 4½ feet deep and sawed off level with the surface of the ground.

Logansport latitude (Cass County, Ind., F. H. Parsons, 1882).—Identical with *Logansport longitude*, described above.

O. & M. longitude (Clark County, Ind., O. B. French, 1915).—Distant 5.650 meters (18.54 feet) or 0″.23 of longitude east and 0.229 meter (0.75 foot) or 0″.01 of latitude north of *O. & M. azimuth*, described below.

O. & M. latitude (Clark County, Ind., O. B. French, 1915).—Identical with *O. & M. longitude*, described above.

O. & M. azimuth (Clark County, Ind., E. H. Pagenhart, 1914).—Identical with the triangulation station of the same name, about 3 miles north of Charleston, 4 miles south of Otisco, about 300 meters west of the Baltimore & Ohio Southwestern Railroad. The station is 150 meters north of the schoolhouse No. 9 of Charleston Township, and 50 meters northwest of a large beech tree standing at the head of a ravine close to the road, on land belonging to Mrs. Madeline Flinchbaugh. The ground to the westward slopes down to a narrowing ridge, and to the northeastward spreads out into a flat field, the highest point of which is about 100 meters north of the station. Station is marked according to notes 1a and 7a, with three stone posts serving as reference marks, at the following distances and directions from the station: 1.75 meters (5.7 feet) north; 1.82 meters (6.0 feet) east; and 1.87 meters (6.1 feet) south. Reference posts have arrows pointing to station.

Osborn azimuth (Martin County, Ind., G. A. Fairfield, 1886).—Identical with the triangulation station of the same name, about 4 miles south and 1 mile east of Scotland, in the northwest corner of the SW. ¼ NE. ¼ sec. 20, T. 5 N., R. 4. W., on top of a hill on land owned by James Osborn. There is a road which makes a right-angled bend to the north a short distance southwest of the station and another right-angled bend to the east just northwest of the station. The home of H. T. Sumerville is on the west side of the north-and-south section of this road, about 100 meters west of the road. The station is marked by a cross in the top of a stone post, 6 inches square and 30 inches long, inscribed with the letters "U. S. C. & G. S." The underground mark is an earthenware pyramid with edges about 6 inches long, marked with the raised letters "U. S. C. S." The reference marks, stone posts 6 inches square and 30 inches long, are at the following distances and magnetic bearings from the station: Near the fence east of the station 30.5 meters (100 feet) N. 70° 30′ E.; near the

For notes in regard to marking of stations see p. 130.

corner of the field where the two fence lines intersect 56.2 meters (184 feet) S. 43° 45′ E.; and near the fence line west of the station 65.4 meters (215 feet) S. 23° 30′ W.

Penn azimuth (Howard County, Ind., E. C. States, 1920).—Identical with the traverse and triangulation station of the same name, at Kokomo Junction, just west of North Main Street, on the south side of the Pennsylvania Railroad, also on the east side of the Lake Erie & Western Railroad, where the Pennsylvania Railroad crosses it, 18 yards northwest of Kokomo Junction station, 1.715 meters (5.63 feet) south of the south and nearest rail on the Pennsylvania Railroad, 2.850 meters (9.35 feet) east of the east rail of the Lake Erie & Western Railroad. The station and underground marks are bronze tablets set in concrete, as described in notes 1a and 7a. There is no reference mark.

Porter azimuth (Fulton County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, about 2¾ miles north of Delong, on the east side of the track, ⅜ mile south of milepost T. H. 146 200 yards northwest of Mrs. Frank Hawk's residence, 11.22 meters (36.8 feet) east of the east and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track, near the fence line, 4.85 meters (15.9 feet) from the station in azimuth 314° 30′.

Reizin latitude (Ripley County, Ind., W. B. Fairfield, 1889).—Marked by a wooden pier 0.705 meter (2.32 feet) or 0.″02 south and 8.67 meters (28.4 feet) east from *Reizin azimuth*, described below.

Reizin azimuth (Ripley County, Ind., A. T. Mosman, 1889).—Identical with the triangulation station of the same name, about 1 mile east of Elrod and about 300 meters south of the road from Elrod to Dillsboro, on land belonging to Joseph Beall, about 12 meters east of the fence line between his land and that of Reizin Johnson. Station is marked by a nail set in concrete at the center of the top of a tile 6 inches in diameter and 2 feet long. Tile is filled with concrete and set flush with the surface of the ground. Underground mark is an earthenware pyramid set about 2½ or 3 feet below the surface of the ground. There are four reference marks similar to mark at the station, except the tiles are only 4 inches in diameter. They are at the following distances and directions from the station: 1.82 meters (6.0 feet) north; 1.84 meters (6.0 feet) east; 1.82 meters (6.0 feet) south and 11.9 meters (39.0 feet) west. The west reference mark is in the fence line mentioned above. A lone hickory tree, marked with a blaze and triangle of nails, is 55.3 meters (181 feet) N. 24° 11′ E. from the station.

Sherman azimuth (Marion County, Ind., C. A. Mourhess, 1920).—Identical with the traverse station of the same name, at the northeast corner of Troy Street and Sherman Drive, 4.03 meters (13.2 feet) from the southeast corner of sidewalk. Station is marked by a bronze tablet set in the concrete road. Reference mark is a bronze tablet set in concrete, as described in note 11a. It is 0.3 meter (1 foot) north of the sidewalk on Troy Street, 9.475 meters (31.09 feet) from the station in azimuth 287° 28′. The center of a manhole in 18.315 meters (60.09 feet) from the station in azimuth 141° 32′, and the top of a fire plug is 6.50 meters (21.3 feet) from it in azimuth 353° 21′.

Tripp azimuth (Jennings County, Ind., C. A. Mourhess, 1920).—Identical with the traverse station of the same name, about 1 mile southwest of North Vernon, 100 meters southeast of the North Vernon-Seymour pike, on land owned by Thomas Noon, about 100 meters south of his house and 100 meters east of an old barn, about 10 meters south of the north line of sec. 4, T 6 N., R. 8 E. Station, underground, and reference marks are bronze tablets set in concrete as described in notes 1a, 7a, and 11a. The reference marks are in the fence line to the north of the station. The first, in which the top of the bronze cap has been cut off, leaving the stem in the concrete, is distant 34.56 meters (113.4 feet) in azimuth 110° 38′, and the second is distant 29.93 meters (98.2 feet) in azimuth 257° 08′. A large concrete post at the eastern end of a row of posts is distant about 100 meters in azimuth 98° 38′, and William Day's house is distant about 150 meters in azimuth 127°, and Noon's house 193°.

Union City longitude (Randolph County, Ind., C. H. Sinclair, 1891).—On a vacant lot on the south side of Pearl Street, west of Union Street and northeast of the Bee Line Railroad depot, between Wright's furniture store on the east and Stewart's grocery on the west. The station is 102.95 meters (337.8 feet) south and 547.12 meters (1,795.0 feet) east of the schoolhouse cupola; 52.35 meters (171.8 feet) south and 443.65 meters (1,455.5 feet) east of the tower of the Methodist Episcopal Church; 93.21 meters (305.8 feet) south and 410.36 meters (1,346.3 feet) east of the Disciples Church spire; and 68.83 meters (225.8 feet) north and 58.80 meters (192.9 feet) west of the State line post in railroad crossing. Station marked by a brick and cement pier.

Union City latitude (Randolph County, Ind., C. H. Sinclair, 1891).—Marked by a brick and cement pier, 1.28 meters (4.2 feet) due west of *Union City longitude*, described above.

Vincennes longitude (Knox County, Ind., Edwin Smith, 1881).—In the courthouse yard, 14.78 meters (48.5 feet) or 0.″48 of latitude north and 55.58 meters (182.3 feet) or 2.″30 of longitude east of the cupola of the clock tower of the courthouse, about 6 meters (20 feet) from the iron fence along Broadway Street, 42.7 meters (140 feet) from northeast corner of courthouse, and 35.3 meters (115.7 feet) from its southeast corner. The station is marked by a cross in the top of a short stone post projecting 2 or 3 inches above the surface of the ground. On either side of this, east and west, are longer stone posts projecting about 3 feet above the ground and used for supporting the instrument. The two high posts are inscribed as follows: "U. S. Coast and Geodetic Survey, 1881."

Vincennes latitude (Knox County, Ind., Edwin Smith, 1881).—Identical with *Vincennes longitude* described above.

For notes in regard to marking of stations see p. 130.

Weed Patch latitude (Brown County, Ind., G. A. Fairfield, 1889).—Marked by a solid wooden pier 23.689 meters (77.72 feet) due west of *Weed Patch azimuth*, described below.

Weed Patch azimuth (Brown County, Ind., G. A. Fairfield, 1889).—Identical with the triangulation station of the same name, about 3 miles south-southeast of Nashville, on Weed Patch Hill, claimed by some, though incorrectly, to be the highest point of land in the State. The station is in the northern part of the SW. ¼ SE. ¼ SE. ¼ sec. 32, T. 9 N., R. 3 E., in a peach orchard belonging to Rufus W. Reddick, just north of the road running east and west across the top of the hill. Station is marked by a cross in the top of stone post 6 inches square and 30 inches long, inscribed with the letters "U. S. C. & G. S." Underground mark is an earthenware pyramid with edges about 6 inches long, marked with the raised letters "U. S. C. S." The reference marks, stone posts 6 inches square and 30 inches long, are at the following distances and magnetic bearings from the station: 32.7 meters (107 feet) S. 37° 44′ E.; near the corner of a log barn, 37.8 meters (124 feet) S. 14° 00′ W.; and near an apple tree, 15.0 meters (49 feet) N. 7° 02′ W.

Western azimuth (Marion County, Ind., E. C. States, 1920).—Identical with the traverse station of the same name, in a cultivated field near a curve and west of the Lake Erie & Western Railroad right of way, 60 yards south of a signal or telephone box on the right of way, and 18.312 meters (60.10 feet) west of the west rail. Station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is in the right-of-way fence line, 12.403 meters (40.69 feet) from the station in azimuth 279° 52′.

Williams azimuth (Harrison County, Ind., Edwin Smith, 1881).—Identical with the triangulation station of the same name, on a hill near Bridgeport, on land belonging to Frank Williams, on the highest ground of a cultivated field south of his house. The station is in the SW. ¼ SE. ¼ sec. 12, T. 4 S., R. 5 E., and is marked by a cross on the top of a stone post 4 inches square and 30 inches long, inscribed with the letters "U. S. C. & G. S." The underground mark is a copper nail in the stopper of a glass bottle filled with ashes. The reference marks, stone posts similar to the station mark, are 1.83 meters (6.0 feet) from the station, north, east, and south (magnetic), respectively.

IOWA

Burlington longitude (Des Moines County, Iowa, E. P. Austin, 1869).—On South Hill, public square, in the city of Burlington. The station is marked by a block of stone 15 by 18 inches by 2 feet high, resting on a second block of stone 14 inches square, 4 feet long, sunk in the ground its entire length. The upper block was secured to the lower block by plaster of Paris. A similar stone was set in the meridian south of the point and was marked by a ¾-inch bolt of gun metal 8 inches long with a cross cut in the center.

Burlington latitude (Des Moines County, Iowa, E. P. Austin, 1869).—Marked by a block of stone 14 inches square and 4 feet long, about 10 feet due east of *Burlington longitude*, described above.

Cedar Falls latitude (Black Hawk County, Iowa, J. E. Hilgard, 1869).—In the northeastern part of the town, a few rods southeast of the Illinois Central Railroad station, 26.2 meters (86 feet) from Charles Overman's warehouse, 22.3 meters (73 feet) from Booth's warehouse, and 28.3 meters (93 feet) from Culver's warehouse. The station is also 28.59 meters (93.8 feet) from the northeast corner stone of two streets (unnamed in 1869) and 2.7 meters (9 feet) north of the north side of the street that runs east and west. The station is marked by an earthen crock, 10 inches in diameter, with a bottle in the center, buried about 2 feet below the surface of the ground.

Des Moines longitude (Polk County, Iowa, E. P. Austin, 1869).—In the courthouse grounds on the west side of the Des Moines River. The station is marked by a block of stone, 14 by 18 inches, and 4½ feet long, sunk into the ground to within 4 inches of the top and filled in with sand. Into this stone, the top of which was lettered "U. S. C. S. 1869," was placed a copper bolt 8 inches long and ¾ inch in diameter, marked with a cross. On the opposite side of the courthouse yard is a similar stone, about 8 inches square and 3½ feet long and marked by a copper bolt with cross. This stone is 90.10 meters (295.6 feet) due north of the station. The center of the courthouse dome is 39.01 meters (128.8 feet) or 1″.27 of latitude north and 18.56 meters (60.9 feet) or 0″.81 of longitude west of the station.

Des Moines latitude (Polk County, Iowa, E. P. Austin, 1869).—The instrument was mounted on a tripod of 6 by 6 inch pine scantling, sunk to a depth of 4 feet and filled around with gravel. It is 2.96 meters (9.7 feet) due east of *Des Moines longitude*, described above.

Sherrills Mound latitude (Dubuque County, Iowa, J. E. Davies, 1880).—The instrument was mounted about 4.6 meters (15 feet) exactly east of the azimuth station, described below.

Sherrills Mound azimuth (Dubuque County, Iowa, J. E. Davies, 1880).—Near Sherrill, Iowa, on the property of Fitz Witter, 7 meters east of the line fence and near the center of the prominence known as Sherills Mound. Marked by a cross on flint stone 6 by 6 inches on top.

KANSAS

Adams latitude (Wabaunsee County, Kans., F. H. Parsons, 1888).—In the meridian 0″.06 of latitude north of *Adams azimuth*, now lost.

Adams azimuth (Wabaunsee County, Kans., F. D. Granger, 1888).—Lost

Brown latitude (Smith County, Kans., W. H. Burger, 1906).—Identical with *Brown azimuth*, described below.

For notes in regard to marking of stations see p. 130.

Brown azimuth (Smith County, Kans., W. H. Burger, 1906).—Identical with the triangulation station of the same name, about 4 miles east of Smith Center, on the west brow of an elevated ridge and 100 paces east of the northwest corner of NE. ¼ SW. ¼ sec. 20, T. 3 S., R. 12 W., in a field of kaffir corn owned by C. F. Shade, who lives about ⅜ mile to the southwest. The station is 264 feet south of the hedge row on the south side of the east and west half-section line. The underground mark is an earthenware crock, buried about 3 feet below the surface and marked by a drill hole. The station mark is a marble post, 8 inches square and 2½ feet long, placed with its top flush with the ground and having two grooves at right angles and the letters "U. S. C. S." cut in the top.

Chetopah longitude (Labette County, Kans., W. Eimbeck, 1871).—In the open prairie about 100 yards west of the south end of the railroad depot. The station is marked by a 7-foot log, 20 inches in diameter, extending 3 feet above the surface of the ground.

Elk Falls (U. S. G. S.) longitude (Elk County, Kans., R. S. Woodward, 1884).—In the southwest corner of Sixth and Sedgewick Streets, in Elk Falls, about 75 feet west of the railway eating house and about 100 feet south of the Southern Kansas Railway. The station is marked by a brick pier, 2 by 2½ brick lengths in cross section, 3½ feet high, and capped by a dressed sandstone about 19 by 24 inches in cross section and 6 inches thick. The pier rests upon a concrete foundation of a cubic yard of concrete, whose upper surface is about flush with the surface of the ground.

Elk Falls (U. S. G. S.) latitude (Elk County, Kans., R. S. Woodward, 1884).—Identical with *Elk Falls (U. S. G. S.) longitude*, described above.

Ellsworth longitude (Ellsworth County, Kans., G. W. Dean, 1885, 1901).—Near the south side of the city school square, near Douglass Avenue and Second Street. The station is 4.02 meters (13.2 feet) from the northern line of Second Street, 34.793 meters (114.15 feet) from the nearest corner of Douglass Avenue and Second Street, 36.73 meters (120.5 feet) from the west corner of the school building, and 40.0 meters (131 feet) or 1″30 of latitude south and 20.3 meters (6.6 feet) or 0″84 of longitude west from *Ellsworth schoolhouse cupola* The station is marked by a drill hole in a block of marble, 1½ feet long, 7 inches wide, and 6 inches thick, set in the concrete between two limestone piers, each 5 feet long, 10 inches wide, and 7 inches thick.

Ellsworth latitude (Ellsworth County, Kans., E. Smith, 1885).—Identical with *Ellsworth longitude*, described above.

Fort Leavenworth observatory (U. S. L. S.) longitude (Leavenworth County, Kans., E. H. Ruffner, 1871).—(The station was the transit at Fort Leavenworth Observatory). (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 765.)

Fort Scott (U. S. G. S.) longitude (Bourbon County, Kans., R. S. Woodward, 1884).—Near the northeast corner of the courthouse square in Fort Scott. The station is a small drill hole in the capstone of a pier similar to the one at *Elk Falls longitude*, described above. A heavy limestone post, about 4 feet long set with the upper end about flush with the surface of the ground, with a ½-inch drill hole in the top, is 15.691 meters (51.48 feet) N. 8° 06′ W. from the station and a similar stone in the meridian 87.709 meters (287.76 feet) south of the northern stone.

Fort Scott (U. S. G. S.) latitude (Bourbon County, Kans., R. S. Woodward, 1884).—Identical with *Fort Scott (U. S. G. S.) longitude*, described above.

Oswego (U. S. G. S.) longitude (Labette County, Kans., R. S. Woodward, 1884).—In the courthouse yard on the northwest corner of Sixth Avenue and Merchant Street, in Oswego. The station is marked by a pier similar to that at *Elk Falls (U. S. G. S.) longitude*, described above.

Oswego (U. S. G. S.) latitude (Labette County, Kans., R. S. Woodward, 1884).—Identical with *Oswego (U. S. G. S.) longitude*, described above.

Quarry latitude (Harper County, Kans., W. H. Burger, 1906).—Identical with *Quarry azimuth*, described below.

Quarry azimuth (Harper County, Kans., W. H. Burger, 1906).—Identical with the triangulation station of the same name in the SE. ¼ sec. 21, T. 32 S., R. 6 W., and about ⅜ mile west and 150 yards north of the southeast corner of the section. A. Wohlford lives 200 yards south of the station, on the south side of the road, and O. R. Riggins lives ⅜ mile west of the station. The nearest railroad station is Harper, 3 miles north and 3½ miles west. The station is near an old stone quarry and is marked by a copper bolt 4 inches long and ½ inch in diameter set in solid rock, with its upper end 2.15 feet below the surface mark, a cross on the head of the bolt being the center of the station. The surface mark is an old-type station mark set in a 6-inch drain-tile pipe 2 feet long, filled with concrete and set flush with the surface of the ground. Two witness marks are placed, respectively, north and south of the station, about 5 or 6 feet distant, and consist of an iron nail set in a piece of 4-inch drain tile 2 feet long, set flush with the surface and filled with concrete.

Russell southeast base latitude (Russell County, Kans., H. S. Stidham, 1893).—Distant 6.16 meters (20.2 feet) due east from *Russell southeast base azimuth*, no description of which is available.

Russell southeast base azimuth (Russell County, Kans., F. D. Granger and H. S. Stidham, 1893).—Identical with the triangulation station of the same name, no description of which is available.

Salina west base longitude (Salina County, Kans., O. B. French, 1907).—Just north of the Union Pacific Railroad and east of the Standard Oil Co.'s property. The station is 33.54 meters (110.0 feet) north and 0.10

For notes in regard to marking of stations see p. 130.

meter (0.3 foot) east of *Salina west base azimuth*, described below. The station was marked by a concrete pier.

Salina west base latitude (Salina County, Kans., W. C. Hodgkins, 1896).—Distant 7.87 meters (25.8 feet) due east from *Salina west base azimuth*, described below. The station was marked by a stone and brick pier.

Salina west base azimuth (Salina County, Kans., F. D. Granger, 1896, 1922).—Identical with the triangulation station of the same name in the northeast part of Salina, east of the tanks of the Standard Oil Co. The station is marked by the intersection of cross lines on a copper bolt set in a limestone post, 6 inches square and 2 feet long. sunk 2½ feet below the surface of the ground. About 5 inches of earth covers the top of the post. Above this, except for a space of 8 inches square over the post, is a layer of concrete 4 inches thick and 36 inches square, on which rests a limestone block 30 inches square and 10 inches high supporting another limestone 30 inches square and 15 inches high, with beveled top and having a copper bolt with cross lines and a small drill hole sunk into its top as a surface mark. The two blocks are cemented together and are surrounded by a body of concrete several inches thick. The exposed part of the block bears the inscription "U. S. C. & G. Survey 1896." The following distances to references are given: The station is 13.030 meters (42.75 feet) northwest of the line of telegraph poles which follow on the north side of and parallel to the track of the Union Pacific Railroad, and 10 feet east of a north and south fence which marks the eastern limit of ground owned by the Standard Oil Co., 24.1 meters (79 feet) northwest of the north rail of the main track of the Union Pacific Railroad. It is also 24.29 meters (79.7 feet) west of a telegraph pole and 10.73 meters (35.2 feet) a little east of north of the fence corner of the Standard Oil Co.'s property.

Spearville (U. S. G. S.) longitude (Ford County, Kans., R. S. Woodward, 1889).—About 150 feet south of the Atchison, Topeka & Santa Fe Railway, and about 1,000 feet east of the railway station. The station is marked by a brick pier, 2 by 2½ bricks cross section and 3 feet high, resting on a foundation of concrete and capped by a dressed stone 6 by 19 by 24 inches.

Spearville (U. S. G. S.) latitude (Ford County, Kans., R. S. Woodward, 1889).—Identical with *Spearville (U. S. G. S.) longitude*, described above.

Sunflower latitude (Reno County, Kans., W. H. Burger, 1906).—Identical with *Sunflower azimuth*, described below.

Sunflower azimuth (Reno County, Kans., W. H. Burger, 1906).—Identical with the triangulation station of the same name in the SW. ¼ sec. 22, T. 25 S., R. 5 W., on land belonging to Mrs. A. C. Galbreath. The station is on the south brow of the ridge, which terminates just after entering this quarter section from the north. The station is about 6 miles due east from Castleton and is 5 paces south and 51 paces west from the center of the section. The underground mark is a bottle incased in concrete and buried with the mouth about 3 feet below the surface of the ground. The surface and reference marks are similar to those at *Quarry azimuth*. (See p. 182.)

Wallace longitude (Wallace County, Kans., F. H. Parsons and E. Smith, 1885; 1922).—Identical with *Wallace latitude*, described below.

Wallace latitude (Wallace County, Kans., E. Smith, 1885; 1922).—Identical with the triangulation station *Wallace latitude station*, in the northeastern corner of the small park belonging to the Union Railway Co., at Wallace. The station is marked by two limestone piers, each 5 feet long, and set firmly in concrete to a depth of 3 feet below the general surface of the ground. In 1908 a point midway between the piers was marked by a cross in the stone flagging.

Wallace azimuth (Wallace County, Kans., W. H. Burger, 1908; 1922).—Identical with *Wallace latitude*, described above.

KENTUCKY

Bushy Pond latitude (Fulton County, Ky., C. H. Sinclair, 1916).—On the east side of Bushy Pond, just at the top of the high ground 16.0 meters (52.5 feet) or 0″.52 of latitude north and 5.94 meters (19.5 feet) east of boundary stone No. 1 of the Kentucky-Tennessee State line. This boundary stone is of sandstone or limestone, 10 by 10 inches on top and standing about 13 inches above ground. It is marked as follows: On the north side, "Ky."; on the south side, "Tenn."; on the east side "10 M"; and on the west side "No. 1." The latitude station was marked by the stump of a dead tree, 14 inches in diameter, sawed off to support the telescope.

Falmouth longitude (Pendleton County, Ky., E. Goodfellow, 1871–72).—On Coleman's farm near the United States Coast and Geodetic Survey eclipse stations at Falmouth. The station is marked by a drainpipe, 25 inches long and 7¼ inches in diameter, containing a locust post with a copper tack. This pipe was sunk into the ground and surmounted by a locust post with a brass screw driven into it. This post may now have been replaced, at the instance of county authorities, by a stone with a copper bolt in the center. The eclipse station, No. 1, on the first hill north of Falmouth, is marked by a block of sandstone 21 inches square and 7 inches thick, surmounted by a block of sandstone 14 inches square and 28 inches long, the stones being cemented together. The upper stone is marked by a drill hole with a copper bolt and the inscription "U. S. C. S. 1872." The eclipse station, No. 2, at the foot of Main Street, opposite Watson's Hotel, was marked in a manner similar to the longitude station. The following shows the connection between the various stations: Eclipse station No. 1 is 21″.49 of latitude north and 18″.04 of longitude east from the longitude station; eclipse station No. 2 is 4″.22 of latitude north and 8″.91 of longitude east of the longitude station. The courthouse spire is 0″.20 of latitude north and 25″.19 of longitude east from the longitude station.

For notes in regard to marking of stations see p. 130.

Falmouth latitude (Pendleton County, Ky., E. Goodfellow, 1871–72).—Identical with *Falmouth longitude*, described above.

Greensburg longitude (Green County, Ky., F. H. Parsons, 1883).—On ground belonging to the Cumberland & Ohio Railroad Co. just west of the engine house. The station is 9.54 meters (31.3 feet) from the north corner of the engine house, 11.73 meters (38.5 feet) from the south corner, 5.61 meters (18.4 feet) from the south side of the second window, and 5.33 meters (17.5 feet) from the north side of the third window. The instrument was mounted on two wooden piers, each made by spiking two pieces of 2-inch plank together and each extending 4 feet below and 4 feet above the ground. The station was not referred to any geodetic point.

Greensburg latitude (Green County, Ky., F. H. Parsons, 1883).—Identical with *Greensburg longitude*, described above.

Guthrie longitude (Todd County, Ky., F. H. Parsons, 1882).—In a lot belonging to J. L. Rogers, between First and Second Streets and to the westward of Ewing Street. The station is 78.1 meters (256 feet) west and 5.7 meters (19 feet) north of the chimney of the two-story dry goods store owned by Norris & Tate, on Ewing Street, and also occupied as post office. The station is marked by a brick pier, 46 inches by 14 inches, 3 feet in the ground and 3½ feet above.

Guthrie latitude (Todd County, Ky., F. H. Parsons, 1882).—identical with *Guthrie longitude*, described above.

Henderson longitude (Henderson County, Ky., F. H. Parsons, 1882).—In the courthouse grounds, between the courthouse and the city station house. The station is 30.03 meters (98.5 feet) east and 5.32 meters (17.5 feet) south of the courthouse cupola and is marked by two posts, 15 inches by 5 inches by 7 feet, placed 22 inches apart and sunk 3.5 feet in the ground.

Henderson latitude (Henderson County, Ky., F. H. Parsons, 1882).—Identical with *Henderson longitude*, described above.

Hickman longitude (Fulton County, Ky., William Eimbeck, 1877).—On the bluff back of the town of Hickman, in the northwest corner of the courthouse lot. The station is 0″58 of longitude west and 0″19 of latitude north of the northwest corner of the courthouse and is marked by a brick pier.

Hickman latitude (Fulton County, Ky., William Eimbeck, 1877).—Identical with *Hickman longitude*, described above.

Lexington longitude (Fayette County, Ky., F. H. Parsons, 1883).—In the grounds of the Kentucky Agricultural and Mechanical College, to the northward and westward of the college building. The station is 9.11 meters (29.9 feet) west and 9.37 meters (30.7 feet) north of the northwest corner of the college building and 30.33 meters (99.5 feet) from a small tree almost due north. The station is marked by a wooden pier surrounded by stones.

Lexington latitude (Fayette County, Ky., F. H. Parsons, 1883).—Identical with *Lexington longitude*, described above.

London longitude (Laurel County, Ky., F. H. Parsons, 1882).—On land belonging to the Louisville & Nashville Railroad Co., very near the line between the company's land and that of Jarvais Jackson. The station is west of the railroad track, 43.89 meters (144.0 feet) south and 11.78 meters (38.6 feet) or 0″47 west of the chimney on the depot. The station is not marked.

London latitude (Laurel County, Ky., F. H. Parsons, 1882).—Identical with *London longitude*, described above.

Louisa longitude (Lawrence County, Ky., F. H. Parsons, 1883).—On a lot belonging to the estate of Mrs. M. B. Gable, between Franklin, Madison, Main, and Cross Streets. The station is 74.44 meters (244.2 feet) or 2″41 of latitude south and 16.26 meters (53.35 feet) or 0″67 of longitude west of the Southern Methodist Church spire. The marking is unknown.

Louisa latitude (Lawrence County, Ky., F. H. Parsons, 1883).—Identical with *Louisa longitude*, described above.

Louisville longitude (Jefferson County, Ky., Edwin Smith, 1879; 1883).—The station was 392.440 meters (1,287.53 feet) or 12″73 of latitude south and 526.618 meters (1,727.75 feet, or 21″66 of longitude west of the Catholic Cathedral. It has now been destroyed by grading and improvements.

Louisville latitude (Jefferson County, Ky., Edwin Smith, 1879; 1883).—Distant 9.405 meters (30.86 feet) or 0″305 of latitude north and 2.224 meters (7.30 feet) west of *Louisville longitude*, described above. The station has now been destroyed by grading and improvements.

Minerva latitude (Mason County, Ky., A. T. Mosman, 1887).—Distant 7.80 meters (25.6 feet) due west of *Minerva azimuth*, described below.

Minerva azimuth (Mason County, Ky., W. B. Fairfield, 1887).—Identical with the triangulation station of the same name, which is about ¼ mile north of the crossroads where are located the churches, stores, etc., which form the village of Minerva, in a field belonging to George F. Winter, directly across the road from Mr. Wilson's house. The station is marked by a nail set in concrete at the center of a tile 6 inches in diameter and 2 feet long. The tile is filled with concrete and is set flush with the surface of the ground. The underground mark is an earthenware pyramid, set about 2½ or 3 feet below the surface. There are four reference marks similar to the surface mark at the station, except the tiles are only 4 inches in diameter. They are 1.74 meters (5.7 feet) north, 1.86 meters (6.1 feet) east, 1.77 meters (5.8 feet) south and 1.82 meters (6.0 feet) west. The

For notes in regard to marking of stations see p. 130.

following azimuths were taken at the station: Front gable Christian Church (wood), 348° 59′; back gable Methodist Church (brick), 352° 52′; back gable Catholic Church (wood), 355° 26′; front gable Baptist Church (brick), 1° 54′; east chimney Winter's house, 51° 53′; front door Wilson's house, 286° 06′.

Oakland longitude (Warren County, Ky., A. T. Mosman, 1871).—In a field on the west side of a lane leading from the public road to the farm buildings of W. S. Craddock, and about ¼ mile west of the Louisville & Nashville Railroad station at Oakland. A large oak tree is 29.72 meters (97.5 feet) northeast of the station and a lone peach tree, 34.59 meters (113.5 feet) northwest. A magnetic station is 67.91 meters (222.8 feet) due south of the station. The eclipse station is 72.32 meters (237.2 feet) or 2″346 of latitude north and 119.28 meters (391.3 feet) or 4″827 of longitude west. The workshop of the plantation is 44.2 meters (145 feet) due north.

Oakland latitude (Warren County, Ky., A. T. Mosman, 1871).—Identical with *Oakland longitude*, described above.

Paducah longitude (McCracken County, Ky., William Eimbeck, 1877).—In the northwestern corner of the courthouse square. The station is marked by a double-column brick pier and is 17.74 meters (58.2 feet) or 0″58 of latitude north and 28.65 meters (94.0 feet) or 1″16 of longitude west of the courthouse dome.

Paducah latitude (McCracken County, Ky., William Eimbeck, 1877).—Identical with *Paducah longitude*, described above.

Reelfoot Lake latitude (Fulton County, Ky., C. H. Sinclair, 1916).—Distant from the boundary stone on the west side of Reelfoot Lake, near the north end, 16.42 meters (53.87 feet) west and 8.60 meters (28.2 feet) or 0″28 of latitude north. This boundary stone is about 9½ inches square at the top, stands 23 inches out of the ground, and leans to the east. The north side is marked "N. 89° 35′ W. Ky.," the east side "1858–9," the south side "N. 83° 40′ E. Tenn.," the west side being unmarked. The latitude station is marked by three cypress posts, 8 inches in diameter and 6 feet long, sunk 3 feet in the ground.

Richmond longitude (Madison County, Ky., F. H. Parsons, 1883).—In the northeast corner of the campus of the Kentucky Central College. The station is 264.9 meters (869 feet) or 10″82 of longitude east and 205.7 meters (675 feet) or 6″67 of latitude north of a point on the roof of the college building. This point is 2.265 meters (7.43 feet) from the northeast edge of the roof, 2.612 meters (8.57 feet) from the southwest edge, 6.294 meters (20.65 feet) from the southeast edge, and 7.730 meters (25.36 feet) from the northwest edge. The marking of the station is unknown.

Richmond latitude (Madison County, Ky., F. H. Parsons, 1883).—Identical with *Richmond longitude*, described above.

Shelbyville longitude (Shelby County, Ky., G. W. Dean and A. T. Mosman, 1871).—On land forming a part of the Shelby College grounds and about 69 feet north of the eclipse station of 1869. The station is 100.09 meters (328.4 feet) or 4″115 of longitude west and 9.98 meters (32.8 feet) or 0″324 of latitude south of the college dome, 557.0 meters (1,827.4 feet) or 22″90 of longitude west and 234.11 meters (768.1 feet) or 7″59 of latitude north of the courthouse spire, 0″36 of longitude west and 0″74 of latitude north of the eclipse station of 1869. The station is marked by two cedar posts.

Shelbyville latitude (Shelby County, Ky., Francis Blake, 1869; 1871).—A few feet west of *Shelbyville longitude*, described above.

LOUISIANA

Baton Rouge longitude (East Baton Rouge Parish, La., Edwin Smith, 1880).—In the grounds of the United States barracks, 10″33 of latitude south and 6″57 of longitude east of *Baton Rouge Barracks azimuth*, described below. The station is about 100 feet from a china tree to the northeast, 27.31 meters (89.6 feet) west from the east curb of Third Street, about 137 feet from a live oak tree to the southeast, 89.82 meters and (294.7 feet) from the south line of the parade grounds to the south. Marked by a brick pier, 18 by 22 inches at the top, 2½ feet below and 3 feet above the ground.

Baton Rouge latitude (East Baton Rouge Parish, La., C. H. Sinclair, 1880).—Identical with *Baton Rouge longitude*, described above.

Baton Rouge Barracks azimuth (East Baton Rouge Parish, La., H. G. Ogden, 1880).—On the last small bluff between Baton Rouge and the small bayou just above the town, outside the fence of the United States barracks and about 75 yards above the guardhouse. The station is marked by two large posts, 14 by 14 inches, which were used as instrument stands. A reference mark was placed near the fence. It consists of an earthen jar buried, bottom up, about 16 inches below the surface, with a drill hole in its center. Above this is a pine stub with a copper tack. The reference mark is 9.431 meters (30.94 feet) from the station in azimuth 276° 36′ 24″. The following additional distances are given: From the station to barracks fence, 10.955 meters (35.94 feet); to the transit stand, 1.420 meters (4.66 feet); to the artificial horizon stand, 2.128 meters (6.98 feet); from the reference mark to the barracks fence, 1.5 meters (5 feet).

Blue Buck Ridge west base latitude (Cameron Parish, La., F. W. Perkins, 1883).—Distant 1.2 meters (4 feet) due west of *Blue Buck Ridge west base azimuth*, described below. Marked by a pine block.

Blue Buck Ridge west base azimuth (Cameron Parish, La., F. W. Perkins, 1883).—Identical with the triangulation station of the same name, in T. 15 S., R. 14 W., on a narrow ridge of high sandy land. Marked by a 3-gallon earthenware crock filled with cement and buried 3 feet below the surface. A hole in the crock

For notes in regard to marking of stations see p. 130.

marks the center. Over this was placed a block 18 inches by 21 inches by 4 feet below the surface and 12 inches by 12 inches b y4 feet above the ground, with a copper tack to mark the station. The following magnetic bearings and distances are given: East end of north slough, 3.1 meters (10 feet) N. 61° 31′ E.; west end of north slough, 36 meters (118 feet) N. 86° 22′ W.; fence corner, 31.5 meters (103 feet) S. 00° 07′ W.; southeast corner of house, 137 meters (449 feet) S. 75° 59′ W.; northeast corner of house, 137.5 meters (451 feet) S. 78° 41′ W.; southeast corner of outhouse, 134 meters (440 feet), S. 79° 51′ W.; northeast corner of outhouse 134.5 meters (441 feet) S. 81° 39′ W.; fence crossing slough to north, 6.5 meters (21 feet) N. 40° 55′ W.

Boyce longitude (Rapides Parish, La., J. E. McGrath, 1920).—Marked by a temporary wooden pier, 16.51 meters (54.2 feet) or 0″.54 of latitude south and 4.76 meters (15.6 feet) or 0″.18 of longitude west of *Boyce azimuth*, described below.

Boyce latitude (Rapides Parish, La., J. E. McGrath, 1920).—Identical with *Boyce longitude*, described above.

Boyce azimuth (Rapides Parish, La., W. Mussetter, 1919).—Identical with the traverse station of the same name on the right of way of the Texas & Pacific Railway, about ⅝ mile east of the railway station at Boyce, 1¼ telegraph poles east of the signboard "Yard limit," 26 telegraph poles west of milepost 207 and 4.1 meters (13 feet) north of the main track. The station is marked as described in notes 1a, 7a, and 11a, the reference mark being 11.106 meters (36.44 feet) from the station in azimuth 177° 25′ 12″.

Burwood latitude (Plaquemines Parish, La., Geo. D. Cowie and E. B. Roberts, 1921).—The station was 194.2 meters (637.1 feet) or 6″.31 of latitude south and 221.8 meters (727.7 feet) or 8″.19 of longitude west of triangulation station *Burwood*, which is on the lawn at Burwood between the sidewalk and the wall at the river, and on a line between Southwest Pass Lighthouse and the westerly one of the group of officer's quarters. An electric-light pole, the west corner of house porch, a second electric-light pole, and a concrete monument are at the following distances and azimuths from the triangulation station: 6.83 meters (22.4 feet), in azimuth 279° 23′; 28.38 meters (93.1 feet), in azimuth 289° 46′; 24.47 meters (80.3 feet), in azimuth 51° 18′; 18.47 meters (60.6 feet), in azimuth 62° 50′. The triangulation station is marked according to note 1c.

Chandeleur Island latitude (St. Bernard Parish, La., Geo. D. Cowie, 1921).—On the wharf of the United States Lighthouse Establishment at Chandeleur Island, just north of the north end of the boathouse, on a wooden platform, near a small winch. The instrument was mounted on a portable aluminum pier, which was 63.71 meters (209.0 feet) or 2″.07 south and 13.16 meters (43.2 feet) east of the center of *Chandeleur Island Lighthouse*.

Chenier Tigre west base latitude (Vermilion Parish, La., W. B. Fairfield, 1889).—Distant 1.2 meters (4 feet) due west from *Chenier Tigre west base azimuth*, described below. The station is marked by a cypress block, 21 inches square, 24 inches below and 34 inches above the ground.

Chenier Tigre west base azimuth (Vermilion Parish, La., W. B. Fairfield, 1889).—Identical with the triangulation station of the same name, about 1 mile from the extreme eastern end of bush growth on Chenier Tigre. Points of hard marsh extend from the Chenier into the soft marsh at right angles to the beach line from ⅓ to ½ mile, varying in width from 100 to 200 feet and covered with a growth of live oak, hackberry, and mesquite. The station is about in the middle of the second of these wooden ridges at the eastern end of the Chenier and just at the junction of the marsh and the shell bank forming the beach, where the growth is not so heavy as to the eastward or westward. The station is marked by an iron screw pile, 6 feet long, with its top even with the surface of the marsh and about 3 feet below the present level of the shell bank. A copper tack driven into a wooden plug in the hole of the screw pile marks the center of the station. Above the screw pile is an octagonal block of cypress 13 inches in diameter and projecting 5 feet above the surface. The following distances and bearings (true) were taken: Hackberry tree (18 inches diameter), 11.00 meters (36.1 feet) N. 5° E.; hackberry tree (13 inches diameter), 20.97 meters (68.8 feet) S. 30° E.; hackberry tree (15 inches diameter), 23.74 meters (77.9 feet) S. 32° W.

Deer Island latitude (Terrebonne Parish, La., P. A. Welker, 1888).—Distant 6.605 meters (21.67 feet) in azimuth 263° 00′, or 0″.03 of latitude north from Deer Island azimuth (now lost). The station was marked by a brick pier, but the pier was washed out of position by the storm of 1909. The station should therefore be considered lost.

Deer Island azimuth (Terrebonne Parish, La., J. H. Oltmanns, 1855; C. H. Sinclair, 1888).—Identical with the triangulation station of the same name. Now lost.

Depot azimuth (West Feliciana Parish, La., H. G. Ogden, 1880).—Identical with the triangulation station of the same name, on the east bank of the river, just below the railroad depot, at the lower end of Bayou Sara. The station is marked by a Congress Water bottle, buried upright, and surmounted by a black post with a copper tack.

Donaldsonville north base azimuth (Ascension Parish, La., H. G. Ogden, 1878).—Identical with the triangulation station of the same name about ¼ mile below Donaldsonville, on the Dugas place, just inside the gate from the levee road, 6.13 meters (20.1 feet) from the nearest gatepost, 22.89 meters (75.1 feet) from the center of the top of the levee. The station is marked by a copper bolt in a large stone monument, 14 inches square on top, with the letters "U.S.C.S." on one side and the figures "1878" on the opposite side, the monument being set in concrete. A smaller monument 6 inches square on top is in line to south base, 30.434 meters (99.85 feet) from the station. Under this monument is a stone block, 8 inches square with a copper bolt and the letters "U.S.C.S." cut in the top.

For notes in regard to marking of stations see p. 130.

Field azimuth (De Soto Parish, La., C. L. Garner, 1919).—Identical with the triangulation station of the same name, about 2½ miles south of Mansfield, ¼ mile west of the Mansfield-Benson road, on a hill, in the north edge of a cultivated field owned by J. A. Williams and Mr. Wallom, of Mansfield. The station is about 10 meters south of a wire fence and the edge of the woods at the high part of the ridge. Marked as described in notes 1a and 7a. A reference mark, note 11a, is about 1 meter south of the wire fence, 48.11 meters (157.8 feet) from the station in azimuth 258° 34′ 15″.

Flora azimuth (Natchitoches Parish, La., W. Mussetter, 1919).—Identical with the traverse station of the same name on the Texas & Pacific right of way, about ¾ mile west of Weaver sawmill, in the town of Flora. The station is at the intersection of the tangents to the curve of the north rail 22½ telegraph poles west of milepost 240 and 10.36 meters (34.0 feet) south of the main track. Marked as described in notes 1a and 7a. The reference mark, note 11a, is 17.936 meters (58.85 feet) from the station in azimuth 88° 43′.

Fort St. Philip latitude (Plaquemines Parish, La., Geo. D. Cowie, 1921).—On the concrete foundation of a gun position, almost directly back of the main wharf and about 80 meters from the river bank. This is the southernmost of two similar gun positions. The station is about 2 feet north and 4 feet west of the center of the circle of bolts with which the gun was fastened to the concrete platform. The deck of the platform is about 2 feet above the level of the ground to the westward and is surrounded on the east and south side by a concrete retaining wall. The station is 184.75 meters (606.1 feet) or 6″.00 of latitude south and 118.14 meters (387.6 feet) west of the *flagpole at Fort St. Phillip.*

Head of Passes latitude (Plaquemines Parish, La., J G. Oltmanns, 1853).—Identical with *Head of Passes azimuth* described below.

Head of Passes azimuth (Plaquemines Parish, La., J. G. Oltmanns, 1853).—On point between South Pass and Southwest Pass. Marked by a brick pier on the foundation of the old lighthouse.

Isle Dernier latitude (Terrebonne Parish, La., J. G. Oltmanns, 1853).—On sand ridge running the length of Isle Dernier, about 3¾ miles east of Raccoon Point, and nearly opposite large and conspicuous dwelling of Mr. Maskel. Marked by copper bolt in a large stone 4 feet below surface of ground. Stone was secured with a framework of cedar.

Lake Pontchartrain east base azimuth (Orleans Parish, La., P. A. Welker, 1896).—Identical with the triangulation station of the same name, at West End, New Orleans, about 230 meters (755 feet) above the mouth of the drainage canal and directly opposite the schoolhouse. The station is on the east bank of the canal and is 16.70 meters (54.8 feet) east from a cypress tree at edge of canal, 16.03 meters (52.6 feet) from the southwest corner of a picnic house, 9.830 meters (32.25 feet) from the southeast corner, and 19.42 meters (63.7 feet) from the northeast corner. The station is marked by a copper nail in a cypress stump. Four other copper nails are about 2 inches from center and serve as reference marks.

Lake Providence north base azimuth (East Carroll Parish, La., H. G. Ogden, 1880).—Identical with the triangulation station of the same name, near the southern limits of the town of Lake Providence, on Hood Street and near the northwest corner of Hood and Fourth Streets. The following distances from the station are given: To fence to westward, about 6 meters (20 feet); to southeast corner of Judge Montgomery's office to the northward, about 157 meters (515 feet); to the southwest corner of the courthouse to the northward, about 180 meters (591 feet); to the northeast corner of Hood and Third Streets, about 78 meters (256 feet). The station is marked by a 14-inch limestone post 3½ feet long set in concrete, extending 4 inches above the ground. A hole is drilled in the top in which is a copper bolt which marks the center. No underground mark was placed.

Lums Point southwest base azimuth (Concordia Parish, La., H. G. Ogden, 1880).—Identical with the triangulation station of the same name on the west side of the Mississippi River about 4 miles below Fort Adams, Miss., near Lums Landing, on land belonging to W. S. Lum. The following approximate distances are given: Pecan tree in horse lot, ESE. 160 feet; thorn tree with triangle SSE., 51 feet; northeast chimney of Lum's house, S. by E., 300 feet; thorn tree with triangle, NW., 76 feet. The station is marked by a stone cube 8 inches on each edge, with a hole drilled in the top and a copper bolt with cross inserted, the whole buried in cement about 4½ feet deep. The surface mark is a stone post 14 inches square and 3½ feet long, with a copper bolt with cross set in a hole drilled in the stone to mark the center. The stone projects 4 inches above the surface of the ground.

Magnolia lower base azimuth (Plaquemines Parish, La., William Eimbeck, 1872).—Identical with the triangulation station of the same name on the western side of the Mississippi River, on Magnolia Plantation, at the southern end of the fourth cane road, and almost at its crossing with another cane road. A screw pile with a cross is on the far side of the ditch, 8.971 meters (29.43 feet) from the station in the prolongation of the base line. The station is marked by a cross in a copper bolt inserted in a granite monument. In 1921 it was reported to be in good condition, except the top of the stone was somewhat nicked.

Man longitude (De Soto Parish, La., W. B. Fairfield, 1920).—Distant 12.61 meters (41.4 feet) or 0″.48 of longitude due west from *Man azimuth*, described below.

Man latitude (De Soto Parish, La., W. B. Fairfield, 1920).—Identical with *Man longitude*, described above.

For notes in regard to marking of stations see p. 130.

Man azimuth (De Soto Parish, La., C. L. Garner, 1919).—Identical with the triangulation station of the same name about 1 mile southwest of the center of the town of Mansfield, under the south side of the Mansfield water tank, between the southeast and southwest foundations supporting its legs. The station is marked, as described in notes 1a and 7a, with a reference mark set in the masonry of the southeast foundation, note 11a, 5 11 meters (16.8 feet) distant in azimuth 272° 54′.

Mansura azimuth (Avoyelles Parish, La., W. Mussetter, 1919; 1920).—Identical with the traverse station of the same name, about ½ mile west of the depot of the Louisville Railway & Navigation Co., at Mansura, and 4.2 meters (14 feet) north of the center line of track at the intersection of the north rail tangent from the west and the south rail tangent from the east. The station is marked as described in notes 1a and 7a, with a reference mark, note 11a, 10.741 meters (35.24 feet) distant in azimuth 196° 20′.

Marthaville azimuth (Natchitoches Parish, La., W. Mussetter, 1919; 1920).—Identical with the traverse station of the same name, on the right of way of the Texas & Pacific Railway, about ½ mile west of Marthaville, on the first curve west of the town, about 5 meters (16 feet) north of the center of Jefferson Highway, at the point of intersection of the north rail from the west and the south rail of Marthaville siding to the east. The station is marked as described in notes 1a and 7a, with a reference mark, note 11a, distant 19.798 meters (64.95 feet) in azimuth 52° 09′.

Morgan City latitude (St. Marys Parish, La., Geo. D. Cowie, 1921).—On the grounds of the city hall in Morgan City, and distant 11.08 meters (36.4 feet) from the northeast corner and 16.32 meters (53.5 feet) from the southeast corner of the city hall. The station is 20.14 meters (66.1 feet) or 0″.65 of latitude north and 10.27 meters (33.7 feet) west of triangulation station *Water tank eccentric*, and 3″.99 of latitude south and 9″.08 of longitude west of *Morgan City Methodist Episcopal Church.*

New Orleans longitude (Orleans Parish, La., E. Goodfellow, 1858; Edwin Smith, 1880; 1895).—The station of 1858 is in the open grass plot on Basin Street near Canal Street and between Canal and Common Streets. The station is 12″.99 of longitude (0ˢ.866) west of the station of 1880. The station of 1880–1895 is in the northeast quarter of Lafayette Square, 6″.27 of latitude north and 0″.63 or (0ˢ.042) of longitude west of *St. Patrick's Church, center of tower*, a geodetic point. The station is marked by a marble monument, which is under the protection of the city of New Orleans. This monument is about 0.95 meter by 0.32 meter and stands about 0.90 meter high. The latitude and longitude, with the words "U. S. Coast and Geodetic Survey, Feb. 1880," are inscribed on the stone. A meridian stone was placed about 70 meters due south.

New Orleans latitude (Orleans Parish, La., J. Kincheloe, 1858).—The station is a very short distance from the longitude station of 1858, described above, and 837.1 meters (2,746.4 feet) or 32″.80 of latitude north and 365.0 meters (1,197.5 feet) or 13″.61 of longitude west of *St. Patrick's Church, center of tower*, a geodetic point.

Pass Manchac north base azimuth (Tangipahoa Parish, La., O. B. French, 1899).—Identical with the triangulation station of the same name, just south of the depot at Manchac (post office, Akers) and east of the Illinois Central Railroad tracks. The station is 11.22 meters (36.8 feet) from the outside of the east rail, 11.52 meters (37.8 feet) from the southwest corner of the main porch of the railroad station, 9.48 meters (31.1 feet) from the southeast corner of the post supporting the southeast corner of the main porch of the railroad station, and 14.78 meters (48.5 feet) from the center of the switch post directly west. The station is marked by a copper nail in the center of a drain tile filled with cement, set with its top about 3 inches above the surface of the ground, and surrounded with cement and gravel. The underground mark is a bottle having its top 2½ feet below the ground and also surrounded by gravel and cement.

Pointe a la Hache latitude (Plaquemines Parish, La., Geo. D. Cowie, 1921).—The station was 36″.68 of latitude north and 5″.77 of longitude east of triangulation station *Magnolia upper base*, which is on the west side of the Mississippi River, 45 miles below New Orleans, on the Magnolia Plantation, at the end of the plantation, and about 100 meters from the levee, on the second cane road from the front main road. An iron pipe is across the ditch at the upper end of the plantation, in the yard back of a barn on the next plantation. This pipe is alongside a row of trees, the first row above Magnolia Plantation. The station is marked by a cross on a copper bolt inserted in a granite monument, 9 by 9 inches, dressed on top and 2 feet long, and bedded in béton.

Port Eads latitude (Plaquemine Parish, La., Geo. D. Cowie, 1921).—At Port Eads, on the South Pass of the Mississippi River, north of the northwest corner of the first dwelling house west of the power station. The station is on the west one of four pilings used to anchor the wireless pole. This piling is driven about 24 feet into the soft ground and projects about 3 feet above the surface. The station is 23.4 meters (76.8 feet) or 0″.76 of latitude south and 40.2 meters (131.9 feet) or 1″.49 of longitude west of this pole, which is a geodetic point and is called *Port Eads wireless pole.*

Quary azimuth (Rapides Parish, La., W. Mussetter, 1919).—Identical with the traverse station of the same name, on the Texas & Pacific Railway right of way, about ⅝ mile east of Lena Railway station, 9¼ telegraph poles east of milepost 216, and 7.8 meters (26 feet) south of center line of main track. The station is marked as described in notes 1a and 7a, with a reference mark, note 11a, which is 10.135 meters (33.25 feet) distant in azimuth 97° 29′.

Raccoon azimuth (Terrebonne Parish, La., C. H. Sinclair, 1888).—Identical with the triangulation station of the same name on the western end of Last Island, 300 meters (984 feet) from the point. The station was marked by a copper tack in a terra-cotta drain pipe, which was sunk flush with the surface. In 1906 the station was not recovered, as the locality could not be identified, and the station is now probably lost.

For notes in regard to marking of stations see p. 130.

Sodus azimuth (Sabine Parish, La., W. Mussetter, 1919; 1920).—Identical with the traverse station of the same name, about ½ mile west of the Texas & Pacific Railway station Sodus (Pleasant Hill post office), on the first curve of the railroad west of the town, at the crossing of the main highway and the Texas & Pacific Railway, at the foot of the cut of the highway on the west side of the highway. The station is 8 meters (26 feet) north of the approximate center of the railroad at the intersection of the tangents to the south rail from the west and the north rail from the east, and is marked as described in notes 1a and 7a. A reference mark, note 11a, is 37.385 meters (122.65 feet) from the station in azimuth 63° 22′ 30″.

South Point southwest base azimuth (Orleans Parish, La., O. B. French, 1898).—Identical with the triangulation station of the same name, about 3 miles toward New Orleans from railroad station South Point, and 19.299 meters (63.32 feet) from the center of the northwest rail of the railroad track toward Lake Pontchartrain and 5.2 meters (17 feet) from high-water mark on the lake. The station is marked by a glass jar set with its top about 2½ feet below the surface and filled with cement, sand, and shells. The surface mark is a 2-foot drain tile 4 inches in diameter, with its top about 4 inches above the ground and filled and surrounded with cement, sand, and shells, the center being a copper nail. A second tile and bottle were placed within the bulkhead which protects the railroad on the same perpendicular to the railroad as the station itself. This mark is 4.533 meters (14.87 feet) from the center of the northwest rail, and 14.766 meters (48.44 feet) from the station. From this second mark the following distances were measured: Telegraph pole No. 5128, 28.71 meters (94.2 feet); telegraph pole No. 5129, 32.94 meters (108.1 feet); bulkhead center, 9.90 meters (32.5 feet); fourteenth milepost toward New Orleans, 418.1 meters (1,371.6 feet).

Timbalier Island latitude (Terrebonne Parish, La., Geo. D. Cowie, 1921).—Directly under and identical in position with *Timbalier Island Lighthouse, 1906;* the new lighthouse is about 700 feet north-northwest in 1 fathom of water. The instrument was mounted on a portable aluminum pier.

Torras longitude (Pointe Coupee Parish, La., W. B. Fairfield, 1920).—Marked by a temporary wooden pier 3.64 meters (11.9 feet) or 0ᵐ14 of longitude due west from *Torras azimuth,* described below.

Torras latitude (Pointe Coupee Parish, La., W. B. Fairfield, 1920).—Identical with *Torras longitude,* described above.

Torras azimuth (Pointe Coupee Parish, La., W. Mussetter, 1919).—Identical with the traverse station of the same name on top of the big levee, about 150 meters east of the railway station at Torras. The station is 6.2 meters (20 feet) north of the center of the Texas & Pacific Railway track and three rails east of a concrete culvert over the wagon road, and is marked as described in notes 1a and 7a. The reference mark, note 11a, is 40.96 meters (140.9 feet) from the station in azimuth 48° 06′.

Zeman azimuth (Rapides Parish, La., W. Mussetter, 1919).—Identical with the traverse station of the same name, on the right of way of the Louisiana Railway & Navigation Co., about 2¾ miles east of the depot at Alexandria. The station is at the point of intersection of the north rail tangent from the west and the south rail tangent from the east of the first curve east of the Rock Island Railway crossing, 31 telegraph poles west of mile post No. 127, 6.6 meters (22 feet) north of the main track, at the edge of the road crossing, and is marked as described in notes 1a and 7a. The reference mark is 18.870 meters (61.91 feet) from the station in azimuth 255° 56′.

MAINE

Agamenticus latitude (York County, Me., A. D. Bache, R. H. Fauntleroy, C. O. Boutelle, T. J. Lee, George Davidson, 1847).—Observations were made with the zenith telescope, zenith sector, and prime vertical transit. The telescope was mounted 3.505 meters (11.5 feet) or 0ᵐ11 of latitude north and 24.354 meters (79.9 feet) east of *Agamenticus azimuth,* described below. The zenith sector was mounted in the parallel and 4.54 meters (14.9 feet) east of the zenith telescope. The prime vertical transit was mounted in the parallel of the azimuth station and 31.42 meters (103.1 feet) east thereof. The observations at each station were reduced to Agamenticus triangulation station and a weighted mean taken.

Agamenticus azimuth (York County, Me., A. D. Bache, 1847; 1908).—Identical with the triangulation station of the same name, on a mountain of the same name about 10½ miles northeast of Portsmouth, N. H., and about 5½ miles north from York Beach, Me. The station is on the highest part of the mountain and is marked by a copper bolt set in a rock.

Bangor longitude (Penobscot County, Me., Edwin Goodfellow, 1851; 1857).—Identical with triangulation station *Thomas Hill Observatory,* which is in Bangor on Thomas Hill, on Divinel's ground, not far from Union Street and 16 meters east and 225 meters south of the triangulation station *Thomas Hill.* The longitude station is marked by a hole drilled in a rock.

Bangor latitude (Penobscot County, Me., Edwin Goodfellow 1857).—Identical with *Bangor, Thomas Hill, longitude,* described above.

Calais longitude (Washington County, Me., G. W. Dean, 1857; 1895).—Identical with the triangulation station *Calais Observatory,* which is south of the Calais High School and near the center of the school ground, bounded on the northwest by North Street and on the northeast by Academy Street. The station is at the most elevated point in Calais and is marked by a rough granite block, smoothed at the top and south side.

Calais latitude (Washington County, Me., G. W. Dean, 1857).—Marked by a granite column 0.193 meter (0.63 foot) or 0ᵐ01 of latitude north and 1.594 meters (5.23 feet) west of *Calais longitude,* described above.

For notes in regard to marking of stations see p. 130.

Cape Small latitude (Sagadahoc County, Me., G. W. Dean, 1851).—Distant 6.53 meters (21 feet) or 0″21 of latitude north and 7.16 meters (23.5 feet) west of *Cape Small azimuth*, described below.

Cape Small azimuth (Sagadahoc County, Me., A. D. Bache, N. P. Trowbridge, and C. O. Boutelle, 1851; 1911).—Identical with the triangulation station of the same name on the high hill on Cape Small Peninsula about 10 miles from Bath, about 5½ miles north from Small Point, about 1¼ miles east of New Meadows River, and about 2¼ miles west of Parkers Head village (on the Kennebec River). The station is marked by a granite post set in the ground so that its top is about on the surface level. Two diagonal lines are cut in the top of this post and a ¾-inch drill hole at their intersection marks the center. Three similar posts are set as reference marks, viz, one 3 feet to the north, one 5 feet to the south, and one 5 feet to the east of the station. These reference posts have each a drill hole in the top but no diagonal lines, and are all sunk so that their tops are level with the surface of the ground. The station is entirely surrounded by trees.

Cooper latitude (Washington County, Me., Edwin Goodfellow, 1859).—Marked by a copper bolt sunk in the ledge of rock 1.3 meters (4 feet) or 0″04 of latitude south and 14 meters (46 feet) west of *Cooper azimuth*, described below.

Cooper azimuth (Washington County, Me., A. D. Bache, 1859; 1913).—Identical with the triangulation station of the same name, on the summit of the highest hill in the township of Cooper. It is known as Western Ridge, or Cooper Hill, and is about 750 feet high and covered with timber. There is a fire lookout tower about 40 feet high, with a house on top, on top of the hill directly over the station. The station is marked by a copper bolt set in a hole in a rock under the center of the lookout tower. Drill holes were made on the rock on the lines to the various main stations of the triangulation at distances given below: In range with Chamcook, 3.84 meters (12.6 feet) from the center of the station; Prince Regents Redoubt, 4.48 meters (14.7 feet) and 40.81 meters (133.9 feet); Grand Manan, 4.3 meters (14 feet) and 37.55 meters (123.2 feet); Trescott Rock, 3.7 meters (12 feet); Howard, 5.60 meters (18.4 feet); Mount Desert, 6.92 meters (22.7 feet); Burke, 7 meters (23 feet). There was so much débris about the station in 1913 that none of these range drill holes were found. Some may have been destroyed when the tower was built, but most of them are probably still in existence.

Farmington latitude (Franklin County, Me., C. O. Boutelle, 1866; 1907).—Marked by the remains of a granite monument, which was in 1907 only a few feet from the edge of an excavation for road grading. The station was 0.7 meter (2 feet) east of the center of triangulation station *Farmington Observatory*, which is now lost.

Howard latitude (Washington County, Me., Edwin Goodfellow, 1859).—Marked by a block of yellow pine which is 17.22 meters (56.5 feet) or 0″56 of latitude north and 17.47 meters (57.3 feet) west of *Howard azimuth*, described below.

Howard azimuth (Washington County, Me., G. W. Dean and R. E. Halter, 1859; 1913).—Identical with the triangulation station of the same name, on a very prominent high bare hill known as Howard Mountain, about 5 miles south of Machiasport and 1 mile south of Bucks Harbor and less than ½ mile northwest of the head of Howard Bay. The latter is an arm of the west side of Machias Bay. The station is about 10 feet west of the highest point of the ledge and about 4 feet from the southern edge and is marked by a copper bolt set slightly below the surface of the rock.

Humpback latitude (Hancock County, Me., A. T. Mosman, 1858).—Marked by a stone pier 13.34 meters (43.8 feet) or 0″43 of latitude north and 6.46 meters (21.2 feet) west of *Humpback azimuth*, described below.

Humpback azimuth (Hancock County, Me., G. W. Dean, 1858; 1913).—Identical with the triangulation station of the same name on the mountain of the same name, the summit of which is near the southeast corner of Brewster Township and about 20 miles north of Cherryfield. The old Bangor-Calais stage road is about 3 miles south, and branching off from it, about 200 meters west of the bridge across the Narragaugus River, is the road made by the Coast Survey in 1858, leading nearly to the summit. A lookout tower for the use of the fire wardens stands on the highest point, and the station is about 50 meters southeast of it on a large bare ledge. The station was originally marked by a copper bolt set in the rock, but in 1913 only the drill hole was found. Three other drill holes, not mentioned in the original description, were found, each about 6 feet from the station, located to the east, west, and south, respectively.

Isles of Shoals latitude (York County, Me., T. J. Lee, 1847).—Located 3.1 meters (10 feet) or 0″10 of latitude north of the triangulation station of the same name, on Appledore Island, the largest and most northern of the Isles of Shoals group. The island in shape resembles a figure 8, and the station is a short distance northwest of the center of its lower section and about 100 yards northwest of the life-saving station. The triangulation station is marked by a copper bolt set in the rock. The marking of the latitude station is unknown.

Mount Blue azimuth (Franklin County, Me., W. H. Burger, 1907).—Identical with the triangulation station of 1853 of the same name, on the mountain of the same name in Avon Township, about 7 miles south of the village of Philips and about 11 miles northwest of Farmington. The distances by road are greater. The summit is bare and its elevation gives a commanding view of the country for 60 to 70 miles. The station is 25.3 meters (83 feet) southwest of and 3.7 feet lower than the highest point of the summit and is marked by an iron bolt set in a hole drilled in the rock. Three reference marks are arrows cut in the rock and pointing to the station, and located, respectively, 4.75 meters (15.6 feet) to the eastward, 5.47 meters (17.9 feet) to the southward, and 3.03 meters (9.9 feet) to the westward of the station.

For notes in regard to marking of stations see p. 130.

Mount Desert latitude (Hancock County, Me., Edwin Goodfellow and S. Harris, 1856).—Marked by a heavy granite block 57.9 meters (190 feet) or 1″88 of latitude north and 31.91 meters (104.7 feet) east of *Mount Desert azimuth*, described below.

Mount Desert azimuth (Hancock County, Me., A. D. Bache and G. W. Dean, 1856; 1902).—Identical with the triangulation station of the same name, on the highest elevation of Mount Desert Island, known as Mount Desert or Green Mount. It is a very commanding position and the view is unobstructed in all directions. The station is on the summit and 22¼ inches east of the southeast corner of a crevice in the rock, and is marked by a hole drilled in the rock. Also the following range drill holes were found: 16.206 meters (53.17 feet) from station on line toward Peaked Mountain; 5.340 meters (17.52 feet) from station on line to Blue Hill, and 6.654 meters (21.83 feet) from the station on line to Ragged Mountain.

Mount Harris latitude (Penobscot County, Me., Edwin Goodfellow and G. W. Dean, 1855).—Marked by a granite block 6.50 meters (21.3 feet) or 0″21 of latitude south and 20.15 meters (66.1 feet) west of *Mount Harris azimuth*, described below.

Mount Harris azimuth (Penobscot County, Me., A. D. Bache, 1855).—Identical with the triangulation station of the same name, on the largest of the Dixmont Hills, in the township of Dixmont, about 21 miles west by south from Bangor, about 18 miles north by west from Belfast, and about 12 miles south by east from Newport. The station is on the summit and is marked by a buried earthen cone and a stake with a nail in its top reaching above its surface; also a stone column, 15.8 feet high, with a base of 7 feet and width of 5 feet at the top and extending 20 inches below the surface, was constructed around the point. Three drill holes in the rock were also made to the north, east, and west of the station at distances, repsectively, of 22.6 meters (74 feet), 5.27 meters (17.3 feet), and 21.15 meters (69.4 feet). The holes were filled with sulphur.

Mount Independence latitude (Cumberland County, Me., A. D. Bache, G. W. Dean, and Geo. Davidson, 1849.)—A point, whose marking is unknown, 0.902 meter (2.96 feet) or 0″03 of latitude north and 16.167 meters (53.04 feet) west from *Mount Independence azimuth*, described below.

Mount Independence azimuth (Cumberland County, Me., A. D. Bache, 1849; 1912).—Identical with the triangulation station of the same name, on a high hill better known locally by the name of "Blackstrap," about 8 miles north of Portland and close to and on the east side of the old road to Gray. The hill is elongated in a north and south direction and has gentle slopes on all sides except the eastern, which is rather abrupt. The station is on the highest part of the summit, which is now covered with clumps of small trees, particularly to the southward. It is marked by a standard disk marker set in cement in an 18-inch section of terra-cotta pipe and centered over the original subsurface mark, an earthenware cone or cylinder. Around the terra-cotta pipe successive layers of cement, stone, gravel and cement, and clear cement were placed and the whole separated from the subsurface mark by a 2-inch layer of gravel. Two reference marks were also placed as follows: (1) A standard disk reference mark set in cement in a hole drilled in a large bowlder 37.08 meters (121.7 feet) north by west from the station; (2) at a distance of 13.69 meters (44.9 feet) east by south from the station a cross was cut on a bowlder which is in the line of a dismantled stone fence. Also to the south-southwest of the station the foundation of an old observing tower still remains. Its center is 31.91 meters (104.7 feet) from the station.

Mount Pleasant latitude (Oxford County, Me., G. W. Dean, 1851).—Marked by a granite pillar resting on the granite ledge 1.52 meters (4.6 feet) or 0″05 of latitude south and 5.70 meters (18.7 feet) west of *Mount Pleasant azimuth*, described below. The original station is the point of reference.

Mount Pleasant azimuth (Oxford County, Me., A. D. Bache, 1851).—Identical with the triangulation station of the same name, on Pleasant Mountain, about 6 miles west of Bridgton. The mountain is between 2,000 and 3,000 feet in height, and the original station was on the summit of the mountain and was marked by a copper bolt set in the rock about a foot below the surface of the ground. The erection of a new hotel on the summit cut off the line to Mount Blue, and it became necessary to change the station point. The new station is 16.922 meters (55.52 feet) to the southeast of the old one and on line to Mount Independence and is also marked by a copper bolt. It is under the soil on the rock and about 4 feet lower in elevation than the old one. The new station is also 26.262 meters (86.16 feet) from the southwest corner of the hotel and 35.256 meters (115.67 feet) from the southeast corner of the bowling alley.

Pole Hill latitude (Aroostook County, Me., W. H. Burger, 1907).—Marked by a pier (the material of which it was constructed is unknown) 1.626 meters (5.33 feet) or 0″05 of latitude north and 3.733 meters (12.25 feet) west of *Pole Hill azimuth*, described below.

Pole Hill azimuth (Aroostook County, Me., W. H. Burger, 1907; 1913).—Identical with the triangulation station of 1889 of the same name, on the hill of the same name in the northeast part of Amity Township, about 100 meters west of the international boundary line and 0.8 mile north of the initial monument of that line. The station is on the highest part of the hill, on a bowlder of gray sandstone, the visible part of which is 6 feet by 3 feet and 2 feet above the ground. The land belongs to the heirs of John Friel, whose house is about 350 meters to the southward. The station is marked by a United States and Canada boundary survey brass station mark set in a hole drilled in the rock and surrounded by a triangle.

Ragged Mountain latitude (Knox County, Me., G. W. Dean and S. Harris, 1854).—Marked by a drill hole on the ledge, 12.47 meters (40.9 feet) or 0″40 of latitude south and 11.18 meters (36.7 feet) east of *Ragged Mountain azimuth*, described below.

For notes in regard to marking of stations see p. 130.

Ragged Mountain azimuth (Knox County, Me., A. D. Bache, 1854).—Identical with the triangulation station of the same name on the summit of the mountain of the same name, also known locally as Hosmer Mountain, which is located on the west side of Penobscot Bay about 4 miles west of Camden and about 7 miles north of Rockland. It is readily reached from Camden by the road to the northeast base of the mountain and thence to the summit by a road constructed by the Coast Survey in 1854. The station is marked by a copper bolt set in a hole in a rock.

Sebattus latitude (Androscoggin County, Me., J. E. Hilgard, 1853; 1907).—The position of zenith telescope No. 1 was marked by a copper bolt in the rock 4.616 meters (15.14 feet) or 0″15 of latitude north and 11.008 meters (36.12 feet) east of *Sebattus azimuth;* zenith telescope No. 2 in the same parallel marked by a copper bolt 9.081 meters (29.79 feet) east of the azimuth station. A third copper bolt marking the position of transit No. 9 is in the same parallel as the first named and 9.991 meters (32.78 feet) east of the azimuth station. The aximuth station is described below.

Sebattus azimuth (Androscoggin County, Me., A. D. Bache, 1853; 1907).—Identical with the triangulation station of the same name, on the mountain of the same name in Wales Township and on the east side of the railroad which passes through Sebattus and Leeds Junction. The station is about 2 miles to the northward and eastward of Sebattus and about 4 miles to the southward of Leeds Junction. The top of the mountain is bare, and the station is on the center of a large flat rock near the north brow of the summit. This outcropping rock is but slightly higher than the surface of the ground. The station is marked by a copper bolt set in the rock.

MARYLAND

Calvert latitude (Calvert County, Md., A. T. Mosman, 1871).—The instrument was mounted on a solid yellow pine block, 0.76 meter (2.25 feet) or 0″02 of latitude north of *Calvert azimuth*, described below.

Calvert azimuth (Calvert County, Md., A. T. Mosman, 1871; 1907).—Identical with the triangulation station of the same name, north of the mouth of the Patuxent River, about 2 miles south of Cove Point, and about 1 mile back from the bay shore, on property owned (in 1897) by Doctor Ireland. Station is west of the garden which is south of Doctor Ireland's house, being near and to the north of the fence which extends along and beyond the south side of the garden. The station is marked by the frustum of a gray sandstone cone 11 inches below surface of ground. Two range stones are to the east close to a garden fence. The first is 6.00 meters (19.7 feet) and the second 7.50 meters (24.6 feet) from the station. A persimmon tree is 22.40 meters (73.5 feet) northeastward from the station.

Cumberland longitude (Allegany County, Md., A. T. Mosman, 1854).—On Decatur Street. No further information is available.

Davis azimuth (Worcester County, Md., J. E. Hilgard, 1853).—Lost.

Gaithersburg longitude (Montgomery County, Md., E. Smith, 1899).—In a corner of the north part of a farm belonging to Mr. I. T. Fulks. The observatory is about ½ mile southwest from the Baltimore & Ohio Railroad station at Gaithersburg. It was established under the control of the International Geodetic Association. Observations for longitude were made previous to the preparation of the observatory for latitude observations.

Gaithersburg latitude (Montgomery County, Md., 1899).—The zenith telescope pier is in the center of the observatory mentioned under *Gaithersburg longitude.* It is of brick, 22 inches square, with a white marble cap 24 inches square. The brick pier rests on a stone foundation (a cube of 5 feet), the top of which is 6 inches below the surface of the ground. The foundation of the observatory is of stone, 2 feet wide and projecting 6 inches above the surface of the ground and of the same depth as the foundation of the zenith telescope pier. The space between the foundation of the pier and the observatory is about half filled with loose earth.

Gantt latitude (Worcester County, Md., Edwin Smith, 1908).—An unmarked point 0.10 meter (0.328 foot) or 0″00 of latitude south and 1.11 meters (3.642 feet) east of triangulation station *Gantt.* The triangulation station is on the western shore of Sinepuxent Bay, opposite Ocean City, and about ½ mile back from the water, in a cultivated field on the Gantt (formerly Davis) farm, and about 10 feet above high water. It is about 300 yards north by west of the old Davis farmhouse, on a ridge or slight rise of ground making out from the woods, 260 yards east-southeast from the old woods, and 90 yards east of a young growth of pines adjacent to the old woods. It is also about 70 yards north of the east-and-west wire fence and ditch and 83 yards west of a north-and-south fence and road running to a farmhouse. The station is marked by the center of a triangle on a cement monument buried with top 2 feet below the surface of the ground. A cement reference monument, similar to center mark but with top 4 inches above ground, is 85.44 meters (280.3 feet) S. 89° 48′ W. from the station.

Hill latitude (Prince Georges County, Md., G. W. Dean, 1850).—Distant 16.46 meters (54.0 feet) or 0″53 of latitude south and 4.51 meters (14.8 feet) west of *Hill azimuth*, described below.

Hill azimuth (Prince Georges County, Md., A. D. Bache and G. W. Dean, 1850; 1917).—Identical with the triangulation station of the same name about 1¾ miles a little east of north from the eastern corner of the District of Columbia, on a small plateau near the highest point or center of Hills Hill, on land belonging (1917) to E. E. Hill. The station is marked by an earthenware cone, with a copper nail in a cedar stub marking the center, buried 27 inches below the surface of the ground. The surface mark is a rough granite pillar with top

For notes in regard to marking of stations see p. 130.

dressed to a square (4 or 6 inches) and about 2 feet long set flush with the surface of the ground. Three similar stones are set north, east, and south of the station at the following distances, respectively: North, 1.603 meters (5.26 feet); east, 1.579 meters (5.18 feet); and south, 1.490 meters (4.89 feet).

Marriott latitude (Anne Arundel County, Md., T. J. Lee, 1846; A. D. Bache and J. Hewston, 1849).—The station of 1846 is 8 meters (26 feet) or 0".26 of latitude north of *Marriott azimuth*, described below. The station of 1849 is 8.188 meters (26.86 feet) or 0".27 of latitude north and 12.979 meters (42.58 feet) west of *Marriott azimuth*, described below.

Marriott azimuth (Anne Arundel County, Md., A. D. Bache and J. Hewston, 1849).—Identical with the triangulation station of the same name on the property of B. Marriott, about 6½ miles from South River and about 100 yards west of the road leading from Annapolis to St. Marys. The station is 30.2 meters (99 feet) from the main post of an old windmill, 10.64 meters (34.9 feet) from a small hut on the south side of the hill. Three stakes were driven into the ground each 30 feet distant from the station, the first in azimuth 222° 34′, the other two at right angles to that line. Station mark was probably a stone post with underground mark consisting of an earthenware cone or bottle.

Maryland Heights latitude (Washington County, Md., Francis Blake, 1870).—The easternmost of two piers in the observatory inside the southeast corner of the old stone fort and 22.94 meters (75.3 feet) or 0".74 of latitude north and 9.53 meters (31.3 feet) east of *Maryland Heights azimuth*, described below.

Maryland Heights azimuth (Washington County, Md., C. O. Boutelle, 1870; 1887).—Identical with the triangulation station of the same name 18.20 meters (59.7 feet) southwest of the extreme southern corner and 9.88 meters (32.4 feet) south of the nearest corner of the old stone fort on the mountain overlooking Harpers Ferry. The station is marked by a copper bolt placed in a large rock 2 feet below the surface. The face of the rock slopes to the northwest at a dip of about 45°, the station being on a small shelf. The surface mark is a stone post with two cross lines, placed over the bolt. Five squares are cut on the rocks near by. These squares are 6 inches on a side, with diagonals in the direction of and perpendicular to the station, and each has an arrow pointing from the center of the square to the station. These marks are at the following distances and azimuths from the station: 7.26 meters (23.8 feet), 96° 14′; 8.53 meters (28.0 feet), 161° 30′; 11.17 meters (36.6 feet), 231° 39′; 18.25 meters (59.9 feet), 269° 46′; and 10.16 meters (33.3 feet), 340° 49′.

Pooles Island latitude (Harford County, Md., Geo. Davidson, 1847; 1898).—Located 241.83 meters (793.4 feet) or 7".84 of latitude north and 127.4 meters (418 feet) east of *Pooles Island* triangulation station. The triangulation station is on the property of P. Wethered (1859) and 130.81 meters (429.5 feet) NW. one-half W. from the center of a well near his dwelling. In continuation of the same range, 44.04 meters (144.5 feet) from the station, is a granite stone with a cross cut on its top, placed close to the east side of a board fence along the side of a farm road. A granite stone was also placed in line with the station and the lighthouse, close to the board fence and 65.0 meters (213.4 feet) from the station. The station is marked by an earthenware jar, with a cedar post through the center and surrounded by bricks and cement. The triangulation point was recovered in 1898.

Principio latitude (Cecil County, Md., R. D. Cutts, 1866).—The latitude station was 7.3 meters (24 feet) due east of *Principio azimuth*, described below.

Principio azimuth (Cecil County, Md., R. D. Cutts, 1866; 1878).—Identical with the triangulation station of the same name, 2½ miles N. 24° W. of Charlestown, on the highest part of the ridge, and about 200 yards north of crossroads known locally as "Foys Patch." The station is marked by a 1-gallon stone pot, the top of which is 2¾ feet below the surface of the ground. Beneath this is a ½-pint mineral-water bottle, standing on end exactly in the center of the station. A similar bottle is buried 3 feet distant from the station, in azimuth 242° 09′, with its neck pointing toward the station. The reference marks placed in 1866 were three stones, 2 feet 9 inches long and averaging 6 to 10 inches thick, sunk halfway into the ground, and placed each 1.83 meters (6 feet) from the station, two in line with the station and the third at right angles to this line.

Rockville latitude (Montgomery County, Md., Edwin Smith, 1891; 1892).—In the garden of Edwin Smith, the observer, on Forest Avenue, about 1 mile from the railroad depot and ½ mile from the nearest point of the railroad, on one of the highest points in the surrounding country. The station is marked by a rough sandstone and cement pier, 2 feet square and 3¼ feet above the ground, resting on a ledge of solid quartz rock, about 2 feet below the surface of the ground. The transit pier, of similar construction, is 1.98 meters (5.9 feet) north of the station. An observatory was built over the two piers The latitude pier was 5.6 meters (18.37 feet) or 0".18 of latitude south and 2.5 meters (8.2 feet) east of triangulation station *Smith*, not described.

Soper latitude (Montgomery County, Md., G. W. Dean, 1850).—The latitude station is 15.50 meters (50.9 feet) east and 2.98 meters (9.8 feet) or 0".10 of latitude north of *Soper azimuth*, described below.

Soper azimuth (Montgomery County, Md., A. D. Bache, 1850; 1868).—Identical with the triangulation station of the same name, 6 miles northwest of Beltsville, on land belonging (1868) to Benjamin F. Mills, and about 28 meters (92 feet) east of the old Columbia turnpike. The station is marked by an earthen cone, 14 inches in diameter at the top and 8 inches at the bottom, and 14 inches long, buried with its top 14 inches below the surface of the ground. Above this is a dressed granite monument, 34 inches long and 5 inches square, with cross lines on its top, set flush with the surface of the ground. Similar monuments are placed 1.52 meters (5 feet) north, south, and east from the station. Due north of the station and distant 7.47 meters (24.5 feet)

For notes in regard to marking of stations see p. 130.

is a cherry stump with a copper nail; in the same line due north is an oak stub with a copper nail, distant 33.7 meters (110.5 feet). This stub is between two red oak trees, notched and with copper nails. A brass screw is in an oak tree on the east side of the road N. 86° 05′ W. from the station at a distance of 28.2 meters (92.5 feet).

Sugarloaf latitude (Frederick County, Md., F. D. Granger and J. B. Boutelle, 1879).—The latitude station is 38.20 meters (125.3 feet) or 1″.24 north and 0.64 meter (2.1 feet) west of *Sugarloaf azimuth*, described below.

Sugarloaf azimuth (Frederick County, Md., C. O. Boutelle and F. D. Granger, 1879; 1892).—Identical with the triangulation station of the same name which is on the south side of the summit of Sugarloaf Mountain, about 3 miles north of the junction of the Monacacy and Potomac Rivers. The station is about 12 feet back from the edge of the cliff and is marked by a brass bolt 1 inch in diameter and 5 inches long placed in a drill hole. Four reference marks, arrows cut upon the rocks, were located as follows: 2.29 meters (7.5 feet) from the station in azimuth 37° 46′; 2.78 meters (9.1 feet) in azimuth 98°; 2.57 meters (8.4 feet) in azimuth 214° 33′; and 3.0 meters (9.8 feet) in azimuth 306° 15′.

Taylor latitude (Anne Arundel County, Md., T. J. Lee, 1847).—The latitude station was 0″.10 of latitude north of the triangulation station *Taylor*. Both are now lost.

Webb latitude (Anne Arundel County, Md., G. W. Dean, 1850; 1896).—The latitude station is 11.64 meters (38.2 feet) east and 7.80 meters (25.6 feet) or 0″.25 of latitude south of *Webb azimuth*, described below.

Webb azimuth (Anne Arundel County, Md., A. D. Bache and G. W. Dean, 1850; 1896).—Identical with the triangulation station of the same name on a hill (but not on highest part) about ¼ mile north of the old Webb home site, and 2½ miles by road east of Odenton, on land belonging (1896) to James Woodward. The station is marked by an earthenware cone, 14 inches in diameter at the bottom and 8 inches at the top, and 14 inches long. Above this is a granite block, with a hole in it, buried 1.1 feet below the surface. The surface mark is a rough granite block 4 inches square and 14 inches long, with two cross lines marking the center. Three stone pillars, each 2 feet 2 inches long and 5 inches square on top, with cross lines cut thereon, were set as reference marks, to the north, east, and south of the station, and each 1.52 meters (5.0 feet) therefrom.

MASSACHUSETTS

Blue Hill azimuth (Norfolk County, Mass., A. D. Bache, 1845; 1901).—Identical with the triangulation station of the same name, on the summit of the highest of the Blue Hills, in the southwestern part of the town of Milton and very near to the Canton line. The station is marked by a copper bolt set in a rock and surrounded by a triangle. Four reference marks, each a drill hole in a rock with a square around it, with arrows pointing toward the station, are at the following distances and azimuths from the station: 9.38 meters (30.8 feet), 60° 00′ 00″; 3.83 meters (12.6 feet), 161° 44′ 30″; 10.75 meters (35.3 feet) 232° 58′ 30″; 9.58 meters (31.4 feet), 337° 31′ 00″. Other points of reference are: Extreme northwest corner of stone building, distant 10.36 meters (34.0 feet) in azimuth 37° 55′; extreme northeast corner of stone building, distant 16.7 meters (55 feet) in azimuth 340° 34′ 30″. The tower in line to center is 6.61 meters (21.7 feet) in azimuth 19° 17′ 30″.

Cambridge, Harvard College Observatory, longitude (Middlesex County, Mass., W. C. Bond, 1848; W. C. Bond, 1851; J. Winlock, 1867, 1901; E. Smith, 1872, 1896; O. B. French, 1914).—The station of 1848 was 0ˢ.044 east of the center of the *dome of Harvard College Observatory;* the station of 1851 was 0ˢ.040 west of the center of the dome. The station of 1867, 1869, 1870, 1871, 1873, 1901 was the pier of the Russian transit in the west transit room, 13.53 meters (44.4 feet) or 0ˢ.039 west of the center of the dome. The station of 1872, 1882, 1895, 1896 was 32.918 meters (108 feet) or 0ˢ.096 west of the center of the dome. The station of 1914 is located in the grounds of the Harvard Observatory, north of Concord Avenue and between Bond and Madison Streets, 37.836 meters (124.13 feet) or 1″.654, or 0ˢ.110, west and 41.448 meters (136.0 feet) or 1″.343 north of the dome of the observatory and 24.23 meters (79.5 feet), or 1″.059 or 0ˢ.071 west of the Russian transit. The Russian transit is mounted on a pier which was erected on the same foundation as the pier used by the Coast and Geodetic Survey in 1867, and hence is probably within an inch or two of the old station. From the above figures the Russian transit is west of the dome 0ˢ.039. The *dome of Harvard College Observatory* is a geodetic point.

Cambridge latitude (Middlesex County, Mass., W. C. Bond, J. D. Graham, and G. P. Bond, 1844; B. A. Gould, James Searles, and C. H. F. Peters, 1855).—No descriptions of the stations are available. The observations of 1844 were made in the grounds of Harvard College at a point 0″.55 of latitude north of the observatory dome. Those of 1855 were made at Cloverden Observatory at a point 7″.20 south of *Harvard College Observatory dome.*

Cambridge Observatory, west transit, azimuth (Middlesex County, Mass., A. T. Mosman, 1869).—The station is the west transit of Cambridge Observatory, distant 13.571 meters (44.52 feet) in azimuth 88° 47′.9 from *Cambridge Observatory, center of dome.*

Copecut azimuth (Bristol County, Mass., A. D. Bache, 1844).—Identical with the triangulation station of the same name on Copecut Hill, about 4½ miles east of Fall River, 3⅞ miles southeast by east of Steep Brook village, 3⅛ miles north-northwest of Hicksville, 1⅝ miles eastward of Watuppa Pond, and ½ mile east

For notes in regard to marking of stations see p. 130.

of the road from Hicksville to Steep Brook. The station is marked by a copper bolt set in a rock and covered with a pile of stones.

Duxbury longitude (Plymouth County, Mass., Edwin Goodfellow, 1869; 1870).—The station is about 269 meters ENE. of the French cable office. The underground mark is a granite pillar 21 inches long and 7 inches square, upon which was placed a granite slab 28 inches square and 7 inches thick. The surface mark, a 14-inch cube of granite, rests on the slab and is set level with the surface of the ground. The surface mark bears the inscription "U. S. C. S. 1870." Copper bolts were inserted in the upper and lower stones to mark the center. The station is a geodetic point.

Indian azimuth (Dukes County, Mass., A. D. Bache and C. O. Boutelle, 1845; 1906).—Identical with the triangulation station of the same name in the northern part of Marthas Vineyard, on the summit of Indian Hill, about 4¼ miles west by south of Vineyard Haven, 1¾ miles north of North Tisbury, and 1 mile south by east of Pauls Point. The station is marked by a drill hole in a rock surrounded by a triangle. Three reference marks, each a drill hole in a rock with a square around it and an arrow pointing toward the station, are located as follows: No. 1, distant 8.39 meters (27.5 feet); No. 2, distant 10.69 meters (35.1 feet); No. 3, distant 10.39 meters (34.1 feet). The angle at the station between reference marks No. 1 and No. 2 is 106° 20′ 10″, and between No. 2 and No. 3 is 93° 54′ 10″.

Manomet latitude (Plymouth County, Mass., C. O. Boutelle, 1845; 1916).—In the same parallel and 1.98 meters (6.5 feet) distant from triangulation station *Manomet*, about 1½ miles northwest by west from the village of Manomet, 2½ miles southeast of the head of Plymouth Harbor and ½ mile south of the road from Manomet to Plymouth. The station is on the summit of the hill and is marked by a cross in the top of a copper bolt set in the rock. Three drill holes forming an equilateral triangle surround the bolt and are each 6 inches from it. A lookout tower, 30 feet high, has been built over the station.

Mount Tom latitude (Hampshire County, Mass., Edwin Goodfellow, 1862).—Distant 28.0 meters (91.7 feet) or 0″.91 of latitude south and 12.8 meters (42.0 feet) west of *Mount Tom azimuth*, described below. The station was marked by a block of pine.

Mount Tom azimuth (Hampshire County, Mass., G. W. Dean and R. E. Halter, 1862; 1901).—Identical with the triangulation station of the same name on the mountain of the same name, near the center of the summit ridge and about 2¾ miles north-northwest of Holyoke. The station is marked by a copper bolt set in the rock surrounded by a triangle with the letters "U. S." near by. Four reference marks, each a drill hole in the rock with a square around it and an arrow pointing toward the station, are located, respectively, 19.21 meters (63.0 feet) southwest; 6.53 meters (21.4 feet) north-northwest; 6.90 meters (22.6 feet) east-northeast; and 6.15 meters (20.2 feet) southeast of the station.

Nantucket latitude (Nantucket County, Mass., C. O. Boutelle, 1866).—On one of the highest points in the city, in the garden of Peter Folger, nearly midway between triangulation station *Cliff* and *Nantucket Unitarian Church*. The instrument was mounted upon a firm wooden stand 2.234 meters (7.33 feet) or 0″.07 of latitude south and 4.255 meters (13.96 feet) west of triangulation station *Folger*.

Provincetown longitude (Barnstable County, Mass., Edwin Smith, 1901).—On the top of Town Hill in Provincetown, about 500 feet north of the town hall. The hill is the highest in the town and has been leveled off, making an oval 350 feet long and 150 feet wide. It is now the town park, and an iron fence is around the east and south border. The station is in the east end of the oval and is 8.940 meters (29.33 feet) from the fence on the east and 24.573 meters (80.62 feet) from the fence on the south. The station is 7″.29 of latitude north and 0″.92 of longitude east of the *New Universal Church spire;* and 4″.56 of latitude north and 1″.67 of longitude west of the town hall.

Provincetown latitude (Barnstable County, Mass., Edwin Smith, 1901).—A brick pier 1.89 meters (6.2 feet) west and 0.15 meter (0.5 foot) or 0″.005 of latitude north of the longitude station described above.

Sankaty Head Lighthouse azimuth (Nantucket County, Mass., Edwin Smith, 1908).—Identical with the triangulation station *Sankaty Head Lighthouse*.

Shootflying azimuth (Barnstable County, Mass., A. D. Bache, 1845; 1909).—Identical with the triangulation station of the same name, on the summit of a hill about 2½ miles west by south from Barnstable, 1 mile south from Old Colony Railroad (Cape Cod Branch) and midway between Great Pond and Seward Pond. The station is marked by a copper bolt set in a rock. A lookout tower, about 30 feet in height, called Shootflying Tower, is 31.62 meters (103.74 feet) to the northwest of the station.

Thompson latitude (Essex County, Mass., T. J. Lee, 1846).—This station was located 0″.25 of latitude south of *Thompson azimuth*, described below.

Thompson azimuth (Essex County, Mass., A. D. Bache, 1846; 1916).—Identical with the triangulation station of the same name on granite rock at the summit of Thompsons Hill, now locally known as Mount Anne. The station is about 3 miles west of Gloucester and ¾ mile to the southward of West Gloucester and is marked by a cross in the head of a copper bolt set in the rock. A standard disk reference mark is on a ledge to the westward of the station and is stamped "Thompson R. M. 1846."

Wachusett latitude (Worcester County, Mass., J. H. Toomer, 1860).—Marked by two granite blocks 29.26 meters (96.0 feet) or 0″.95 of latitude south and 40.01 meters (131.3 feet) east of *Wachusett azimuth* station, described below.

For notes in regard to marking of stations see p. 130.

Wachusett azimuth (Worcester County, Mass., G. W. Dean and R. E. Halter, 1860).—Identical with the triangulation station of the same name on the summit of the mountain of the same name, about 8 miles southwest of Fitchburg, 3¼ miles south-southwest of Wachusett village, and 2¾ miles north of Princeton Center. The station is on a detached rock about 4 feet by 2 feet and is marked by a copper bolt. Three reference marks, holes drilled in rocks and filled with lead and copper tacks, were placed in the form of an equilateral triangle about the station at 3.651 meters (11.98 feet) to the north-northeast, southeast by south, and west by south, respectively. In 1884 only the last-named reference mark remained, the others having disappeared in the course of construction of a road and the erection of a hotel called the Summit House. It was also reported that the rock bearing the station mark was moved to be used in the construction of the hotel, but subsequently, on learning that it was an important mark of the Coast and Geodetic Survey, an attempt was made to restore it to its original position. The Massachusetts Topographical Survey Commission, having occasion in 1895 to use the point, and having learned of the reported removal and replacement, determined the position of the copper bolt as found and called the station Wachusett 2. Their final computation indicates that Wachusett 2 is 0.3 meter (1 foot) south and 0.2 meter (0.7 foot) east of the original station.

MICHIGAN

A Mackinac west base (U. S. L. S.) azimuth (Emmet County, Mich., E. E. Haskell, 1896).—Identical with triangulation station *A Mackinac west base* of the United States Lake Survey, on the south shore of the Straits of Mackinac, on McGulpins Point. The station is 7.19 meters (23.6 feet) from the northeast corner of the lighthouse dwelling, and 3.99 meters (13.1 feet) from the front angle of the tower of the lighthouse. The underground mark is a hole in a brass plug set in a mass of concrete in a sugar barrel. The station mark is a cross in a brass plug, set in a limestone post, about 30 inches long and 6 inches square, set with the top about 8 inches below the surface of the ground.

Allegan (U. S. L. S.) longitude (Allegan County, Mich., T. N. Bailey, 1875).—No description. The station is 00″.29 of longitude west of the northwest corner of the county building, in the public square. (See Professional Papers, Corps of Engineers, No. 24, p. 762.)

Allegan (U. S. L. S.) latitude (Allegan County, Mich., T. N. Bailey, 1875).—No description. The station is 01″.73 of latitude south of the northwest corner of the county building, in the public square. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 748.)

Ann Arbor (U. S. L. S.) longitude (Washtenaw County, Mich., 1861).—The station is the pier of the meridian circle of the observatory.

Beaver Island (U. S. L. S.) latitude (Charlevoix County, Mich., O. B. Wheeler and S. W. Robinson, 1863).—No description. The station is 01″.72 of latitude north of Beaver Island Lighthouse, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 738.)

Belle Isle azimuth post (U. S. L. S.) azimuth (Wayne County, Mich., G. A. Marr, 1873).—No description. The station is identical with the United States Lake Survey triangulation station of the same name.

Big Pointe au Sable (U. S. L. S.) latitude (Mason County, Mich., O. B. Wheeler, 1866; 1872).—On the east shore of Lake Michigan on the end of the point nearly southwest from *Big Pointe au Sable Lighthouse.* The station is probably marked by a stone post. It is 96.00 meters (315.0 feet) north and 7.58 meters (24.9 feet) east of the traverse station *Big Pointe au Sable,* of the United States Lake Survey, which is also marked by a stone post. *Big Pointe au Sable Lighthouse* is 71.16 meters (233.5 feet) north and 83.22 meters (273.0 feet) east of the traverse station. The latitude station is therefore 24.84 meters (81.5 feet) or 0″.80 of latitude north and 75.64 meters (248.2 feet) west of the lighthouse.

Bunday (U. S. L. S.) longitude (Hillsdale County, Mich., Edwin Smith, 1908).—Identical with *Bunday (U. S. L. S.) azimuth,* described below.

Bunday (U. S. L. S.) latitude (Hillsdale County, Mich., William Bowie, 1908).—Identical with *Bunday (U. S. L. S.) azimuth,* described below.

Bunday (U. S. L. S.) azimuth (Hillsdale County, Mich., William Bowie, 1908).—Identical with *Bunday* triangulation station of the United States Lake Survey, which is in sec. 7, T. 5 S., R. 1 W., in Somerset Township, about 2 miles west of Somerset Center, on a hill known as Bundays Hill, now (1908) the property of Alfred Sutfin, who lives about 300 meters southwest of the station. The station is marked by a stone post 2½ feet below the surface of the ground. The surface mark is a stone post, marked with a cross, set in concrete and surmounted by a concrete pier used for longitude observations. Three stone reference posts are, respectively, 132.0 meters (433 feet) N. 85° 56′ E.; 161.7 meters (531 feet) S. 54° 50′ E., and 210.9 meters (692 feet) S. 14° 47′ E.

Burnt Bluff (U. S. L. S.) latitude (Delta County, Mich., O. B. Wheeler, 1863).—No description. The station is 30″.41 of latitude south of Burnt Bluff (old), a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 737.)

Cedar River (U. S. L. S.) latitude (Menominee County, Mich., S. W. Robinson, 1865).—A short distance from triangulation station *Cedar River* of the United States Lake Survey, which is on the west shore of Green Bay, about 2 miles northeast of the mouth of Cedar River and about 50 feet back from the shore. The triangulation station is marked by a stone post set about 2 feet below the level of the ground. The surface mark is a

For notes in regard to marking of stations see p. 130.

similar stone post, set about flush with the surface. Three reference stones are set, one north 13 meters (43 feet), one south 12.5 meters (41 feet), and one west 14 meters (46 feet) from the triangulation station. The latitude station is 0″07 of latitude south of triangulation station *Cedar River*. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 738.)

Charlotte (U. S. L. S.) longitude (Eaton County, Mich., P. M. Price, 1875).—Not described. The station is 0″26 of longtitude west of the intersection of axes of Oliver and Stoddard Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 761.)

Charlotte (U. S. L. S.) latitude (Eaton County, Mich., P. M. Price, 1875).—Not described. The station is 05″16 of latitude north of the intersection of axes of Oliver and Stoddard Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 747.)

Clay Banks (U. S. L. S.) latitude (Oceana County, Mich., E. Maguire, 1873).—Distant 0.21 meter (0.7 foot) south and 14.12 meters (46.3 feet) east from traverse station *Clay Banks* of the United States Lake Survey, which is about 9½ miles northward along the shore from the White River lights, about 10½ miles southward from Little Pointe au Sable, and about 4 miles southward from Stony Creek. The triangulation station is on the highest ground nearest the lake, northwest from Harvey Tower's barn and almost directly south from the house of Doctor Phillips. The traverse station is marked by a stone sunk in the ground, having a hole and the letters "U. S." cut in the top. Three piles of stone were made around the station, one north, one south, and one west. The latitude station is marked by a stone post.

Copper Harbor (U. S. L. S.) latitude (Keweenaw County, Mich., O. B. Wheeler, 1864).—About 1 mile east of Copper Harbor and just north of Fort Wilkins. The station is marked by a pine post. A *stone post marked "S"* is just outside the fort fence, 71.29 meters (233.9 feet) 2″31 of latitude south of the observatory post, and a cross on the rock near the water's edge is 157.25 meters (515.9 feet) north.

Corunna (U. S. L. S.) longitude (Shiawassee County, Mich. H. M. Adams, 1874).—Not described. The station is 01″65 of longitude west of the intersection of axes of Shiawassee Avenue and Flint Road. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 760.)

Corunna (U. S. L. S.) latitude (Shiawassee County, Mich., H. M. Adams, 1874).—Not described. The station is 15″69 of latitude south of intersection of axes of Shiawassee Avenue and Flint Road. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 745.)

Crebassa (U. S. L. S.) latitude (Houghton County, Mich., G. A. Marr, 1871).—Not described. Identical with Crebassa latitude post, a triangulation station of the United States Lake Survey.

Detroit (U. S. L. S.) longitude (Wayne County, Mich., O. M. Poe, 1860; James Carr, 1861; W. F. Reynolds, 1864; E. H. Ruffner; 1868; O. B. Wheeler, 1871; 1891).—The station of 1861–1868 was 1″90 of longitude (0ˢ127) east of the station of 1871. The station of 1871 is the east pier of the Lake Survey observatory and is 0ˢ366 west of the United States Coast and Geodetic Survey station of 1891. (See description of *Detroit longitude.*) The west pier of the observatory is 1.55 meters (5.1 feet) or 0″068 (0ˢ004) of longitude west of the east pier.

Detroit (U. S. L. S.) latitude (Wayne County, Mich., C. B. Comstock, 1872).—Identical with the west pier of the observatory of 1871, described above.

Detroit longitude (Wayne County, Mich., C. H. Sinclair and G. R. Putnam, 1891; O. B. French, 1908).—The station of 1891 is on the ground back of the building at the northeast corner of Grand River and Washington Avenues. The station is 2.53 meters (8.3 feet) from the near side of the sidewalk along Grand River Avenue, at the line of the Hull Bros.' building and 3.38 meters (11.1 feet) from the old Lake Survey building now owned by Hull Bros. and 1.5 meters (5 feet) due west of another pier. It is also 20.45 meters (67.1 feet) north and 57.64 meters (189.1 feet) east of the intersection of Grand River and Washington Avenues. The station of 1908 is in the parking of Washington Avenue, just south of Grand River Avenue. It is 35.68 meters (117.1 feet) due south of a point midway between the two street-car tracks on Grand River Avenue; 9.85 meters (32.3 feet) east of the east side of the roadway along Washington Avenue, 55.95 meters (183.6 feet) south and 62.94 meters (206.5 feet) or 2″75 (0ˢ183) of longtitude west of the station of 1891. It is also 66.07 meters (216.8 feet) north and 36.26 meters (119.0 feet) west of the southwest wall of St. Aloysius Church. The station, in 1908, is marked by a brick and cement pier, 17 by 25 inches, extending 3 feet below the ground, the top of the pier being about 6 inches below the surface.

Douglas (U. S. L. S.) latitude (Allegan County, Mich., E. Maguire, 1873).—Distant 17.77 meters (58.3 feet) or 0″58 of latitude south and 18.29 meters (60.0 feet) east of traverse station *Douglas* of the United States Lake Survey, on the east shore of Lake Michigan, on the edge of the bank about 2½ miles south of Kalamazoo River, and about 1½ miles southwest of the village of Douglas. The traverse station is marked by a stone post set 3 feet below the ground surface, with a stone post set directly over it for a surface mark. The azimuth post is 10 meters north of the traverse station. The latitude station is also marked by a stone post.

Duck Lake (U. S. L. S.) latitude (Muskegon County, Mich., J. H. Wheeler, 1871).—Distant 15.05 meters (49.4 feet) or 0″49 of latitude north and 8.54 meters (28.0 feet) west of traverse station *Duck Lake* of the United States Lake Survey, on the east shore of Lake Michigan, about 3 miles south of White River Lights and ½ mile south of Duck Lake, on the highest bluff close to the shore. The traverse station is marked by a stone post set about 3 feet below the surface level, with a stone post set directly over this for a surface mark. The latitude station is also marked by a stone post.

For notes in regard to marking of stations see p. 130.

Escanaba (U. S. L. S.) longitude (Delta County, Mich., O. B. Wheeler and S. W. Robinson, 1865).—No description. The station is 179″85 of longitude east of Ford River 2, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 723.)

Escanaba (U. S. L. S.) latitude (Delta County, Mich., O. B. Wheeler and S. W. Robinson, 1865).—No description. The station is 12″26 of latitude south of Escanaba Lighthouse, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 737.)

Flint (U. S. L. S.) longitude (Genesee County, Mich., C. F. Powell, 1874).—No description. The station is 0″36 of longitude west of the intersection of axes of Keasley and East Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 760.)

Flint (U. S. L. S.) latitude (Genesee County, Mich., C. F. Powell, 1874).—No description. The station is 01″31 of latitude north of intersection of axes of Keasley and East Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 745.)

Ford River (U. S. L. S.) latitude (Delta County, Mich., G. Y. Wisner, 1874).—Distant 2.16 meters (7.1 feet) or 0″07 of latitude south and 8.72 meters (28.6 feet) west from *Ford River (U. S. L. S.) azimuth,* described below.

Ford River (U. S. L. S.) azimuth (Delta County, Mich., G. Y. Wisner, 1874).—Identical with triangulation station *Ford River* of the United States Lake Survey, on the west shore of Green Bay, about 5 miles southwest of Escanaba Lighthouse, about 2 miles northeast of the mouth of Ford River, and about 100 feet back from the shore. The station is marked by a cross cut in the solid rock, about 3 feet below the surface of the ground. The surface mark is a stone post set flush with the surface. Two reference stones are set, one north (approximately) 16.79 meters (55.1 feet) and one west (approximately) 19.66 meters (64.5 feet) from the station. A large boulder marked "U. S." lies 6.16 meters (20.2 feet) to the south of the station. The southeast corner of sec. 12, T. 38 N., R. 23 W., bears north 79° 29′ east and is 132.74 meters (435.5 feet) distant.

Fort Gratiot (U. S. L. S.) latitude (St. Clair County, Mich., C. N. Turnbull, 1858).—No description. The station is 29″68 of latitude south of Fort Gratiot Lighthouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 745.)

Frankfort (U. S. L. S.) latitude (Benzie County, Mich., J. H. Weeden, 1871).—Distant 7.22 meters (23.7 feet) or 0″24 of latitude north and 26.79 meters (87.9 feet) east from triangulation station *Frankfort* of the United States Lake Survey, on the east shore of Lake Michigan, about 1.2 miles north of Frankfort, 3 miles south of the Pointe aux Becs Scies Lighthouse, and about 170 meters back from the shore. The triangulation station is probably marked by a stone post set below the level of the ground, with a similar post set flush with the surface for a surface mark. The latitude station is probably marked with a stone post also. The old triangulation station *Pointe aux Becs Scies* bears N. 1° 16′ 32″ E. and is 5,570.8 meters (18,277 feet) from the triangulation station.

Grand Haven (U. S. L. S.) longitude (Ottawa County, Mich., James Carr, 1860).—No description. The station is 21″80 of longitude east of Grand Haven Lighthouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 755.)

Grand Island (U. S. L. S.) latitude (Alger County, Mich., O. B. Wheeler, 1867).—No description. The station is 1″19 of latitude north of Grand Island Lighthouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 736.)

Grand Rapids (U. S. L. S.) longitude (Kent County, Mich., C. F. Powell, 1874).—No description. The station is 04″50 of longitude east of quarter-section corner on west side of sec. 30, T. 7 N., R. 11 W., being at the intersection of Division and Fulton Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 761).

Grand Rapids (U. S. L. S.) latitude (Kent County, Mich., C. F. Powell, 1874).—No description. The station is 01″98 of latitude north of quarter-section corner on west side of sec. 30, T. 7 N., R. 11 W., being at the intersection of Division and Fulton Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 746.)

Hastings (U. S. L. S.) longitude (Barry County, Mich., T. N. Bailey, 1875).—No description. The station is 0″70 of longitude west of intersection of axes of State and Church Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 761.)

Hastings (U. S. L. S.) latitude (Barry County, Mich., T. N. Bailey, 1875).—No description. The station is 01″28 of latitude south of intersection of axes of State and Church Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 747.)

Howell (U. S. L. S.) longitude (Livingston County, Mich., T. N. Bailey, 1875).—No description. The station is 06″52 of longitude east of intersection of axes of Higgins and Monroe Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 761.)

Howell (U. S. L. S.) latitude (Livingston County, Mich., T. N. Bailey, 1875).—No description. The station is 10″94 of latitude south of intersection of axes of Higgins and Monroe Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 747.)

Huron Mountains (U. S. L. S.) latitude (Marquette County, Mich., S. W. Robinson, 1866).—Distant 23.90 meters (78.4 feet) or 0″77 of latitude south and 17.68 meters (58.0 feet) west of triangulation station *Huron*

For notes in regard to marking of stations see p. 130.

Mountains of United States Lake Survey, which is on one of the Huron Mountains, about 3 miles southwest of the mouth of Pine River, and near the north end of Mountain Lake. The triangulation and latitude stations are both marked by stone posts.

Ionia (U. S. L. S.) longitude (Ionia County, Mich., C. F. Powell, 1874).—No description. The station is 03″.99 of longitude east of intersection of axes of Main and First Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 760.)

Ionia (U. S. L. S.) latitude (Ionia County, Mich., C. F. Powell, 1874).—No description. The station is 01″.14 of latitude north of intersection of axes of Main and First Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 745.)

Iroquois Point (U. S. L. S.) latitude (Chippewa County, Mich., O. B. Wheeler, 1867).—No description. The station is 0″.32 of latitude north of Iroquois Point Lighthouse, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 737.)

Isle Royale (U. S. L. S.) latitude (Keweenaw County, Mich., S. W. Robinson, 1866; 1906).—Distant 0.9 meter (3 feet) or 0″.03 of latitude north and 26.8 meters (88 feet) east from triangulation station *Isle Royale east* of the United States Lake Survey, near the east end of Isle Royale, about 1¼ miles north from the old mining company's landing in Rock Harbor. The triangulation station is marked by a copper bolt set in the rock and the latitude station by a wooden post. A cross in a 4-inch circle cut in a large bowlder is 2.234 meters (7.33 feet) N. 18° 44′ E. from the triangulation station.

Jackson (U. S. L. S.) longitude (Jackson County, Mich., T. N. Bailey, 1875).—No description. The station is 01″.90 of longitude west of intersection of axes of Main and Jackson Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 763.)

Jackson (U. S. L. S.) latitude (Jackson County, Mich., T. N. Bailey, 1875).—No description. The station is 01″.62 of latitude north of intersection of axes of Main and Jackson Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 749.)

Kalamazoo (U. S. L. S.) longitude (Kalamazoo County, Mich., P. M. Price, 1875).—No description. The station is 06″.20 of longitude east of intersection of axes of South and Park Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 762.)

Kalamazoo (U. S. L. S.) latitude (Kalamazoo County, Mich., P. M. Price, 1875).—No description. The station is 01″.37 of latitude north of intersection of axes of South and Park Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 749.)

Keweenaw Point south base (U. S. L. S.) latitude (Keweenaw County, Mich., G. Y. Wisner, 1873).—Distant 0.08 meter (0.3 foot) north and 7.71 meters (25.3 feet) east from *Keweenaw Point south base* (*U. S. L. S.*) *azimuth*, described below. The station is marked by a post.

Keweenaw Point south base (U. S. L. S.) azimuth (Keweenaw County, Mich., G. Y. Wisner, 1873).—Identical with triangulation station *Keweenaw Point south base* of the United States Lake Survey on Keweenaw Point, about 6½ miles south of Portage Entry, and about ½ mile back from the lake shore, about 50 feet east of the State road running north along the base line. The station is marked by the intersection of two lines cut on the surface of a brass frustum leaded into the end of a stone post 6 feet long, set with its upper end about flush with the surface of the ground. A second stone, 2½ feet long and similarly marked, is set 1 yard south of the first and in the prolongation of the base line. The top of this stone is 6 feet below the surface of the ground. Two reference stones are set, one east and one west of the line, each about 100 feet distant, and the line joining them passes through the station at right angles to the base line. The east stone is 6 feet long and projects about 1 foot above the ground. The west stone was originally the same as the east one, but is now broken off at its upper end.

Lansing (U. S. L. S.) longitude (Ingham County, Mich., T. N. Bailey, 1875).—No description. The station is 02″.70 of longitude west of intersection of axes of Michigan and Capitol Avenues. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 761.)

Lansing (U. S. L. S.) latitude (Ingham County, Mich., T. N. Bailey, 1875).—No description. The station is 02″.68 of latitude south of intersection of axes of Michigan and Capitol Avenues. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 746.)

Lapeer (U. S. L. S.) longitude (Lapeer County, Mich., C. F. Powell, 1874).—No description. The station is 01″.52 of longitude east of intersection of axes of Calhoun and Franklin Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 760.)

Lapeer (U. S. L. S.) latitude (Lapeer County, Mich., C. F. Powell, 1874).—No description. The station is 00″.35 of latitude north of intersection of axes of Calhoun and Franklin Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 745.)

Manistee (U. S. L. S.) latitude (Manistee County, Mich., J. H. Weeden, 1871).—Distant 27.84 meters (91.3 feet) or 0″.90 of latitude north and 11.95 meters (39.2 feet) east of traverse station *Manistee* of the United States Lake Survey, on the east shore of Lake Michigan, 2½ miles north along the shore from the mouth of Manistee River and about 260 meters north of a crossroad leading down to the beach from the main road. The traverse station and latitude station are marked by wooden posts. Hydrographic station *Rush Lake*, probably marked by a stone post, is 475.5 meters (1,560 feet) from the traverse station in azimuth 195° 59′ 50″.

For notes in regard to marking of stations see p. 130.

Marshall (U. S. L. S.) longitude (Calhoun County, Mich., P. M. Price, 1875).—No description. The station is 0".04 of longitude east of intersection of axes of Kalamazoo Avenue and Mansion Street. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 762.)

Marshall (U. S. L. S.) latitude (Calhoun County, Mich., P. M. Price, 1875).—No description. The station is 03".46 of latitude south of intersection of axes of Kalamazoo Avenue and Mansion Street. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 749.)

Monroe (U. S. L. S.) longitude (Monroe County, Mich., G. Y. Wisner, 1868).—No description. The station is 17".61 of longitude east of triangulation station *Monroe courthouse* of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 756.)

Monroe (U. S. L. S.) latitude (Monroe County, Mich., G. Y. Wisner, 1868).—No description. The station is 1".23 of latitude north of triangulation station *Monroe courthouse* of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 750.)

Mount Houghton (U. S. L. S.) latitude (Keweenaw County, Mich., S. W. Robinson, 1865.)—In the meridian 0".06 of latitude north of triangulation station *Mount Houghton* of the United States Lake Survey, which is on Mount Houghton, about 1.2 miles north of Bete Grise Bay. The latitude station, about 100 feet northeast from the cliff, is marked by a wooden post. A second wooden post is 11.70 meters (38.4 feet) southeast from the latitude post. A secondary triangulation station, marked by a stone buried in the ground, is 23.2 meters (76 feet) from *Mount Houghton* triangulation station in azimuth 85° 30′.

Newaygo (U. S. L. S.) longitude (Newaygo County, Mich., T. N. Bailey, 1875).—No description. The station is 00".56 of longitude east of intersection of axes of Wood and State Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 759.)

Newaygo (U. S. L. S.) latitude (Newaygo County, Mich., T. N. Bailey, 1875).—No description. The station is 01".29 of latitude south of intersection of axes of Wood and State Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 743.)

Paw Paw (U. S. L. S.) longitude (Van Buren County, Mich., P. M. Price, 1875).—No description. The station is 01".59 of longitude west of intersection of axes of Main and Van Buren Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 763.)

Paw Paw (U. S. L. S.) latitude (Van Buren County, Mich., P. M. Price, 1875).—No description. The station is 00".75 north of intersection of axes of Main and Van Buren Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 749.)

Pontiac (U. S. L. S.) longitude (Oakland County, Mich., C. F. Powell, 1874).—No description. The station is 05".31 of longitude west of the southeast corner of sec. 29, T. 3 N., R. 10 E. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 761.)

Pontiac (U. S. L. S.) latitude (Oakland County, Mich., C. F. Powell, 1874).—No description. The station is 00".25 of latitude north of southeast corner of sec. 29, T. 3 N., R. 10 E. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 747.)

Porcupine Mountains (U. S. L. S.) latitude (Ontonagon County, Mich., G. Y. Wisner, 1870).—Distant 13.7 meters (45 feet) or 0".44 of latitude north and 4.42 meters (14.5 feet) east of triangulation station *Porcupine Mountains* of the United States Lake Survey, on the south shore of Lake Superior, on one of the highest ridges of the Porcupine Mountains. The station is about 4 miles south of the Carp Lake Mining Co.'s landing and about 2 miles south of Carp Lake. The triangulation station is marked by a stone post and the latitude station by a wooden post.

Portage Entry (U. S. L. S.) latitude (Houghton County, Mich., O. B. Wheeler, 1864).—The station is 00".17 of latitude south of a stone post marked "S." (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 735.)

Round Island (U. S. L. S.) latitude (Mackinac County, Mich., J. N. Macomb, 1853).—Identical with Round Island observatory post, a triangulation station of the United States Lake Survey. Not described.

Saginaw (U. S. L. S.) longitude (Saginaw County, Mich., D. W. Lockwood, 1876).—No description. The station is 02".24 of longitude east of east corner of courthouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 759.)

Saginaw (U. S. L. S.) latitude (Saginaw County, Mich., D. W. Lockwood, 1876).—No description. The station is 01".87 of latitude north of east corner of courthouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 743.)

St. Johns (U. S. L. S.) longitude (Clinton County, Mich., C. F. Powell, 1874).—No description. The station is 00".82 of longitude west of intersection of axes of Clinton Avenue and State Street. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 760.)

St. Johns (U. S. L. S.) latitude (Clinton County, Mich., C. F. Powell, 1874).—No description. The station is 02".45 of latitude south of intersection of axes of Clinton Avenue and State Street. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 745.)

St. Louis (U. S. L. S.) longitude (Gratiot County, Mich., D. W. Lockwood, 1876).—No description. The station is 12".50 of longitude east of intersection of axes of Washington and Mill Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 759.)

For notes in regard to marking of stations see p. 130.

St. Louis (U. S. L. S.) latitude (Gratiot County, Mich., D. W. Lockwood, 1876).—No description. The station is 00″83 north of intersection of axes of Washington and Mill Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 744.)

Sault Ste. Marie (U. S. L. S.) longitude (Chippewa County, Mich., Charles S. Riche, 1893).—The west pier of the United States Lake Survey observatory at Sault Ste. Marie. The station is a geodetic point of the United States Lake Survey.

Sault Ste. Marie (U. S. L. S.) latitude (Chippewa County, Mich., J. F. Gregory and G. Y. Wisner, 1867; Chas. S. Riche, 1893).—The station of 1867 is 02″62 south of beacon light (1867) on west end of canal pier. The station of 1893 is the east pier of the Sault Ste. Marie observatory and is 0″02 of latitude south of the longitude station described above.

Sault Ste. Marie Observatory, west pier (U. S. L. S.), azimuth (Chippewa County, Mich., E. E. Haskel, 1893).—Identical with *Sault Ste. Marie, (U. S. L. S.) longitude*, described above.

Sherman (U. S. L. S.) latitude (St. Joseph County, Mich., William Bowie, 1908).—Distant 35.351 meters (115.98 feet) in azimuth 329° 51′ or 0″99 of latitude south from *Sherman* triangulation station, of the United States Lake Survey, which is in the NW. ¼ sec. 22, T. 7 S., R. 10 W., Sherman Township, about 4 miles northwest from Sturgis, on the highest point of a hill in a woods owned (1908) by Mrs. Jane Taylor, about 125 feet north of the Sturgis-Sherman wagon road, 66 feet west of a fence between the properties of Mrs. Jane Taylor and Mr. George W. Taylor, and about 150 feet northwest of a turn in the wagon road. The triangulation station is marked by a stone post, with three reference posts, set as follows: One S. 28° 58′ E. distant 45.9 meters (151 feet); one S. 21° 16′ W. distant 41.7 meters (137 feet); one N. 70° 17′ W. distant 26.8 meters (88 feet) from the station. The latitude station is near the edge of the woods and just north of the angle of the road.

Sherman (U. S. L. S.) azimuth (St. Joseph County, Mich., William Bowie, 1908).—Identical with *Sherman* triangulation station of the United States Lake Survey, described above.

South Haven (U. S. L. S.) latitude (Van Buren County, Mich., E. Maguire, 1873).—Distant 7.34 meters (24.1 feet) or 0″24 of latitude south and 12.22 meters (40.1 feet) east of triangulation station *South Haven* of the United States Lake Survey, on the east shores of Lake Michigan, 9½ miles southward along the shore from South Haven, and 3¼ miles south of Little Brandywine Creek, on a sand dune nearly 100 feet above the lake. The triangulation station is marked by a stone post set 3 feet below the surface of the ground, with a similar stone post for a surface mark. A blaze on a large oak tree bears N. 70° E., distant 18 meters (59 feet), and a blaze on an oak stump bears S. 20° E., distant 14 meters (46 feet) from the triangulation station. The latitude station is marked by a post.

South Twin Sister (U. S. L. S.) latitude (Ottawa County, Mich., J. H. Weeden, 1871).—Distant 4.2 meters (14 feet) due west from triangulation station *South Twin Sister* of the United States Lake Survey, on the east shore of Lake Michigan, about 6 miles south of Grand Haven, nearly 1 mile north of Little Pigeon River, and about 950 meters south of a landing pier, on the summit of a hill about 134 feet above the lake and about 100 meters back from the edge of the lake. Another hill, about 120 feet high, is about 300 meters to the northward. The latitude station is marked by a post and the triangulation station by a stone post, with a similar stone post for a surface mark.

Stanton (U. S. L. S.) longitude (Montcalm County, Mich., P. M. Price, 1875).—No description. The station is 06″34 of longitude west of intersection of axes of Main and Camburn Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 760.)

Stanton (U. S. L. S.) latitude (Montcalm County, Mich., P. M. Price, 1875).—No description. The station is 0″93 of latitude south of intersection of axes of Main and Camburn Streets. (See Professional Papers, Corps of Engineers, United States Army, No. 24. p. 744.)

Thones Hill (Marquette) (U. S. L. S.) longitude (Marquette County, Mich., O. B. Wheeler and S. W. Robinson, 1865; 1867).—Identical with triangulation station *Observatory post, Thones Hill* of the United States Lake Survey, on Thones Hill, no description of which is available.

Thones Hill (Marquette) (U. S. L. S.) latitude (Marquette County, Mich., O. B. Wheeler and S. W. Robinson, 1865; 1867).—The station is 0″07 of latitude north of *Thones Hill (U. S. L. S.) longitude.* (See above.)

Thunder Bay Island (U. S. L. S.) latitude (Alpena County, Mich., C. N. Turnbull, 1858).—No description. The station is 4″58 of latitude south of Thunder Bay Island Lighthouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 739.)

Vulcan Post No. 1 (U. S. L. S.) latitude (Keweenaw County, Mich., James Mercur, 1867).—Distant 1.73 meters (5.3 feet) or 0″06 of latitude north and 14.69 meters (48.2 feet) west of triangulation station *Vulcan* of the United States Lake Survey. (See *Vulcan azimuth*, below.)

The observations at post No. 1 and post No. 2 were reduced to triangulation station *Vulcan* and a weighted mean taken.

Vulcan Post No. 2 (U. S. L. S.) latitude (Keweenaw County, Mich., James Mercur, 1867).—Distant 47.598 meters (156.16 feet) or 1″54 of latitude due south of *Vulcan post No. 1 (U. S. L. S.) latitude*, described above. The station is probably marked by a wooden post. (See *Vulcan post No. 1* above.)

Vulcan (U. S. L. S.) azimuth (Keweenaw County, Mich., William Bowie, 1908).—Identical with the United States Lake Survey triangulation station of the same name on Keweenaw Point, about 6 miles southeast

For notes in regard to marking of stations see p. 130.

of Copper Harbor and about 3 miles directly east-southeast from the eastern end of Lake Fanny Hooe. The station is at the eastern extremity of a prominent ridge running east and west, on a round flat-top and wooded knoll several feet higher than the remainder of the ridge. The station is marked by a copper bolt in a dressed stone set flush with the surface of the ground.

Wheal Kate (U. S. L. S.) latitude (Keweenaw County, Mich., O. B. Wheeler, 1866; 1870).— Distant 9.85 meters (32.3 feet) or 0".32 of latitude north and 28.35 meters (93 feet) east of triangulation station *Wheal Kate* of the United States Lake Survey, on Keweenaw Point, about 7 miles southwest of Houghton, about ¼ mile west of the old Ontonagon road, and 1½ miles southwest of Wheal Kate mine. The triangulation station is marked by a stone post, the latitude station by a wooden post.

Whitefish Point (U. S. L. S.) latitude (Chippewa County, Mich., O. B. Wheeler, 1867).—No description. The geodetic position is given in United States Engineers Report for 1902, Northern and Western Lakes, page 2973.

MINNESOTA

Buchanan (U. S. L. S.) latitude (St. Louis County, Minn., A. R. Flint, 1871).—Distant 71.11 meters (233.3 feet) or 2".30 of latitude south and 356.95 meters (1,171.1 feet) west of triangulation station *Buchanan* of the United States Lake Survey, on the north shore of Lake Superior, about 1 mile southwest of Granite Point. The triangulation station is not more than 100 feet back from the lake shore, near the site of the now deserted village of Buchanan. A brass frustum is 2 feet S. 36° 30′ E., and an iron bolt leaded into solid surface rock is 3 feet N. 36° 30′ W. from the triangulation station, which is unmarked. The latitude station is marked by a large bowlder.

Dalton longitude (Ottertail County, Minn., W. H. Burger, 1907; 1908).—Marked by a concrete pier 2 feet in the ground and 3 feet above. The station is 2.26 meters (7.4 feet) south and 4.15 meters (13.6 feet) or 0".19 of longitude west of *Dalton azimuth*, described below.

Dalton latitude (Ottertail County, Minn., W. H. Burger, 1906; 1907).—Identical with *Dalton azimuth*, described below.

Dalton astronomic azimuth (Ottertail County, Minn., W. H. Burger, 1906; 1907).—Identical with triangulation station *Dalton astronomic*, on the south edge of the town of Dalton, near the Great Northern Railway station, on a prominent small knoll in a vacant lot belonging to M. T. McMahon, who lives in Fergus Falls and owns the Dalton Lumber Co. The railway telegraph station is 120 paces west. The station is marked by a 60d. nail in a terra-cotta pipe set in concrete and buried with the top about 2 feet below the surface. A similar mark is placed above the underground mark, the top of the concrete being flush with the surface. The reference mark is similar to the surface mark and is 29.757 meters (97.63 feet) from the station in azimuth 179° 26′ 04″. Various distances and azimuths from the station are as follows: Great Northern Railway section house, about 500 feet, 346° 11′ 09″; Dalton Lumber Co.'s building gable, about 300 feet, 6° 47′ 42″; Minneapolis & Northern elevator, northeast corner, 80.3 meters (263 feet), 59° 00′ 11″; Bank of Dalton, chimney, about 175 feet, 187° 05′ 06″; Oliver Rustadt's house, small gable over west entrance, about 200 feet, 273° 08′ 07″.

Douglas latitude (Aitkin County, Minn., W. H. Burger, 1905).—The instrument was mounted on a wooden pier 10.46 meters (34.3 feet) due west of the triangulation station of the same name, near the center of the NE. ¼ SW. ¼ sec. 28, T. 46 (49), R. 23, on land belonging to E. L. Douglas, who lives at Tamarack. It is 3½ miles by road west of south from Tamarack, from which place it is reached by following the main road south for 2 miles to where it forks, then west ¾ mile to M. O. Frisk's gate; then in a southerly direction about ¾ mile past Frisk's house. After passing through the gate on the road to John Maxwell's place (about ½ mile from the main road), follow the right-hand trail for ¼ mile. The triangulation station is on top of a hill and is marked in the same manner as *Dalton azimuth*, described above, the reference mark being on the south side of the trail and 44.86 meters (147.2 feet) from the station in azimuth 70° 52′ 58″. Other distances and azimuth, from the triangulation station are as follows: Leveitchi's barn, northwest gable, about ⅜ mile, 254° 56′ 18″; Fred Burger's house, north gable, about ½ mile, 276° 20′ 57″; John Maxwell's house, west corner, ⅜ miles 240° 41′ 07″.

East Sawteeth (U. S. L. S.) latitude (Lake County, Minn., A. R. Flint, 1870).—Distant 14.02 meters (46.0 feet) or 0".45 of latitude north and 6.07 meters (19.9 feet) west of triangulation station *East Sawteeth* of the United States Lake Survey on one of the Sawteeth mountains, about 1½ miles northeast of *West Sawteeth* and about 2 miles back from the lake shore. The station is marked by a stone post; the latitude station by a wooden post.

Farquhars Knob (U. S. L. S.) latitude (Cook County, Minn., E. H. Ruffner, 1869).—Distant 1.80 meters (5.9 feet) or 0".06 of latitude south and 7.59 meters (24.9 feet) east from triangulation station *Farquhars Knob* of the United States Lake Survey, on the north shore of Lake Superior, about 4 miles northwest of Sand Bay. The triangulation station is marked by a cross cut on solid rock about 3 feet below the surface of the ground. The surface mark is a stone post. The latitude station is marked by a wooden post.

Grindle azimuth (Aitkin County, Minn., W. H. Burger, 1905).—Identical with the triangulation station of the same name, 4½ miles south of McGregor in the SW. ¼ sec. 17, T. 47, R. 23, on the east side of the wagon road on the west section line, and 250 paces north of the quarter-section corner, on land owned by John Lewis, who lives 65 paces southwest of the station. The station is marked in the same manner as *Dalton azimuth*,

For notes in regard to marking of stations see p. 130.

described above, the reference mark being just outside the fence between Mr. Lewis's house and the road and 34.96 meters (114.7 feet) from the station in azimuth 359° 49′ 20″. Other distances and azimuths from the station are as follows: John Graydon's house, southeast gable, about 1 mile, 171° 12′ 16″; schoolhouse belfry, about 1 mile, 181° 43′ 34″; Carlson's house (on northeast shore of lake) southeast gable, about ¼ mile, 230° 52′ 51″; Johnson's barn, west gable, about ⅛ mile, 268° 56′ 14″; Lewis's house, east gable, 60 paces, 299° 42′; Hoder's house, north gable, about ¼ mile, 10° 14′ 04″; Westburger's barn, east gable, about ¾ mile, 53° 23′ 37″; center of island in Rice Lake, 56° 27′; Vernon Grindle's house, northeast corner, 200 paces, 65° 44′ 55″.

Gull azimuth (Cass County, Minn., W. H. Burger, 1904; 1905).—Identical with the triangulation station of the same name, on the highest peak on the west side of Gull Lake, and near the center of the S. ½ SE. ¼ sec. 6, T. 134 N., R. 29 W., near the fence on the west edge of the 80-acre field, owned by J. M. Hayes, whose house is about ⅛ mile east of the station, and between it and the lake shore. The station is 1.4 meters (4.6 feet) west of the fence, on land constituting a State reserve. On the fence line and 4.158 meters (13.64 feet) from the station, in azimuth 331° 06′, is a pipe marking a Mississippi River Commission station. The station is marked in the same manner as *Dalton azimuth*, described above, the reference mark being 0.6 meter (2 feet) west of the fence and 21.187 meters (69.51 feet) from the station in azimuth 357° 34′. Other distances and azimuths from the station are as follows: No. 2 district schoolhouse, top of befry, about 1 mile, 173° 14′ 28″; J. M. Hayes's house, west gable, about 250 meters, 267° 23′ 17″.

Jones latitude (Crow Wing County, Minn., W. H. Burger, 1905; 1906).—The instrument was mounted on a wooden pier 7.47 meters (24.5 feet) due west of the triangulation station of the same name, in the SW. ¼ of NE. ¼ sec. 12, T. 45, N., R. 30 W., about ½ mile south of Jonesville railway station on the Northern Pacific Railway and on land owned by V. A. Loerch, who lives at the railway station. The triangulation station is 290 paces east and 185 paces north of the center of section 12, on a hill covered with small brush and timber 30 to 40 feet high. Brainerd is 8 miles by road southwest of the station. The triangulation station is marked in the same manner as *Dalton azimuth*, described above, the reference mark being 23.018 meters (75.52 feet) from the station in azimuth 272° 47′. Other distances and azimuths from the triangulation station are as follows: John Peterson's red barn, north gable, about ¾ mile, 1° 24′ 05″; Frederick Bergemann's house chimney, about ¼ mile, 91° 44′ 27″.

Minneapolis longitude (Hennepin County, Minn., Francis Blake, 1873; 1915; F. A. Leavenworth, 1895).—The station of 1873–1915 is in the grounds of the University of Minnesota, about 300 feet south of the main stone building. The station was originally marked by a brick pier, which in 1895 was lowered to meet grade requirements. The station is now (1915) marked by a bronze triangulation marker, stamped "Longitude Station 1873, 1891, 1907, 1915," set in the top of a brick pier built on the foundation of the old pier. This new pier is at the following distances and azimuths from the four near corners of the library building: 39.172 meters (128.52 feet), 158° 16′ 20″; 28.821 meters (94.56 feet) 168° 31′ 30″; 17.885 meters (58.68 feet), 203° 18′ 40″; 17.879 meters (58.66 feet) 242° 19′ 20″. A granite post is 83.06 meters (272.5 feet) north of the station. The station of 1895 is marked by a brick pier 64.425 meters (211.37 feet) or 2ˢ.94 of longitude (0ˢ.196) west and 50.99 meters (167.3 feet) north of the station of 1873–1915.

Minneapolis latitude (Hennepin County, Minn., Francis Blake, 1873; C. O. Boutelle, 1887).—The station of 1873 was 2.26 meters (7.4 feet) to the west of the longitude station of 1873, described above. The station of 1887 is on the east pier of the observatory, 2.807 meters (9.21 feet) due east of the *Minneapolis azimuth* station, described below and 1″.26 of latitude north of the 1873 station.

Minneapolis azimuth (Hennepin County, Minn., C. O. Boutelle, 1887).—At a point in the grounds of the University of Minnesota, in line with the pole on the university dome and triangulation station *Prospect Park* and 154.732 meters (507.65 feet) from the dome of the university. The instrument was mounted on the westernmost pier of the observatory, mentioned under the description of *Minneapolis latitude, 1887*. (See above.)

Minnesota Point, north base (U. S. L. S.), longitude (St. Louis County, Minn., General Comstock and G. Y. Wisner, 1871).—Distant 33.59 meters (110.2 feet) north and 45.75 meters (150.1 feet) or 2ˢ.15 of longitude east from *Minnesota Point north base (U. S. L. S.) azimuth*, described below.

Minnesota Point, north base (U. S. L. S.), latitude (St. Louis County, Minn., G. Y. Wisner, 1871).—Distant 52.21 meters (171.3 feet) or 1″.69 of latitude north and 106.50 meters (349.4 feet) east from *Minnesota Point north base (U. S. L. S.) azimuth*, described below.

Minnesota Point north base (U. S. L. S.) azimuth (St. Louis County, Minn., G. Y. Wisner, 1871; 1905).—Identical with triangulation station *Minnesota Point north base*, of the United States Lake Survey, on Minnesota Point, on the low sand spit which separates Superior Bay from Lake Superior, about 2 miles southeast from Duluth, 1½ miles south from Duluth ship canal, and 10 meters from the west shore. The station is about 100 feet west of the car track and just north of Church Street. The station is marked by the intersection of two lines cut in the surface of a brass frustum, which is leaded into the end of a stone post 1 foot by 1 foot by 3 feet. The post is set so that its upper end is about 1 foot below the surface of the ground. An iron cover 2 feet square and ½ inch thick, with flanges 6 inches deep, is placed over the stone. In the center of this cover is a hub $\frac{3}{16}$ inch high, 2 inches in diameter, with a ¼-inch drill hole to mark the center. Three reference stones similar to the one at center are set each 15 feet from the station, one in the prolongation of the base line and one on either side in

For notes in regard to marking of stations see p. 130.

the line passing through the station at right angles to the base line. The following azimuths are from the center: Duluth State Normal School chimney, 181° 39′ 18″; elevator "M" smokestack, 334° 10′ 22″; Alger and Smith's sawmill smokestack, 71° 17′ 17″; church spire in Duluth, 148° 30′ 15.″

Minnesota Point south base (U. S. L. S.) latitude (St. Louis County, Minn., G. Y. Wisner, 1871; 1905).—Distant 7.59 meters (24.9 feet) or 0″25 of latitude north and 5.53 meters (18.1 feet) west of triangulation station *Minnesota Point south base*, on Minnesota Point near the southern extremity. The latitude station is marked by a pine post. The triangulation station is marked underground in a manner similar to *Minnesota Point north base azimuth*, described above, the station mark being 5 feet below the surface of the ground. Above this is a granite block 1 foot square, 58 inches long, in the top of which is a drill hole marking center. Reference stones are as at *Minnesota Point north base*. The azimuth to elevator "M" smokestack is 75° 07′.

Morken latitude (Clay County, Minn., W. H. Burger, 1906).—The latitude station is marked by a wooden pier 12.40 meters (40.7 feet) west and 0.3 meter (1 foot) or 0″01 of latitude south of *Morken azimuth*, described below.

Morken azimuth (Clay County, Minn., William Bowie, 1906).—Identical with the triangulation station of the same name in the northeast corner of sec. 15, T. 141 N., R. 47 W., on land owned by the Wheeler Land Co., of Moorhead, Minn. The station is about 5 miles west and 3 miles south of the town of Felton, on the Great Northern Railway; it is 13.3 meters (44 feet) south of the center of the east and west road and 30 meters (98 feet) west of the center of the north and south road. The station was marked in the same manner as *Dalton azimuth*, except that iron pipes 2 inches in diameter were used. The reference mark is in the extreme northeast corner of section 15, being 9.1 meters (29.9 feet) south of the center of the east and west road and 10.3 meters (33.8 feet) west of the center of the north and south road; and 20.070 meters (65.85 feet) from the station in azimuth 256° 36′ 11″. The following azimuths and distances are from the station: Tall chimney on house of Erick Carlson, about 150 meters, 139° 19′ 24″; south gable of barn of Erick Carlson, about 200 meters, 154° 44′ 59″; corner of sections 10, 11, 14 and 15 (stone not found), 32.2 meters (106 feet), 245° 21′ 38″.

Osakis latitude (Todd County, Minn., William H. Burger, 1906).—Latitude observations were made on a wooden pier, 1.0287 meters (3.375 feet) west and 0.076 meter (0.25 foot) or 0″00 south of *Osakis azimuth*, described below.

Osakis azimuth (Todd County, Minn., William H. Burger, 1904).—Identical with the triangulation station of the same name, on a hill at the north side of a cultivated field, near the center of sec. 7, T. 128 N., R. 35 W., on land owned by A. L. Markthaler, living about ⅜ mile to the west. It is in what is known as West Union Township and is 3.45 meters (11.3 feet) south of the north fence and 29.9 meters (98 feet) east from the fence running north to the house of C. A. Markthaler. It is 3 miles south and 1 mile east of Osakis, on the Great Northern Railway, from which place it can be reached by going 2½ miles south, then southeast to the house of A. L. Markthaler, then ⅜ mile east along his pasture lane to the station. This pasture lane is along the east and west quarter-section line. The station is marked in the same manner as *Dalton azimuth*, the reference mark being in the northeast corner of the field almost at the center of the section, being 0.60 meter (2.0 feet) west from the east fence, 1.2 meters (4 feet) south from the north fence, and 52.831 meters (173.33 feet) from the station in azimuth 263° 58′ 41″. A telephone line to the town of Osakis runs about 15 feet north of the station. The following azimuths and distances are from the station: C. A. Markthaler's barn, cupola, about 200 meters, 168° 45′ 13″; Cath. farm, large house, cupola, about ½ mile, 129° 39′ 59″; A. L. Markthaler's house, low (south) chimney, about ⅜ mile, 86° 21′ 22″.

Red Wing (U. S. L. S.) longitude (Goodhue County, Minn., C. F. Powell, 1878).—The station is 09″60 of longitude west of the spire of the Catholic Church. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 759.)

Red Wing (U. S. L. S.) latitude (Goodhue County, Minn., C. F. Powell, 1878).—The station is 0″48 of latitude south of the Catholic Church spire. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 740.)

Royalton south base latitude (Benton County, Minn., William H. Burger, 1905).—A wooden pier 8.85 meters (29.0 feet) due east of *Royalton south base azimuth*, described below.

Royalton south base azimuth (Benton County, Minn., William H. Burger, 1904; 1906).—Identical with the triangulation station of the same name, just east of the middle of the south side of sec. 33, T. 38 N., R. 31 W., in a field belonging to Mrs. A. J. Fromelt, who lives in Rice, Minn. The station is in what is known as Langola Township, is 22 paces north of the road at the south side of the section, about 240 paces east of the railway track, and about 1⅜ miles south of the town of Rice The underground mark is a 1-millimeter drill hole in a copper bolt, set in a stone ½ foot square and 1 foot high, placed 5 feet below the surface The surface mark is a 1-millimeter drill hole in a bronze station mark, set in a stone block, 2 feet square and 14 inches high, and weighing about 900 pounds. This is set in a mass of concrete. The reference mark is similar to that of *Dalton azimuth*, described above, and is 1½ feet inside the east right-of-way fence of railway, 14.215 meters (46.64 feet) east of the east rail of the railway track (at right angles to track), 25.50 meters (83.7 feet) south of where the section-line road prolonged intersects the right-of-way fence, and 163.78 meters (537.3 feet) from the station in azimuth 75° 41′ 42″.

For notes in regard to marking of stations see p. 130.

St. Paul (U. S. L. S.) longitude (Ramsey County, Minn., A. R. Flint, 1871).—The station is 6″.27 of longitude east of the southeast corner of the customhouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 753.)

St. Paul (U. S. L. S.) latitude (Ramsey County, Minn., A. R. Flint, 1871).—The station is 0″.48 of latitude south of southeast corner of the customhouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 739.)

Stephen west base longitude (Marshall County, Minn., W. H. Burger, 1907; 1908).—A pier of concrete resting on a brick base 9.70 meters (31.8 feet) or 0″.47 of longitude east and 1.20 meters (3.9 feet) north of *Stephen west base azimuth*, described below.

Stephen west base latitude (Marshall County, Minn., W. H. Burger, 1905).—Distant 101.81 meters (334.0 feet) or 0″.95 of latitude north of *Stephen west base azimuth* (described below) in azimuth 253° 19′ 14″, being directly in line with triangulation station *Stephen east base.*

Stephen west base azimuth (Marshall County, Minn., W. H. Burger, 1905; 1907).—Identical with the triangulation station of the same name, in the southwest corner of the SE. ¼ sec. 33, T. 158 N., R. 48 W., in a cultivated field belonging to Mr. J. Gillespie, of Stephen. The station is 31.0 meters (102 feet) east of the half-section line and 15.0 meters (49 feet) north of the center of the east-and-west section line, in what is known as Sinnot Township, about ½ mile north and ¾ mile east of the town of Stephen. The underground mark is a ½-inch copper bolt set in a granite block 6 inches square and 1 foot deep, placed 5 feet below the surface of the ground. Above this is placed an empty section of 4-inch sewer pipe. The surface mark is a 1-millimeter drill hole in a bronze station mark set in a granite block 2 feet square and 1 foot deep. The pipe and both stones are surrounded by a mass of concrete 2 feet square at the base and 4 feet square at the surface of the ground. The reference mark is similar to that of *Dalton azimuth* (described above) and is in the southwest corner of the section, 9.0 meters (30 feet) east of the north and south section road and 9.6 meters (31 feet) north of the east and west section road, and 832.51 meters (2,731.33 feet) from the station in azimuth 89° 40′ 19″. The following distances and azimuths are from the triangulation station: Coast and Geodetic Survey bench mark T 6, 38.4 meters (126 feet), 46° 30′ 29″; house chimney, about 600 meters, 170° 11′ 47″; house chimney, about 800 meters, 267° 11′ 09″.

Tilden latitude (Polk County, Minn., W. H. Burger, 1905).—Latitude observations were made on a triangular-shaped pier built of 4 by 6 inch wooden posts, boxed with 2 by 8 inch planks, placed 8.90 meters (29.2 feet) due west of *Tilden azimuth* station, described below, and 8.9 meters (29 feet) east of the section line.

Tilden azimuth (Polk County, Minn., W. H. Burger, 1906).—Identical with the triangulation station of the same name in the southwest corner of sec. 20, T. 149 N., R. 44 W., 14.9 meters (49 feet) east of the center of the wagon road and 12.8 meters (42 feet) east of the north-and-south section line. The station is in Tilden Township, about 14 miles east-southeast of Crookston, about 3 miles west of Dugdale, a railway station on the Great Northern Railway, and 153 meters (502 feet) north of the center of the railway track. The open field in which the station is located belongs to John Clayton, of Illinois, whose agent in Crookston is John H. Boyd. The station is marked in the same manner as the *Dalton azimuth*, described above, the tile of the surface mark being 20 inches in length. The reference mark is on the north edge of the railroad cut, 23.7 meters (78 feet) north of the center of the track, 8.5 meters (28 feet) from the center of the first telegraph pole east of the railroad crossing, and 129.217 meters (423.94 feet) from the station in azimuth 358° 49′ 29″. From the station the sign board at the railroad crossing is distant about 145 meters (476 feet) in azimuth 5° 13′ 44″, and the section corner common to sections 19, 20, 29, and 30 is distant 164.9 meters (541 feet) in azimuth 5° 58′ 49″.

Warroad, south base (U. S. & C.), longitude (Roseau County, Minn., O. B. French, 1915).—Distant 2.11 meters (6.9 feet) or 0″.07 of latitude south and 0.01 meter (0.03 foot) or 0″.00 of longitude east of triangulation station *Warroad south base* of the International Boundary Commission, on the east side of the Canadian Northern Railway, nearly a mile north of the station at Warroad, 700 meters north of the Great Northern Railway crossing, 14.575 meters (47.82 feet) east of the center of the east rail, along a line at right angles to the track. The subsurface mark is a small concrete block, with a cross, which was set 3 feet below the surface, and surmounted by a concrete slab 2 feet square and 6 inches thick, which contains a regular bronze station mark. The surface mark is a concrete block 2 feet square and 2½ feet long containing a bronze station mark. Two reference marks are concrete blocks, 8 by 8 by 18 inches, marked with crosses and set just inside the railroad fences on each side of the track, their tops flush with the surface of the ground. They are 3.885 meters (12.75 feet) and 26.622 meters (87.34 feet) west of the station and in the same perpendicular to the railway as the station. The longitude station was marked by a wooden pier.

Warroad, south base (U. S. & C.), latitude (Roseau County, Minn., O. B. French, 1915).—Identical with *Warroad south base longitude*, described above.

MISSISSIPPI

Ben azimuth (Perry County, Miss., E. C. States, 1921).—Identical with the traverse station of the same name, 1 mile south of Benmore, on the west side of the track, on the extension of the forward tangent of the west rail of the first curve south of Benmore, 150 meters south of the point of tangency, 15 meters south of a wagon road crossing and directly east of the Missionary Baptist Church at Overstreet. The station is 12.435

For notes in regard to marking of stations see p. 130.

meters (40.81 feet) west of the west and nearest rail, and is marked as described in notes 1a and 7a. Two reference marks, note 11a, are located, respectively, 14.41 meters (47.3 feet) from the station in azimuth 353° 07′ 27″ and 28.045 meters (92.01 feet) from the station in azimuth 259° 15′ 27″. The first is on the west side of the track, 0.3 meter (1 foot) east of the west fence line and the second is on the opposite side of the track 0.3 meter (1 foot) west of the east line fence.

Big azimuth (Jackson County, Miss., E. C. States, 1921).—Identical with the traverse station of the same name, 2½ miles north of Nut Bank, on the east side of the Alabama & Mississippi Railroad track, ¼ mile north of where the main road crosses the track, and 175 meters north of milepost P-16. The station is on the apex of the first rise north of the railroad crossing, 4.35 meters (14.3 feet) east of the east and nearest rail, and is marked as described in notes 1a and 7a. Two reference marks, note 11a, are, respectively, 20.25 meters (66.4 feet) from the station in azimuth 97° 12′ 31″ and 12.33 meters (40.5 feet) distant in azimuth 280° 27′ 11″. The first is on the west side of the track, the second on the east side.

Camel azimuth (Perry County, Miss., E. C. States, 1921).—Identical with the traverse station of the same name, 1¼ miles north of Richton, on the east side of the track, on the extension of the backward and forward tangents of the east rail, 70 meters north of milepost 83, 25 meters east of the railroad property line fence, 45 meters south of the wagon road crossing, and 26.36 meters (86.5 feet) east of the east and nearest rail. The station is marked as described in notes 1a and 7a, with two reference marks, note 11a, on the east side of the track, 1 foot west of the east fence line and distant, respectively, 13.33 meters (43.7 feet) in azimuth 45° 28′ 17″ and 18.98 meters (62.3 feet) in azimuth 102° 17′ 48″.

Cat Island azimuth (Harrison County, Miss., J. E. Hilgard, 1855; 1857).—Identical with the triangulation station of the same name, reported in 1917 as lost.

East Pascagoula latitude (Jackson County, Miss., R. H. Fauntleroy, 1847; 1855).—Identical with *East Pascagoula azimuth*, now reported lost.

East Pascagoula azimuth (Jackson County, Miss., R. H. Fauntleroy, 1847).—Identical with the triangulation station of the same name, now reported lost.

Fort (Vicksburg) longitude (Warren County, Miss., Edwin Smith, 1878).—In an old fort, on the east side of Washington Street, about ¼ mile south of the railroad. The station is marked by a brick pier 16.03 meters (52.6 feet) or 0″.52 of latitude north and 8.08 meters (26.5 feet) or 0″.31 of longitude east of *Fort (Vicksburg) azimuth*, described below. The pier is 2½ feet below and 3 feet above the surface of the ground.

Fort (Vicksburg) latitude (Warren County, Miss., Edwin Smith, 1878).—Identical with *Fort (Vicksburg) longitude*, described above.

Fort (Vicksburg) azimuth (Warren County, Miss., C. H. Sinclair, 1878).—Identical with triangulation station *Fort*, on the west corner of an old redoubt about ¼ mile southwest of the bridge that crosses the Vicksburg & Jackson Railroad. The county road leading to the fort is the prolongation of Washington Street to the southwest. The station is in the suburbs of the city and is marked by a small square limestone block, with a ¼-inch drill hole in the top and the letters "U. S. C. S." Over this is a larger limestone monument, 4 feet long and 13 inches square on top, with a ¼-inch hole in the top and the letters "U. S. C. S." on one side and the date 1878 on the other.

Greenville longitude (Washington County, Miss., Edwin Smith, 1878).—On a vacant lot adjoining the Episcopal Church, at the corner of Main and Walnut streets, 15.8 meters (52 feet) or 0″.51 of latitude south and 18.0 meters (59 feet) or 0″.70 of longitude east of the cross on the Episcopal Church. The station is marked by a brick pier extending 3 feet above the ground and 2½ feet below. An underground mark, a champagne bottle covered with brick, is buried about 18 inches below the surface of the ground on Main Street, 23.93 meters (78.5 feet) due north of the station.

Greenville latitude (Washington County, Miss., Edwin Smith, 1878).—Identical with *Greenville longitude* described above.

Greenville south base azimuth (Washington County, Miss., Edwin Smith, 1881).—Identical with the triangulation station of the same name, about 2½ miles south of Greenville courthouse, on the Bachelor's Bend Plantation, owned (1880) by C. P. Huntington. The station is on the top of the south end of the first long stretch of levee below Greenville, 37 meters northwest of a negro's house and about 250 feet north of a deep gully. The station is marked by an eathenware pyramid buried 4 feet below the surface. The surface mark is a limestone post, 4 feet long, the upper foot of which is dressed to a 12-inch square. On the southern side are the letters "S. Base," on the east "U. S. C. & G. S.," and on the west "1880." The post has a drill hole in which is set a brass bolt 2½ inches long and ⅜ inch in diameter, on the top of which is cut a cross which marks the center. The base of the post is surrounded by concrete.

Hub azimuth (George County, Miss., E. C. States, 1921).—Identical with the traverse station of the same name, 2½ miles north of Harleston, on the west side of the railroad track, on the extension of the forward tangent of the west rail, 60 meters south of the point of tangency, 15 meters south of a wagon road crossing, 1.595 meters (5.23 feet) west of the west and nearest rail. The station is marked as described in notes 1a and 7a, with two reference marks, note 11a, on the same side of the track as the station at the following distances and azimuths, respectively, from the station: 25.45 meters (83.5 feet) in azimuth 95° 40′ 28″; 39.66 meters (130.1 feet) in azimuth 157° 17′ 32″.

For notes in regard to marking of stations see p. 130.

Jago azimuth (George County, Miss., E. C. States, 1921).—Identical with the traverse station of the same name, 1¼ miles south of Bexley, on west side of the track, 350 meters north of the main road crossing, 300 meters north of milepost 45, and 56 meters south of the whistle board for the crossing. The station is on the west bank of the cut at the north end of the first curve north of the crossing, 8.40 meters (27.6 feet) west of the west or nearest rail, and is marked as described in notes 1a and 7a, with two reference marks, note 11a. The first is on the west side of the track, 0.2 meter (0.7 foot) east of the west fence line and 22.70 meters (74.5 feet) from the station S. 52° 45′ E. The second is on the opposite side of the track, 1 foot west of the east fence line and 24.03 meters (78.8 feet) from the station, N. 31° 30′ E.

Leaf azimuth (Greene County, Miss., E. C. States, 1921).—Identical with the traverse station of the same name, 60 meters north of the Gulf, Mobile & Northern depot at Leaf, on the west side of the railroad track, 20 meters north of milepost No. 56, 30 meters south of a switch stand for a passing siding, and 5.55 meters (18.2 feet) west of the west and nearest rail of the main line. The station is marked as described in notes 1a and 7a, with two reference marks, note 11a, on the same side of the track and distant from the station, respectively, 16.38 meters (53.7 feet), in azimuth 235° 53′ 12″ and 18.53 meters (60.8 feet) in azimuth 190° 10′ 26″.

Moss Point azimuth (Jackson County, Miss., E. C. States, 1921).—Identical with the traverse station of the same name, 45 meters northwest of the northwest corner of the Alabama & Mississippi Railroad depot at Moss Point, on the west side of the main-line track, 60 meters west of a switch stand for a siding to the freight platform, 5.790 meters (19.00 feet) north of the north rail of the siding. The station is marked as described in notes 1a and 7a, with two reference marks, note 11a. The first reference mark is directly north of the center of the depot and on the north side of the siding for the freight platform, 17.050 meters (55.94 feet) from the station, in azimuth 126° 49′ 04″; the second is on the south side of the siding near the center of the freight platform on the east side, 22.98 meters (75.4 feet) from the station, in azimuth 35° 52′ 34″.

Natchez longitude (Adams County, Miss., Edwin Smith, 1878).—In an old graveyard behind the Catholic Church on Main Street, 47.49 meters (155.8 feet) or 1″.54 south and 40.81 meters (133.9 feet) or 1″.55 east of the cross on the Catholic Church. The station is marked by a wooden pier 2½ feet below and 3 feet above the ground.

Natchez latitude (Adams County, Miss., Edwin Smith, 1878).—Identical with *Natchez longitude*, described above.

Natchez, lookout near, azimuth (Adams County, Miss., H. G. Ogden, 1878; 1879).—Identical with triangulation station *Lookout*, on a high, bold bluff on the east side of the river, about 3 miles south of Natchez. An old deserted house owned by Mrs. Kate McGinley stands about 100 meters east of the station. The station is about ¾ mile below the wharf boat and is marked by a cottonwood stump, with a nail to mark the center.

Pascagoula, east base, azimuth (Jackson County, Miss., E. C. States, 1921).—Identical with the traverse station of the same name, ¾ mile west of the Louisville & Nashville Railroad passenger station at Pascagoula, on the south side of the railroad track, midway between the first and second semaphore signals, and about 300 meters west of the drawbridge. The station is on the fill across the bayou, 1.97 meters (6.5 feet) south of the south and nearest rail, and is marked as described in notes 1a and 7a. Two reference marks, each a triangle of nails driven in piling which supports the breakwater for the protection of the south side of the fill, are, respectively, 13.43 meters (44.1 feet) from the station in azimuth 5° 55′ 08″ and 14.84 meters (48.7 feet) distant, in azimuth 89° 44′ 23″. The center of the city water tank near the depot is in azimuth 285° 25′ 37″.

Strickland longitude (Alcorn County, Miss., O. B. French, 1914).—An oak pier extending 3 feet below the ground and 4 feet above, 0.72 meter (2.4 feet) or 0″.02 north and 5.87 meters (19.3 feet) or 0″.23 east of *Strickland azimuth*, described below.

Strickland latitude (Alcorn County, Miss., O. B. French, 1914).—Identical with *Strickland longitude*, described above.

Strickland azimuth (Alcorn County, Miss., E. H. Pagenhart, 1914).—Identical with the triangulation station of the same name, about 9 miles southeast from Corinth, about 1¼ miles southeast from Strickland railroad station, and about 250 meters west of the Illinois Central Railway. The station is on the highest point of the wooded knoll, about 80 meters north of the house of Richard P. Strickland and 20 meters northeast of the Corinth-Jacinto wagon road. The station is marked as described in notes 1a and 7a. Two reference marks, note 11a, were set as follows: The first about 60 meters north of Strickland's house, on the south slope of the knoll, on a pasture line fence, 8 meters northeast of the road and 36.57 meters (120.0 feet) from the station, in azimuth 317° 50′. The second was set among the trees about 3 meters northeast of the wagon road and 50.47 meters (165.6 feet) from the station, in azimuth 76° 42′.

Vant azimuth (George County, Miss., E. C. States, 1921).—Identical with the traverse stations of the same name, ½ mile north of the Gulf, Mobile & Northern Railroad depot at Lucedale, on the east side of the railroad track, on the extension of the back tangent of the west rail at the second curve north of Lucedale, and 100 meters north of the point of tangency. The station is near the north end of the cut at the curve, 225 meters north of the railroad bridge and 7.86 meters (25.8 feet) east of the east and nearest rail. The station is marked according to notes 1a and 7a, with two reference marks, note 11a, set as follows: One across the track, just east of the fence line, 26.26 meters (86.2 feet) from the station, in azimuth 43° 55′ 35″; the other, on the same side of the track, just west of the fence line, 18.22 meters (59.8 feet) from the station, in azimuth 298° 59′ 25″.

For notes in regard to marking of stations see p. 130.

MISSOURI

Berger longitude (Franklin County, Mo., E. Smith, 1907; 1922).—Distant 19.89 meters (65.3 feet) north and 2.90 meters (9.5 feet) or 0″.12 of longitude west from *Berger azimuth*, described below. The station is marked by a concrete pier, surmounted by two pillars, each 14 by 9 inches. A standard disk reference mark is in the center of the pier.

Berger latitude (Franklin County, Mo., W. H. Berger, 1906).—Distant 16.69 meters (54.8 feet) N. 9° 46′ W. or 0″.53 of latitude north from *Berger azimuth*, described below. In 1922 the latitude pier was reported lost.

Berger azimuth (Franklin County, Mo., H. W. Blair, 1878; 1922).—Identical with the triangulation station of the same name, about 4 miles west by south from the town of New Haven, in the SW. ¼ sec. 32, T. 45 N., R. 3 W., on a hill known locally as Kaisers Hill, the highest one of several prominent hills in the northwestern part of Franklin County. Berger Knob is the most northern one of four hills forming the group of which Kaisers Hill is the most southern. The top of the hill is cultivated and the station is on the southeastern extremity of the top of the knoll, about 30 meters to the left of where the roads enter the clearing, and is marked by a standard bronze tablet cemented into the top of a limestone post, which projects about 4 inches above the surface. The letters "U. S." are inscribed in the top of the post. The underground mark is the apex of an earthenware pyramid, about 30 inches below the surface of the ground. The pyramid is about 10 inches on an edge and has on one face the raised letters "U. S. C. S."

Bolivar (U. S. G. S.) longitude (Polk County, Mo., R. S. Woodward, 1884).—In the northwest corner of the grounds of the Southwest Baptist College, at Bolivar. The station is marked by a brick pier on a concrete foundation, capped with a limestone slab, 4 inches thick and 18 by 22 inches in cross section.

Bolivar (U. S. G. S.) latitude (Polk County, Mo., R. S. Woodward, 1884).—Identical with *Bolivar (U. S. G. S.) longitude*, described above.

Cottonwood Point, north base, azimuth (Pemisco County, Mo., H. G. Ogden, 1880).—Identical with P. B. M. north base, a bench mark of the Mississippi River Commission, on the right bank of the Mississippi River, about 300 meters below a point opposite foot of Island 18, about ¾ mile above town of Cottonwood Point; at base of west slope of levee, 40 meters below angle in levee, 70 meters back from river bank, 25 meters south of house of James Garrett, and 11 meters south of yard fence. The station is marked by a copper bolt, inscribed "1879," in top of a large stone post, its top being about 6 inches below surface of ground. A pipe marked with a triangle was placed at the side of the station to assist in finding the stone mark. A 60-inch cottonwood tree is 48 meters from the station.

Hunter latitude (Morgan County, Mo., F. D. Granger, 1880).—Distant 0.004 meter (0.01 foot) north and 6.431 meters (21.10 feet) west from *Hunter azimuth*, described below.

Hunter azimuth (Morgan County, Mo., F. D. Granger, 1880; 1922).—Identical with the triangulation station of the same name in Moreau Township, about 4 miles east from Versailles, in the SE. ½ SW. ¼ sec. 2, T. 42 N., R. 17 W., on the highest point of land in a cultivated field, about ¼ mile east of the Chicago, Rock Island & Pacific Railway, on land owned by W. D. Wilson. The station is marked by a standard disk station mark, set in the top of a rough-dressed Warrensburg sandstone, 0.65 meter square and 0.24 meter deep and inscribed "U. S. C. & G. S., 1897," the block in turn being set in concrete. The disk is inscribed with the name and date of the station. The underground mark is a similar block of limestone, 0.54 meter deep and 0.28 meter square. The reference marks are two sandstone posts, respectively, 5 feet north and 5 feet south from the station, and in the top of each there is an inscribed diagonal cross, with an arrowhead at the end of one diagonal pointing toward the station. The southeast corner of the old Hunter house is 294.1 meters (965 feet) S. 65° W. magnetic from the station, and the east and west line fence is 211.8 meters (695 feet) south of the station. The station is the south end of the Versailles base line.

Ironton longitude (Iron County, Mo., C. H. Sinclair, 1890).—In a field belonging to the Pilot Knob Ore & Steel Co., about 100 meters northeast of the St. Louis, Iron Mountain & Southern Railway depot. The station is 1,145.77 meters (3,759.1 feet) south and 226.31 meters (742.5 feet) west of a drill hole about 12 feet west of the highest rock in the northwest clump of rocks on Pilot Knob, 887.42 meters (2,911.5 feet) north and 45.7 meters (150 feet) west of the cupola of the public school in Ironton, and 977.29 meters (3,206.4 feet) north and 53.0 meters (173.9 feet) west of the lightning rod on the Presbyterian Church at Ironton. The station is marked by a pier of brick laid in cement. In 1923 the brick pier reported broken from base and moved, and meridian marks gone.

Ironton latitude (Iron County, Mo., G. R. Putnam, 1890).—Identical with *Ironton longitude*, described above.

Jefferson City latitude (Cole County, Mo., H. W. Blair, 1879).—In the parallel with *Jefferson City azimuth*, described below.

Jefferson City azimuth (Cole County, Mo., H. W. Blair, 1879).—Identical with triangulation station *Jefferson City astronomic*, on a hill in the extreme southeastern part of Jefferson City, on the east side of the Castle Rock road, about ¼ mile south of the national cemetery and about the same distance north of the fair grounds, in the front yard of the house of E. T. Manchester, on the right-hand side of the walk leading from the front gate to the house. The station is marked by a cross in the top of a stone post, 6 inches square and 2½

For notes in regard to marking of stations see p. 130.

feet long, projecting about 2 inches above the ground. The letters "U. S. C. S." are inscribed in the top of the post.

Kansas City longitude (Jackson County, Mo., C. H. Sinclair, 1882).—This station, now lost, was 5″41 of latitude south and 8″71 of longitude west of *Kansas City Second Presbyterian Church.*

Kansas City latitude (Jackson County, Mo., C. H. Sinclair, 1882).—Identical with *Kansas City longitude,* now lost. (See above.)

Kleinschmidt azimuth (St. Louis County, Mo., W. Eimbeck, 1871).—Identical with the triangulation station of the same name. Lost.

Knob Noster longitude (Johnson County, Mo., E. Smith, 1907; 1922).—Distant 3.62 meters (11.9 feet) due south of *Knob Noster azimuth,* described below. The station is marked by a pier similar to that at *Berger longitude* (p. 208) in which a standard disk reference mark was placed in 1922.

Knob Noster azimuth (Johnson County, Mo., W. H. Burger, 1906; 1922).—Identical with the triangulation station of the same name on a prominent hill known as Knob Noster in 1882, but since called Prices Hill or Guihens Hill, after the names of successive owners, and about ⅔ mile north by east from the railway station called Knob Noster. The station is in the SW. ¼ NW. ¼ sec. 15, T. 46 N., R. 24 W. It is marked by a standard disk station mark, set in the top of a stone post, about 6 inches square and 30 inches long, projecting about 4 inches above the surface of the ground and inscribed with the letters "U. S. C. S." The underground mark is a bottle filled with ashes, about 30 inches below the surface of the ground. Two stone posts, slightly smaller than the one marking the station, are, respectively, 5 feet north and 5 feet south from the station, and in the top of each there is an inscribed diagonal cross with an arrowhead at the end of one diagonal pointing toward the station.

Louisiana (U. S. L. S.) longitude (Pike County, Mo., C. F. Powell, 1878).—In the northwest corner of the high-school grounds, 1″66 north and 1″88 east of the northeast corner of the high-school building. Marked by a stone post.

Louisiana (U. S. L. S.) latitude (Pike County, Mo., C. F. Powell, 1878).—Identical with *Louisiana (U. S. L. S.) longitude,* described above.

Macon longitude (Macon County, Mo., C. H. Sinclair, 1892).—At Macon, in the northwest corner of the courthouse square, 24 feet from the north fence, and 36 feet from the west fence. The station is marked by a cross in the top of a marble post 6 by 6 inches square and 26 inches long, which forms the north end of a meridian line. The station is 28.229 meters (92.62 feet) or 0″92 of latitude north and 25.29 meters (83.0 feet) or 1″05 of longitude west of the courthouse cupola. The south end of the meridian is on south side of grounds, 2½ feet from the fence, and is marked by a sandstone post, 8 inches by 8 inches by 44 inches, the top containing 5 drill holes.

Macon latitude (Macon County, Mo., C. H. Sinclair, 1892).—Distant 1.28 meters (4.2 feet) due west from *Macon longitude,* described above.

Potosi longitude (Washington County, Mo., C. H. Sinclair, 1890).—In the courthouse grounds at Potosi, north of the courthouse and southwest of the jail. The station is 25.92 meters (85.0 feet) north and 4.34 meters (14.2 feet) west of the courthouse cupola, 164.10 meters (538.4 feet) south and 91.96 meters (301.7 feet) east of the Presbyterian Church, 63.97 meters (209.9 feet) south and 129.73 meters (425.6 feet) west from the Catholic Church, 12.68 meters (41.6 feet) from the northwest corner of the jail, 8.19 meters (26.9 feet) from the southwest corner of the jail, 11.77 meters (38.6 feet) from the northwest corner of the courthouse, and 24.00 meters (78.7 feet) from the northeast corner of the courthouse. The station is marked by a brick and stone pier, extending 2½ feet below the ground and 3 feet above, which is capped by a stone slab 15 by 30 by 7 inches, containing a drill hole, ⅛ inch in diameter and ⅞ inch deep, surrounded by four other depressions about 2 inches from the center. This drill hole marks the south end of a meridian. The north meridian stone was set in the curb line, at the southeast corner of the yard of James Long, near the northwest corner of Church and Mine Streets. It is marked similar to the stone capping the station pier, and is 109.05 meters (357.8 feet) from the station.

Potosi latitude (Washington County, Mo., G. R. Putnam, 1890).—Identical with *Potosi longitude,* described above.

St. Louis longitude (St. Louis County, Mo., E. Smith and G. W. Dean, 1881; 1900).—All observations since 1881 have been made in the observatory at Washington University, at the northeast corner of Eighteenth and Charles Streets. In 1881 the east pier of the observatory was used. This pier still exists, under the floor of the observatory. It is 73.96 meters (242.7 feet) or 2″40 of latitude north, and 69.99 meters (229.6 feet) or 2″90 of longitude west of the *Second Presbyterian Church spire.* There are two piers at present in the observatory. The west pier, used in 1884 and 1892, is 1.83 meters (6.0 feet) or 0″08 of longitude (0ˢ005) west of the pier of 1881. The east pier, used in 1890, 1891, and 1900, is 0.37 meter (1.2 feet) or (0ˢ001) of longitude west of the pier of 1881. The station of 1881 is 12.144 meters (39.84 feet) or 0″39 of latitude north, and 45.318 meters (148.68 feet) or 1″87 (0ˢ125) of longitude west of the old station of 1869–1872, now lost.

St. Louis latitude (St. Louis County, Mo., O. H. Tittmann and W. Eimbeck, 1869–70; F. H. Parsons, 1881).—In 1869 the station was 01″97 of latitude north of the *Second Presbyterian Church spire.* The 1881 station was identical with the 1881 longitude station, described above. The observations at each station were reduced to the *Second Presbyterian Church* and a weighted mean taken.

For notes in regard to marking of stations see p. 130.

Springfield (U. S. G. S.) longitude (Greene County, Mo., R. S. Woodward, 1884).—In North Springfield, on the grounds of Drury College, about 50 feet east of the center of Benton Avenue and between Calhoun and Center Streets. The station is marked by a dressed sandstone pier, set in a foundation of concrete and capped by a limestone slab, 4 inches thick and 18 by 22 inches in cross section.

Springfield (U. S. G. S.) latitude (Greene County, Mo., R. S. Woodward, 1884).—Identical with *Springfield (U. S. G. S.) longitude*, described above.

MONTANA

Blue azimuth (Wibaux County, Mont., E. H. Pagenhart, 1912).—Identical with the triangulation station of the same name, about 20 miles due north of Wibaux and ¾ mile west of the road from that place, on the highest point of Blue Mountain. The station is marked by a standard disk station mark cemented in solid rock. The United States Geological Survey station "Blue Camel," marked by a bronze tablet set in solid rock over which is a cairn 6 feet high, is 4.09 meters (13.4 feet) from the station in azimuth 138° 47′. A 1-inch drill hole in solid rock is 6.76 meters (22.2 feet) from the station in azimuth 340° 57′, and a cross chiseled in solid rock is 15.81 meters (51.9 feet) distant in azimuth 334° 03′.

Bozeman (U. S. E.) latitude (Gallatin County, Mont., J. H. Clark, 1873).—On the western edge of the town of the same name, south of the principal east and west street and about 100 feet northeast of the grave of Bozeman, the founder of the town. The station is probably marked by a pier of the same type as that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Chinook longitude (Blaine County, Mont., William Eimbeck, 1903).—In the northwestern corner of the public school lot at Chinook. The station is marked by a concrete pier, the portion above the ground being 19 by 36 by 30 inches and that below the ground being 24 by 36 by 30 inches. The station is 49.4 meters (162 feet) north and 17.8 meters (58 feet) or 0″87 west of the public schoolhouse cupola; 51.0 meters (167 feet) north and 156.0 meters (512 feet) or 7″61 east of the Catholic Church and 138.4 meters (454 feet) south and 11.7 meters (38 feet) or 0″57 east of the Methodist Church.

Hamilton (U. S. G. S.) longitude (Ravalli County, Mont., S. S. Gannett, 1897).—On the railroad right of way 50 feet east of the eastern rail of the track and 80 feet northeast of the depot at Hamilton. The quarter-section corner between secs. 25 and 30, T. 6 N., Rs. 20 and 21 W., is 339 feet N. 39° 13′ W. true bearing, from the station. Marked by a pier.

Hamilton (U. S. G. S.) latitude (Ravalli County, Mont., S. S. Gannett, 1897).—Identical with *Hamilton (U. S. G. S.) longitude*, described above.

Helena longitude (Lewis and Clark County, Mont., C. H. Sinclair, R. A. Marr, and Edwin Smith, 1888; 1892).—In the northwest corner of the grounds of the United States assay office. The assay office fronts on Broadway, and the station, on the Warren Street side, is in front of the wagon gate, and 4.3 meters (14 feet) from the corner fence post and 20.54 meters (67.4 feet) from the northwest corner of the assay building. It is marked by a pier of brick and cement, 15 by 25 inches in cross section, set 2 feet below the ground and extending to within a few inches of the surface. The station is 103.52 meters (339.6 feet) or 4″86 of longitude west and 25.03 meters (82.1 feet) or 0″81 of latitude north of the courthouse tower.

Helena latitude (Lewis and Clark County, Mont., C. H. Sinclair, 1890; 1892).—Identical with *Helena longitude*, described above.

Kootenai River, east (U. S. & C.), latitude (Lincoln County, Mont., and British Columbia, Canada, C. H. Sinclair, 1901).—On the east side of the river on the second bench above the river flat, and just on the line between boundary monuments Nos. 243 (old No. 10) and 245 (old No. 9) of the International Boundary Commission. The station is 145 meters (476 feet) west of Kootenai River azimuth station and 324 meters (1,063 feet) west of monument No. 245. Kootenai River azimuth is on the western edge of the highest prominent bench on the east side of the river. It is marked by an iron post with the letters "U. S. SURVEY" cut on the top, together with a warning against disturbing the mark. A similar post is 381 meters (1,250 feet) due north of the azimuth station marking the meridian. The latitude station itself is unmarked except by a stump.

Mondak longitude (Roosevelt County, Mont., H. A. Seran, 1912).—An unmarked point 3.995 meters (13.11 feet) north and 0.25 meter (0.8 foot) or 0″01 east of *Mondak azimuth*, described below.

Mondak latitude (Roosevelt County, Mont., C. V. Hodgson, 1913).—Identical with *Mondak azimuth*, described below.

Mondak azimuth (Roosevelt County, Mont., E. H. Pagenhart, 1912; 1913).—Identical with the triangulation station of the same name, which is in Mondak, about 93 meters south of the main-line track of the Great Northern Railway, on vacant land belonging to Jacob Seel, of the townsite company. The station is marked by an old-type cap station mark, screwed to the top of a 3-inch iron pipe, which is embedded in a cylinder of concrete 10 inches in diameter and 30 inches long. The cylinder projects 3 inches above the ground. The underground mark is a brass bolt ¼ inch in diameter 2 inches long set in a block of concrete 6 inches square on top and 4 inches thick. The bolt projects ¼ inch above the concrete and is about 33 inches below the surface of the ground. A rough cross about 1 foot above the ground on the south face of the concrete foundation at the southeast corner of the engine room and office of the W. I. Saxton elevator is about 40 meters south of the main-line track of the railway and 53.25 meters (174.7 feet) from the station in azimuth 208° 16′. Bench mark 123/2 of the Missouri River Commission, marked by a 5-inch iron pipe, is at the edge of the weeds just south of a

For notes in regard to marking of stations see p. 130.

wagon track, 46.6 meters (153 feet) nearly south of the southeast corner of the depot, and 96.89 meters (317.9 feet) from the station in azimuth 256° 08′. The southeast corner of the depot is 119.60 meters (392.4 feet) from the station in azimuth 234° 22′.

Montana-North Dakota boundary latitude (Wibaux County, Mont., and Golden County, N. Dak., C. V. Hodgson, 1913).—Identical with the triangulation station *North Dakota-Montana boundary monument eccentric*, which is about 20 miles north of Beach, in a small saddle on the crest of the divide about 300 meters west of the house of L. C. Callender, who lives on the Wibaux-Trotter wagon road, and 3.28 meters (10.8 feet) north of the North Dakota-Montana boundary *monument*, which is an old oak post. The station is marked by a standard disk station mark set in the top of a concrete cylinder 7 inches in diameter and 30 inches long, incased in a galvanized-iron pipe which was used for the form. The cylinder projects 3 inches above the ground. The underground mark is the same as at *Mondak azimuth*, described above. The southwest corner of sec. 7, T. 143 N., R. 105 W., is 33.48 meters (109.8 feet) from the station in azimuth 00° 08′, and the southeast corner of sec. 22, T. 17 N., R. 60 E., is 261.31 meters (857.3 feet) from the station in azimuth 00° 09′. The oak boundary post is in azimuth 359° 40′, and the chimney of Mr. Callender's house is in azimuth 293° 21′.

Tobacco Plains (U. S. & C.) latitude (Lincoln County, Mont., C. H. Sinclair, 1901).—Distant 1.46 meters (4.8 feet) or 0″.05 of latitude south and 7.13 meters (23.4 feet) west of monument No. 247 (old No. 8) of the International Boundary Commission, which is about ¼ mile south of Phillips post office, British Columbia. The monument is now marked by a pile of stones. The azimuth station *Tobacco Plains* is 54.9 meters (180 feet) east and 0.17 meter (0.6 foot) north of the monument. It is marked by an iron post 4 feet long and 3½ inches in diameter with a brass cap marked with cross lines and the inscription "U. S. SURVEY, 1901, AZ. STA." The latitude station is marked only by a wooden pier.

Wigwam (U. S. & C.) latitude (Lincoln County, Mont., C. H. Sinclair, 1901).—Near the center of the little valley through which Wigwam Creek flows, 0.46 meter (1.5 feet) or 0″.01 of latitude south and 272.36 meters (893.6 feet) west of *Wigwam Creek azimuth* and 0.52 meter (1.7 feet) or 0″.02 of latitude south and 264 meters (866 feet) west of monument No. 255 (old No. 6) and 0.40 meter (1.3 feet) south and 402.82 meters (1,321.6 feet) east of monument No. 254 (old No. 7) of the International Boundary Commission. The station is on the east side of the creek and in the midst of a dense forest. The azimuth station is marked by an iron post, and a similar post marking a line at right angles to the meridian, is 800.68 meters (2,626.9 feet) due west.

Wigwam 2 (U. S. & C.) latitude, (Lincoln County, Mont., C. H. Sinclair, 1901).—Distant 530 meters (1,738.5 feet) or 17″.16 of latitude south and 13.2 meters (40.7 feet) east of monument 255, mentioned above in connection with *Wigwam latitude*. The station is marked by a wooden pier, which is 10 feet north of the section of a tree (26 inches diameter) used as an instrument stand in 1861.

Wymonkota azimuth (Carter County, Mont., E. H. Pagenhart, 1912).—Identical with the triangulation station and the United States Geological Survey station of the same name, which is about 2½ miles west-northwest of the southeast corner of the State, at the edge of the breaks and just south of the wagon road leading into the Badlands, on a small conical-shaped hill, the largest in the vicinity. The station is marked by a United States Geological Survey bronze tablet cemented in a large rock set in the ground. A 1-inch drill hole in solid rock is 4 meters (13 feet) from the station in azimuth 260° 31′.

Wyoming, northeast corner eccentric, latitude (Carter County, Mont., C. V. Hodgson, 1913).—Distant 0.01 meter (0.03 foot) or 0″.00 north and 0.06 meter (0.2 foot) east of the triangulation station *Wyoming northeast corner eccentric*, which is about 2 meters east of the Hash Knife wagon road, a short distance north of the Montana-South Dakota State line, on the first knoll covered with red rock seen on approaching along the road from the south. The station is marked according to notes 1b and 7b. The *northeast corner of Wyoming* is marked by a red granite post 12 inches square, projecting 3 feet above the ground, and is 269.41 meters (883.9 feet) from the eccentric station in azimuth 35° 18′. About 3 feet west of the corner monument is a block of soft white sandstone 18 by 22 inches on top and projecting about 2 feet above the ground. Thirty-seven paces east of the corner monument is a 2-inch iron pipe with a bronze cap projecting 1 foot above the surface of the ground and marked "U. S. General Land Office Survey, 1910. $250 fine for removal. Mont-Wyo-S. D., T. 9, R., 62–63, sec. 36-sec. 31."

NEBRASKA

Daily latitude (Greeley County, Nebr., W. H. Burger, 1906).—Identical with *Daily azimuth*, described below.

Daily azimuth (Greeley County, Nebr., W. H. Burger, 1906).—Identical with the triangulation station of the same name on the crest of a prominent hill in the NW. ¼ sec. 25, T. 19 N., R. 12 W., 6 miles west and 3½ miles north of Greeley Center, ⅓ mile to the southwest of the house of Mr. Holmes, and on clay land owned by Mr. Dailey. An old trail passes to the southward of the station. The station is marked by a marble post 8 inches square and 2.3 feet long, placed with its top flush with the ground and with two V-shaped grooves at right angles and the letters "U. S. C. S." cut in the top. The underground mark is an earthenware crock, buried about 3 feet below the surface, with bottom upward and with a small drill hole in the bottom. The azimuths and distances from the station to certain points are: To the head of a ravine, 280° 35′, about 103 yards; to the spire of the Catholic Church in Greeley Center, 297° 22′ 23″; to the schoolhouse at Horace, 18° 21′; to Everett's windmill, 168° 22′, ¾ mile; to Holmes's windmill, 221° 31′, ⅓ mile.

For notes in regard to marking of stations see p. 130.

North Platte (U. S. E.) latitude (Lincoln County, Nebr., F. Kampf, 1874).—On the west side of the town of North Platte, in the center of the military reservation. The station is probably marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Omaha longitude (Douglas County, Nebr., Edwin Goodfellow, 1869; 1891; Edwin Goodfellow, 1873; Edwin Smith, 1901; O. B. French, 1907, 1912).—The station of 1869 was in the southeastern part of the high-school grounds. A copper bolt was placed in a stone, 85.77 meters (281.4 feet) due north of the station. The station of 1873 was 4.273 meters (14.02 feet) due north of that of 1869. The station of 1882–1891 was established 85.77 meters (281.4 feet) due south of the copper bolt mentioned above, but no trace was found of the piers of 1869 or 1873. It may be presumed, however, that the station of 1882–1891 is identical with that of 1869. The station is marked by two stone piers. The 1901 station was established west of the high school and 98:49 meters (323.1 feet) or 0s.282 (4s.23) of longitude west and 55.41 meters (181.8 feet) north of the station of 1869–1891. The 1901 pier is no longer standing. The station of 1907–1912, is just west of the southern end of the new high-school building, near the corner of Dodge and Twenty-second Streets, and is marked by a concrete pier. This station is 39.315 meters (128.99 feet) or 1s.274 of latitude north and 89.896 meters (294.93 feet) or 0s.257 (3s.86) of longitude west of the station of 1869–1891. The station of 1907–1912 is also 59.663 meters (195.74 feet) or 1s.93 of latitude north and 479.62 meters (1,573.55 feet) or 20s.61 of longitude west of the Presbyterian Church spire; 40.71 meters (133.6 feet) or 1s.32 of latitude north and 618.2 meters (2,028 feet) or 26s.56 of longitude west of the post-office tower; and 113.153 meters (371.24 feet) or 3s.67 of latitude south and 184.833 meters (606.41 feet) or 7s.94 of longitude west of the Methodist Episcopal Church tower.

In 1920, information was received from the city engineer of Omaha that it would be necessary to move the pier marking the station of 1882–1891 but that the new location would be referenced carefully. The data at present do not indicate the new location precisely, but it is not believed to be materially different from the old.

Omaha latitude (Douglas County, Nebr., Edwin Goodfellow, 1869—1912).—Identical with *Omaha longitude*, of 1869–1891 described above.

Page, southwest base, longitude (Holt County, Nebr., O. B. French and Edwin Smith, 1907).—Marked by a concrete pier 1.12 meters (3.7 feet) due north of *Page southwest base azimuth*, described below.

Page, southwest base, latitude (Holt County, Nebr., W. H. Burger, 1906).—Distant 2.09 meters (6.9 feet) in azimuth 318° 53′ or 0s.05 of latitude south from *Page southwest base azimuth*, described below.

Page, southwest base, azimuth (Holt County, Nebr., W. H. Burger, 1906; 1907).—Identical with the triangulation station of the same name in the SW. ¼ sec. 1, T. 28 N., R. 10. W., about 2 miles north and 0.7 mile west of the town of Page and about 2 miles south and 12 miles east of O'Neill, on land owned by William Lord and near his dwelling. The azimuths and distances to certain points are: To the northwest corner of the old portion of a granary, 288° 23′, 43.6 meters (143 feet); to the northwest corner of Mr. Lord's house, 57 meters (188 feet) to the windmill, 305° 08′; to the center of the section-line road to the southward, 120 meters (393 feet); to precise level bench mark M 2, is 320° 07′, 80.93 meters (265.5 feet). The bench mark is a limestone post with a square cut in the top and lettered "U. S. B. M."; the surface mark of the station is a stone 24 by 24 by 14 inches set in cement and with a copper bolt, marked with cross lines, set in its upper surface to mark the exact point. The underground mark is a stone 6 by 6 by 8 inches, set in cement and carrying a copper bolt with cross lines to mark the exact point.

Shelton east base latitude (Buffalo County, Nebr., W. H. Burger, 1906).—Identical with *Shelton, east base, azimuth*, described below.

Shelton east base azimuth (Buffalo County, Nebr., W. H. Burger,1906).—Identical with the triangulation station of the same name about ½ mile west of the town of Shelton and 1.7 meters (6 feet) inside the right-of-way fence of the Union Pacific Railway and about 220 feet west of a stone culvert which is 4 telegraph poles west of milepost 177. A telegraph pole of the Postal Telegraph Co., is about 5 feet north and 5 inches west of the station, which is marked by a copper bolt with cross lines set in a limestone post 8 inches square and 2½ feet long. The top of the post is flush with the ground and 2.93 feet above the underground mark. The underground mark is a copper bolt with cross lines set in a limestone block 15 inches square and 8 inches thick. Azimuths and distances to certain points are: To a telegraph pole marked with a triangle on the side facing the station, 0° 00′; to west base (parallel to railroad tracks), 70° 13′ 01″; to telephone pole No. 1, blazed with triangle on side facing the station, 140° 53′, 13.01 meters (42.7 feet); to telephone pole No. 2, blazed with triangle on side facing station, 230° 30′, 36.73 meters (120.5 feet). Two reference marks were set. The west reference mark is a 4 by 26 inch sewer pipe filled and surrounded by concrete, with its top flush with the surface of the ground. It is about 1 foot east of the fence running on the west side of a small house of Mr. Anderson and is in the exact prolongation of the line from Shelton water tower through the station. It is 9.30 meters (30.5 feet) north of the center of the road, 14.80 meters (48.6 feet) north of the right-of-way fence, and 53.938 meters (176.96 feet) from the station in azimuth 87° 38′. A 30d. wire nail inverted marks the point of reference. The east reference mark, similar to the west mark, is in a field across a wagon road from the station, about 6 feet north of a line of telephone poles, 7.40 meters (24.3 feet) north of the center of the road, 12.60 meters (41.3 feet) north of the right-of-way fence, and 16.388 meters (53.77 feet) from the station in azimuth 189° 51′, being in the exact line between the station and Meisner's house cupola.

Sidney Barracks (U. S. E.) latitude (Cheyenne County, Nebr., F. Kampf, 1874).—About 2,000 feet from the town of Sidney, in the parade ground of the military post. The station is probably marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

For notes in regard to marking of stations see p. 130.

NEVADA

Austin longitude (Lander County, Nev., R. A. Marr and C. H. Sinclair, 1889, 1902).—On the west side of the courthouse at Austin, on the south side of the main street of the town. The station is marked by the foundation of a pier, and is 6.4 meters (21 feet) north and 12.8 meters (42 feet) or 0″.54 west of *Austin courthouse flagstaff*, and 0″.06 of latitude south and 0″.22 of longitude west of *Austin longitude eccentric* not described. Wheeler's stone, a granite monument 6 by 6 inches square with a cross on the top and the letters "U. S. E." cut in the side, is about 355 meters south and 1,070 meters east of the station.

Austin (U. S. E.) latitude (Lander County, Nev., E. P. Austin, 1871, 1898).—On a gentle slope at the base of Mount Prometheus, 100 meters north of the road leading up over the divide, a short distance west of a dwelling house, and near the last big dump extending north and south across the ravine. The station is marked by a cross in the top of a granite post 6 inches square on top, projecting 8 inches above the ground and inscribed "U. S. E. 1871." The station is identical with triangulation station *Wheeler stone*.

Battle Mountain (U. S. E.) latitude (Lander County, Nev., E. P. Austin, 1871).—Near Battle Mountain, a town on the Central Pacific Railroad and distant 1,166 feet southeast from the public school building and 1,475 feet east of the railroad track, which at this point runs nearly north and south. The marking of the station is not known.

Carlin (U. S. E.) latitude (Elko County, Nev., E. P. Austin, 1871).—Located west-northwest of the town of Carlin, 344 feet from the Central Pacific Railroad track, 1,406 feet from the Humbolt River, which is due south, and 550 feet from the railroad bridge over a small creek entering the Humbolt from the south. The marking of the station is unknown.

Carson City longitude (Ormsby County, Nev., R. A. Marr, and C. H. Sinclair, 1889, 1902; Geo. Davidson and C. H. Sinclair, 1893).—The station of 1889–1902 is in the observatory of Charles W. Friend, near the corner of King and Stewart Streets, on the property line of the latter street, the pier being 3 feet east of the line. The equatorial pier is 8 feet east of the transit pier, which is 25.69 meters (84.3 feet) or 0″.83 of latitude north and 154.8 meters (508 feet) or 6″.45 of longitude east of the capitol dome. The station of 1893 is 0.803 meter (2.63 feet) or 0″.03 of latitude north and 8.015 meters (26.30 feet) or 0″.33 of longitude east of the station of 1889–1902. It is marked by a pier of brick and cement.

Carson City latitude (Ormsby County, C. H. Sinclair, 1889; C. H. Sinclair, 1893).—The station of 1889 is identical with the longitude station of 1893, described above. The station of 1893 is marked by a brick pier, 1.28 meters (4.2 feet) due east of the latitude station of 1889.

Carson Sink latitude (Churchill County, Nev., William Eimbeck, 1880).—Marked by a concrete pier 14.37 meters (47.1 feet) or 0″.47 of latitude north and 17.54 meters (57.5 feet) east from *Carson Sink azimuth*, described below.

Carson Sink azimuth (Churchill County, Nev., William Eimbeck, 1880).—Identical with the triangulation station of the same name about 20 miles in an easterly direction from the town of Stillwater, on the highest point of the Carson Sink Range of mountains. The station is marked by a copper bolt in a drill hole in the solid rock. It is also marked a few inches above the bolt by a drill hole in a porous rock surmounting the pier used for mounting the instrument. The station is partly surrounded by a ring wall of rocks about 5½ meters in diameter. Four drill holes in solid rock are at the following distances and azimuths from the station: 5.36 meters (17.6 feet), 253° 58′; 5.38 meters (17.7 feet), 328° 07′; 3.12 meters (10.2 feet), 69° 12′; and 1.99 meters (6.5 feet), 163° 42′. The vertical circle station, partly surrounded by a ring wall of rocks, is 8.13 meters (26.7 feet) from the station in azimuth 39° 15′.

Diamond Peak latitude (Eureka County, Nev., R. A. Marr, 1881).—Marked by a masonry pier 8.67 meters (28.4 feet) or 0″.28 of latitude north and 24.35 meters (79.9 feet) east from *Diamond Peak azimuth*, described below.

Diamond Peak azimuth (Eureka County, Nev., William Eimbeck, 1881).—Identical with the triangulation station of the same name, which is about 12 miles northeast of Eureka, on Diamond Peak, the highest point of the Diamond Range of mountains, on a small cone rising from a small approximately level space on the south end of the ridge. The station is marked by a copper bolt set in the solid rock. The bolt is protected by the low masonry foundation used for mounting the instrument. The station is nearly surrounded by a ring wall of rocks, and just outside this wall are four drill holes in the solid rock at the following distances and azimuths from the station: 2.65 meters (8.7 feet), 10° 04′; 2.83 meters (9.3 feet), 92° 59′; 3.27 meters (10.7 feet), 204° 29′; and 4.72 meters (15.5 feet), 291° 44′. The vertical circle pier, partly surrounded by a small ring wall of rocks, is 23.65 meters (77.6 feet) south of the station.

Eureka longitude (Eureka County, Nev., R. A. Marr, 1889, 1898).—In a stone quarry just east of a large ditch on the east side of the town of Eureka, about 11 meters north of the north line of Bateman Street and about the same distance west of the nearly vertical wall of the quarry. There is a stone wall about 25 meters north of the station and a similar wall about 30 meters south. The station is marked by a drill hole in a large black stone placed on the stone foundation of the old pier. This station is also a geodetic point.

Fort McDermitt (U. S. L. S.) longitude (Humboldt County, Nev., W. A. Jones, 1880).—No description.

Genoa longitude (Douglas County, Nev., C. H. Sinclair, 1889).—In a vacant lot just back of the store of Morris Harris which fronts on the west side of Main Street. The station is marked by a pier of brick and stone

For notes in regard to marking of stations see p. 130.

set in cement, 15 by 25 inches and 3 feet above ground. It is 5.91 meters (19.4 feet) from the fence due west; 25.33 meters (83.1 feet) from the northwest corner of Harris's store; 23.04 meters (75.6 feet) from the southwest corner of the store; 27.70 meters (90.9 feet) from the southwest corner of a stone building; and 14.26 meters (46.8 feet) from the northwest fence corner. It is also 57.87 meters (189.9 feet) or 2″41 of longitude west and 39.89 meters (130.9 feet) north of triangulation station *Genoa flagstaff*.

Mill azimuth (Mineral County, Nev., C. H. Sinclair, 1902).—Identical with the triangulation station of the same name near the intersection of several roads north of an old lake bed, on a light-colored pile of earth a short distance southeast of the old Eagle mill. The station is marked by a 1-inch iron pipe 15 inches long.

Moapa longitude (Clark County, Nev., W. B. Fairfield, 1916).—Near the town of the same name, on the west side of the Los Angeles & Salt Lake Railroad, out in the open desert, about 160 meters almost due west of the railroad station. The wooden pier is 37.375 meters (122.62 feet) or 1″21 of latitude due north of United States Coast and Geodetic Survey bench mark I-1.

Moapa latitude (Clark County, Nev., W. B. Fairfield, 1916).—Identical with *Moapa longitude*, described above.

Monument No. 108, California-Nevada boundary, latitude (Nye County, Nev., C. V. Hodgson, 1914).—An unmarked point 3.17 meters (10.4 feet) or 0″09 of latitude north from monument 108 in azimuth 204° 45′. This monument is on the extreme southern end of the range of hills that divides the Pahrump and Stewart Valleys, on a rock spur that runs out in a westerly direction from the south end of the ridge, projecting into the valley. It is marked by a redwood post, marked "C. N. 108," centered over a drill hole in the solid rock and surrounded by a cairn.

Mount Callahan latitude (Lander County, Nev., R. A. Marr, 1881).—Marked by a masonry pier, 12.79 meters (42 feet) or 0″41 north and 31.98 meters (104.9 feet) east from *Mount Callahan azimuth*, described below.

Mount Callahan azimuth (Lander County, Nev., William Eimbeck, 1881).—Identical with the triangulation station of the same name about 20 miles north of Austin, on the summit of Mount Callahan, a large flat-topped mountain at the northern extremity of the Toiyabe Range of mountains. The station is marked by a copper bolt set with plaster of Paris in a drill hole in a large rock. This rock is embedded in the foundation of a masonry pier with an opening at the center to give access to the bolt. There is a bottle set with plaster of Paris in this opening, and the pier is capped with a large stone having a drill hole directly over the bolt. The station is nearly surrounded by a ring wall of rocks. Three drill holes in solid rock are outside the wall at the following distances and azimuths from the station: 3.38 meters (11.1 feet), 60°; 3.47 meters (11.4 feet), 180°; and 3.72 meters (12.2 feet), 300°. In addition to the latitude pier described above, a vertical circle station, partly surrounded by a ring wall of rocks, is 11.52 meters (37.8 feet) from the station in azimuth 4° 10′, and the magnetic station, protected by a right-angled wall of rocks, is 18.59 meters (61.0 feet) from the station in azimuth 194° 12′.

Mount Grant azimuth (Mineral County, Nev., William Eimbeck, 1879).—Identical with the triangulation station of the same name, which is about 7 or 8 miles west of the southern end of Walker Lake, on the central one of three peaks which form the summit of Mount Grant, about 200 meters north of the highest one of the three peaks. The station is marked by a copper bolt in a rock embedded in a masonry pier about 3 feet above the base and 8 inches below the top of the pier. An opening or pit in the top of the pier allows access to this bolt. The station is nearly surrounded by a ring wall of rocks about 4 to 5 meters in diameter, from which there is a hook-shaped spur wall extending to and part way round the vertical circle station, which is 9.9 meters (32 feet) south-southeast of the station.

Pilot Peak latitude (Elko County, Nev., E. P. Austin, 1889).—Marked by a brick pier 1.42 meters (4.7 feet) or 0″05 south and 12.57 meters (41.2 feet) east of *Pilot Peak azimuth*, described below.

Pilot Peak azimuth (Elko County, Nev., William Eimbeck, 1881, 1889).—Identical with the triangulation station of the same name, which is on Pilot Peak, the most southern and highest of a prominent range of mountains near the northwestern border of the Great American Desert. The station is on the highest point of the summit, at the junction point of the three main spurs of the peak, and is marked by a copper bolt in a drill hole in solid rock. It is also marked, about 10 inches above the bolt, by a drill hole in the masonry built between the bases of three small piers. The station is nearly surrounded by a ring wall of rocks, about 4½ feet high, with an inner diameter of 11 feet. Four reference marks, each a drill hole in solid rock filled with lead, are just outside the wall at the following distances and azimuths from the station: 2.98 meters (9.8 feet), 47° 36′; 2.73 meters (9.0 feet), 123° 29′; 2.67 meters (8.8 feet), 189° 13′; and 2.97 meters (9.7 feet), 324° 59′.

Pioche latitude (Lincoln County, Nev., G. F. Bird, 1883).—Marked by a masonry pier, 3 feet by 2 feet by 3 feet high, 8.70 meters (28.5 feet) or 0″28 of latitude north and 8.41 meters (27.6 feet) west from *Pioche azimuth*, described below.

Pioche azimuth (Lincoln County, Nev., William Eimbeck, 1883).—Identical with the triangulation station of the same name, about 33 miles by road and 22½ miles direct in an easterly direction from the town of Pioche, on the highest rock knoll of Pioche Peak in the mountains just east of Eagle Valley. The station is marked by a copper bolt leaded in a drill hole in solid rock. It is also marked, a few inches above the bolt, by a drill hole in a flat stone. The station is nearly surrounded by a ring wall of rocks having an inner diameter of about 11 feet. Four reference marks, each a drill hole in solid rock, are outside the wall at the following

For notes in regard to marking of stations see p. 130.

distances and azimuths from the station: 2.53 meters (8.3 feet), 214° 28′; 2.41 meters (7.9 feet), 271° 38′; 2.71 meters (8.9 feet), 344° 46′; and 2.35 meters (7.7 feet), 92° 00′. In addition to the latitude station described above, the vertical circle station, nearly surrounded by a ring wall of rocks with an inner diameter of 8 feet, is 21.1 meters (69 feet) north-northwest from the station.

Pioche (U. S. E.) latitude (Lincoln County, Nev., W. W. Maryatt, 1872).—On the northeastern declivity of hills which form a spur of the Ely Mountains and 120 feet to the left of the road leading from Pioche to Bullionville. The station is 3,050 feet southwest by west from the church on the corner of Cedar and Meadow Valley Streets. About 1,250 feet from this church on the summit of the divide, where it is crossed by Meadow Valley and near the Gold Hill mine, there stands a very conspicuous telegraph pole. The station, marked by a monument, is 1,060 feet south and 1,470 feet east of this pole. The station is a geodetic point.

Toiyabe Dome latitude (Nye County, Nev., William Eimbeck and R. A. Marr, 1880).—Marked by a masonry pier, 21.29 meters (69.9 feet) or 0″.69 of latitude north and 12.83 meters (42.1 feet) west from Toiyabe *Dome azimuth*, described below.

Toiyabe Dome azimuth (Nye County, Nev., William Eimbeck, 1880).—Identical with the triangulation station of the same name on a peak locally known as Bold Mountain and Mount Poston, the highest and boldest peak at the southern extremity of the Toiyabe Range of mountains. The station is marked by a copper bolt set in solid rock under the center of the low masonry foundation used for mounting the instrument and is nearly surrounded by a ring wall of rocks. In the central pit of the pier was embedded a tin can. Four drill holes in the solid rock outside the wall are at the following distances and azimuths from the station: 4.69 meters (15.4 feet), 135° 16′; 5.12 meters (16.8 feet), 258° 19′; 2.47 meters (8.1 feet), 308° 07′; and 5.61 meters (18.4 feet), 26° 14′. In addition to the latitude station described above, the vertical circle station, partly surrounded by a ring wall of rocks, is 43.10 meters (141.4 feet) distant in azimuth 151° 13′.

Tonopah longitude (Nye County, Nev., C. H. Sinclair, 1902).—Identical with triangulation station *Tonopah astronomic*, which is in the town of Tonopah, on the east edge of Central Street about 30 meters south of Oddie Avenue, just west of the office of the Tonopah Miner, and on the same lot and on a ridge which commands a view north and south. The station is marked by a drill hole in the top of the pier which consists of two long stone blocks, set on end side by side with the bases embedded in concrete.

Tonopah latitude (Nye County, Nev., C. H. Sinclair, 1902).—Marked by a pier of stone and cement 0.40 meter (1.3 feet) or 0″.01 of latitude north and 1.90 meters (5.8 feet) west of *Tonopah longitude*, described above.

Verdi longitude (Washoe County, Nev., C. H. Sinclair, 1889; 1897).—Identical with triangulation station of the same name, about ⅛ mile east of the town of Verdi, on the slight elevation back of O. Lonkey's residence, about 40 meters north of a stone fence and directly opposite the water faucet in the garden. The station is marked by the remains of a brick and cement pier, projecting a few inches above the surface of the ground.

Verdi, east base, longitude (Washoe County, Nev., S. R. Throckmorton, jr., 1872; 1897).—Identical with *Verdi east base, azimuth*, described below.

Verdi, east base, latitude (Washoe County, Nev., Geo. Davidson, 1872; 1897).—Identical with *Verdi east base, azimuth*, described below.

Verdi, east base, azimuth (Washoe County, Nev., Geo. Davidson, 1872; 1897).—This station has been destroyed. It has been approximately recovered and remarked by a drill hole in the top of a large, triangular granite block, but the geodetic position of the new point has never been determined.

Virginia City longitude (Storey County, Nev., C. H. Sinclair and R. A. Marr, 1889; 1897).—Identical with triangulation station *Virginia City astronomic*, which is in the yard south of the office of the Consolidated California & Virginia Mines Co., and directly opposite the railroad station at Virginia City. The station is marked by a drill hole in the top of the pier used for supporting the transit. Due to mining operations, the ground on which the whole of Virginia City is situated is moving slowly to the eastward and this station should be used with caution.

Virginia City (U. S. E.) latitude (Storey County, Nev., W. W. Maryatt, 1873).—Identical with triangulation station *Wheeler monument*, on a prominent hill near the main road which connects Gold Hill and Virginia City, and in full view of both places. The station is 554 feet from the center of the airshaft of the Imperial mine, 400 feet S. 48° 47′ W. from a prominent rock and 79 feet N. 21° E. from a second prominent rock. The station is marked by a monument probably similar to that at *Colorado Springs U. S. E. latitude* (see p. 155).

Winnemucca (U. S. E.) latitude (Humboldt County, Nev., W. W. Maryatt, 1873).—In the northeastern part of the town of Winnemucca, in an open lot on a small elevation in full view of the river and railroad. The station is 527 feet due west of the railroad, 1,538 feet from the depot, and 687 feet from the schoolhouse, and is marked by a pier similar to that at *Colorado Springs U. S. E. latitude* (see p. 155).

NEW HAMPSHIRE

Croydon azimuth (Sullivan County, N. H., Ernest T. Quimby, 1875).—Identical with the triangulation station of the same name on Croyden Mount, which is on the southern and highest part of a range running in a general north and south direction and called Grantham Range. The station is on the highest part of the peak and is marked by a copper bolt in the rock.

For notes in regard to marking of stations see p. 130.

Gunstock latitude (Belknap County, N. H., J. H. Toomer, 1860).—Marked by a granite block, fitted to and resting upon the solid rock of the mountain, and distant 41.20 meters (135.2 feet) or 1″33 of latitude south and 11.24 meters (36.9 feet) east of *Gunstock azimuth*, described below.

Gunstock azimuth (Belknap County, N. H., G. W. Dean and R. E. Halter, 1860; 1897).—Identical with the triangulation station of the same name in the township of Guilford, about 5 miles in an easterly direction from Laconia, on land owned by Col. Benjamin F. Weeks, about 2,440 feet above the mean sea level. The ascent of the mountain is quite steep on all sides, but the least steep on the western slope, where a road was constructed in 1859. The station is marked by a copper bolt in the rock at the summit of the mountain. In 1878 another bolt was placed 0.635 meter (2.08 feet) from the station in azimuth 271° 15′.

Moosilauk azimuth (Grafton County, N. H., Ernest T. Quimby, 1873).—Identical with the triangulation station of the same name on the top of the mountain on land leased by James Clement for 99 years. The station is south of a house, on a large flat rock, buried in the ground and resting on a ledge, and is marked by a copper bolt in the rock, surrounded by a triangle with sides of about 1 foot.

Observatory Hill azimuth (Hanover County, N. H., Ernest T. Quimby, 1874).—Identical with the triangulation station of the same name near Dartmouth College. No detailed description of the station or marking is available.

Prospect Mount azimuth (Grafton County, N. H., Ernest T. Quimby, 1873).—Identical with the triangulation station of the same name on a ledge on the eastern part of the highest part of Prospect Mount. No description of the marking was given.

Unkonoonuc latitude (Hillsboro County, N. H., J. S. Ruth, 1848).—Distant 11.24 meters (36.89 feet) or 0″36 of latitude south and 14.16 meters (46.47 feet) east of *Unkonoonuc azimuth*, described below.

Unkonoonuc azimuth (Hillsboro Coonty, N. H., A. D. Bache, 1848; 1886).—Identical with the triangulation station of the same name on the summit of the more southeasterly of the two prominent elevations known as the Unkonoonuc Mountains, about 7 miles west of Manchester, 4½ miles northwest of Bedford, and 2½ miles west of Goffstown. The station is on the north side of the flat, on the summit and is marked by a drill hole in a rock which is about a foot below the surface of the soil. The copper bolt originally placed in the drill hole has been removed.

NEW JERSEY

Barnegat Inlet latitude (Ocean County, N. J., W. H. Burger, 1907).—Identical with *Barnegat Inlet azimuth*, described below.

Barnegat Inlet azimuth (Ocean County, N. J., W. H. Burger, 1907).—Identical with the triangulation station *Barnegat Inlet astronomic*, on a sand ridge near the inlet, and between the lighthouse and the north shore of the island. The station is 65.44 meters (214.7 feet) from the center of the lighthouse in azimuth 162° 53′ 04″ and 1.431 meters (4.69 feet) to the west of the line joining the center of the lighthouse to *Gowdy's house*.

Beacon Hill latitude (Monmouth County, N. J., J. B. Baylor, 1875; 1918).—Marked by a brick pier 1.49 meters (4.9 feet) east from *Beacon Hill azimuth*, described below.

Beacon Hill azimuth (Monmouth County, N. J., G. W. Dean, 1875; 1918).—Identical with the triangulation station of the same name, about 5 miles southwest from Keyport and about 2¾ miles south from Matawan. The station is on the top of the hill of the same name and is marked underground by a stone cone. The reference marks, granite posts, centered over bottles, and inscribed with the letters "U. S. C. S.," are at the following distances and azimuths from the station: No. 1, 46.345 meters (152.05 feet), 253° 28′; No. 2, 23.055 meters (75.64 feet), 311° 13′; No. 3, 51.990 meters (170.57 feet), 35° 13′; No. 4, 29.438 meters (96.58 feet), 140° 22′. The lower part of a marble post is beneath the ground 30 feet from the station, direction not given. The surface mark is a tack in a 2 by 2 inch stub. Reference marks Nos. 1 and 3 are on the line of the partition fence between the land of Thomas and James Griffin; No. 2 is at the bottom of the gravel pit on Thomas Griffin's place and is sunk 8 inches below the surface, and over it a portion of a brick pier was placed; No. 4 is on the hillside about 5 feet lower than the bottom of James Griffin's gravel pit. Standing at either of the reference marks so that the letters appear in their natural position, you will be facing the station.

Cape May longitude (Cape May County, N. J., G. W. Dean, 1881; 1891).—On ground belonging to the Pennsylvania Railroad, and near the Sea Breeze Excursion House. The station is marked by a brick pier which is 39.3 meters (129.1 feet) or 1″28 of latitude south and 4.0 meters (13.1 feet) or 0″17 of longitude west from triangulation station *Pole on arbor*.

Cape May latitude (Cape May County, N. J., E. Smith and F. H. Parsons, 1881; C. H. Sinclair, 1891).—The station of 1881 is identical with the longitude station described above. The station of 1891 is marked by a pier 1.905 meters (6.25 feet) west and 0.101 meter (0.33 foot) north of the station of 1881.

Chapel Hill azimuth (Monmouth County, N. J., A. T. Mosman, 1869).—Identical with the triangulation station of the same name, about 2 miles from Riceville on the road to Middletown, in the southwest corner of a field and about 15 feet from the road. Mr. Hall's house is 200 yards down the gentle slope of the field and a little to the southeast of the house is Chapel Hill Lighthouse. The following distances were measured: To nail in black-oak tree (found in 1899), 8.87 meters (29.1 feet); to second fence post parallel to road, 5.541 meters (18.18 feet); to second chestnut post perpendicular to road, 7.59 meters (24.9 feet) to fifth chestnut post perpendicular to road, 17.71 meters (58.1 feet). The marking of the station is unknown.

For notes in regard to marking of stations see p. 130.

High Point latitude (Sussex County, N. J., Edwin Smith, 1908).—Distant 1.2 meters (4 feet) due east of *High Point azimuth*, described below.

High Point azimuth (Sussex County, N. J., Edwin Smith, 1908).—Identical with the triangulation station of the same name, on a prominent projection of the Blue Ridge, the highest point in the State. The station is about 1 mile north of the Port Jervis-Colesville road, about 4 miles from the former place and 3½ miles from the latter, and about 1¼ miles from the New York-New Jersey boundary line. It is marked by a copper bolt set in the rock. A group of large bowlders lies to the westward, the most northwesterly of which is 1.791 meters (5.88 feet) from the station.

Jersey City longitude (Hudson County, N. J., E. Loomis, 1847).—The station was at Loomis's observatory.

Leeds Point azimuth (Atlantic County, N. J., A. T. Mosman, 1869; 1903).—Identical with the triangulation station of the same name, on the firm land on the southwest side of Great Bay, about 260 meters west of the marsh line, and about ½ mile to the southward of Leeds Point and the road leading thence to Smithville. The mouth of Little Egg Inlet lies about 6 miles to the eastward, the intervening area being marsh. The station is marked by a cross cut on the top of a 6 by 6 inch stone post, which projects about 6 inches above the surface of the ground.

Mount Rose latitude (Mercer County, N. J., J. E. Hilgard, 1852).—Distant 2 meters (7 feet) due west of *Mount Rose azimuth*, described below.

Mount Rose azimuth (Mercer County, N. J., J. E. Hilgard and S. W. Sterns, 1852; 1868).—Identical with the triangulation station of the same name about 2½ miles southeast of Hopewell, ½ mile south of the southwest corner of Somerset County, and ½ mile west of the dividing line between Hopewell and Princeton Townships. The station is marked underground by an earthenware cone. To the east of the station 6.349 meters (20.83 feet) there is a walnut tree growing from the stump of an old one. A cherry tree 114 feet north of the walnut and a cedar 42 feet south of the walnut are, respectively, 36.088 meters (118.4 feet) and 13.69 meters (44.9 feet) from the station. All these trees are directly in a fence line.

NEW MEXICO

Albuquerque (U. S. G. S.) longitude (Bernalillo County, N. Mex., R. S. Woodward, 1885).—On the grounds of the Atlantic & Pacific Railway, about 100 feet south of the general office of the railway company. The station is marked by a pier of dressed sandstone about 16 inches square in cross section, about 7 feet long, and capped by a limestone slab 6 inches thick and 19 by 24 inches in cross section.

Albuquerque (U. S. G. S.) latitude (Bernalillo County, N. Mex., R. S. Woodward, 1885).—Identical with *Albuquerque (U. S. G. S.) longitude*, described above.

Burro azimuth (Grant County, N. Mex., J. S. Hill, 1910).—Identical with the triangulation station of the same name near a United States Geological Survey station. It is on the northeast and highest point of Big Burro Mountain, 16 miles on a direct line south from Silver, a town on the Atchison, Topeka & Santa Fe Railway, and 23 miles in a direct line northeast from Lordsburg, a town on the Southern Pacific Railway. It is about 4 miles south of the Silver-Duncan wagon road and about 3 miles in a southerly direction from the Richardson ranch. The station is marked according to note 2. The reference mark is the stem of a United States Geological Survey brass station mark cemented into a drill hole in the rock, the top or disk part having been broken off, and is 3.145 meters (10.32 feet) from the station in azimuth 287° 01′. Other distances and azimuths are as follows: One-half inch drill hole in a depression in a rock, 4.800 meters (15.75 feet), 208° 28′; large blazed tree on slope, 40.3 meters (132 feet), 217° 17′.

Cimarron (U. S. E.) latitude (Colfax County, N. Mex., J. H. Clark, 1874).—In the corner of a lot in the southern part of the town of Cimarron. The meridian is marked by two pillars of solid stone extending 3 feet below and 1½ feet above the surface of the ground. The center of the south meridian mark is exactly in the meridian of the middle point between the two iron pieces which connect the platform and the foundation of the astronomical station; the center of the cross on the north mark is about 0″.7 east of the meridian line.

Cooks azimuth (Grant County, N. Mex., J. S. Hill, 1909).—Identical with the triangulation station of the same name on Cooks Peak, 20 miles in a direct line north of Deming, a town on the Southern Pacific, and about 3 miles a little west of south from Cooks post office. It is best reached from Grovers Bros.' ranch, which is on the east side of the peak. The station is marked according to note 2. The reference mark, a cross cut in the rock, is 11.62 meters (38.1 feet) from the station in azimuth 202° 13′.

Corduna latitude (Otero County, N. Mex., C. V. Hodgson, 1914).—Distant 0.1 meter (0.3 foot) or 0″.00 due south of *Corduna* triangulation station (1909), which is about 1½ miles north of the Texas-New Mexico boundary, 70 miles by road or 60 miles direct, north of Sierra Blanca, a town at the junction of the Southern Pacific and the Texas & Pacific Railways, and about 3 miles northeast of San Antonio Peak, on the highest peak in the vicinity, known locally as Wind Mountain. The triangulation station is marked according to note 2. The reference mark, a cross cut in the top of a rock, is 4.63 meters (15.2 feet) from the station in azimuth 157° 43′. The United States Geological Survey station, marked by a cairn, was, in 1909, 7.8 meters (26 feet) from the station in azimuth 170° 48′. In 1914 this cairn was found torn down and was rebuilt in approximately the same position.

For notes in regard to marking of stations see p. 130.

Corner boundary (United States and Mexico), longitude (Hidalgo County, N. Mex., C. H. Sinclair, 1892).—At the camp of the boundary commission, near monument No. 40, which marks the terminal western point of the 100-mile line of the Mexican boundary running west from the Rio Grande River near El Paso. The station is marked by a pier of rock and cement, standing about 3½ feet above the ground and 28 by 19 inches in cross section. It is 35.9 meters (118 feet) south and 0.80 meter (2.6 feet) or 0".03 east of monument No. 40, 10.71 meters (35.1 feet) due east of the boundary commission's latitude pier, and 9.44 meters (31.0 feet) due east of the Fauth theodolite pier of the boundary commission.

Corner boundary (United States and Mexico), latitude (Hidalgo County, N. Mex., J. F. Hayford, 1892).—The station is 39.5 meters (118 feet) or 1".17 of latitude south and 9.91 meters (32.51 feet) west of monument No. 40, United States and Mexico. (See Report of the International Boundary Commission, United States and Mexico, West of the Rio Grande, 1891–1896, p. 80, and the description of the longitude station above.)

Deming City, waterworks, latitude (Luna County, N. Mex., C. V. Hodgson, 1914).—Distant 16.99 meters (55.7 feet) in azimuth 49° 43′ or 0".36 of latitude south from the center of the high red water tank which supplies Deming with water and which is known as Deming City waterworks. A United States Geological Survey bench mark is near the base of the tower.

Fort Bayard latitude (Grant County, N. Mex., C. V. Hodgson, 1914).—Distant 0.93 meter (3.1 feet) in azimuth 247° 50′, or 0".01 of latitude north of Fort Bayard, United States Geological Survey station. The United States Geological Survey station is on the summit of a rounded hill of syenite rock, just outside the quadrangle of the military post and at its southwestern corner. The United States Geological Survey point is identical with the Wheeler astronomic station at Fort Bayard and is marked by an aluminum tablet cemented in rock, which was placed over the foundation of the Wheeler astronomic pier.

Fort Selden longitude (Dona Ana County, N. Mex., Geo. Davidson, Edwin Smith, and J. J. Gilbert, 1882).—In the northwest parade grounds of Fort Selden, about ⅔ mile north of Cerro Roblero, a station of the Transit of Venus Commission (1882), the position and description of which is not available. The station is marked by a brick pier.

Fort Union (U. S. E.) latitude (Mora County, N. Mex., T. H. Safford, 1873).—The station is identical with the sun dial of the supply depot, at Fort Union military reservation. Eight feet due south is a pier similar to that at *Colorado Springs, U. S. E., latitude* (see p. 155).

Glen Rio longitude (Quay County, N. Mex., G. D. Cowie, 1920).—On the highest ridge south of Glen Rio, about 3,500 feet from the Chicago, Rock Island & Pacific Railroad station and just west of the Texas-New Mexico boundary road. There is another ridge, slightly lower to the north. The station is 0.66 meter (2.2 feet) or 0".02 of latitude north and 10.08 meters (33.1 feet) or 0".40 of longitude west of *Glen Rio azimuth*, described below, and is marked by a temporary wooden pier. A stake was driven in along the boundary fence line 10.1 meters (33 feet) due east of the station.

Glen Rio latitude (Quay County, N. Mex., G. D. Cowie, 1920).—Identical with *Glen Rio longitude*, described above.

Glen Rio azimuth (Quay County, N. Mex., and Deaf Smith County, Tex., E. O. Heaton, 1920).—Identical with the triangulation station of the same name, about ¾ mile south of Glenrio, a town on the Texas-New Mexico boundary, on the second small knoll south of the town, and in the boundary line fence at milepost 218 of the boundary survey. The station is marked according to notes 1a and 7a, with 2 reference marks, note 11a. The first is 17.14 meters (56.2 feet) from the station in azimuth 179° 48′; the second is 21.78 meters (71.5 feet) distant in azimuth 00° 15′.

Jarilla longitude (Otero County, N. Mex., Edwin Smith, 1911, 1914).—Distant 2.5 meters (8 feet) or 0".10 of longitude east and 0.38 meter (1.2 feet) or 0".01 of latitude south of *Jarilla azimuth*, described below. The station is marked by a standard disk station mark in the top of a concrete pier, 14 by 26 inches and 35 inches high above the solid rock on which it stands. The station mark is similar to the standard station mark except it has the words "Astronomical Station" stamped on the disk in addition to the regular inscription.

Jarilla latitude (Otero County, N. Mex., C. V. Hodgson, 1914).—Identical with *Jarilla longitude* described above.

Jarilla azimuth (Otero County, N. Mex., J. S. Hill, 1909; 1911).—Identical with the triangulation station of the same name on the extreme south peak of the Jarilla Mountain, about 2½ miles in a direct line N. 26° W. from the railroad station at Orogrande, a town on the El Paso & Southwestern Railroad, 1 mile southwest of the Brice post office and about ½ mile west of the railroad and wagon road which lead from Orogrande to the Brice post office and mines in that vicinity. The station is marked according to note 2; the reference mark, an iron pipe embedded in concrete, is 7.14 meters (23.4 feet) from the station in azimuth 269° 42′. A conical pile of rocks with a stone at the top bearing the inscription "I. P. Jarilla U. S. M. M." is 9.72 meters (21.9 feet) from the station in azimuth 275° 42′.

Las Vegas (U. S. E.) latitude (San Miguel County, N. Mex., J. H. Clark, 1874).—Marked by a sandstone pier, in the center of the plaza in the town of Las Vegas.

Line latitude (Grant County, N. Mex., C. V. Hodgson, 1914).—Distant 0.05 meter (0.2 foot) or 0".00 due south of station *Line* of the United States Geological Survey, which is on the highest point of Laura Mountain, also called Vanderbilt Mountain, about 15 miles northeast from Duncan, Ariz., a town on the Arizona &

For notes in regard to marking of stations see p. 130.

New Mexico Railway, 2 miles from Steeple Rock post office or Carlisle mine, and about ½ mile from the Laura mining camp. The triangulation station is marked by a United States Geological Survey triangulation station mark cemented into the solid rock. The reference mark, a cross cut in the highest point of a rock ledge, is 5.020 meters (16.47 feet) from the station in azimuth 234° 01′.

Los Lunas longitude (Valencia County, N. Mex., W. B. Fairfield, 1920).—Marked by a temporary wooden pier 8.510 meters (27.92 feet) or 0″.28 south and 0.770 meter (2.53 feet) or 0″.03 of longitude east from *Los Lunas azimuth*, described below. It is also 8.745 meters (28.69 feet) south and 3.180 meters (10.43 feet) east from United States Geological Survey bench mark 4851, at the northeast corner of the stone fence at the residence formerly belonging to Solomon Lunas.

Los Lunas latitude (Valencia County, N. Mex., W. B. Fairfield, 1920).—Identical with *Los Lunas longitude*, described above.

Los Lunas azimuth (Valencia County, N. Mex., C. L. Garner, 1920).—Identical with the triangulation station of the same name in the town of Los Lunas, on the west side of the Atchison, Topeka & Santa Fe Railway tracks, 150 meters (492 feet) north of the railway station, 1 meter (3 feet) south of the south side of the sidewalk along Los Lunas-Gallup road. The station is marked according to notes 1a and 7a, the disk being stamped 1919. A United States Geological Survey bench mark is 2.568 meters (8.43 feet) from the station in azimuth 102° 25′. Other distances and azimuths are as follows: Tank, 100 meters (328 feet) 247° 44′ 00″; courthouse flagstaff, 267° 57′ 09″; Catholic Church steeple, 346° 17′ 41″; corner of stone fence at former residence of Solomon Lunas, 2.745 meters (9.01 feet) 130° 14′.

Santa Fe (U. S. E.) latitude (Santa Fe County, N. Mex., T. H. Safford, 1873).—In the military reservation in that part of the town known as the old Fort Marcy parade ground. The station is marked by a heavy stone pillar 4 feet high, probably similar to that at *Colorado Springs, U. S. E., latitude* (see p. 155). A stone meridian mark is 1,926 feet north of this monument.

Santa Fe longitude (Santa Fe County, N. Mex., C. H. Sinclair, 1886).—The station is the pier used by the Engineer Corps in the grounds of the Fort Marcy military reservation. A flagstone 2½ inches thick and 33 inches long was placed on the pier and on this flagstone two stones 8 by 10 by 10 inches were set. The portion of the pier below the flagstone is inscribed as follows: "U. S. Meridian and Latitude Mark. Explorations West of the 100th Meridian. War Department." The center of the pier has a drill hole filled with lead. A meridian stone was set by the Engineer Corps about 2,000 feet south of the pier. It still existed in 1886, but the entire top had been broken off. No connection has been made to a geodetic point.

NEW YORK

Albany, Dudley Observatory, longitude (Albany County, N. Y., G. W. Dean and E. Goodfellow, 1858; 1896; C. H. Sinclair and R. L. Faris, 1896; 1908).—The station of 1858–1896 was the transit pier in the old Dudley Observatory, and was 1.83 meters (6.0 feet) north and 18.63 meters (61.1 feet) or 0ˢ.055 (0″.82) east of the center of the dome of the old observatory. It is now lost. The station of 1896–1908 is marked by a brick pier, 17 by 25 inches, set about 75 feet due north of the meridian circle at the new Dudley Observatory. The station of 1858–1896 is a geodetic point.

Buffalo (U. S. L. S.) longitude (Erie County, N. Y., E. H. Ruffner, 1868).—No description. The station is 16″.22 of longitude east of the *intersection of the axes of Exchange and Michigan Streets*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 755.)

Buffalo (U. S. L. S.) latitude (Erie County, N. Y., E. H. Ruffner, 1868).—No description. The station is 02″.67 south of the *intersection of the axes of Exchange and Michigan Streets*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 746.)

Carpenters Point longitude (Orange County, N. Y., G. W. Dean and Edwin Smith, 1873).—About 1½ miles from the Erie Railroad depot at Port Jervis, on a point of land at the junction of the Delaware and Naversink Rivers, at the extreme western end of Laurel Grove Cemetery. The station is marked by a piece of copper pipe about 4½ feet in length on which is engraved, from the top down, "U. S. Coast Survey June 1873." The pipe is secured in the ground by masonry work of brick and cement up to the engraving, where loose brick only are placed around it to the top. A small copper rod was put through the pipe at right angles to hold it in the masonry work. The top of the pipe is about 1 foot below the surface of the ground. The station is 12.65 meters (41.5 feet) from Benjamin Carpenter's grave, 22.15 meters (72.7 feet) or 0″.72 of latitude north and 32.45 meters (106.5 feet) or 1″.35 of longitude east of copper pipe on the rock at the corner of the States of New York, Pennsylvania, and New Jersey, known as Tri State Rock.

Carpenters Point latitude (Orange County, N. Y., Edwin Smith, 1873).—Marked by a brick pier 1.8 meters (6 feet) west of *Carpenters Point longitude*, described above.

Carpenters Point azimuth (Orange County, N. Y., Edwin Smith, 1873).—Identical with *Carpenters Point longitude*, described above.

Ceres latitude (Alleghany County, N. Y., Edwin Smith, 1879; 1884).—In the southwest corner of the meadow across the road from the northwest corner of the cemetery and just east of the school lot. The station

For notes in regard to marking of stations see p. 130.

is marked by a granite block inscribed "Station Ceres, U. S. C. & G. S. 1879," surmounted by a hemlock slab. The granite post is 2½ feet below the surface, and is 17.25 meters (56.6 feet) or 0″.56 of latitude north and 3.54 meters (11.6 feet) east of milepost 149 of the New York and Pennsylvania boundary line.

Cheever latitude (Essex County, N. Y., G. W. Dean, 1874).—Marked by a brick pier 1.417 meters (4.65 feet) west of *Cheever azimuth*, described below.

Cheever azimuth (Essex County, N. Y., G. W. Dean, 1874; 1880).—On property belonging to the Cheever Iron Mining Co., about 2½ miles north of the village of Port Henry. The station is about 600 feet east of the upper engine station of the Cheever mines and is marked by a drill hole in the ledge. A larger drill hole is about 2½ inches west of the station. A brick pier was built over the station in 1874, but no mention of it was made in 1880.

Connelly (U. S. & C.) latitude (Clinton County, N. Y., C. A. Bigger, 1902).—The station was 6.71 meters (22 feet) east of *monument No. 678* of the New York and Canada boundary. (See Report of Chief Astronomer and Boundary Commissioner of Canada, Part IX, Annual Report 1904, p. 60.)

Corydon latitude (Cattaraugus County, N. Y., Edwin Smith, 1879; 1884).—Marked by a granite monument centered over a circular disk of glazed stoneware. The monument is reddish-gray granite, 12 inches square and 19 inches high, and bears the inscription "STATION CORYDON U. S. C. & G. S. 1879." The top of the monument is 2½ feet below the surface of the ground. This monument is 1.362 meters (4.47 feet) or 0″.04 of latitude north and 0.155 meter (0.51 foot) west of milestone 184 of the Pennsylvania-New York boundary. The milestone is in an open field about 775 feet east of the bank of the Allegheny River and 179.902 meters (590.23 feet) S .89° 08′ E. of a granite highway monument on the east side of the stage road from Corydon to Steamburg. Milestone 184 is a granite monument extending 6 inches above the ground with the letters "N. Y." on the north side, "PA." on the south, and "184 M" on the east. It is set in a manner similar to the monument marking the latitude station.

Dannemora azimuth (Clinton County, N. Y., W. H. Burger, 1907).—Identical with the triangulation station of the same name in the eastern summit of Fairbanks or Dannemora Mountain, about ½ mile east of the old Fairbanks mine, and about 1½ miles north of the village of Dannemora. The station is marked by a ⅞-inch iron bolt in solid rock, surrounded by a triangle and sunk 1½ feet below the surface of the ground. Three reference marks, each an arrowhead pointing toward the station, are located as follows: No. 1, on a sharp-pointed rock about 6 inches above the ground, 3.4 meters (11 feet) northeast of the station; No. 2, on a flat rock 1 foot above the ground, 3.11 meters (10.2 feet) southeast of the station; No. 3, on a flat rock in the roadway, 8.32 meters (27.3 feet) southwest of the station.

Dunkirk (U. S. L. S.) longitude (Chautauqua County, N. Y., G. Y. Wisner, 1868).—No description. The station is 115″.50 of longitude east of *Dunkirk new lighthouse*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 755.)

Dunkirk (U. S. L. S.) latitude (Chautauqua County, N. Y., G. Y. Wisner, 1868).—No description. The station is 24″.27 of latitude south of *Dunkirk new lighthouse*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 748.)

Fairbanks (U. S. & C.) latitude (Clinton County, N. Y., C. A. Bigger, 1903).—On the New York and Canada boundary, 145.39 meters (477 feet) west of *monument No. 648*. (See Report of Chief Astronomer and Boundary Commissioner of Canada, Part IX, Annual Report for 1904, p. 58.)

Far Rockaway longitude (Queens County, N. Y., Fremont Morse and O. B. French, 1914).—On a lot on Grand View Avenue to the east of the office and operating building of the Commercial Cable Co. The station is 9.29 meters (30.5 feet) from the corner of the granite coping on which the iron fence rests, 15.89 meters (52.1 feet) from the nearest corner of the cable building, measured to the granite trimming above the water table and 22.28 meters (73.1 feet) to the corner of the first jog in the building on the east side, measured to the granite trimming above the water table. The German longitude station is 2.4 meters (8 feet) west of the station, the two piers being in the same observatory. The station is a geodetic point.

Far Rockaway latitude (Queens County, N. Y., O. B. French, 1914).—Identical with *Far Rockaway longitude*, described above.

Finn longitude (Broome County, N. Y., Edwin Smith, 1877; 1884).—About 1½miles north from Great Bend, near the road following the Erie Railroad, in the northwest corner of the yard at the residence of James M. Finn. The station is marked by a cross in a marble slab, which caps a brick pier. The underground mark is a granite post with the inscription "Station Finn U. S. C. & G. S., 1877." A stone marked "N.Y." and "PA." to the north on the land of John Cline, at the edge of his stone fence, marks the meridian. The station is 78.12 meters (256.3 feet) or 2″.53 of latitude north and 43.37 meters (142.3 feet) or 1″.88 of longitude west from a monument on the east side of the river road, set by the New York and Pennsylvania Boundary Survey in 1882

Finn latitude (Broome County, N. Y., Edwin Smith, 1877).—Identical with *Finn longitude*, described above.

Gardiners Island latitude (Suffolk County, N. Y., W. H. Burger, 1907).—Distant 2.57 meters (8.43 feet) or 0″.08 of latitude north in azimuth 179° 34′ from *Gardiners Island azimuth*, described below.

Gardiners Island azimuth (Suffolk County, N. Y., W. H. Burger, 1907; 1916).—Identical with the triangulation station of the same name about 61 paces S. 73° W. from the highest point on the north and south

For notes in regard to marking of stations see p. 130.

fence line which divides the island into halves. The underground mark is as described in note 8a. The surface mark is a standard disk station mark, fastened in a 3-foot piece of 3-inch galvanized-iron pipe, and surrounded by cobblestones. Reference marks were established as follows: The center of a square cut on a rock distant 30.44 meters (99.9 feet) in azimuth 20° 24′; the center of a triangle cut on a rock on top of the ridge distant 68.15 meters (223.6 feet) in azimuth 85° 46′; the center of a barred X toward the fence distant 30.71 meters (100.8 feet) in azimuth 264° 22′; the center of a plain X distant 12.76 meters (41.9 feet) in azimuth 303° 44′; the center of a triangle on a rock about 1 meter from the preceding mark and distant from the station 11.42 meters (37.5 feet) in azimuth 304° 43′.

Genesee Valley latitude (Alleghany County, N. Y., Edwin Smith, 1879; 1884).—About 1¾ miles southeast from Shongo (or Beanville) on the southwest side of the stage road. The station is marked by a hemlock block surmounting a granite post with the inscription "Station Genesee Valley, U. S. C. & G. S. 1879." The granite post is 2½ feet below the surface of the ground. It is 16.43 meters (53.9 feet) or 0″.53 of latitude north and 22.68 meters (74.4 feet) west from a monument set on the New York-Pennsylvania boundary in 1882. This monument is a granite block 12 by 6 by 54 inches, having on its north and south sides, respectively, the letters "N.Y." and "PA." Underneath the monument is a glazed stoneware disk. The latitude station is also 16.545 meters (54.28 feet) or 0″.54 of latitude north and 66.309 meters (217.55 feet) east of the one hundred and twenty-ninth milestone of the State boundary, a granite monument.

Hollinbeck (U. S. & C.) latitude (Franklin County, N. Y., C. A. Bigger, 1903).—On the New York and Canada boundary line 239.57 meters (786 feet) east of monument No. 760. (See Report of Chief Astronomer and Boundary Commissioner of Canada, Part IX, Annual Report, 1904, p. 63.)

Howlett latitude (Onondago County, N. Y., J. B. Boutelle, 1883).—Distant 145.47 meters (477.3 feet) or 4″.71 of latitude north and 148.01 meters (485.6 feet) east of *Howlett azimuth*, described below.

Howlett azimuth (Onondago County, N. Y., C. O. Boutelle, 1883).—Identical with the triangulation station of the same name established by the New York State Survey in the township of Marcellus close to the north and south road forming the boundary between the townships of Marcellus and Onondago. The station is on the southerly edge of a barnyard, about 50 meters south of the highest ground near it. The underground mark is an earthenware crock, lettered "N. Y. S. S.," buried 5 feet deep. Three feet from the center are buried, at right angles to one another, earthenware crocks, with the letters "N. Y. S. S." stamped on them and also arrows pointing toward the station. The surface mark is a granite post bearing the inscriptions "N. Y. S. S. 109" around the top and "U. S. C. S." on the top. Four other stone posts are north, east, south, and west, respectively, distant 1.5 meters (5 feet) from the station. These bear arrowheads pointing to the station.

Ithaca longitude (Tompkins County, N. Y., J. F. Hayford, 1896).—At Cornell University, in the observatory of the college of civil engineering, in the transit room. The station is marked by a pier of hard-burned brick, laid in cement, with a foundation of 4 inches of concrete, with a smooth sandstone cap.

Jinks (U. S. L. S.) azimuth (St. Lawrence County, N. Y., Lewis Foote, 1873; 1901).—Identical with triangulation station *Jinks* of the United States Lake Survey on the United States side of the St. Lawrence River, about 1 mile back from the shore at Waddells Point and about 3½ miles above Waddington and to the north of the Ogdenburg road. The station is 40 feet from the stone fence to the east and 76 feet from the stone wall to the south. A butternut tree, near the stone fence to the east, is 133 feet N. 19° 33′ W. from the station. A bowlder, with a cross to the northwest, is 61.63 meters (202.2 feet) distant and another, with a cross, is 180 feet to the west. A gate in the stone wall toward the south is 47.49 meters (155.8 feet) distant. The station is marked by two stones set one directly over the other, the uppermost being about 1 foot below the surface of the ground. Both stones have drill holes for marks.

Kit longitude (Duchess County, N. Y., Edwin Smith, 1908).—Identical with the triangulation station of the same name in the southwest part of the town of Fishkill Landing on the first hill, locally known as "Sky Hill," east of the railroad dock. The station is marked by a drill hole in a rock surrounded by a triangle and surmounted by a pier of concrete, with a cross on the top to mark the center. An opening in the pier allows the drill hole and triangle to be seen.

Kit latitude (Duchess County, N. Y., W. H. Burger, 1905).—Distant 17.44 meters (57.2 feet) due west from *Kit longitude*, described above.

Lawrenceville latitude (Steuben County, N. Y., Edwin Smith, 1879; 1882).—Marked by the center one of 5 copper rivets in a solid hemlock pier, 2.576 meters (8.45 feet) or 0″.08 of latitude north and 0.658 meter (2.16 feet) west of the center of the ninetieth milepost of the Pennsylvania-New York boundary. This monument is similar to that of milestone 184 (see description of *Corydon latitude*, p. 220), except that the east side is marked "90 M." The original monument marking the milestone is 0.479 meter (1.57 feet) west of the new monument and was left in place.

Little Meadows latitude (Tioga County, N. Y., Edwin Smith, 1879).—Near the Pennsylvania-New York boundary midway between the thirty-ninth and fortieth milestones, and just north of milestone 39½. The station is marked by a brass rod surrounded by 4 copper rivets, driven into a solid hemlock block. It is 0.73 meter (2.4 feet) or 0″.02 of latitude north of milestone 39½. This milestone is a granite post similar to that of milestone 184 (see description of *Corydon latitude*, p. 220) except that the east face is marked "39½ M."

For notes in regard to marking of stations see p. 130.

Mannsville (U. S. L. S.) longitude (Jefferson County, N. Y., A. R. Flint, 1875).—Distant 231.54 meters (759.6 feet) south and 586.98 meters (1,925.8 feet) or 26″.22 of longitude west of *Mannsville* triangulation station of the United States Lake Survey. (See *Mannsville azimuth*, below.)

Mannsville (U. S. L. S.) azimuth (Jefferson County, N. Y., W. H. Burger, 1907).—Identical with the triangulation station of the United States Lake Survey of the same name, about ½ mile northeast of the village of Mannsville, in lot 177, Ellisburg Township, on the highest land in the immediate vicinity. The station is marked by a single post of cut marble, set 18 inches below the surface of the ground. Three marble reference posts are set as follows: One bearing N. 67° 48′ E., distant 91.79 meters (301.1 feet); one bearing S. 54° 30′ E., distant 107.84 meters (353.8 feet); and one bearing S. 34° 06′ W., distant 393.1 meters (1,290 feet), from the station. The first two reference stones are set close to a stone wall east of the station, and the third in the road (Lorain Street) on the south side of the station. The northeast corner of lot 177 bears N. 23° 44′ E., and is distant 190.7 meters (626 feet). A stone astronomical post standing on the public school grounds on the north side of Railroad Street, near its junction with Lorain Street, bears S. 68° 28′ W., and is distant 630.98 meters (2,070.1 feet).

Mount Merino latitude (Columbia County, N. Y., G. W. Dean, 1874).—Marked by brick pier 1.448 meters (4.75 feet) east of *Mount Merino azimuth*, described below.

Mount Merino azimuth (Columbia County, N. Y., G. W. Dean, 1874; 1881).—Identical with the triangulation station of the same name on the highest part of Merino Hill, 2 miles southwest of the city of Hudson. The station is marked by a granite monument inscribed "N. Y. S. S. 271 U. S. C. S." An earthenware pipe in cement, with a copper wire in the center, is 0.5588 meter (1.833 feet) west of the station. Two reference pots are buried, the first about 1 foot below the surface, distant 1.34 meters (4.4 feet) in azimuth 100°, the second about ½ foot below the surface, distant 1.44 meters (4.7 feet) in azimuth 5°.

New York City, Rutherford's Observatory, longitude (Borough of Manhattan, New York City, N. Y., S. C. Walker, 1848, Edwin Goodfellow, 1858).—At the private observatory of L. M. Rutherford, at the corner of Second Avenue and Eleventh Streets. The station of 1858 is 0.88 meter (2.9 feet) or 0ˢ.003 (0″.04) east of that of 1848, which has been lost through the changing of the piers. The 1848 station is a geodetic point.

New York City, Rutherford's Observatory, latitude (Borough of Manhattan, New York City, N. Y., Edwin Goodfellow, 1858).—Distant 6.4 meters (21 feet) or 0″.21 of latitude south and 14.2 meters (46.5 feet) east from *Rutherford's Observatory longitude 1858*, described above.

New York City, Manhattan Square, longitude (Borough of Manhattan, New York City, N. Y., Edwin Smith, 1911).—Located in the northwest corner of Manhattan Square, between Eighth and Ninth Avenues and Seventh-seventh and Eighty-first Streets. The station is marked by a concrete pier containing a copper disk triangulation station marker with the inscription "Astronomical Station" about the triangle. A round stone post with a brass plug and a dot in the center of the plug is 107.92 meters (354.1 feet) north of the station marking the true meridian. The station is 57.7 meters (189 feet) or 1″.87 of latitude north and 190.9 meters (626 feet) or 8″.14 of longitude east of the southwest tower of the American Museum of Natural History and 156.4 meters (513 feet) or 5″.07 of latitude north and 13.6 meters (45 feet) or 0″.58 of longitude east of the southeast tower of the same building. The astronomic latitude and longitude of the marble slab in the center of the hall of the Museum of Natural History, Seventy-seventh Street entrance, determined by traverse from the astronomic station is: Latitude, 40° 46′ 47″.91, longitude 73° 58′ 40″.46.

New York City, Manhattan Square, latitude (Borough of Manhattan, New York City, N. Y., Edwin Smith, 1911).—Distant 2.09 meters (6.9 feet) due west from *Manhattan Square longitude*, described above.

Ogdensburg (U. S. L. S.) longitude (St. Lawrence County, N. Y., E. H. Ruffner, 1868).—No description. The station is 27″.86 of longitude east of *Ogdensburg lighthouse*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 753.)

Ogdensburg (U. S. L. S.) latitude (St. Lawrence County, N. Y., E. H. Ruffner, 1868).—No description. The station is 27″.59 of latitude south of *Ogdensburg lighthouse*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 739.)

Ogdensburg lighthouse (U. S. L. S.) azimuth (St. Lawrence County, N. Y., 1871).—A short distance west of the lighthouse building, 35 feet from the southwest corner of the lighthouse and 36 feet from the southwest corner of the lighthouse tower. The station is marked by a stone post.

Oswego (U. S. L. S.) longitude (Oswego County, N. Y., O. B. Wheeler, 1868).—Distant 2,144 meters (7,034 feet) or 69″.47 of latitude north and 654 meters (2,146 feet) or 29″.09 of longitude east from triangulation station *Oswego* of the United States Lake Survey, which is in the southwest part of Oswego, in the grounds of the orphan asylum, corner of Ellen and West Seventh Streets. The triangulation station is marked by a stone post set 2 feet below the surface of the ground, a stone post being set directly over it as a surface mark. Three stone reference posts are set as follows: One in the northeast corner of the lot in which the orphan asylum stands, bearing N. 50° E., distant 52.50 meters (172.2 feet); one in the northwest corner of the lot bearing N. 54° W., distant 49.65 meters (162.9 feet); and one bearing S. 6° W., distant 49.38 meters (162.0 feet) from the triangulation station. The bearings given above are magnetic. *Oswego courthouse* bears north 22° 24′ east (true) and is distant 1,627 meters (5,338 feet). The longitude station is marked by a post.

Oswego (U. S. L. S.) latitude (Oswego County, N. Y., O. B. Wheeler, 1868).—Identical with *Oswego (U. S. L. S.) longitude*, described above.

For notes in regard to marking of stations see p. 130.

Prospect Mountain latitude (Warren County, N. Y., R. D. Cutts, 1878).—Distant 4.0 meters (13 feet) due west from *Prospect Mountain azimuth*, described below.

Prospect Mountain azimuth (Warren County, N. Y., R. D. Cutts, 1878; 1882).—Identical with the triangulation station of the same name about 3 miles west from Lake George post office, on the summit of a heavily wooded mountain. The underground mark is a copper bolt placed in a solid rock about 2 feet below the surface of the ground. The surface mark is a stone post 7 inches square and 30 inches long, with deep diagonal grooves running north and south, and east and west, and with the letters "U. S. C. S." cut in the top. Two reference marks, each a cross on an arrowhead, cut in the rocks, are as follows: One 4.237 meters (13.90 feet) in the direction of *Killington*, the other 6.123 meters (20.09 feet) in the direction of *Mount Equinox*.

Rochester (U. S. L. S.) longitude (Monroe County, N. Y., G. Y. Wisner, 1868).—No description. The station is 48″92 of longitude west of *Rochester City Hall statue*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 755.)

Rochester (U. S. L. S.) latitude (Monroe County, N. Y., G. Y. Wisner, 1868).—No description. The station is 02″87 of latitude north of *Rochester City Hall statue*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 744.)

Rochester longitude (Monroe County, N. Y., C. H. Sinclair, 1915; 1916).—The pier of the meridian circle in a separate room on the east side of the observatory of the Bausch & Lomb Optical Co. The pier, hollow concrete with walls 8 inches thick, extends about 6 feet in the ground and 15 feet above. The station is 72″51 of latitude north and 37″60 of longitude west of the center of the courthouse (new). *Rochester City Hall statue* (old) is a triangulation station of the United States Lake Survey and stood on the same site as the new. With the aid of the plan of the old building, the United States Lake Survey station was probably recovered within 30 feet. The station is also 58″39 of latitude north and 131″15 of longitude west of *Anderson Hall, center of roof*, a triangulation station of the United States Lake Survey; but as some changes had been made in the roof, the recovery of the Lake Survey station is in doubt about 25 feet.

Rochester latitude (Monroe County, N. Y., C. H. Sinclair, 1916).—Identical with *Rochester longitude* described above.

Rouses Point latitude (Clinton County, N. Y., G. W. Dean, 1874).—Marked by a stone pier 1.49 meters (4.9 feet) due west from *Rouses Point azimuth*, described below.

Rouses Point azimuth (Clinton County, N. Y., G. W. Dean, 1874).—Identical with the triangulation station *Rouses Point astronomical azimuth and latitude station*, upon a Government reservation known as Astronomical Hill, about 1 mile south of Rouses Point. The station is marked by a drill hole in the top of a stone post, set in concrete, with its top about 2 inches below the surface of the ground. Besides the latitude pier mentioned above, three other piers are west of the station. They are boundary stones set by Major Graham, in 1845. The southeast corner of one is 7.361 meters (24.15 feet) due west of the center of the station. The second is 18 inches (inside measurement) due north of the first, and its northeast corner is 7.47 meters (24.5 feet) from the station. The third is south of west from the station and 18.59 meters (61. 0 feet) distant; also 11.55 meters (37.9 feet) from the southeast corner of the first pier.

Sandy Creek, north base (U. S. L. S.), latitude (Oswego County, N. Y., 1874).—Distant 24.05 meters (78.9 feet) or 0″78 of latitude south and 5.73 meters (18.8 feet) west of *Sandy Creek north base (U. S. L. S.) azimuth*, described below.

Sandy Creek, north base (U. S. L. S.), azimuth (Oswego County, N. Y., G. Y. Wisner, 1874).—Identical with triangulation station *Sandy Creek north base* of the United States Lake Survey, on the lake shore near the boundary beween Oswego and Jefferson Counties. The station is marked by a brass frustum leaded into a stone post, 8 inches by 8 inches by 5 feet, set 5 feet below the surface of the ground. Two other stone posts, each 5 feet long and set 5 feet below the surface, are set on a line, through the station, perpendicular to the direction of the base line; one bearing N. 87° 14′ E., and distant 3.79 meters (12.4 feet), and one bearing S. 87° 14′ W., distant 3.70 meters (12.1 feet). Two stone reference posts are set as follows: One N. 3° 09′ E., distant 60.17 meters (197.4 feet) and one S. 82° 14′ W., distant 20.87 meters (68.5 feet) from the station. A tree blazed on the side toward the station is N. 2° 55′ E., distant 60.5 meters (198 feet).

Sopers Hill (U. S. L. S.) azimuth (St. Lawrence County, N. Y., W. A. Metcalf, 1873).—No description.

Tassel Hill latitude (Oneida County, N. Y., J. B. Boutelle, 1880).—Distant 412.57 meters (1,353.6 feet) or 13″37 of latitude south and 83.771 meters (274.84 feet) eastof *Tassel Hill Azimuth*, described below.

Tassel Hill azimuth (Oneida County, N. Y., C. O. Boutelle, 1880; 1881).—Identical with triangulation station *Tassel* of the New York State Survey, in Marshall Township, about 3 miles east-northeast of Waterville, at the highest point in Oneida County. The station is marked by a stone post with the inscription "N. Y. S. S. 29" around the side and the letters "U. S. C. S." cut between the diagonals on the top. Four other posts, each with an arrowhead pointing toward the station, are 1.5 meters (5 feet) north, south, east, and west from the station.

Tonawanda (U. S. L. S.) longitude (Erie County, N. Y., A. R. Flint, 1875).—Distant 0.58 meter (1.9 feet) or 0″02 of latitude north and 9.67 meters (31.7 feet) or 0″43 of longitude east from *Tonawanda (U. S. L. S.) azimuth*, described below.

Tonawanda (U. S. L. S.) latitude (Erie County, N. Y., A. R. Flint, 1875).—Identical with *Tonawanda (U. S. L. S.) longitude*, described above.

For notes in regard to marking of stations see p. 130.

Tonawanda (U. S. L. S.) azimuth (Erie County, N. Y., G. Y. Wisner, 1875).—Identical with triangulation station *Tonawanda* of the United States Lake Survey, in Tonawanda Township, about 2 miles south of Tonawanda. The station is marked by a hole drilled in the top of a stone post set 2 feet below the surface of the ground. Three reference posts were set as follows: One N. 69° 07′ E., distant, 25.2 meters (83 feet); one N. 48° 43′ W., distant 10.65 meters (34.9 feet); and one S. 74° 23′ W., distant 18.7 meters (61 feet) from the station. A post is N. 55° 18′ E., and is distant 9.24 meters (30.3 feet).

Travis longitude (Delaware County, N. Y., Edwin Smith, 1877).—At the eastern extremity of the boundary line between Pennsylvania and New York. The station is on the east side of the road running along the Erie Railroad and Delaware River, and about 2 miles from Hales Eddy, the nearest Erie Railroad station. The station is marked by a brick and stone pier, capped by a common flagstone. The pier extends about 2½ feet below the ground and about 3 feet above. On the top a cross marks the center of the station. On a rock to the south and on the west side of the Delaware River is an arrowhead marking the meridian through the center of the station. References are as follows: Stones set in cement, due west distant 13.576 meters (44.54 feet); south, stone set in cement and surrounded by a triangle, distant 19.102 meters (62.67 feet); to the southwest, rock, distant 15.09 meters (49.5 feet). The station is 0″.99 of latitude north and 6″.03 of longitude east of milestone 1 of the Pennsylvania-New York boundary.

Travis latitude (Delaware County, N. Y., Edwin Smith, 1877).—Identical with *Travis longitude*, described above.

Troy latitude (Rensselaer County, N. Y., D. Greeme, 1871).—Distant 7.9 meters (26 feet) nearly south from the southwest corner of the main building of the Rennselaer Polytechnic Institute. The station was marked by a chestnut post capped by a 2½-inch pine plank, and inclosed in a wooden observatory, which was allowed to remain in position. It is 3″.47 of latitude north and 6″.03 of longitude west of triangulation station *Troy University*.

Tuna Valley latitude (Cattaraugus County, N. Y., Edwin Smith, 1879).—About 2 miles, by road, south of Limestone, and 2.7 meters (9 feet) or 0″.09 of latitude north and 0.2 meter (0.7 foot) east of the old seventh latitude stone between the one hundred and sixty-seventh and one hundred and sixty-eighth mile stones of the Pennsylvania-New York boundary. The seventh latitude stone is marked on the north side "N. York 167 m. & 8 (?) ch" and on the south side "Penns. Lat. 42° Var. 1° 30′ W. 1787." The station itself is marked by the center one of five copper rivets in a solid hemlock block.

Watertown (U. S. L. S.) longitude (Jefferson County, N. Y., G. Y. Wisner, 1868).—The station is 07″.14 of longitude east of the northeast corner of the cupola of *Watertown courthouse, 1874*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 754.)

Watertown (U. S. L. S.) latitude (Jefferson County, N. Y., G. Y. Wisner, 1868).—The station is 10″.14 of latitude north of the northeast corner of the cupola of *Watertown courthouse, 1874*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 742.)

Waverly latitude (TiogaCounty, N. Y., Edwin Smith, 1879; 1881).—In the lumber yard of H. J. Baldwin, corner of Pennsylvania Avenue and Erie Street, in the town of Waverly. The station is 2.338 meters (7.67 feet) or 0″.08 of latitude north and 32.28 meters (105.9 feet) east of a monument in the State boundary line on the east side of Pennsylvania Avenue. It is also 0.594 meter (1.95 feet) or 0″.02 of latitude south and 262.37 meters (860.8 feet) east from milestone 60, a granite monument 6 inches square. It is also 2.240 meters (7.35 feet) or 0″.07 of latitude north and 44.5 meters (146 feet) east from a granite monument set in the State boundary. This monument is 12 inches wide, 6 inches thick, and 4½ feet long. The top is marked by ¼-inch grooves and the inscriptions "N. Y." and "Pa." are on the north and south faces, respectively.

West Hills latitude (Suffolk County, N. Y., A. T. Mosman, 1865).—Distant 4.91 meters (16.1 feet) or 0″.16 of latitude north and 5.33 meters (17.5 feet) west of *West Hills azimuth*, described below.

West Hills azimuth (Suffolk County, N. Y., G. W. Dean, 1865).—Identical with the triangulation station of the same name, about 4 miles from Huntington, 7 miles from Farmingdale, and 6 miles from Syosset, on the summit of a hill in the open field. The station is marked by a red sandstone column, placed with its top about 2½ feet below the surface, and having the inscription "U. S. C. S. 1836." The surface mark is a stub. Four granite posts, each marked with grooves and bearing the letters "U. S. C. S." are, respectively, north, south, east, and west from the station. A drill hole in the top of a rock, flush with the ground, is 12.515 meters (41.06 feet) from the station bearing about N. 75° W.

NORTH CAROLINA

Alpha azimuth (New Hanover County, N. C., D. B. Wainwright, 1887).—Lost.

Bodies Island azimuth (Dare County, N. C., C. O. Boutelle, 1846).—A point marked by a copper nail in a stub, on the Bodies Island base, 7,223 meters (23,697 feet) from the southern extremity of the line, near the house of E. B. Midgett.

Bridge azimuth (New Hanover County, N. C., J. A. Bond, 1918).—Identical with the traverse station of the same name, on the Atlantic Coast Line Railroad, at the east end of Hilton Bridge over Northeast River, 1.5 meters (4.9 feet) north of the north rail and 1 meter east of the east end of the bridge. The station is in the top face of the stone abutment and is marked as described in note 1a. The reference mark is a United States Engineers' mark on the opposite side of the track in azimuth 327° 14′ from the station.

For notes in regard to marking of stations see p. 130.

Bumble azimuth (New Hanover County, N. C., R. P. Strough, 1914).—Identical with the triangulation station of the same name at the back side of the banks, opposite Virginia Creek, on the marsh about 150 meters from Yellow Hill Fishing Camp and about 2 meters from high-water mark. The channel from Sloop Point to the banks passes along the marsh at this point, and the station is under water at extreme high tide. The station is marked as described in note 6c. The reference mark, a tile filled with and set in cement, is about 30 meters from the station, about 120 meters from the house at the camp and about 3 meters from high-water mark.

Canaday azimuth (Onslow County, N. C., W. C. Hodgkins, 1888).—Identical with the triangulation station of the same name on top of a bluff on the west bank of New River, close to what is now called "Peru Landing." The marking of the station is unknown.

Cox azimuth (Halifax County, N. C., J. A. Bond, 1918).—Identical with the traverse station of the same name, on the Seaboard Air Line Railway, 550 meters east of the Littleton depot, 1.31 meters (4.3 feet) north of the north rail of the main line, 3 meters east of a wagon-road crossing, and 30 meters east of milepost 98 at the southwest corner of a lumber mill. The station is marked as described in notes 1a and 7c, with a reference mark in the southwest corner of the brick foundation of a cottonseed house, 1 foot above the ground and 10.875 meters (35.68 feet) from the station in azimuth 140° 07′ 18″.

Cut azimuth (New Hanover County, N. C., C. L. Garner, 1918).—Identical with the triangulation station of the same name, on the mainland side of Myrtle Sound, about 1 mile north of Carolina Beach, ½ mile northeast of the house of S. A. Lewis, and on his property about 75 meters from the edge of the field. The station is marked as described in notes 1a and 7d, with a reference mark, note 11a, 22.530 meters (73.92 feet) from the station in azimuth 100° 11′.

Dro azimuth (Chatham County, N. C., J. A. Bond, 1918).—Identical with the traverse station of the same name, on the Seaboard Air Line Railway, on the first curve south of Moncure, and ¼ mile from the depot. The station is on the line of the left tangent toward the depot, 30 meters west of the track, on level ground at the bottom of a fill, 75 meters south of the section house, and 100 meters north of the bridge over Deep River. The station is marked as described in notes 1a and 7c, with a reference mark, note 11a, 18 meters west of the track and 23.09 meters (75.75 feet) from the station in azimuth 254° 50′.

Fort Johnson latitude (Brunswick County, N. C., E. Goodfellow, 1859).—Distant 5.21 meters (17.1 feet) or 0″.17 of latitude south and 8.60 meters (28.2 feet) west of *Fort Johnson azimuth*, now lost.

Fort Johnson flagstaff azimuth (Brunswick County, N. C., G. W. Dean, 1859).—Identical with triangulation station *Fort Johnson flagstaff*, now lost.

Fort Spinola 2 latitude (Craven County, N. C., E. Goodfellow, 1866).—Distant 8.547 meters (28.04 feet) or 0″.28 of latitude north of *Fort Spinola 2 azimuth*, now lost.

Fort Spinola 2 azimuth (Craven County, N. C., G. W. Dean, 1866).—Identical with triangulation station *Spinola 2*, now lost.

Greensboro azimuth (Guilford County, N. C., C. L. Garner, 1918).—Identical with the triangulation station of the same name at Greensboro, on the corner of North Elm Street and Bellemeade Avenue, on the highest point of the O. Henry Hotel, on the roof covering the hotel water tank. Distances and azimuths from the station to various points are as follows: Southwest corner of the roof covering the tank, 5.57 meters (18.3 feet), 57° 23′; northwest corner of the building, 32.41 meters (106.3 feet), 133° 00′; northeast corner of the roof covering the tank, 3.35 meters (11.0 feet), 267° 40′; northwest corner of the roof covering the tank, 3.20 meters (10.5 feet), 152° 51′. Distances from the station to additional points are as follows: East corner of the ventilator hole that is south of the station, 1.55 meters (5.1 feet); to the west corner of the same ventilator hole, 1.51 meters (5.0 feet); to the north edge of the coping of the roof covering the tank (measured perpendicular to the coping), 1.77 meters (5.8 feet).

Hoffman azimuth (Richmond County, N. C., E. C. Bennett, 1918).—Identical with the traverse station of the same name about ½ mile north of Hoffman on the right of way of the Seaboard Air Line Railway, at the intersection of the tangents of the west rail of the first curve north of Hoffman, about 400 meters north of milepost 239, 30 meters north of a wagonroad crossing, 3 meters east of the edge of a dirt road running north from Hoffman, and 10.34 meters (33.9 feet) west of the west rail. The station is marked as described in notes 1a and 7b, with a reference mark, note 11c, on a ridge midway between the railroad and the dirt road, 7.38 meters (24.2 feet) west of the west rail and 21.87 meters (71.8 feet) from the station in azimuth 253° 06′. The azimuth from the station to the semaphore signal at Hoffman is 56° 11′.

Hog Island latitude (Hyde County, N. C., Edwin Smith, 1876).—Distant 1.091 meters (3.58 feet) or 0″.04 of latitude north and 6.934 meters (22.75 feet) west of *Hog Island azimuth*, now lost.

Hog Island azimuth (Hyde County, N. C., Edwin Smith, 1876).—Lost. Identical with the triangulation station of the same name.

Humphreys azimuth (Carteret County, N. C., W. C. Hodgkins, 1888).—Lost. Identical with the triangulation station of the same name.

King latitude (Gaston County, N. C., H. W. Blair, 1876).—Distant 495.37 meters (1,625.2 feet) or 16″.07 of latitude south and 274.43 meters (900.4 feet) west from *King azimuth*, described below.

King azimuth (Gaston County, N. C., H. W. Blair, 1876; 1917).—Identical with the triangulation station of the same name on Kings Mountain, about 3 miles southeast from Kings Mountain railway station,

For notes in regard to marking of stations see p. 130.

about 26 miles west-southwest from Charlotte. The station is marked by a glass lamp shade plugged at both ends and filled with ashes; above this was built a brick platform, with diagonals on north and south and east and west lines, and having a hole 8 inches square at the center. In 1917 the platform had been partly torn away.

Lee longitude (Lee County, N. C., J. E. McGrath, 1918).—Distant 82.01 meters (269.1 feet) or 2".66 of latitude north and 16.41 meters (53.8 feet) or 0".65 of longitude west of *Lee azimuth*, described below.

Lee latitude (Lee County, N. C., J. E. McGrath, 1918).—Identical with *Lee longitude*, described above.

Lee azimuth (Lee County, N. C., E. C. Bennett, 1918).—Identical with the traverse station of the same name about 100 meters south of the railroad station at Sanford, on the right of way of the Seaboard Air Line Railway, about 30 meters north of milepost 199, directly opposite the crossing of the Seaboard Air Line Railway and the Atlantic & Yadkin Railway and 4.01 meters (13.2 feet) west of southwest frog point of the intersection. The station is marked as described in notes 1a and 7b. The reference mark is a bronze tablet set in the concrete sidewalk opposite the Sanford Supply Co. building, about 1 meter north of a telephone pole and 17.60 meters (57.7 feet) from the station in azimuth 49° 03′. The azimuth from the station to the tall steel water tank at Sanford is 163° 22′.

Littleton longitude (Warren County, N. C., W. B. Fairfield, 1918).—Distant 6.66 meters (21.9 feet) or 0".22 of latitude north and 7.25 meters (23.8 feet) or 0".29 of longitude east from traverse station *Littleton*, which is about 735 meters west of the Seaboard Air Line depot at Littleton, on the first curve west of the station, about 345 meters east of milepost 99, on the south side of the track, 20.2 meters (66 feet) from the south rail, 2 meters north of the stone fence of Littleton Female College and 10 meters east of the west end of the fence, 150 meters west of a road crossing, and 120 meters east of the east fence of a cemetery on the opposite side of the track. The triangulation station is marked as described in notes 1a and 7c, with a reference mark, a bronze tablet set in the north face of the northwest corner of the northwest building of Littleton Female College. It is 196.90 meters (646.0 feet) from the station in azimuth 21° 22′.

Littleton latitude (Warren County, N. C., W. B. Fairfield, 1918).—Identical with *Littleton longitude*, described above.

Long Shoal Point latitude (Dare County, N. C., Edwin Smith, 1876).—Distant 0.3 meter (1 foot) or 0".01 of latitude south and 8.02 meters (26.3 feet) west from *Long Shoal Point azimuth*, now lost.

Long Shoal Point azimuth (Dare County, N. C., Edwin Smith, 1876).—Identical with the triangulation station of the same name, now lost.

Mobile azimuth (Vance County, N. C., J. A. Bond, 1918).—Identical with the traverse station of the same name on the Seaboard Air Line Railway, 1,060 meters (3,478 feet) distant from Henderson and at the first curve south of the depot, 11 meters (36 feet) south of the railway water tank, 20 meters (66 feet) north of the railway coal chute, and 1.72 meters (5.6 feet) west of the west rail. The station is marked as described in notes 1a and 7c, with a reference mark, note 11, in the south face of the southeast concrete pier under the water tank, 10.42 meters (34.2 feet) from the station in azimuth 173° 56′ 48″.

Money Point azimuth (New Hanover County, N. C., D. B. Wainwright, 1887).—Identical with the triangulation station of the same name on a small island of solid ground, surrounded by marsh and just inside Money Point. The station is marked by an iron nail, in a cedar stub, inclosed in a 3-foot piece of 10-inch terra-cotta pipe. Three lengths of 5-inch drain pipe, packed with shells, are each 2 feet distant from the station.

Moore latitude (Stokes County, N. C., J. B. Baylor and W. B. Fairfield, 1876).—Distant 1.07 meters (3.5 feet) or 0".04 of latitude north and 1.52 meters (5.0 feet) east from *Moore azimuth*, described below.

Moore azimuth (Stokes County, N. C., A. T. Mosman, 1876; 1918).—Identical with the triangulation station of the same name about 12 miles northwest of Walnut Cove on the Norfolk & Western and Southern Railways, on the highest part of the solid rock forming the top of Moores Mountain or Moores Knob of what are known as the Sauratown Mountains. The station is marked as described in note 2, with a reference mark, note 12b, 12.90 meters (42.3 feet) from the station in azimuth 169° 56′. Additional reference marks, copper bolts with crosses, are as follows: Distant 1.83 meters (6. 0 feet) north; distant 2.170 meters (7.12 feet) east; distant 1.838 meters (6.03 feet) west of the station.

New Macon azimuth (Carteret County, N. C., W. C. Hodgkins, 1886; 1919).—Identical with the triangulation station of the same name at the west side of Beaufort Entrance, on the north side of Fort Macon, near the northwest corner, on the broad inner part of the walls where the guns were mounted, on one of the platforms of brick and stone for mounting the guns. The platform is 8 feet wide at the back, 6.3 feet wide at the front, and 7 feet deep from front to back; on this platform is a granite block 2 feet square, on which rests a circular iron plate 20 inches in diameter and having in the center an iron pin or pivot on which the gun carriage turned. The center of this pin is the station mark. A vertical cross with the letters "U. S. C. S." was cut on the upper surface of the brownstone coping abreast of the station. This cross is 9.525 meters (31.25 feet) from the northwest angle of the inner line of the coping, and 3 feet from the station. The station is 0.890 meter (2.92 feet) from the vertical brick wall below the coping, 7.074 meters (23.21 feet) from the center of the flagstaff, and 7.163 meters (23.50 feet) from the corner of the coping over the parade. The reference mark has an underground mark of 4-inch terra-cotta pipe buried 20 inches below the surface; above this is a similar pipe, filled with and set in concrete, projecting 4 inches above the surface. The letters "U. S." and "1908" are marked on the concrete. This reference mark is about 2 meters north of the Engineers bench mark "Raingauge" and

For notes in regard to marking of stations see p. 130.

104.94 meters (344.3 feet) from the station in azimuth 230° 11′. In 1919 the fort was abandoned and falling to pieces; the walls were overgrown with weeds, bushes, and ivy.

New South Caswell azimuth (Brunswick County, N. C., D. B. Wainwright, 1886).—Identical with the triangulation station of the same name. The fort has been remodeled and the station can not be recovered with certainty.

Ocracoke northeast base latitude (Carteret County, N. C., A. T. Mosman, 1871).—Distant 10.948 meters (35.92 feet) or 0″24 of latitude north in azimuth 323° 32′ from *Ocracoke northeast base azimuth*, described below. The observations at this station, Portsmouth Island No. I and Portsmouth Island No. II, were reduced to triangulation station *Ocracoke northeast base* and a weighted mean taken.

Ocracoke northeast base azimuth (Carteret County, N. C., A. T. Mosman, 1871; 1916).—Identical with the triangulation station of the same name on the north end of Portsmouth Island, east of the village of Portsmouth. The station is on sand flats frequently covered by high water, 150 meters inside outer beach, and is marked by a 5-foot screw pile surrounded by cement, projecting about 5 inches above the surface of the ground. A post reference mark is 6.00 meters (19.7 feet) from the station. It projects about 20 inches above the ground and has a row of nails on top pointing toward the station. A second reference mark, note 11c, is 15.15 meters (49.7 feet) from the station in azimuth 161° 47′.

Portsmouth Island I latitude (Carteret County, N. C., A. T. Mosman, 1873).—Distant 844.8 meters (2,772 feet) or 7″74 of latitude north in azimuth 106° 24′ 23″ from *Ocracoke northeast base azimuth*, described above. The station is also 10.86 meters (35.6 feet) or 0″10 of latitude south in azimuth 286° 24′ from *Portsmouth Steeple*. (See *Ocracoke northeast base latitude*, above.)

Portsmouth Island II latitude (Carteret County, N. C., A. T. Mosman, 1873).—Distant 1,515.6 meters (4972 feet) or 15″32 of latitude south in azimuth 71° 51′ 12″ from *Ocracoke northeast base azimuth*, described above. (See *Ocracoke northeast base latitude*, above.)

Raleigh longitude (Wake County, N. C., B. A. Gould, 1853; 1918).—In the southeast corner of the capitol grounds and distant 58.67 meters (192.5 feet) east and 66.94 meters (219.6 feet) south of the center of the capitol building. The station is marked by two granite posts set firmly in the ground, the dimensions of one being 18 by 18 inches and the other 10 by 10 inches, each being 5 feet in length. The station is a geodetic point.

Raleigh azimuth (Wake County, N. C., J. A. Bond, 1918).—Identical with the traverse station of the same name in the city of Raleigh, on top of the Citizens National Bank building, near the northwest corner of the roof of the elevator house. Distances from the station to various points are as follows: To the northwest corner of the roof of the elevator house, 1.962 meters (6.44 feet); to the southwest corner of the same, 4.472 meters (14.67 feet); to the southeast corner of the same, 5.880 meters (19.29 feet); to the southwest corner of the chimney in the northeast corner of the elevator-house roof, 3.293 meters (10.80 feet). The reference mark is a bronze tablet set in the inner side of the parapet at the southeast corner of the roof of the bank building and is 20.60 meters (67.6 feet) from the station in azimuth 295° 11′.

Roan High Bluff latitude (Mitchell County, N. C., W. H. Burger, 1907).—Identical with *Roan High Bluff azimuth*, described below.

Roan High Bluff azimuth (Mitchell County, N. C., W. H. Burger, 1907).—Identical with the triangulation station of the same name about 5 miles north of Bakersville, on a very high bluff, about ¾ mile from the Cloudland Hotel, and on a very large rock on the edge of the bluff. The station is marked by a drill hole 2 inches deep, with grooves cut in the rock on north-and-south and east-and-west lines intersecting at the station. The letters "U. S. C. S." are cut in the rock around the center. The rock is large and no references were considered necessary.

Roseboro azimuth (Samson County, N. C., J. A. Bond, 1918).—Identical with the traverse station of the same name about ¼ mile north of Roseboro depot, on the Atlantic Coast Line Railroad, on the first curve north of the depot, on line of the left tangent toward the depot and of the left tangent toward Hayne, about 60 meters northeast of the track, in the woods, and 28 meters east of a small road through the woods. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7c, and 11a. The reference mark is on the west side of the road, 33.56 meters (110.1 feet) from the station in azimuth 109° 32′.

Sand Island latitude (Dare County, N. C., Edwin Smith, 1876).—Distant 3.581 meters (11.75 feet) or 0″12 of latitude north and 2.7 meters (9 feet) west of *Sand Island azimuth*, now lost.

Sand Island azimuth (Dare County, N. C., Edwin Smith, 1876).—Identical with the triangulation station of the same name, now lost.

Sanford azimuth (Lee County, N. C., E. D. Bromley, 1919).—Identical with the triangulation station of the same name about 2 miles south of Sanford, about 15 meters south of a road or trail that crosses the Seaboard Air Line Railway at the north end of the second curve south of Sanford and ends at a small cabin that is about 85 meters southeast of the station. The station is on top of a cultivated flat-topped hill, about 100 yards north of two lone persimmon trees. The station is marked as described in notes 1a and 7b, with a reference mark, note 11c, about 1 meter west of the southwest corner of the cabin and 83.10 meters (272.6 feet) from the station in azimuth 278° 31′. Other azimuths from the station are: To a tall steel water tank, 173° 58′; to a red steel standpipe about 2 miles north of Sanford, 197° 50′.

Shellbank latitude (Currituck County, N. C., C. O. Boutelle, 1847).—Distant 2.50 meters (8.2 feet) or 0″08 north, and 12.80 meters (42.0 feet) east of triangulation station *Shellbank*, now lost.

For notes in regard to marking of stations see p. 130.

Sloop Point 2 azimuth (New Hanover County, N. C., D. B. Wainwright, 1888).—Identical with the triangulation station of the same name on the middle point of the parapet facing the boat landing and marked by a cedar post. The station is now probably lost.

Statesville longitude (Iredell County, N. C., Edwin Smith, 1878).—In the grounds of Simonton College, to the southwest of the college building. The station is marked by a brick and stone pier and is 42.975 meters (140.99 feet) south and 22.387 meters (73.45 feet) or 0".89 of longitude west of triangulation station *Simonton College, center of cupola.*

Stevensons Point latitude (Perquimans County, N. C., C. O. Boutelle, 1847).—Distant 194.14 meters (636.9 feet) or 6".30 of latitude north and 70.00 meters (229.7 feet) west of *Stevensons Point azimuth*, no description of which is available.

Stevensons Point azimuth (Perquimans County, N. C., C. O. Boutelle, 1848).—No description available.

Tank azimuth (Franklin County, N. C., J. A. Bond, 1918).—Identical with the traverse station of the same name about 1½ miles north of the Seaboard Air Line Railway station at Youngsville, on the second curve north of the station, on the line of the right rail tangent toward Franklinton, 36 meters north of milepost 135, 1.80 meters (5.9 feet) west of the west rail, and 25 meters south of Brandy Creek water tank. The station is marked as described in notes 1a and 7c, with a reference mark, a bronze tablet set in the west face of a stone post under the water tank and 22.85 meters (75.0 feet) from the station in azimuth 185° 18′.

Virginia-North Carolina boundary, Dismal Swamp Canal, latitude (Gate County, N. C., C. H. Sinclair, 1886).—On the Dismal Swamp Canal, about 4 miles south of Wallacetown. The station is 3.7 meters (12 feet) or 0".12 of latitude south and 7.3 meters (24 feet) east of a boundary stone said to have been set in 1800 to mark the boundary run by Col. William Byrd in 1728. This stone is on the east side of the road that runs along the eastern side of the canal and is not more than 20 feet from the canal.

Virginia-North Carolina boundary, Knott Island latitude (Currituck County, N. C., C. H. Sinclair, 1887).—About 10 feet north of the traditional boundary in a fence corner near the road north and west of the stable of Mr. Williams. A small stream is just south of the station, which is 35.14 meters (115.3 feet) south and 15.926 meters (52.25 feet) west of Knott Island azimuth, and 1,749.1 meters (5,738 feet) or 56".74 of latitude south and 555.01 meters (1,820.88 feet) west of *Knott Island north end azimuth* (see p. 262).

Virginia-North Carolina boundary, Northwest latitude (Currituck County, N. C., C. H. Sinclair, 1886).—In the fence line south of the traditional boundary and 550 feet south of the line as run by transit from Dismal Swamp Canal, on the west side of the county road leading from Northwest, 1 mile north of the station to Moyock, 1¾ miles south.

Virginia-North Carolina boundary, Nottaway River latitude (Hertford County, N. C., C. H. Sinclair, 1887).—Distant ½ mile from the west bank of the Nottaway River at its junction with the Blackwater River. A lane runs along the line to the west from this point, and the station is in the south fence line at the eastern end of this lane on the edge of the bluff as the road goes down into the swamp. The station is about 12 feet north of some old gum trees supposed to have been marked by Col. William Byrd in 1728.

Wadesboro latitude (Anson County, N. C., G. R. Putnam, 1900).—In the eclipse expedition grounds of the Smithsonian Institute, at Wadesboro, 105 meters (344 feet) from the east fence, 42.4 meters (139 feet) south of the south line of Morgan Street, 29.6 meters (97 feet) from the east line of a north-and-south wagon track. The observing tripod was left standing. The north meridian stone of the meridian through the spectroscope is 74.4 meters (244 feet) northwest of the station. This meridian stone is of marble, 9 by 9 by 24 inches.

Wilmington (De Rosset) longitude (New Hanover County, N. C., G. W. Dean, 1855; 1856).—In the rear of St. James Episcopal Church and 13.91 meters (45.6 feet) or 0".46 of latitude south and 28.47 meters (93.5 feet) or 1".11 of longitude east of *Wilmington, St. James Church, azimuth*, described below. The station is 2.07 meters (6.8 feet) south of a buried bottle which in turn is surrounded by three bottles. The bottle is 7.59 meters (25.0 feet) from the nearest corner of the church, and is 23.62 meters (77.5 feet) due north of a marble post bearing the letters "U. S. C. S." just below the surface of the ground. This post is 2.90 meters (9.5 feet) from the northeast and nearest corner of the church. The station itself is unmarked.

Wilmington (De Rosset) latitude (New Hanover County, N. C., G. W. Dean and A. D. Bache, 1854; 1856).—Distant 1.83 meters (6.0 feet) due west of *Wilmington longitude*, described above.

Wilmington, St. James Church, azimuth (New Hanover County, N. C., C. P. Bolles, 1854; 1921).—Identical with the triangulation station of the same name on the corner of Market and Third Streets, on the tower of St. James Episcopal Church. The tower is approximately 14 feet square and has a spire at each corner. A nearly circular hole was cut through the boards of the roof and the tin covering for the passage of signal pole but this hole was soldered up. On the recovery of the station in 1917 a metal point was pressed up at the center of the hole making a slight protuberance on the upper surface of the tin to mark the station center. A small outlined triangle is punched in the tin about the center. As the position is not quite central to the tower, careful measurements were made for locating the station center. The distances from the station to the inside corners of the tower are as follows: To the northwest corner (corner of Third and Market Streets), 2.691 meters (8.83 feet); to the northeast corner, 2.691 meters (8.83 feet), to the southeast corner, 2.929 meters (9.61 feet); to the southwest corner, 2.920 meters (9.58 feet). The lengths of the sides of the tower between the points measured to are as follows: The north side (on Market Street), 3.975 meters (13.04 feet); the east side, 3.932 meters (12.90 feet); the south side, 3.969 meters (13.02 feet); and the west side, 3.993 meters (13.10 feet).

For notes in regard to marking of stations see p. 130.

Young latitude (Rowan County, N. C., H. W. Blair and J. B. Boutelle, 1876).—Distant 37.60 meters (123.4 feet) east and 0.43 meter (1.4 feet) or 0".01 of latitude south from *Young azimuth*, described below.

Young azimuth (Rowan County, N. C., C. O. Boutelle, 1876; 1917).—Identical with the triangulation station of the same name about 2 miles east of the railway station known as "Third Creek," on the division of the Southern Railway formerly known as the Western North Carolina Railroad, about 12 miles northwest of Salisbury and about 2 miles northwest of Barber railway station, on Youngs Mountain. The station is marked by a buried bottle and a central stone post, and surrounded by four stone posts as reference marks.

NORTH DAKOTA

Ambrose northeast base latitude (Divide County, N. Dak., C. V. Hodgson, 1913).—An unmarked point 0.030 meter (0.10 foot) north and 0.025 meter (0.08 foot) west of triangulation station *Ambrose northeast base*, which is the station of the United States and Canada Boundary Survey called *School*. It is about 2½ miles north of Ambrose, 0.7 mile south of the Canadian boundry, and about 0.1 mile north of a deep ravine. in the SW. ¼ NW. ¼ sec. 36, T. 164 N. R., 99 W., in the public road on top of the highest knoll in the vicinity. The station is marked by a benchmark post projecting 16 inches above the ground. A drill hole in the top of a stone post projecting 4 inches above the ground is 17.09 meters (56.1 feet) from the station in azimuth 352° 28′. The east gable of T. O. Moan's house is about 180 meters from the station in azimuth 99° 01′.

Badland latitude (Billings County, N. Dak., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name about 13 miles south and 7 miles west of Belfield and about 1 mile south and 7 miles west of Gaylord in the NE. ¼ sec. 8, T. 137 N., R. 100 W., on the highest point in the section. The station is at the edge of the "Breaks," where the level land breaks off abruptly into the Badlands to the west, and is near the road which leads west along section 8 and turns to the southwest, passing between the station and the reference mark just before it descends into the Badlands. The station is marked according to notes 1b and 7b. The reference mark, note 11b, is on the opposite side of the road on the highest point of a somewhat lower knob and is 56.77 meters (186.3 feet) from the station in azimuth 26° 34′. The chimney of E. Meyer's house is about 600 meters from the station in azimuth 275° 45′.

Bismarck longitude (Burleigh County, N. Dak., R. A. Marr, 1890; 1908; O. B. French, 1908).—The station of 1890 is marked by the foundation of a brick and cement pier about 6 inches below the surface of the ground in the lawn northwest of the courthouse. It is 23.93 meters (78.5 feet) west of the nearest point of the jail, 14.40 meters (47.25 feet) south of the iron fence along Rosser Street, and 17.25 meters (56.6 feet) west of the iron fence along Fifth Street. The State capitol flagpole is 1,312.75 meters (4,306.9 feet) or 42".512 of latitude north and 165.65 meters (543.5 feet) or 0s.520 (7".785) east of the station. The courthouse flagstaff is 31.57 meters (103.6 feet) or 1".02 south and 27.855 meters (91.39 feet) or 0s.087 (1".31) east of the station. The station of 1908 is unmarked. It is in the north edge of the east-and-west driveway to the south front of the courthouse. It is 42.36 meters (139.0 feet) south and 6.355 meters (20.85 feet) 0s.020 or 0".300) east of the station of 1890.

Bismarck latitude (Burleigh County, N. Dak., C. H. Sinclair, 1890).—Distant 36.74 meters (120.5 feet) due south of *Bismarck longitude, 1890*, described above.

Bonetrail latitude (Williams County, N. Dak., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name, about one-half a mile east of the town of Bonetrail, on the south section line near the center of sec. 14, T. 157 N., R. 102 W., on the highest point of the north side of the wagon road running east from the town. The station is marked according to note 5, with a reference mark, note 12d, 20.70 meters (67.9 feet) from the station in azimuth 54° 38′. A 1-inch drill hole in a large bowlder on the north side of the road is 14.03 meters (46.0 feet) from the station in azimuth 92° 29′, and the schoolhouse at Bonetrail is in azimuth 77° 39′.

Bowie azimuth (Divide County, N. Dak., E. H. Pagenhart, 1912).—Identical with the triangulation station of the same name, which is also a station of the United States and Canada Boundary Survey. It is about 11½ miles west and 3 miles north of Ambrose, in the SW. ¼ SE. ¼ sec. 25, T. 164 N., R. 101 W., on a knoll about 65 meters south of the Canadian boundary on land belonging to Frank Christianson. The station is marked by a boundary survey tablet in a block of concrete, 12 by 12 by 19 inches, set firmly in the ground and surmounted by a cairn. Boundary monument No. 232A is 90.70 meters (297.6 feet) from the station in azimuth 134° 05′. Ivar Eideness's house is about ¾ mile distant in azimuth 268° 47′; and a small shack at the west end of a lake is 1½ miles distant in azimuth 304° 31′.

Bowman longitude (Bowman County, N. Dak., H. A. Seran, 1912; 1913).—About 10 meters northwest of the northwestern support of the Bowman city water tank on a slight elevation on the western edge of the town. The station is 12.018 meters (39.43 feet) or 0".56 of longitude west and 8.219 meters (26.97 feet) or 0".27 of latitude north of *Bowman water tank* and is marked by a concrete pier.

Bowman latitude (Bowman County, N. Dak., C. V. Hodgson, 1913).—Identical with *Bowman longitude*, described above.

Gladys azimuth (Williams County, N. Dak., E. H. Pagenhart, 1912).—Identical with the triangulation station of the same name about 2 miles west and 2 miles north of Bonetrail, on a knoll locally known as Observation Butte, the highest point in the SW. ¼ sec. 4, T. 157 N., R. 102 W. The station is marked accord-

For notes in regard to marking of stations see p. 130.

ing to notes 1b and 7b, with a reference mark, note 12d, 28.20 meters (92.5 feet) from the station in azimuth 99° 45′. The southwest corner of section 4 is 36.61 meters (120.1 feet) distant in azimuth 20° 03′.

Hankinson latitude (Richland County, N. Dak., W. H. Burger, 1906).—Distant 6.59 meters (21.6 feet) due east from *Hankinson azimuth*, described below.

Hankinson azimuth (Richland County, N. Dak., W. H. Burger, 1904; 1906).—Identical with the triangulation station of the same name, about 4 miles southwest of Hankinson on the high part of a very prominent ridge in the SE. ¼ SE. ¼ sec. 28, T. 130 N., R. 50 W. The southeast corner of section 28 is 150.473 meters (493.68 feet) from the station in azimuth 273° 25′ 18″. The station is marked by a nail in the center of a piece of terra-cotta pipe which was filled by and incased in concrete. The underground and reference marks are similar to the station mark, the reference mark being in the southeast fence corner at the corner of the section, distant 141.664 meters (464.78 feet) from the station in azimuth 270° 29′ 30″. The following azimuths and distances are from the station: Behle's house, chimney, 77° 12′ 04″, about ½ mile; schoolhouse, chimney, 204° 50′ 23″, about ½ mile; Hankinson High School spire; 228° 15′ 26″.

Jamestown (U. S. G. S.) longitude (Stutsman County, N. Dak., S. S. Gannett, 1892).—No description.

Jamestown (U. S. G. S.) latitude (Stutsman County, N. Dak., S. S. Gannett, 1892).—No description.

Saddle azimuth (Billings County, N. Dak., E. H. Pagenhart, 1912).—Identical with the triangulation station of the same name about 6½ miles north and 1½ miles west of Belfield, in the SE. ¼ sec. 33, T. 141 N., R. 99 W., on the south end and highest point of Saddle Butte. The northwest corner of Stark County is about 400 meters in a southwesterly direction from the station, but a large cairn about 8 feet high on the edge of the cliff 7 meters to the south obstructs the view to the county corner. The station is on a smooth rock ledge and is marked according to note 3, with a reference mark, note 12a, 8.96 meters (29.4 feet) from the station in azimuth 113° 53′. A 1-inch drill hole in solid rock is 8.93 meters (29.3 feet) distant in azimuth 187° 09′.

Sheep latitude (McKenzie County, N. Dak., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name, about 12 miles east of the State boundary, 3 miles south of the county boundary, and 1½ miles east of the ranch house of R. B. Burns, in sec. 22, T. 148 N., R. 103 W., on the highest point of the most prominent butte in the vicinity, locally known as Sheep Butte. The station is marked according to notes 1b and 7b, with a reference mark, 39.15 meters (128.4 feet) distant in azimuth 164° 04′. A schoolhouse flagstaff is about 1¼ miles distant in azimuth 178° 36′.

OHIO

Ashtabula (U. S. L. S.) longitude (Ashtabula County, Ohio, G. Y. Wisner, 1868).—The station is 0″.39 of longitude west of the southwest corner of the passenger depot. (See Professional Papers, Corps of Engineers, United States Army, p. 757.)

Ashtabula (U. S. L. S.) latitude (Ashtabula County, Ohio, G. Y. Wisner, 1868).—The station is 02″.38 of latitude south of the southwest corner of the passenger depot. (See Professional Papers, Corps of Engineers, United States Army, p. 751.)

Cincinnati (Mount Adams) longitude (Hamilton County, Ohio, O. M. Mitchel, 1848).—The transit of Mitchel's observatory on Mount Adams.

Cincinnati (Mount Lookout) longitude (Hamilton County, Ohio, G. W. Dean, 1881; 1889).—In the grounds of the Cincinnati Observatory, on Mount Lookout, 24.87 meters (81.6 feet) N. 5° W. from the northwest corner of the observatory and 13.2 meters (43.3 feet) or 0″.55 (0s.037) of longitude west and 29.6 meters (97 feet) or 0″.96 of latitude north from the center of the dome. The station is marked by a sandstone pier built of three pieces cemented together in the form of an H. The pier is inscribed "U. S. Coast and Geodetic Survey, 1881." It is 33.5 meters (109.9 feet) or 1″.09 of latitude north and 9.3 meters (30.5 feet) or 0″.39 of longitude west from triangulation station *Observatory*, which is just southwest of the dome and is marked by a copper tack surrounded by three other tacks in the form of a triangle.

Cincinnati latitude (Hamilton County, Ohio, C. H. Sinclair, 1881; 1889).—Identical with *Cincinnati longitude*, described above.

Cleveland (U. S. L. S.) longitude (Cuyahoga County, Ohio, O. B. Wheeler, 1868).—The station is 15″.34 of longitude east of *Cleveland Lighthouse, on hill in city*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 757.)

Cleveland (U. S. L. S.) latitude (Cuyahoga County, Ohio, O. B. Wheeler, 1868).—The station is 10″.38 of latitude north of *Cleveland Lighthouse, on hill in city*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 751.)

Cleveland longitude (Cuyahoga County, Ohio, E. Goodfellow, 1871; 1901).—In the marine hospital grounds near the intersection of Lake and Erie Streets. The station is 69.260 meters (227.23 feet) or 2″.24 of latitude south and 56.772 meters (186.26 feet) or 2″.45 of longitude west of the *dome of the marine hospital*, a triangulation station of the United States Lake Survey, and is marked by a copper bolt in a pier, 15 by 21 inches in cross section and 6 feet long, extending about 3 feet above the ground. The pier is inscribed on the top "U. S. C. S. 1871" and on the side with the latitude and longitude. A meridian stone marked "U. S. C. S. N." is 55.163 meters (180.98 feet) north of the station.

For notes in regard to marking of stations see p. 130.

Cleveland latitude (Cuyahoga County, Ohio, E. Goodfellow, 1871; 1901).—Identical with the *longitude station*, described above.

Cleveland, Case School Observatory, latitude (Cuyahoga County, Ohio, C. S. Howe).—In the same parallel as the *center of the Almucantar*, a triangulation station of the United States Lake Survey.

Columbus longitude (Franklin County, Ohio, G. W. Dean, 1871).—The station is in Capitol Square, east of the statehouse, and is marked by a sandstone pier, 6 feet by 3 feet by 10 inches, sunk 3 feet below the surface of the ground and embedded in concrete. The north side of the pier bears the inscription, "U. S. Coast Survey, Astronomical Station, Sept. 1871." The station is 78.36 meters (257.1 feet) or 3".30 of longitude east and 2.62 meters (8.6 feet) or 0".08 of latitude north from the center of the dome of the capitol.

Columbus latitude (Franklin County, Ohio, A. T. Mosman, 1871).—Identical with *Columbus longitude*, described above.

Elizabethtown longitude (Hamilton County, Ohio, C. H. Sinclair, 1891).—About 1 mile from the State line, in the street, about 200 meters northwest from the Big Four Railroad depot. The station is marked by a stone pier extending 3 feet above and 2½ feet below the ground. The pier is about in the curb line and is 102.06 meters (334.8 feet) or 4".25 of longitude east and 302.17 meters (991.4 feet) or 9".80 of latitude south from the Presbyterian Church, 28.39 meters (93.1 feet) or 1".18 of longitude east and 50.07 meters (164.3 feet) or 1".62 of latitude north of the Methodist Episcopal Church and 24.16 meters (79.3 feet) or 1".01 of longitude west and 209.88 meters (688.6 feet) or 6".81 of latitude south of the public school.

Elizabethtown latitude (Hamilton County, Ohio, C. H. Sinclair, 1891).—Marked by a stone pier 1.28 meters (4.2 feet) west of *Elizabethtown longitude*, described above.

Gould latitude (Scioto County, Ohio, A. T. Mosman, 1885).—Distant 61.652 meters (202.27 feet) or 2".00 of latitude north in azimuth 181° 40′ 20″ from *Gould azimuth*, described below.

Gould azimuth (Scioto County, Ohio, A. T. Mosman, 1885).—Identical with the triangulation station of the same name, on a wooded hill east of the Ohio River, about 1½ miles from Franklin furnace landing, ¾ mile from Powellsville, and about ½ mile from Junior furnace. The station is marked by a nail set in concrete at the center of the top of a tile 6 inches in diameter and 2 feet long. The underground mark is an earthenware pyramid set about 2½ or 3 feet below the surface. There are four reference marks, three of which are similar to the surface mark at the station, except that the tiles are only 4 inches in diameter. The west reference mark consists of a brass bolt driven into an oak stump and surrounded by a triangle of nails. The reference marks are at the following distances and directions from the station: north, 1.85 meters (6.1 feet); east, 1.76 meters (5.8 feet); south, 1.86 meters (6.1 feet); and west, 1.76 meters (5.8 feet).

Hudson longitude (Cuyahoga County, Ohio, E. Loomis, 1849).—The transit of Western Reserve College.

Hudson (U. S. L. S.) longitude (Summit County, Ohio, C. A. Young, 1859).—The stone post in the observatory of Western Reserve College.

Sandusky (U. S. L. S.) longitude (Erie County, Ohio, G. Y. Wisner, 1868).—Probably identical with *Sandusky west base (U. S. L. S.) latitude*. The station is 792.77 meters (34".16 of longitude) west of the northeast corner of the customhouse.

Sandusky, west base (U. S. L. S.), latitude (Erie County, Ohio, G. Y. Wisner, 1868).—In Sandusky, about 2½ miles nearly south of *Sandusky west base U. S. L. S.*, described below. The station is 311.72 meters (1,022.7 feet) south and 792.33 meters (2,599.5 feet) west of the northeast corner of the customhouse, and is 1′51".10 of latitude south of *Sandusky west base (U. S. L. S.) azimuth*. The station is marked by a wooden post.

Sandusky, west base (U. S. L. S.), azimuth (Erie County, Ohio, G. Y. Wisner, 1877).—Identical with the triangulation station *Sandusky west base* of the United States Lake Survey on the northeast side of Cedar Point, about 40 meters from the lake shore and 1,016 meters from the lighthouse at the end of the point. The station is marked by a stone post set in a bed of brickwork 3 feet square by 4 feet deep. Three stone reference posts are set as follows: One S. 8° 02′ E., distant 26.3 meters (86 feet); one S. 55° 11′ W., distant 19.5 meters (64 feet); and one N. 64° 21′ W., distant 38.8 meters (127 feet) from the station. The azimuth post is S. 40° 23′ E., distant 46.91 meters (153.9 feet) from the station.

South Point longitude (Lawrence County, Ohio, A. T. Mosman, 1864).—No description.

Toledo (U. S. L. S.) longitude (Lucas County, Ohio, O. B. Wheeler, 1881).—Near the north corner of Monroe and Michigan Streets, and 71.02 meters (233.0 feet) north and 73.06 meters (239.7 feet) west from a stone marking the intersection of Monroe and Ontario Streets. The station is 879.0 meters (2,884 feet) south and 650.5 meters (2,134 feet) or 28".11 of longitude west of triangulation station *St. Mary's Church spire* of the United States Lake Survey. The station is marked by a stone post. A wooden longitude post, used in 1868, is 13.6 meters (45 feet) south and 16.6 meters (54 feet) east of the station.

Toledo (U. S. L. S.) latitude (Lucas County, Ohio, O. B. Wheeler, 1868).—In Toledo, 57.42 meters (188. 4 feet) north and 56.45 meters (185.2 feet) west of the stone marking the intersection of Monroe and Ontario Streets, and 13.59 meters (44.6 feet) or 0".44 of latitude south and 16.61 meters (54.5 feet) east of *Toledo (U. S. L. S.) longitude*, described above. The station is marked by a wooden post.

Toledo azimuth (Lucas County, Ohio, P. A. Welker, 1890).—In Toledo, on the public property known as Lincoln and Washington Parks. The azimuth observations were made to determine a true meridan line and the instrument was mounted over the point in the stone marking the south end of the line near the corner of

For notes in regard to marking of stations see p. 130.

Prospect and Forest Avenues. Each end of the line is marked by a heavy granite post 12 by 12 inches on the top surface and 3½ feet long. The stones were set in concrete and a ¾-inch copper bolt 3½ inches long was set firmly into the top of each stone and a cross with a small hole drilled in the center marks each end of the line.

The south meridian stone is 222.1 meters (729 feet) north and 1 foot west of the monument marking the intersection of Oakwood and Forest Avenues. The north stone is distant from the south stone 281.44 meters (923.4 feet). A reference point was placed in a black-oak tree which was in the meridian 7 feet north of the north stone. The bark was cut away and five copper nails driven into the tree 3 feet 3 inches above the ground. A cross on the middle nail marks the true meridian.

According to the city engineers, the monument marking the intersection of Oakwood and Forest Avenues is 670.92 meters (2, 201.2 feet) north and 2,371 meters (7,779 feet) west of the monument marking the intersection of Monroe and Ontario Streets. (See description of *Toledo longitude*, p. 231.)

OKLAHOMA

Allen longitude (Pontotoc County, Okla., G. D. Cowie, 1920).—Distant 3.18 meters (10.4 feet) or 0″.12 of longitude due east from *Allen azimuth*, described below.

Allen latitude (Pontotoc County, Okla., G. D. Cowie, 1920).—Identical with *Allen longitude*, described above.

Allen azimuth (Pontotoc County, Okla., R. L. Schoppe, 1920).—Identical with the triangulation station of the same name on the highest part of a timbered knoll near the center of sec. 24, T. 5 N., R. 8 E., and about ¾ mile north of the railroad station at Allen. The station is marked according to note 1a, with a reference mark, note 12b, distant 52.515 meters (172.29 feet) in azimuth 359° 19′. The center of the city water tank at Allen is in azimuth 343° 09′ 34″.

Blue azimuth (Latimer County, Okla., C. L. Garner, 1919).—Identical with the triangulation station of the same name on the highest point of Blue Mountain, about 7 miles, air line, northwest from Red Oak, and 7 miles by road from C. E. Noah's house, which is 4 miles northwest from Red Oak. The station is marked according to note 4, with two reference marks, note 12c, distant, respectively, 12.320 meters (40.42 feet) in azimuth 1° 42′ 45″ and 6.553 meters (21.50 feet) in azimuth 109° 38′ 42″.

Carson latitude (Grady County, Okla., William Bowie, 1908, 1921).—Identical with *Carson azimuth*, described below.

Carson azimuth (Grady County, Okla., William Bowie, 1908, 1921).—Identical with the triangulation station of the same name in sec. 8, T. 9 N., R. 7 W., 3 miles south and 1 mile west of Minco, on the highest point of a ridge ¾ mile west of the Chicago, Rock Island & Pacific Railroad. The station is marked in a manner similar to *Franklin (S. Dak.) azimuth* (see p. —), the reference mark being near the fence line north of the station, and 275.776 meters (904.78 feet) from the station in azimuth 179° 42′ 36″. The azimuths and distances to certain points are: To an 8-inch cottonwood post, with top squared and projecting about 3 or 4 feet above the ground and surrounded by a mound of earth, 151° 10′ 47″, 398.2 meters (1,306 feet); to quarter-section stone, common to sections 5 and 8, 150° 29′ 12″, 410.3 meters (1,346 feet).

Dill longitude (Washita County, Okla., G. D. Cowie, 1920).—Distant 10.47 meters (34.4 feet) or 0″.41 of longitude west from *Dill azimuth*, described below.

Dill latitude (Washita County, Okla., G. D. Cowie, 1920).—Identical with *Dill longitude*, described above.

Dill azimuth (Washita County, Okla., E. O. Heaton, 1920).—Identical with the triangulation station of the same name, about 1 mile north and ¼ mile east of Dill City, about 100 meters south of the house of O. J. Knight, 100 meters west of the railroad, and 135 meters south of road on the north side of the section. The station is marked according to notes 1a and 7a, with a reference mark, note 11a, distant 78.90 meters (258.9 feet) from the station in azimuth 292° 12′ 11″.

Guthrie (U. S. G. S.) longitude (Logan County, Okla., S. S. Gannett, 1892).—In "Government Acre" 15.67 meters (51.4 feet) south of the building line on Oklahoma Avenue and 35.51 meters (116.5 feet) east of the building line on Second Street. The station is marked by a pier, and is identical with *Guthrie*, a triangulation station of the United States Geological Survey.

Guthrie (U. S. G. S.) latitude (Logan County, Okla., S. S. Gannett, 1892).—Identical with *Guthrie (U. S. G. S.) longitude*, described above.

Marlow longitude (Stephens County, Okla., Edwin Smith, 1899).—Marked by a bronze station mark in the center of a concrete pier 3.11 meters (10.2 feet) east of *Marlow latitude*, described below. This station is a geodetic point.

Marlow latitude (Stephens County, Okla., Edwin Smith, 1899).—Marked by a rough stone pier in the northeast corner of the public-school lot, at the southwest corner of Fifth Street and Brummet Avenue. A copper bolt in a stone located 100.996 meters (331.35 feet) south of Marlow longitude station marks the meridian. (See *Marlow longitude*, described above.)

Pond Creek longitude (Grant County, Okla., O. B. French, 1907; 1920).—In the high-school grounds, originally the courthouse square, in Pondcreek, 0.72 meter (0″.02 of latitude) due north of *Pond Creek astronomic* station, which is the center of a tile 4 inches in diameter and 26 inches long, set with the top 2 inches below the surface of the ground. The 1920 longitude station not marked, was 2.78 meters due south of the reference tile.

For notes in regard to marking of stations see p. 130.

In 1920 the following distances and azimuths were measured from the reference tile: Center pipe of water tower, 56.23 meters (184.5 feet), 127° 56′; northeast corner of schoolhouse, 51.48 meters (168.9 feet), 225° 52′; northwest corner of schoolhouse, 39.20 meters (128.6 feet), 255° 28′; northeast corner of south vault, 30.30 meters (99.4 feet), 286° 00′; northwest corner of south vault, 31.64 meters (103.8 feet), 293° 12′.

Pond Creek latitude (Grant County, Okla., W. H. Burger, 1906; 1920).—A concrete pier 1.79 meters (5.87 feet) due west of *Pond Creek astronomic* station, described above.

Rosedale azimuth (McLain County, Okla., R. L. Schoppe, 1920).—Identical with the triangulation station of the same name in a cultivated field 1 mile east and 3 miles south from Rosedale, in sec. 34, T. 5 N., R. 1 E., on what is known locally as Signal Hill, on land owned by Julius Yakum, about 70 meters south of the tenant's house and 12 meters west of the section line. The station is marked according to note 1a, with a reference mark, note 11a, distant 7.20 meters (23.6 feet) in azimuth 258° 34′. The cupola of a church 1 mile distant is in azimuth 224° 33′; the flagpole, Byars High School, is in azimuth 269° 51′.

Savanna (U. S. G. S.) longitude (Pittsburg County, Okla., S. S. Gannett, 1895).—On high ground, about 300 yards northeast of the railroad station at Savanna. The station is marked by a pier of brick, laid in cement, with its base on solid rock.

Savanna (U. S. G. S.) latitude (Pittsburg County, Okla., S. S. Gannett, 1895).—Identical with *Savanna (U. S. G. S.) longitude*, described above.

Savanna south base azimuth (Pittsburg County, Okla., C. L. Garner, 1919; 1920).—Identical with the triangulation station of the same name, an old Geological Survey station about 4 miles south of Savanna, 80 meters west of the Missouri, Kansas & Texas Railway, 125 meters west of the Savanna-Kiowa road, and 50 meters north of the Ashland road, which runs into the road mentioned above. The station is near the prolongation of the tangent to the railroad tracks from the north and is marked according to notes 1a and 7a, with two reference marks, note 11a, distant 93.55 meters (306.9 feet) in azimuth 270° 42′ and 39.311 meters (128.97 feet) distant in azimuth 342° 49′. The following additional azimuths and distances are from the station: Savanna school building, 218° 29′; United States Geological Survey south base, 0.906 meter (2.97 feet) 335° 30′; United States Geological Survey reference mark, 3.775 meters (12.39 feet), 305° 30′; United States Geological Survey reference mark, 3.67 meters (12.0 feet), 16° 30′; United States Geological Survey reference mark, 2.53 meters (8.3 feet), 102° 00′.

Wingard latitude (Logan County, Okla., W. Bowie, 1908).—Identical with *Wingard azimuth*, described below.

Wingard azimuth (Logan County, Okla., W. Bowie, 1908).—Identical with the triangulation station of the same name, in the SW. ¼ sec. 14, T. 17 N., R. 3 W., on property of J. B. Wingard, about 5 miles north and 3¾ miles west of Guthrie. The station is marked in a manner similar to *Franklin azimuth (S. Dak.)* (see p. 242). The reference mark is in the southwest quarter very near the center of the section, 0.94 meter (3.1 feet) south of the east and west fence, 0.50 meter (1.6 feet) west of the north and south fence, and 329.096 meters (1,079.71 feet) from the station in azimuth 194° 42′ 03″. Other azimuths and distances are: Corner stone of quarter section between sections 14 and 23, 2° 04′ 56″, 490.9 meters (1,611 feet); to east end of ridge of James Dodd's house, 56° 05′ 36″, ¾ mile; to chimney in center of square-roofed house of William Dodd, 67° 57′ 18″, ¾ mile; to south end of ridge of John Gooch's house, 121° 30′ 15″, ¾ mile.

OREGON

Baker (U. S. G. S.) longitude (Baker County, Oreg., S. S. Gannett, 1897).—In sec. 17, T. 9 S., R. 40 E., in the grounds of the high school at Baker, and 38.86 meters (127.5 feet) east of the center of the tower on the building. The station is marked by a brick pier.

Baker (U. S. G. S.) latitude (Baker County, Oreg., S. S. Gannett, 1897).—Identical with *Baker (U. S. G. S.) longitude*, described above.

Baker (U. S. N.) longitude (Baker County, Oreg., Charles C. Wylie, 1918).—In the fair grounds, about 1 mile northwest of the central portion of Baker. The station is marked by a concrete pier in the top of which is embedded a brass tablet, inscribed as follows: "U. S. Naval Observatory, Eclipse Expedition, June 8, 1918."

Baker (U. S. N.) latitude (Baker County, Oreg., Charles C. Wylie, 1918).—Identical with *Baker (U. S. N) longitude*, described above.

Balch latitude (Multnomah County, Oreg., Geo. Davidson, 1886).—About 2.1 meters (7 feet) due west of *Balch azimuth*, described below.

Balch azimuth (Multnomah County, Oreg., Geo. Davidson, 1886; 1906).—Identical with the triangulation station of the same name immediately northwest of the city limits of Portland, about 1 mile south of the Willamette River, on the first small level bench of the spur making out from the ridge west of the Cornell road, and about 255 feet above the road. The station is marked underground by a broken-necked bottle placed neck up 2 feet below the surface and by a cross in the top of a copper bolt set in concrete 6 inches above the bottle, and at the surface by a cross on an old-type station mark, set in concrete, which is inscribed with the letters "C. & G. S." The old-type station mark consists of a disk and shank made of brass and cast in one piece. The disk is about 85 millimeters in diameter and has a polished center surrounded by the raised letters

For notes in regard to marking of stations see p. 130.

"U. S. C. & G. S." and a raised flange around the edge. The reference marks are the remains of two brick piers built in line to the west of the station, with their foundation about 20 inches below the surface, the nearest edge of the first pier being about 1 meter west of the station.

Barnes azimuth (Multnomah County, Oreg., O. B. French, 1903).—Identical with the triangulation station of the same name on a cleared hill about 4 miles west of Portland, between the Barnes and Cornell roads, and just east of the highest hill in the range. It is on the south edge of the hill, about 100 feet southeast of a fir tree and some small maples, and close to the north side of a large stump. The station is marked by a ⅜-inch copper bolt 3 inches long, cemented into a drill hole in a stone 6 by 12 by 18 inches, 1¼ feet below the surface. The surface mark is an old-type station mark, as was used at *Balch azimuth*, described above. It is set in a stone 8 by 14 by 18 inches, with its top flush with the surface of the ground. The two reference marks are drill holes in the top of ⅜-inch copper bolts, which are leaded or cemented into drill holes in rock with the top of the bolt flush with the surface. These are set at the roots of stumps on the side facing the station and are located as follows: One in a boulder 15 inches in diameter, distant 15.80 meters (51.8 feet) from the station in azimuth 156° 11′; the other in a boulder 12 inches in diameter, 7.02 meters (23.0 feet) from the station in azimuth 233° 23′. A third reference mark consists of a cross in the top of a boulder 10 inches in diameter buried 15 inches beneath the surface, and of a copper bolt directly above the cross in a boulder 14 by 14 by 18 inches, set with its top flush with the surface of the ground. It is about 3 feet north of the main east-and-west fence line, about 30 feet east of where this fence crosses the highest part of the ridge, and about 3 feet east of a fence extending northward from this fence, and 44.95 meters (147.5 feet) from the station in azimuth 184° 35′.

Beaver azimuth (Baker County, Oreg., C. V. Hodgson, 1916).—Identical with the triangulation station of the same name, about 12 miles south and 3 miles east of Baker, on the northern and higher of the two bald grassy knobs on Beaver Mountain or Bald Ridge, which lies just south and east of the head of Beaver Creek, and about 1½ miles south of Echam & Son's sawmill on Beaver Creek. The station is marked by a nail in a block of concrete and covered by a cairn. The reference mark is a hole in a rock flush with the surface of the ground, distant 16.48 meters (54.1 feet) in azimuth 261° 47′.

Beulah azimuth (Malheur County, Oreg., E. O. Heaton, 1920).—Identical with the triangulation station of the same name, about 5 miles southeast from Beulah post office, and about 12 miles north from Juntura, on the highest point in the vicinity. The station is on a hill directly behind the one that appears as highest one from Beulah. The station was marked as described in note 2, while two reference marks, as described in note 12a, were set as follows: One 17.01 meters (55.8 feet) from the station in azimuth 153° 42′ and the other 6.12 meters (20.1 feet) the station in azimuth 359° 56′.

Burns azimuth (Harney County, Oreg., E. O. Heaton, 1920).—Identical with the triangulation station of the same name, about 7 miles west from Burns, 4.4 miles north (by wood road) from the Burns-Bend highway and on the highest point of one of the Sage Hen Hills. The station is about 2 miles farther west and to the left of the hill which appears to be the highest when looking from Burns. The station is marked as described in note 2. Two reference marks, as described in note 12a, were set as follows: One 6.18 meters (20.3 feet) from the station in azimuth 354° 41′ and the other 8.42 meters (27.6 feet) from the station in azimuth 162° 00′.

Central Point latitude (Jackson County, Oreg., W. H. Burger, 1908).—Marked by a wooden pier 4.77 meters (15.6 feet) or 0″.07 of latitude south in azimuth 296° 41′ from *Central Point astronomic station.* The north and west fences of the field are, respectively, 6.18 meters (20.3 feet) and 15.55 meters (51.0 feet) from the latitude station. *Central Point astronomic station* is about 2 miles north of Central Point, near the intersection of the Southern Pacific Railway and the county road, and in the northwest corner of the field which is just east of the county road and south of the private road leading to the house occupied by Geo. Mims. The station is about 30 meters from the railroad and is marked by a ¾-inch drill hole in the top of a triangular granite rock, set in cement 15 inches below the surface of the ground. The surface mark is an old-type station mark, described under *Balch azimuth*, set in the top of a granite rock which projects 2 inches above the surface, and which is embedded in a mass of concrete 30 inches square and 12 inches deep. The reference mark, a United States Geological Survey bench mark, is at the intersection of the railroad and the county road, just east of the rail on the east side of the road and 28.15 meters (92.4 feet) from the station in azimuth 31° 55′. This bench mark is also 28.82 meters (94.6 feet) from the latitude station in azimuth 41° 18′.

Dalles (U. S. E.) latitude (Wasco County, Oreg., J. H. Clark, 1878).—On the bluff of the lava bed, under the shadow of which are the Steam Navigation Co.'s offices and workshop. The station is marked by a pier of cemented brick. The northwest corner of sec. 3, T. 1 N., R. 13 E., is 47.5 feet N. 33° W., and Main Street (prolongation) is south 81.5 feet. The meridian was marked on the north by an iron pin driven into the ground, near the bluff facing the Columbia River. Southward, on a large natural mound, once part of a military reservation of old Fort Dalles, it was indicated in the same way. Both pins were covered by piles of stone.

Echo longitude (Umatilla County, Oreg., W. B. Fairfield, 1916).—Distant 2.973 meters (9.75 feet) or 0″.10 of latitude north from *Echo azimuth*, described below.

Echo latitude (Umatilla County, Oreg., W. B. Fairfield, 1916).—Identical with *Echo longitude*, described above.

Echo azimuth (Umatilla County, Oreg., C. V. Hodgson, 1916).—Identical with the triangulation station of the same name in the town of Echo, about 225 meters northeast of the railroad depot, 25 meters east of the

For notes in regard to marking of stations see p. 130.

upper irrigation canal, on a point of ridge nearest the town. The station is marked by a bronze tablet as described in notes 1a and 7a, except that the underground mark bears an iron bolt in place of the usual metal mark. The reference mark is a bronze tablet in concrete, as described in note 11a, distant 9.530 meters (31.27 feet) in azimuth 200° 28′. The center chimney of the concrete schoolhouse at Echo is in azimuth 0° 38′ 26″ and the center of the red wooden tank at Echo is in azimuth 42° 03′ 08″.

Ella azimuth (Umatilla County, Oreg., C. V. Hodgson, 1916).—Identical with the triangulation station of the same name, about 5 miles north and ½ mile east of Ione, 3½ miles south and 1½ miles east of what was formerly Ella post office, 1 mile south and ½ mile west of United States Geological Survey station *Ella*, on a flat-topped ridge in a cultivated field in the NE. ¼ sec. 14, T. 1 N., R. 24 E., on the highest point in the vicinity. The fence line to the west is about 135 meters distant. The station is marked by a bronze tablet in concrete, as described in notes 1a and 7a, with a reference mark, a bronze tablet in concrete, note 11a, distant 9.300 meters (30.51 feet) in azimuth 181° 01′.

Eugene (U. S. G. S.) longitude (Lane County, Oreg., S. S. Gannett, 1894).—Identical with triangulation station *Eugene astronomic*, described below.

Eugene (U. S. G. S.) latitude (Lane County, Oreg., S. S. Gannett, 1894).—Identical with triangulation station *Eugene astronomic*, described below.

Eugene astronomic azimuth (Lane County, Oreg., O. B. French, 1904; 1908).—Identical with the triangulation station *Eugene astronomic station*, which is also a United States Geological Survey station. It is on the east end of Skinners Butte, near Eugene, just above the reservoir and north of the railroad station, on the site of the old observatory of Oregon State University. It was learned in 1908 that the land was to be converted into a park and that the station would be demolished, so two marble reference stones projecting 2 inches above the surface and bearing on the top the letters "U. S.," with a cross between, were set to preserve the station. The first, 5 by 5 by 18 inches, is 18.294 meters (60.02 feet) from the station in azimuth 119° 59′, and the second, 4 by 7 by 14 inches, is on the south brow of the hill, 12.211 meters (40.06 feet) from the station in azimuth 52° 47′. A large concrete "O" on the brow of the hill overlooking the station is in azimuth 2° from the station. The distance between the two reference marks is 17.625 meters (57.82 feet), and from the first reference mark the Patterson School spire is in azimuth 315° 28′ and the spire of the Humphrey Memorial Methodist Church is in azimuth 353° 53′.

Fort Stevens longitude (Clatsop County, Oreg., C. V. Hodgson, 1911; 1913).—On the embankment at the edge of the old moat, just in front of Battery Freeman, at Fort Stevens. The station is marked by a standard disk station mark bearing the usual inscription and the words "Astronomical Station," set in the middle of the notch in the top of the pier. The foundation of the pier was placed 4 feet in the ground, the lower 2 feet being old concrete blocks tamped in with sand; the remainder is concrete. *Gun* is distant 27.90 meters (91.5 feet) in azimuth 45° 18′ 20″. Reference mark No. 1 is a cross ½ inch deep in the concrete embankment in front of the easternmost and smallest cannon in Battery Freeman and about 8 inches from the inner edge of the concrete, distant 37.25 meters (112.2 feet), S. 27° 30′ E. (magnetic). Reference mark No. 2 is a small triangle with a ¾-inch hole in the center, cut in the concrete directly in front of the easternmost of the two 6-inch guns, about 8 inches from the inner edge of the concrete, distant 42.20 meters (138.5 feet), S. 40° 00′ W. (magnetic). The station is a geodetic point.

Fort Stevens azimuth (Clatsop County, Oreg., E. H. Pagenhart, 1912; 1913).—Identical with *Fort Stevens longitude*, described above.

John azimuth (Sherman County, Oreg., C. V. Hodgson, 1916).—Identical with the triangulation station of the same name in the northwest corner of the NW. ¼ sec. 17, T. 2 S., R. 18 E., on the highest part of a knoll in a cultivated field now leased by Joseph Eddy. Moro is about 7 miles north and 7 miles west of the station. The station is marked by a bronze tablet in concrete, as described in notes 1a and 7a, with a bronze tablet in concrete as a reference mark, note 11a, distant 139.23 meters (456.8 feet) in azimuth 179° 57′ 42″. Reference mark No. 2, a bronze tablet in a bowlder, note 12d, is at the northwest corner of section 17, distant 201.88 meters (662.3 feet) in azimuth 130° 13′ 27″. Permission was given to remove the surface mark, but the underground mark can be recovered from the reference marks.

Juniper azimuth (Harney County, Oreg., W. Mussetter, 1920).—Identical with the triangulation station of the same name, about 60 miles northeast from Lakeview, about 20 miles south from Butte, and 5 miles east from Alkali Lake, on the highest point of Big Juniper Butte. The station was marked as described in note 2, and two reference marks, as described in note 12a, were set in the following azimuths from the station: 7° 12′ and 118° 35′.

La Grande longitude (Union County, Oreg., J. E. McGrath, 1916).—Distant 76.408 meters (250.68 feet) or 2″.475 of latitude north and 40.284 meters (132.17 feet) or 1″.850 of longitude west from *La Grande azimuth*, described below.

La Grande latitude (Union County, Oreg., J. E. McGrath, 1916).—Identical with *La Grange longitude*, described above.

La Grande azimuth (Union County, Oreg., C. V. Hodgson, 1916).—Identical with the triangulation station of the same name opposite the freight depot, southwest of the intersection of Chester Street with the

For notes in regard to marking of stations see p. 130.

street running south of the railroad tracks, on a lot formerly occupied by a building which had been burned. The station was not marked. Reference mark No. 1, a bronze tablet in concrete, note 11a, is in the southwest corner of the small sodded park between the passenger and freight depots, distant 49.79 meters (163.4 feet) from the station in azimuth 279° 53′. Reference mark No. 2, a bronze tablet in concrete, note 11a, was buried with the top 1 inch below the surface, because of the traffic, and is just west of the longitude station, about 10 feet north of the edge of the sidewalk and 87.00 meters (285.4 feet) from the station in azimuth 149° 58′. Reference mark No. 3 is a small cross chiseled in the concrete pavement about 15 inches back from the corner of the curb and on the line to station *Fanny* at the southwest corner of the intersection of Chester Street with the street along the south side of the railroad and is distant 10.535 meters (34.56 feet) from the station in azimuth 274° 46′.

Lakeview bench mark M 16 azimuth (Lake County, Oreg., W. Mussetter, 1920).—Identical with the triangulation station of the same name on the west edge of the town of Lakeview, on the south side (in fence line) of the Lakeview-Klamath Falls wagon road and about 275 meters west from the Nevada-California-Oregon railroad crossing. The station is marked as described in note 1c, while a reference mark, note 11c, was set 18.45 meters (60.5 feet) from the station in azimuth 186° 29′.

Mary azimuth (Benton County, Oreg., O. B. French, 1903; 1908).—Identical with the triangulation station of the same name on the highest point of the grassy summit of Mary Peak, about south-southwest from Corvalis. The station is marked by a ⅜-inch copper bolt, in a flat stone 4 inches thick and 19 inches in diameter, 22 inches below the surface. The surface mark is an old-type station mark (see description of *Balch azimuth*, p. 233) in a bowlder 16 by 18 by 30 inches, the top of which is flush with the surface of the ground. Two reference marks, each a drill or punch hole in the top of a ⅜-inch copper bolt 3 inches long, which is leaded or cemented into a drill hole in a rock with the top of the bolt flush with the surface, are at the following distances and azimuths from the station: 13.77 meters (45.2 feet), 326° 22′, and 29.36 meters (96.3 feet), 58° 11′.

Onion azimuth (Douglas County, Oreg., O. B. French, 1903; 1904).—Identical with the triangulation station of the same name on the highest part of the bare summit of Onion Springs Mountain, about 1 mile south of the Onion Springs. The station is marked by a ⅜-inch copper bolt 3 inches long cemented into a drill hole in the rock. Directly above the bolt in the same drill hole is cemented an old-type station mark (see description of *Balch azimuth*, p. 233) with a cross in its top to mark the center. Two reference marks, each a drill or punch hole in the top of a ⅜-inch copper bolt 3 inches long which is leaded or cemented into a drill hole in a rock with the top of the bolt flush with the surface, are located as follows: One in a prominent ledge 24.62 meters (80.8 feet) from the station in azimuth 91° 50′, and the other in an inconspicuous, low bowlder at the western edge of the summit and distant 47.22 meters (154.9 feet) in azimuth 182° 47′.

Pigeon azimuth (Coos County, Oreg., A. T. Mosman, 1861).—Identical with the triangulation station of the same name. Now lost.

Portland longitude (Multnomah County, Oreg., C. H. Sinclair, 1887; 1905).—The station was 0.25 meter (0.833 foot) or 0″.01 of latitude south and 1.96 meters (6.42 feet) or 0″.09 of longitude east of *Portland latitude*, described below. The station is now lost.

Portland latitude (Multnomah County, Oreg., C. H. Sinclair, 1887; 1905).—Distant 136.6 meters (448.2 feet) or 4″.38 of latitude south and 0″.87 of longitude west in azimuth 7° 56′ 53″ from triangulation station *Oregonian*, the tall iron pole at the southeast corner of the tower of the Oregonian Building, at the northwest corner of Sixth and Adler Streets, Portland. The station is now lost.

Port Orford latitude (Curry County, Oreg., J. Rockwell, 1851).—Distant 1.65 meters (5.4 feet) west of triangulation station *Port Orford astronomic*, now lost.

Rainier latitude (Columbia County, Oreg., Geo. Davidson, 1886).—Distant 0.061 meter (0.20 foot) or 0″.00 of latitude south and 1.064 meters (3.49 feet) east of *Rainier azimuth*, described below.

Rainier azimuth (Columbia County, Oreg., Geo. Davidson, 1886).—Identical with the triangulation station of the same name near the village of Rainier on a sidehill about 200 meters from the shore and down the hill about 45 meters from an old logging road. The station is marked by a bottle buried mouth up below the surface, and at the surface there is a post 2½ feet long with a copper tack in the top. Around the station, buried 1 foot, are three bottles distant about 6 feet, at equal angles, and lying on their side with their necks pointing to the station. There is a blazed fir-tree stump bearing 206° magnetic, distant 3.64 meters (11.9 feet), and a blazed fir tree bearing 37° magnetic, distant 2.59 meters (8.5 feet).

Riddle azimuth (Harney County, Oreg., W. Mussetter, 1920).—Identical with the triangulation station of the same name, about 26 miles southeast from Narrows, about 24 miles south from Crane, 6 miles east from Smith post office (locally known as Coon Town), 4 miles north of James Paul ranch, and on the eastern end and highest point of Riddle Mountain. The station is marked as described in note 2, while 2 reference marks, as described in note 12a, were set as follows: 16.55 meters (54.3 feet) from station in azimuth 122° 41′; and 4.75 meters (15.6 feet) from station in azimuth 272° 22′.

Roseburg latitude (Douglas County, Oreg., W. H. Burger, 1908).—Distant 1.955 meters (6.41 feet) or 0″.02 of latitude north in azimuth 112° 05′ from the triangulation station known as *Roseburg latitude station*, which is on the point of a spur across the river from the town of Roseburg, about 100 feet west from the end of the bridge and 60 feet above it. The triangulation station is marked by a ⅜-inch copper bolt 3 inches long,

For notes in regard to marking of stations see p. 130.

cemented into a drill hole in the rock, and directly above the bolt in the same drill hole is an old-type station mark (see description of *Balch azimuth*, p. 233). A cross in the top of the copper bolt and another in the polished center of the disk mark the station. Two reference marks, each a punch or drill hole in the top of a ⅜-inch copper bolt 3 inches long, which is set into a drill hole in the rock, are located as follows: One in a prominent ledge, 18.18 meters (59.6 feet) from the triangulation station in azimuth 30° 17′; the other in the side of a ledge flush with the ground and distant 32.30 meters (106.0 feet) from the triangulation station in azimuth 109° 05′.

Rust azimuth (Jackson County, Oreg., O. B. French, 1904).—Identical with the triangulation station of the same name, on the highest summit of the peaks known locally as the Black Buttes (Rustler on United States Geological Survey maps), about 20 miles north of Mount Pitt, and 26 miles by road and trail from Big Butte post office via Parker's ranch. The station is marked in the same manner as the triangulation station at *Roseburg latitude*, described above. The reference marks are the same as at *Roseburg latitude* and are at the following distances and azimuths from the station: 11.995 meters (39.35 feet), 264° 33′; and 10.12 meters (33.2 feet), 337° 53′.

Scott azimuth (Douglas County, Oreg., O. B. French, 1904).—Identical with the triangulation station of the same name on the highest part of the summit of Mount Scott, about 20 miles northeast of Roseburg The station is marked in the same way as the triangulation station at *Roseburg latitude*, described above. The reference marks are the same as at *Roseburg latitude*, and are located as follows: One in a white rock at about the middle of a prominent ledge and 32.71 meters (107.3 feet) from the station in azimuth 195° 02′; and the other in a rocky ledge near the edge of the brush and 18.17 meters (59.6 feet) from the station in azimuth 305° 42′.

Spencer azimuth (Lane County, Oreg., O. B. French, 1903).—Identical with the triangulation station of the same name on the south end and highest point of the summit of Spencer Butte, about 4 miles south of Eugene, near a United States Geological Survey station. Two trees used by the Geological Survey are at the north end of the summit, which is in the form of a ridge. The station is marked in the same manner as the triangulation station at *Roseburg latitude*, described above. The reference marks are the same as at *Roseburg latitude*, and are located as follows: One distant 5.338 meters (17.5 feet) in azimuth 175° 02′; and the other 4.570 meters (15.0 feet) in azimuth 328° 51′. The Geological Survey station is 7.970 meters (26.15 feet) from the station in azimuth 176° 12′.

Tongue Point Neck azimuth (Clatsop County, Oreg., R. D. Cutts, 1852).—Identical with the triangulation station of the same name, on the summit of the ridge of the narrow neck of land connecting Tongue Point with the mainland about 40 feet above the tide. The station is marked by a bottle buried 3 feet below the surface of the ground. Around the station, buried 1 foot, are three other bottles, distant about 6 feet, at equal angles, lying on their sides with the necks pointing to the station.

Umpqua River latitude (Douglas County, Oreg., Geo. Davidson, 1853).—Lost.

Yam latitude (Polk County, Oreg., W. H. Burger, 1908).—Distant 4.986 meters (16.36 feet) or 0″.12 of latitude north in azimuth 220° 07′ from *Yam azimuth*, described below.

Yam azimuth (Polk County, Oreg., O. B. French, 1903; 1908).—Identical with the triangulation station of the same name on the highest point of a group of hills about 12 miles northwest of Salem, and about 10 meters south of a wire fence which passes over the summit. A slightly lower wooded hill is about ½ mile northwest of the station and a group of hills is about halfway between the station and Salem. The station is marked in the same manner as *Mary azimuth*, described above, the surface mark is a bowlder 15 by 18 by 18 inches with its top flush with the surface of the ground, and the subsurface mark is a bowlder 8 by 16 by 16 inches and 23 inches below the surface mark. Two reference marks, similar to those at *Mary azimuth*, are in bowlders about 14 by 18 by 18 inches with their tops flush with the surface of the ground, and with a few loose stones piled about them for identification. One is in the line of the wire fence, 11.06 meters (36.3 feet) from the station in azimuth 197° 10′, and the other 8.59 meters (28.2 feet) from the station in azimuth 329° 07′.

Yaquina longitude (Lincoln County, Oreg., R. A. Marr, 1888).—On the bluff above and north of the town of Yaquina upon ground belonging to the railroad company. The station is 8.47 meters (27.8 feet) from the southeast corner of the Yaquina church and 1.86 meters (6.1 feet) from the plane of the east face of the church, and is marked by a brick and cement pier. In the third course of brick from the bottom is a bottle containing a paper bearing the legend of the station. The station is 18.99 meters (62.3 feet) or 0″.86 of longitude east and 9.01 meters (29.6 feet) or 0″.29 of latitude south of the west pinnacle of the church and 17.14 meters (56.2 feet) or 0″.78 of longitude east and 9.31 meters (30.5 feet) or 0″.30 of latitude south of the east pinnacle of the church.

Yaquina Point latitude (Lincoln County, Oreg., Fremont Morse, 1885; 1908).—Inside and north of the fence inclosing the lighthouse and keeper's dwelling. From the station the southeast corner of the oil room is 11.92 meters (39.1 feet) N.25° 12′ W. (magnetic), and the southwest corner of the keeper's dwelling is 20.18 meters (66.2 feet) N. 43° 53′ E. (magnetic). The station is marked by a bottle buried 2 feet below the surface and containing a shipper's tag upon which was written "George Davidson, U. S. Coast and Geodetic Survey." The surface mark is a standard brass station mark set in a rock buried flush with the surface of the ground. *Yaquina Head Lighthouse* is 16.85 meters (55.3 feet) or 0″.55 of latitude north and 11.78 meters (38.6 feet) or 0″.53 of longitude west from the station.

Yonna azimuth (Klamath County, Oreg., E. O. Heaton, 1920).—Identical with the triangulation station of the same name about 12 miles northeast from Bonanza, on the top of Yonna Butte, and about 70 meters east

For notes in regard to marking of stations see p. 130.

from its highest point. The station was marked as described in note 2, while 2 reference marks, as described in note 12a, were set as follows: 1.73 meters (5.7 feet) from the station in azimuth 354° 23′ and 4.99 meters (16.4 feet) from the station in azimuth 140° 26′.

PENNSYLVANIA

Allegheny Observatory, old site, longitude (Allegheny County, Pa., S. P. Langley, 1869; 1872).—Distant 9.02 meters (29.6 feet) or 0″.38 of longitude west of the center of *Allegheny Observatory, old site, dome*, a triangulation station of the United States Geological Survey.

Allegheny Observatory, new site, longitude (Allegheny County, Pa., Messrs. Schlesinger and Baker, 1907).—The pier of the transit instrument of Allegheny Observatory, 17.07 meters (56 feet) or 0″.73 of longitude west of *Allegheny Observatory center* of 62-foot *dome*, a triangulation station of the United States Geological Survey.

Allegheny Observatory, new site, latitude (Allegheny County, Pa., Messrs. Schlesinger and Baker, 1907).—Identical with Allegheny Observatory, new site; longitude described above.

Altoona longitude (Blair County, Pa., C. H. Sinclair, 1890).—Near the shops of the Pennsylvania Railroad, above the small reservoir of the railroad company, about 1 mile north of the depot. The station is marked by the intersection of the cross lines on the head of a copper bolt, embedded in a solid sandstone pier which rests upon a concrete foundation. The pier is inscribed "U. S. Coast and Geodetic Survey," with the latitude, longitude, and altitude below the inscription. A meridian stone about 400 feet north rests upon a concrete foundation and has a copper bolt to mark the center. It is inscribed "Meridian 1890." The longitude station is indentical with the United States Geological Survey triangulation station of the same name.

Altoona latitude (Blair County, Pa., C. H. Sinclair, and R. A. Marr., 1890).—Identical with *Altoona longitude*, described above.

Austinburg latitude (Tioga County, Pa., Edwin Smith, 1879; 1882).—Near the location of the old fifth latitude stone and between the one hundred and ninth and one hundred and tenth milestones of the Pennsylvania-New York boundary. The station is about ¾ mile northwest of Austinburg, on the southwest side of the road between Austinburg and South Troupsburg, in the northeast corner of a meadow. The station is 0.98 meter (3.2 feet) or 0″.03 of latitude south and 3.84 meters (12.6 feet) west of a milestone set in 1882 by the New York-Pennsylvania Boundary Commission. This stone is similar to the one set near *Corydon, latitude station* (*N. Y.*) (see p. 220).

Burt longitude (Bradford County, Pa., Edwin Smith, 1877; 1882).—About 1 mile south from Wellsburg, in the yard of the blacksmith shop belonging to David A. Burt, about 446 feet south of the State line and about the same distance north of Mr. Burt's house. The station is marked by a brick pier. The meridian mark, a stone with a cross, is to the south near a fence. A boundary monument of the Pennsylvania-New York Boundary Commission similar to that at *Little Meadows latitude* (*N. Y.*) (see p. 221) is 134.518 meters (441.33 feet) or 4″.36 of latitude north and 12.25 meters (40.2 feet) west of the station.

Burt latitude (Bradford County, Pa., Edwin Smith, 1877; 1882).—Identical with *Burt longitude*, described above.

Clark latitude (Erie County, Pa., Edwin Smith, 1877; 1884).—About 1 mile from the western extremity of the State line, in the yard of the residence of L. D. Clark, 23.93 meters (78.5 feet) from the northwest corner of his house, and 68 feet from the center of the State road. The meridian stone is 49.018 meters (160.82 feet) south of the station. The station is marked by a granite monument, with its top 2½ feet below the surface of the ground, bearing the inscription "Station Clark U. S. C. & G. S. 1877." The surface mark is a hole in the capstone of the pier, used when the station was occupied. A similar monument, bearing the inscription "N. Y." on the north side and "Pa. Ft. SoS Sta. Clark" on the south, is at the intersection of the State line with the meridian through the station and 21.129 meters (69.32 feet) north of the station.

Erie (U. S. L. S.) longitude (Erie County, Pa., O. B. Wheeler, 1868).—No description. The station is 32″.40 of longitude west of *Erie Lighthouse*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 756.)

Erie (U. S. L. S.) latitude (Erie County, Pa., O. B. Wheeler, 1868).—No description. The station is 67″.11 of latitude south of *Erie Lighthouse*, a triangulation station of the United States Lake Survey. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 750.)

Flower observatory (U. of P.) longitude (Delaware County, Pa., Eric Doolittle, 1912).—On the Westchester Pike, 1 mile west of the Sixty-ninth Street terminal of the Philadelphia elevated road. The station is the center of the dome of the equatorial building.

Harrisburg longitude (Dauphin County, Pa., Edwin Smith, 1877).—In the State capitol grounds, and 196.624 meters (645.09 feet) or 6″.38 of latitude south and 131.808 meters (432.44 feet) or 5″.58 of longitude east of the center of the dome of the old capitol building. The station is marked by a sandstone block bearing on its north side the inscription "U. S. Coast Survey, Sept. 1877," with a space for the latitude and longitude. To the north 79.172 meters (259.75 feet) is a meridian stone inscribed "U. S. C. S."

Harrisburg latitude (Dauphin County, Edwin Smith, 1877).—Identical with *Harrisburg longitude*, described above.

For notes in regard to marking of stations see p. 130.

Jollytown latitude (Greene County, Pa., C. H. Sinclair, 1883).—On the land of Mr. Lantz, about 2 miles southeast from Jollytown, and very near an old stake marking the boundary between Pennsylvania and West Virginia.

Maryland corner latitude (Fayette County, Pa., C. H. Sinclair, 1883).—About ¼ mile west of an old mound accepted as the Maryland corner and 2.99 meters (9.8 feet) or 0".10 of latitude north and 10.27 meters (33.7 feet) east of a large stone set in the east and west Pennsylvania boundary as the north terminus of the meridian passing through Fairfax.

Philadelphia old Central High School, longitude (Philadelphia County, Pa., E. O. Kendall, 1847; 1849).—The observatory of the old Central High School.

Smiths Ferry longitude (Beaver County, Pa., C. H. Sinclair, 1883).—On the north bank of the Ohio River, 35 feet from the edge of the bank and just south of the brick hotel kept by Jesse Smith. The station is identical with the United States Geological Survey triangulation station of the same name, and 587.6 meters (1,928 feet) north and 1,536.07 meters (5,039.6 feet) east of a granite monument marking the boundary between Pennsylvania and Ohio.

Smiths Ferry latitude (Beaver County, Pa., C. H. Sinclair, 1883).—About 1 mile west of Smiths Ferry, 587.6 meters (1,928 feet) or 19".05 of latitude south and 1,538.09 meters (5,046.2 feet) or 65".44 of longitude west of Smiths Ferry longitude, and 2.02 meters (6.6 feet) west of the granite monument marking the boundary between Pennsylvania and Ohio. (See *Smiths Ferry longitude*, described above.)

Southwest corner latitude (Greene County, Pa., C. H. Sinclair, 1883).—On a high hill 11.9 meters (39 feet) or 0".39 of latitude north and 86.0 meters (282 feet) west of the southwest corner stone of Pennsylvania.

Sugar Grove latitude (Warren County, Pa., Edwin Smith, 1879).—About 1 mile north of Sugar Grove, in a field on the east side of the road. The station is marked by a granite monument, with its top about 2½ feet below the surface and bearing the inscription "Station Sugar Grove U. S. C. & G. S. 1879." A flat stone caps the monument. Northward from the station and in line with milestones 203 and 204 is a boundary monument similar to the one marking the station. This monument is 7.242 meters (23.76 feet) or 0".24 of latitude north and 2.152 meters (7.06 feet) west from the monument marking the station. The boundary monument extends 1 foot above the surface of the ground and is marked "N. Y." on its northern side and "PA." on the southern side.

Womelsdorf latitude (Lebanon County, Pa., Edwin Smith, 1908).—Distant 1.2 meters (4 feet) east of *Womelsdorf azimuth*, described below.

Womelsdorf azimuth (Lebanon County, Pa., Edwin Smith, 1908).—Identical with the triangulation station of the same name which is on a high summit of South Mountain in Heidelberg Township. The station is marked by a copper bolt set in the rock. Three reference marks, each a cross cut in a rock, are at the following distances and bearings from the station: 2.860 meters (9.38 feet) N. 90° 17′ W.; 10.780 meters (35.37 feet) N. 1° 42′ W.; 7.49 meters (24.6 feet) N. 68° 41′ E. The letters "U. S. C. S." are cut on the rock around the copper bolt.

Yard latitude (Delaware County, Pa., J. E. Hilgard, 1854).—Distant 1.2 meters (4 feet) east from *Yard azimuth*, now lost.

Yard azimuth (Delaware County, Pa., J. E. Hilgard, 1854; 1907).—Identical with the triangulation station of the same name, which is now lost.

RHODE ISLAND

Beaconpole azimuth (Providence County, R. I., A. D. Bache, 1844; 1896).—Identical with the triangulation station of the same name, in the northwest part of the town of Cumberland, about 2 miles northeast of the village of Cumberland Hill, on the Woonsocket & Manville Electric Railway, on the summit of a high hill known as Copper Mine Hill, or Beaconpole Hill. The station is on the highest part of a round, granite rock with a smooth surface, about 25 or 30 feet in diameter, about 200 meters east of the highest part of the hill. The dividing line of the properties of Mr. Cook and Mr. Welcun Cargill runs over the rock. The station is marked by a copper bolt with lead around it and inclosed in a triangle. Four reference marks, each a drill hole within a square, are located as follows: No. 1, on the apex of a large low rock, distant 7.87 meters (25.8 feet) in azimuth 354° 35′; No. 2, near the south corner of a flat rock, distant 10.12 meters (33.2 feet) in azimuth 87° 11′; No. 3, in the center of a flat rock, 6.41 meters (21.0 feet) distant in azimuth 151° 38′; No. 4, on the east slope of a large rock, 5.49 meters (18.0 feet) distant in azimuth 233° 34′. Arrows point from the reference marks to the station.

Spencer azimuth (Kent County, R. I., A. D. Bache, 1844; 1879).—Identical with the triangulation station of the same name, on Spencer Hill, about 2½ miles northwest of East Greenwich and 1½ miles southeast by east of Crompton. The station is a short distance east of the summit, on land belonging to Jesse Dewley, and about 200 yards east of his house. An old barn is 15.00 meters (49.2 feet) N. 71° 30′ W. of the station at the angle of a stone wall. The station is marked by an iron bolt set in a hole drilled in the rock.

For notes in regard to marking of stations see p. 130.

SOUTH CAROLINA

Allen azimuth (Allendale County, S. C., E. A. Gatje, 1918; 1919).—Identical with the traverse station of the same name on the right of way of the Charleston & Western Carolina Railway, about 1¼ miles from the town of Allendale, about 75 meters east of milepost 54, about 75 meters south of the most western switch stand of a sidetrack, about 6 meters north of a public road leading from Fairfax to Allendale, and 6.48 meters (21.3 feet) south of the south rail of the main track. The station is marked as described in notes 1a and 7b. A standard disk reference mark is about 5 meters from the center of the public road leading from Fairfax to Allendale, about 5 meters from a private road that joins the main highway, and 35.24 meters (115.6 feet) in azimuth 130° 33′.

Allendale longitude (Allendale County, S. C., J. S. Hill, 1907).—Distant 21.50 meters (70.5 feet) from the brick pier which forms the northeast corner of the Methodist Church (white) at Allendale; 16.72 meters (54.9 feet) from five nails driven into the southeast face of a large pine tree which stands in the church lot. The station is 11.09 meters (36.4 feet) south and 0.32 meter (1.0 foot) or 0″.01 of longitude east from *Allendale latitude* a point of the triangulation now lost. The longitude station is marked by a drill hole in a concrete pier. The pier is inscribed on top "U. S. C. & G. S. '07."

Allendale latitude (Allendale County, S. C., W. H. Burger, 1907).—Reported lost in 1918. The station is a geodetic point. (See Allendale longitude, described above.)

Allston latitude (Georgetown County, S. C., C. O. Boutelle, 1853; 1875).—Marked by four granite blocks 16.65 meters (54.6 feet) or 0″.54 of latitude north and 5.65 meters (18.5 feet) east of *Allston azimuth*, described below.

Allston azimuth (Georgetown County, S. C., C. O. Boutelle, 1854; 1875).—Identical with the triangulation station of the same name on the top of a neck between Sampit and Winyah Bays, on the highest part of a cultivated grain patch, near some old unoccupied houses, about 300 yards from the last street in Georgetown. (1854.) The station is marked by an iron cone surmounted by a marble monument.

Battery azimuth (Horry County, S. C., O. H. Tittman, 1873; 1886).—Identical with the triangulation station of the same name, near the northeast corner of a small earthwork, known as the Battery, on a small bluff where the flood tide coming into Little River first strikes the mainland. The station is marked by a drill hole in a small stone buried about 2 feet below the surface of the ground. The surface mark is a copper tack in a pine stub. The edge of the bluff is about 20 feet distant.

Bethune I longitude (Chesterfield County, S. C., W. B. Fairfield, 1918).—Distant 23.778 meters (78.01 feet) or 0″.77 of latitude north from *Bethune I azimuth*, described below.

Bethune I latitude (Chesterfield County, S. C., W. B. Fairfield, 1918).—Identical with *Bethune I longitude*, described above.

Bethune I azimuth (Chesterfield County, S. C., E. C. Bennett, 1918).—Identical with the traverse station of the same name in the town of McBee, opposite the northeast corner of the Seaboard Air Line Railway freight depot, about 100 meters north of milepost 300 and 2.16 meters (7.1 feet) west of the west rail. The station is marked as described in notes 1a and 7b.

Breach Inlet latitude (Charleston County, S. C., C. O. Boutelle, 1849).—Marked by stone blocks with wooden curbs around them and about 300 feet west of *Breach Inlet azimuth*, described below.

Breach Inlet azimuth (Charleston County, S. C., C. O. Boutelle, 1849; 1857).—On the northeast end of Sullivans Island, marked as follows: A layer of bricks was first put down 36 inches below the surface. On these an iron cone was laid, then another layer of bricks around the cone. A marble post was then placed upon the cone and tamped with oyster shells. The letters "U. S. C. S." were cut upon the top of the post. In 1902 the station was reported as probably lost.

Charleston longitude (Charleston County, S. C., L. R. Gibbs, 1851; G. W. Dean, 1880; 1896).—The station of 1851 was 95.1 meters (312 feet) south and 60.4 meters (198 feet) or 2″.32 of longitude (0ˢ.16) east of the cupola of the *Orphan asylum*. The station of 1880 is near the east end of the citadel on ground belonging to the State. The station is 19.07 meters (62.6 feet) from the edge of the curbstone toward Meeting Street; 37.89 meters (124.3 feet) from the edge of the curbstone toward Hudson Street; 8.20 meters (26.9 feet) from the flagstone in the sidewalk passing in front of the citadel, and 7.83 meters (25.7 feet) from the southeast corner of the citadel building. The station is marked by two granite posts each 8 by 12 by 60 inches, set in concrete 2 feet below the surface, with a granite post between them marking the point. The station is 182.21 meters (597.8 feet) or 5″.92 of latitude north and 220.67 meters (724.0 feet) or 8″.48 (0ˢ.565) east of the cupola of the *Orphan asylum*.

Charleston latitude (Charleston County, S. C., C. H. Sinclair, 1896).—Distant 1.28 meters (4.2 feet) due west of *Charleston longitude, 1880, 1896*, described above.

Columbia longitude (Richland County, S. C., G. W. Dean, 1854; 1855).—Marked by a granite block. The statehouse, to which the station was referred, has been torn down.

Columbia latitude (Richland County, S. C., B. A. Gould and G. W. Dean, 1854).—Identical with *Columbia longitude* described above.

Columbia azimuth (Richland County, S. C., E. A. Gatje, 1918).—Identical with the traverse station of the same name in Columbia, near the northwest corner of the roof of the Palmetto Building, 3.00 meters (9.8 feet)

For notes in regard to marking of stations see p. 130.

from the west edge of the coping and 3.31 meters (10.9 feet) from the north edge of the coping and 2.11 meters (6.9 feet) west from the west side of the penthouse. The station is marked by a standard disk station mark set in the tile roof of the building.

Denmark azimuth (Bamberg County, S. C., E. A. Gatje, 1918; 1919).—Identical with the traverse station of the same name on the Seaboard Air Line Railway right of way, 580 meters north of milepost 411, 400 meters south of the Atlantic Coast Line Railway crossing at Denmark railway station, and 5.3 meters (17.4 feet) east of the east rail of the main track and about 2 meters above the track. The station is marked as described in notes 1a and 7b. United States Coast and Geodetic Survey bench mark K_1 is 13.23 meters (43.4 feet) from the station in azimuth 73° 45′.

Edisto Island, east base, latitude (Charleston County, S. C., C. O. Boutelle, 1850).—An unmarked point 33.915 meters (111.27 feet) or 1″.10 of latitude north and 417.50 meters (1,369.7 feet) west of *Edisto Island east base azimuth*, described below.

Edisto Island, east base, azimuth (Charleston County, S. C., C. O. Boutelle, 1850; 1917).—Identical with the triangulation station of the same name in a cultivated field about ½ mile east of the dwelling of J. F. Townsend. The station is marked by a copper bolt in a small stone set in a bed of cement about 3 feet below the surface of the ground. Above this are two stones, about 3 feet square, set one on top of the other and entirely in the ground; the station is marked by a drill hole in a copper bolt set in the top of the upper of these two stones. Above this is a monument about 18 inches square and 4 feet high, with its top cut in the shape of a flat pyramid. This monument is inscribed on the north face "1849," on the east face "Base No. 6," on the south face "A. D. Bache, Supt.," and on the west face "U. S. Coast Survey." The following directions and distances are given: Cupola of Townsend's house, 0° 00′ 00″; reference stone, distant 48.085 meters (157.76 feet) 78° 00′ 35″; reference stone, distant 50.12 meters (164.4 feet), 168° 08′ 40″; reference stone, distant 48.02, meters (157.5 feet) 258° 00′ 00″; reference stone, distant 50.15 meters (164.5 feet), 348° 06′ 45″.

Estill azimuth (Hampton County, S. C., E. A. Gatje, 1918).—Identical with the traverse station of the same name on the right of way of the Seaboard Air Line Railway at Estill railway station, 35 meters north of the depot, 12.33 meters (40.5 feet) west of the city water tank and 8.919 (29.26 feet) east of the west rail of the main track. The station is marked as described in notes 1a and 7b. United States Coast and Geodetic Survey bench mark K is distant 10.52 meters (34.5 feet) in azimuth 272° 20′; United States Geological Survey bench mark (traverse station No. 78), marked "Elev. 113 feet," is 49.65 meters (162.9 feet) from the station in azimuth 356° 18′ 50″.

Fort Johnson azimuth (Charleston County, S. C., F. D. Granger, 1890; 1921).—Identical with the triangulation station of the same name on the southwest side of Charleston Harbor, about 2½ miles below the city and just below the quarantine wharf. It is at about the center of the top of the old magazine, which is the highest mound in the fort. East of the mound and about 30 feet below is a large stone monument marked "U. S." This monument is at one corner of the Government reservation, 88 feet from the station in azimuth 261° 28′. The station is marked underground by a bottle filled with ashes and at the surface by a standard station mark set in a terra-cotta pipe filled with cement.

New Cut azimuth (Charleston County, S. C., C. O. Boutelle, 1852; 1917).—Identical with the triangulation station of the same name on high land just back of a large clump of trees, on the ridge of the bank. The station is about 80 meters from the edge of the bank, about 67 meters from an old house, and about 100 meters northwest of a cotton gin. The station is marked by a station mark, set in a stone with the letters "U. S. C. & G. S." traced in the cement around the stone. The underground mark is a bottle placed in an iron cone. The following directions and distances are from the station: Beacon No. 4 Wadmelaw River, 0° 00″ 00″.0; west chimney of the southwest corner of the house of Nancy Hart 47.82 meters (156.9 feet), 75° 56′; reference mark in corner of yard, a concrete pier with bottle in cement at bottom and cross lines and nail at surface, 36.90 meters (121.06 feet), 86° 02′ 16″; a second reference mark similar to first, on west side of farm road, 33.29 meters (109.22 feet), 338° 58′ 43″.

Paris latitude (Greenville County, S. C., C. O. Boutelle, and H. W. Blair, 1875).—Distant 26.90 meters (88.2 feet) or 0″.87 of latitude north and 35.21 meters (115.5 feet) west of *Paris azimuth*, described below.

Paris azimuth (Greenville County, S. C., C. O. Boutelle, 1875).—Identical with the triangulation station of the same name, on the mountain of the same name. No description of the marking is available.

Port Royal latitude (Beaufort County, S. C., C. O. Boutelle, 1859).—Distant 106.7 meters (350 feet) west of *Port Royal azimuth*, described below.

Port Royal azimuth (Beaufort County, S. C., C. O. Boutelle, 1859; 1916).—Identical with the triangulation station of the same name, at the southwestern end of St. Helena Island. The underground mark is a bottle surrounded by an iron cone, filled with cement containing a copper nail. The surface mark is a copper nail in a 4-inch drain pipe filled with cement and surrounded by cement, making a column of cement about 2 feet in diameter, flush with the surface of the ground and marked "U. S. C. G. S." A reference mark, note 6b, is 20.79 meters (68.2 feet) a little east of south from the station; a second reference mark, note 1a, is 13.23 meters (43.4 feet) northwest of the station.

For notes in regard to marking of stations see p. 130.

SOUTH DAKOTA

Franklin latitude (Codington County, S. Dak., W. H. Burger, 1906).—Distant 4.28 meters (14.0 feet) or 0".05 of latitude south in azimuth 67° 47′ from *Franklin azimuth*, described below.

Franklin azimuth (Codington County, S. Dak., W. H. Burger, 1906).—Identical with the triangulation station of the same name on high ground in an open field, near the center of the W. ¼ sec. 34. T. 113 N., R. 51 W. and about 1⅛ miles northwest of Kranzburg. The station is marked in a manner similar to *Hankinson, azimuth (N. D.)* (see p. 230), the reference mark being in the north line of the railroad right of way and 839.924 meters (2,755.65 feet) from the station in azimuth 0° 30′ 01″. The following azimuths and distances are from the station: Oliver Franklin's house chimney, 10° 51′ 20″, about ½ mile; John Fox's house (square roof) chimney, 203° 09′, about ½ mile; Kranzburg Catholic Church spire, 287° 51′ 43″, about 1⅛ miles.

Freeman latitude (Hutchinson County, S. Dak., W. H. Burger, 1906).—Identical with *Freeman azimuth*, described below.

Freeman azimuth (Hutchinson County, S. Dak., W. H. Burger, 1906).—Identical with the triangulation station of the same name in the NE. ¼ NW. ¼ sec. 15, T. 98 N., R. 56 W., on the highest point of land in a pasture belonging to John Stahl. The station is 3 miles south and ⅝ mile west of the town of Freeman, it is 26 feet east of a wire fence separating the pasture from a cultivated field and 307 feet south of the road on the north side of the section. A windmill in the pasture is 508 feet from the station in azimuth 293° 31′. The following are azimuths to various points of section 15: Northwest corner, 99° 07′; north center, 242° 24′; northeast corner, 264° 34′. The station is marked underground by a tack in the center of the cork of a stone jug and at the surface by a marble post, 2.5 feet long and 8 inches square at the top, with two V-shaped grooves cut in the top at right angles to each other and the letters "U. S. C. S." A circular trench 4 feet in diameter and about 1 foot deep, partly filled with soft coal and covered with earth, encircles the station.

Harding latitude (Harding County, S. Dak., C. V. Hodgson, 1913).—A point, not marked, 0.005 meter (0.02 foot) north and 0.010 meter (0.03 foot) east of triangulation station of the same name, which is about 4 miles southwest of Harding, on the highest point, about 1 mile from the southeast end of a prominent mesa, which is a part of the Sioux National Forest. The station is in the NE. ¼ sec. 9, T. 16 N., R. 2 E., and is marked by an old-type cap station mark, screwed to the top of a 3-inch iron pipe, and embedded in a cylinder of concrete. The underground mark is described in note 7b. The reference mark, note 11b, is on the west brow of the mesa, 49.15 meters (161.3 feet) from the station in azimuth 112° 28′.

Howard longitude (Miner County, S. Dak., Edwin Smith, 1907).—In the grounds of the county courthouse at Howard, in a direct line between the center of the dome of the courthouse and the cross on the Catholic Church. The station is 3.5 meters (11.5 feet) or 0".11 of latitude south and 12.5 meters (41 feet) or 0".56 of longitude west of the *Howard courthouse dome*, 7.295 meters (23.93 feet) from the southwest corner, and 13.414 meters (44.01) from the northwest corner of the sandstone course running around the courthouse at a height of about 4 feet above the ground, and 5.388 meters (17.68 feet) in a line almost perpendicular to the face of the building, from the head of a large bolt used as a brace to the foundation. The station is marked by a concrete pier.

Howard latitude (Miner County, S. Dak., W. H. Burger, 1906; 1907).—Identical with *Howard longitude*, described above.

Preacher Hill latitude (Roberts County, S. Dak., W. H. Burger, 1906).—Identical with *Preacher Hill azimuth*, described below.

Preacher Hill azimuth (Roberts County, S. Dak., W. H. Burger, 1906).—Identical with the triangulation station of the same name which is in the northeast corner of the NE. ¼ sec. 1, T. 123 N., R. 52 W., on a high rounding hill known as Preacher Hill. It is in Sisseton Indian Reservation, upon dead Indian land leased to J. E. Aiken. The station is marked in a manner similar to *Hankinson, N. Dak., azimuth* (see p. —), the reference mark being on the top of a rounding rocky knoll, 149.968 meters (492.02 feet) from the station in azimuth 258° 22′ 56″. The following azimuths and distances are from the station: Kinsman's house, stovepipe chimney, 88° 41′ 18″, about ¾ mile; Mrs. Lentz's house, west gable, 256° 23′ 29″, about ¾ mile; Mrs. Echart's house, west gable, 306° 11′ 16″, about 1¼ miles.

Provo longitude (Fall River County, S. Dak., H. A. Seran, 1912).—An unmarked point 12.355 meters (40.53 feet) north and 1.404 meters (4.61 feet) or 0".06 of longitude west from *Provo astronomic azimuth*, described below.

Provo latitude (Fall River County, S. Dak., C. V. Hodgson, 1913).—An unmarked point 3.598 meters (11.80 feet) or 0".01 of latitude north in azimuth 95° 04′ from *Provo astronomic azimuth*, described below.

Provo astronomic azimuth (Fall River County, S. Dak., C. V. Hodgson, 1912; 1913).—Identical with the triangulation station *Provo astronomic*, about 600 meters northeast of the depot at Provo, on the highest point of a low hill in the open prairie. The station is marked as described in notes 1b and 7b, with a reference mark, note 11b, 29.294 meters (96.11 feet) distant in azimuth 355° 07′. The center of sec. 12, T. 10 S., R. 2 W. is 4.56 meters (15.0 feet) from the station in azimuth 201° 33′.

Rapid City (U. S. G. S.) longitude (Pennington County, S. Dak., S. S. Gannett, 1890).—In the courthouse yard at Rapid City, about 75 feet west of the southwest corner of the courthouse. The station is marked

For notes in regard to marking of stations see p. 130.

by a brick pier extending about 3 feet below the surface of the ground and about 30 inches above; it has a dressed sandstone cap marked "U. S. G. S."

Rapid City (U. S. G. S.) latitude (Pennington County, S. Dak., S. S. Gannett, 1890).—Identical with *Rapid City (U. S. G. S.) longitude*, described above.

Reva latitude (Harding County, S. Dak., C. V. Hodgson, 1913).—Identical with *Reva azimuth*, described below.

Reva azimuth (Harding County, S. Dak., E. H. Pagenhart, 1912; 1913).—Identical with the triangulation station of the same name about 16 miles east of Buffalo and about ½ mile north of the top of the old Moonshine trail, on the highest point at the north end of the Slim Buttes, on an isolated knob connected to the main butte by a short low spur. It is the highest point in sec. 25, T. 19 N., R. 8 E. The station is marked as described in note 1b, with an underground mark, a brass bolt set in solid rock, 25 inches below the surface of the ground. A reference mark, note 12b, is on the south end of the knob, 7 meters lower and 48.72 meters (159.8 feet) distant in azimuth 345° 23′.

Sioux Falls (U. S. G. S.) longitude (Minnehaha County, S. Dak., S. S. Gannett, 1896).—In the grounds of the United States Government building, east of and opposite to the center of the building and 8 feet west of the east edge of the lot. The station is marked by a pier.

Sioux Falls (U. S. G. S.) latitude (Minnehaha County, S. Dak., S. S. Gannett, 1896).—Identical with *Sioux Falls (U. S. G. S.) longitude*, described above.

TENNESSEE

Bean latitude (Polk County, Tenn., W. H. Burger, 1907).—Identical with *Bean azimuth*, described below.

Bean Azimuth (Polk County, Tenn., W. H. Burger, 1907).—Identical with the triangulation station of the same name on the highest and most western point of Bean Mountain, known as Oswald Dome, about 7 miles by road from Benton and the same distance from Cogg Hill. The station is marked by a granite jar 4 feet below the surface of the ground. The surface mark is a stone post whose top is 4 inches above the surface, and is marked by a groove running north and south and one running east and west, with the letters "U. S. C. S.", one in each corner. Three reference marks, each a hole drilled in the rock, are at the following distances and bearings from the station: 6.22 meters (20.4 feet), S. 5 W.; 4.63 meters (15.2 feet), N. 54° 30′ W.; and 13.66 meters (44.8 feet), N. 45° 30′ E.

Hickory azimuth (Hardeman County, Tenn., E. H. Pagenhart, 1914).—Identical with the triangulation station of the same name about 1 mile southwest from Hickory Valley, about 8 miles north from Grand Junction, in an open field about 100 meters west of the highest part of the highest hill in the vicinity, about 50 meters south of the north line of Mr. F. M. Avent's property, and about 240 meters southwest from the steel water tank at the manager's place on the H. B. Duryea tract. The station is marked as described in notes 1a and 7a, with a reference mark, note 11a, on the fence line on the east side of the road leading southward, at the highest point of the road, about 80 meters south from the turn, and 38.03 meters (124.8 feet) from the station in azimuth 299° 08′. A second reference mark, note 11a, is 1 foot north of the fence and property line on the Duryea property, about 60 meters west from a gully, near the southwest corner of the manager's yard and 51.92 meters (170.3 feet) from the station in azimuth 184° 20′.

Jellico longitude (Campbell County, Tenn., F. H. Parsons, 1883).—On land belonging to the Louisville & Nashville Railroad, and about 100 yards east of the depot. The station is 157.37 meters (516.3 feet) south and 111.01 meters (364.2 feet) or 4″.47 of longitude west from boundary stone No. 59 on the Tennessee-Kentucky boundary. This stone is of sandstone, about 8 inches square, extending about 2 feet above the ground. It is inscribed as follows: On the north side "Ky.," on the south side "Tn.," on the east side "1859," and on the west side "No. 59–301–H 15." The inscriptions are very indistinct and almost illegible.

Knoxville longitude (Knox County, Tenn., Edwin Smith, 1907).—Distant 47.1 meters (154.5 feet) or 1″.53 of latitude south and 0.8 meter (2.6 feet) or 0″.03 of longitude east from *Knoxville College cupola*. Both the station and point of reference were lost in 1922.

Knoxville latitude (Knox County, Tenn., W. H. Burger, 1907).—In the meridian and practically identical with *Knoxville longitude*, described above.

Lebanon, north base, latitude (Wilson County, Tenn., A. H. Buchanan, 1878).—Identical with *Lebanon north base azimuth*, described below.

Lebanon, north base, azimuth (Wilson County, Tenn., A. H. Buchanan, 1878).—Identical with the triangulation station of the same name, about 1,525 meters N. 68° 45′ W. from the center of the square in Lebanon on a small timbered elevation. The station is about 390 meters north of the Nashville turnpike, 275 meters a little east of north from the residence of A. W. Vick, and is marked by a stone pier set in hydraulic cement. The monument is 33 inches by 33 inches by 27 inches and extends 4 inches above the ground. It bears the inscription "North-Base U. S. C. S., Tennessee, 1877."

Luper latitude (Cumberland County, Tenn., W. H. Burger, 1907).—Identical with *Luper azimuth* described below.

Luper azimuth (Cumberland County, Tenn., W. H. Burger, 1907).—Identical with the triangulation station of the same name, which is on Luper Mountain, a high point in Crab Orchard Range, south of Mead

For notes in regard to marking of stations see p. 130.

Gap, 15½ miles from Crossville to the west, 8½ miles from Rockwood to the southeast, and 3¼ miles from Waldusia to the south. The station is marked by a large sand rock in natural position, the top dressed level and capped with cement and marked with grooves running north and south and east and west. The letters "U. S. C. S." were cut in the cement.

Martin longitude (Shelby County, Tenn., O. B. French, 1914).—Distant 11.60 meters (38.1 feet) or 0″.38 of latitude south and 6.50 meters (21.3 feet) or 0″.26 of longitude west of *Martin azimuth*, described below.

Martin latitude (Shelby County, Tenn., O. B. French, 1914).—Identical with *Martin longitude*, described above.

Martin azimuth (Shelby County, Tenn., E. H. Pagenhart, 1914).—Identical with the triangulation station of the same name, about ¾ mile a little southeast of Germantown, 200 meters east of Booths Station, a stop for suburban trains on the Southern Railway, 90 meters north of the railroad tracks, and 80 meters north of the wagon road leading east from Germantown. The station is in an orchard about 40 meters southeast of the house of T. W. Martin and 7 meters east of his yard fence. It is marked as described in notes 1a and 7a, with a reference mark, note 11a, in the yard about 10 meters south of the southeast corner of the house and 31.35 meters (102.9 feet) from the station in azimuth 122° 58′ 42″.

Memphis longitude (Shelby County, Tenn., William Eimbeck, 1877, 1879).—Lost. The station was 0″.33 of latitude north and 1″.72 of longitude west from the northwest corner of the customhouse and 6″.12 of latitude north and 0″.92, (0s.06) east of the Lake Survey longitude station at Memphis (see below).

Memphis latitude (Shelby County, Tenn., William Eimbeck, 1877, 1879).—Identical with *Memphis longitude*, now lost. See above.

Memphis (U. S. L. S.) longitude (Shelby County, Tenn., C. F. Powell, 1877).—Distant 13.03 meters (42.7 feet) or 0″.42 of latitude south and 31.51 meters (103.4 feet) or 1″.25 of longitude east of triangulation station *Memphis* of the Mississippi River Commission, which is on a bluff near the corner of Front and Monroe Streets in Memphis. The triangulation station is marked by a ¼-inch hole in the top of a stone post 2½ feet long set 3 feet below the surface of the ground. The surface mark is a stone post projecting 6 inches above the surface of the ground. The longitude station is marked by a limestone post. The following bearings and distances are from the longitude station: Gas lamp at northwest corner of Front and Monroe Streets, 75.8 meters (249 feet) N. 52° 31′ E.; southwest corner of Vaccaro & Co.'s store, 68.1 meters (223 feet), S. 68° 06′ E.; southwest corner of Magnolia Block, at northeast corner of Front and Union Streets, 71.6 meters (235 feet) S. 33° 16′ E.

Memphis (U. S. L. S.) latitude (Shelby County, Tenn., C. F. Powell, 1877).—Identical with *Memphis (U. S. L. S.) longitude*, described above.

Mount Lore latitude (White County, Tenn., W. H. Burger, 1907).—Distant 0.02 meter (0.1 foot) N. 29° 30′ E. of *Mount Lore azimuth*, described below.

Mount Lore azimuth (White County, Tenn., W. H. Burger, 1907).—Identical with the triangulation station of the same name on a very sharp-topped hill known as the "High Point," or "Gum Springs Mountain," about 5 miles southwest of Sparta and ¼ mile north of the residence of Martin Young. The station is marked by a drill hole, filled with melted lead, in the solid rock about 18 inches below the surface. The surface mark is the intersection of two cross lines on the top of an 8-inch stone post resting on the solid rock.

Nashville longitude (Davidson County, Tenn., G. W. Dean, 1877; 1915).—In the statehouse grounds at Nashville, on the terrace at the east front of the capitol, in a grass plot to the south and a little east of the equestrian statue of Andrew Jackson. The station is marked by two marble posts, each 7 by 15 by 55 inches, set on end in a heavy concrete foundation and projecting 30 inches above the ground. A drill hole in the concrete between the posts marks the station. The outside face of the west post is inscribed "U. S. Coast and Geodetic Survey" and the outside face of the east post is inscribed "Astronomical Station." The station is 15.512 meters (50.89 feet) or 0″.50 of latitude north and 64.269 meters (210.86 feet) or 2″.57 of longitude east of the center of the State capitol.

Nashville latitude (Davidson County, Tenn., H. W. Blair, 1877; 1915).—Identical with *Nashville longitude*, described above.

Waverly (U. S. G. S.) longitude (Humphreys County, Tenn., S. S. Gannett, 1898).—In the grounds of the county courthouse, just southeast of the building, and identical with United States Geological Survey triangulation station of the same name. The station is marked by a bronze tablet cemented in the center of the capstone on a brick and cement pier 72 by 18 by 21 inches, set 36 inches in the ground. The following distances and azimuths are from the station: Southeast corner of courthouse, 6.4 meters (21 feet), 121° 55′; iron fence, 6.1 meters (20 feet) due east; iron fence, 8.72 meters (28.6 feet) due south.

Waverly (U. S. G. S.) latitude (Humphreys County, Tenn., S. S. Gannett, 1898).—Identical with *Waverly (U. S. G. S.) longitude*, described above.

TEXAS

Alice longitude (Nueces County, Tex., Edwin Smith, 1906).—Distant 0.814 meter (2.67 feet) due north of *Alice azimuth*, described below. The station is marked by a concrete pier 16 by 26 inches, 2½ feet in the ground and 2⅔ feet above the ground.

For notes in regard to marking of stations see p. 130.

Alice latitude (Nueces County, Tex., W. H. Burger, 1905).—Distant 9.03 meters (29.6 feet) due east of *Alice azimuth*, described below. The station is marked by a wooden pier.

Alice azimuth (Nueces County, Tex., W. H. Burger, 1905).—Identical with the triangulation station of the same name in the South Heights addition to the town of Alice, ⅓ mile south of the Mexican National Railway track, about ⅛ mile east of the San Antonio & Aransas Pass Railway track, on a vacant lot belonging to the Alice Land Co., of which F. B. Nayer is manager and a member. The station stands close to the edge of Cactus Avenue, which runs east and west, but has not been fenced, and between King Street on the west and Wright Street on the east. The underground mark is a 60d. nail in the center of a 2-inch iron pipe 2 feet long, filled with concrete and surrounded by a block of concrete 12 inches in diameter. The surface mark is a similar pipe filled with concrete and surrounded by a block of concrete 18 inches in diameter and set flush with the surface. The concrete is marked with the letters "U. S. C. & G. S." and the date. The reference mark, similar to the underground station mark, is at the southwest corner of the house lot of Mrs. E. McKenzie, 0.23 meter (0.8 foot) south of the south fence of the lot, 0.70 meter (2.3 feet) east from its southwest corner, and 53.820 meters (176.57 feet) from the station in azimuth 165° 18′ 14″. The following azimuths are from the triangulation station: Chimney on F. W. Ellis's house, on opposite side of King Street, 56° 23′ 57″; northeast fence corner of F. W. Ellis's house lot, distant 36.93 meters (121.2 feet), 59° 58′ 54″; southeast corner post of vacant lot across King Street from Mrs. McKenzie's house, distant 61.88 meters (203.0 feet), 147° 59′ 14″; south gable of Mrs. E. McKenzie's house, 176° 10′ 51″; Methodist Church spire, 192° 01′ 36″.

Allamore latitude (El Paso County, Tex., C. V. Hodgson, 1914).—Distant 13.32 meters (43.7 feet) in azimuth 231° 31′ 15″ or 0″.27 of latitude north of the triangulation station of the same name. The triangulation station is near a water tank on the north side of the Texas & Pacific Railway track, about 2 miles west of the Allamore section house, and is marked by a cap station mark, similar to the standard bronze mark, screwed to the top of a 3-inch iron pipe, which is anchored by means of an iron rod through a horizontal hole near the bottom of the pipe. The center of the water tank is 8.79 meters (28.8 feet) from the triangulation station in azimuth 338° 11′. The north rail of the track is 12.49 meters (41.0 feet) south of the triangulation station, and the railway fence is 1.56 meters (5.1 feet) north.

Appleby azimuth (Nacogdoches County, Tex., C. L. Garner, 1919).—Identical with the triangulation station of the same name, about 3¼ miles by road east of Appleby, 150 meters south of the Appleby-Miller Mills road, on the top of a hill in the edge of a cultivated field owned by J. T. Greening, and 200 meters east of his house. The station is about 4 meters south of the wire fence separating the property of Mr. Greening and Mr. Crawford, and is marked according to notes 1a and 7a. The reference mark, note 11a, is just inside the wire fence, 25.71 meters (84.4 feet) from the station in azimuth 261° 06′ 40″.

Austin longitude (Travis County, Tex., W. Eimbeck, 1872; Edwin Smith and G. R. Putnam, 1895, 1906; Edwin Smith, 1911, 1919).—The station of 1872 was in the grounds of the public land office (old) of Texas, near the northeast corner of the public reservation. This square is bounded by College Avenue on the north, Brazos Street on the west, Mulberry Street on the south, and an alley on the east. The station was marked by a brick pier, which has since been torn down. It formed the southern terminus of a meridian line, the northern pier of which was still standing in 1919. The north pier was 112.65 meters (369.6 feet) from the 1872 station and practically in Brazos Street. It is a massive monument and is now almost hidden by shrubbery. A large copper bolt marks the meridian point. The station of 1895–1906 is 4.42 meters (14.5 feet) due north of this copper bolt in the north meridian stone. It is marked by a brick and cement pier which in 1911 was in the midst of a large flower bed. The station is in the eastern part of the State capitol grounds. The capitol dome is 134.14 meters (440.1 feet) or 5″.02 west of the stations of 1872 and 1895 and is 173.142 meters (568.05 feet) or 5″.62 north of the station of 1872, and 56.070 meters (183.95 feet) or 1″.83 north of the station of 1895. The station of 1911 is a concrete pier 14 by 26 inches, extending 2 feet below the ground and 34 inches above. It is marked by a bronze astronomical station mark. It is 0.122 meter (0.40 foot) south and 11.716 meters (38.44 feet) or 0s.029 of longitude west of the station of 1895. It was in excellent condition in 1919.

Austin latitude (Travis County, Tex., W. Eimbeck, 1872).—Identical with the longitude station of 1872, described above.

Austin capitol dome, star in hand of Liberty, azimuth (Travis County, Tex., W. H. Burger, 1906).—The station is identical with the triangulation point *Austin, capitol dome, star in hand of Liberty*.

Bachelor latitude (Burnet County, Tex., W. H. Burger, 1906).—Marked by a wooden pier 40.99 meters (134.5 feet) due west of *Bachelor azimuth* described below.

Bachelor azimuth (Burnet County, Tex., W. H. Burger, 1906).—Identical with the triangulation station of the same name (1902), 8 miles by road south of east from Lampasas, and 600 yards northeast of the Lampasas-Georgetown wagon road, at the center of the top of a sharp-pointed hill called "Bachelor Peak," on land of A. S. Eldridge. No reference mark was put in on account of the sharp-pointedness of the hill. The peak was a station of the United States Geological Survey, but no station mark was found. Owing to the shape of the hill it is probable that the station of the United States Geological Survey was within a meter of the station of the Coast and Geodetic Survey. The station is marked as follows: A hole 20 inches in diameter was dug 16 inches deep, to bedrock, in the bottom of which a 60d. nail was set. The surface mark is a piece of terra-cotta pipe, 2 feet long and 4 inches in diameter, with a 60d. nail set in cement. The pipe is surrounded by a block of concrete 18 inches in diameter.

For notes in regard to marking of stations see p. 130.

Baird latitude (Callahan County, Tex., Edwin Smith, 1912).—In the courthouse grounds, west of the courthouse. The station is in a meridian line established at the request of local authorities, and is 29.1 meters (95 feet) from the south stone and 40.7 meters (134 feet) from the north stone. The station is 33.5 meters (110 feet) west and 13.4 meters (44 feet) or 0".44 of latitude north of the triangulation station *Baird courthouse dome.*

Barstow latitude (Ward County, Tex., C. V. Hodgson, 1914).—Distant 33.17 meters (108.8 feet) in azimuth 268° 24′, or 0".03 of latitude north from the courthouse at Barstow.

Beaumont latitude (Jefferson County, Tex., G. D. Cowie, 1921).—On a bluff about 100 feet south from and 25 feet above the Neches River. The latitude station is at an unmarked point 11.28 meters (37.0 feet) or 0".37 south and 20.41 meters (67.0 feet) west from triangulation station *Beaumont (U. S. E.) 1911*, which is outside the city limits of Beaumont, on the west bank of the Neches River on land occupied by the refinery of the Magnolia Petroleum Co., on a bluff 35 meters from the edge of the water and 100 meters southwesterly from a small boiler house. The triangulation station is marked by a 3-inch galvanized iron pipe, 4½ feet long, with a flange at the lower end, set in concrete and projecting 1 foot above the surface of the ground. The station is in the middle of a wide place in the road, where teams and trucks turn about, and has been badly buffetted, until it is now loose in its hole and may be several inches from its original position.

Black latitude (El Paso County, Tex., C. V. Hodgson, 1914).—Identical with *Black azimuth*, described below.

Black azimuth (El Paso County, Tex., J. S. Hill, 1909, 1914).—Identical with the triangulation station of the same name, 30 miles direct and 35 miles by road, N. 23° E. from Sierra Blanca, a town at the junction of the Southern Pacific and Texas & Pacific Railways. The station is on the highest and most southern point of the southeast end of a small range of isolated mountains, known locally as the Black Mountains, but given as the Sierra Prieta Mountains on the United States Geological Survey map of this region. The station is about 400 meters south of the United States Geological Survey triangulation station "Salt," which is marked by a large rock on a very rough peak of about the same height as the one described above. The station is marked according to note 2, with a reference mark, a badly rusted iron nail driven into a crevice in a rock, 6 inches below its top, on the opposite side of the rock from the station and 3.39 meters (11.1 feet) from the station in azimuth 82° 54′.

Blue azimuth (Val Verde County, Tex., E. H. Pagenhart, 1918).—Identical with the triangulation station of the same name, about 31 miles by road west of north from Comstock, 3 miles west of the Comstock-Ozone Ridge road, ¼ mile south of the Roberts ranch, and located on a prominent knob, known as Blue Hill. The station is marked according to notes 1a and 7a, with a reference mark, note 11a, distant 14.68 meters (48.2 feet) in azimuth 114° 54′. The Roberts's windmill is distant ⅛ mile in azimuth 160° 28′.

Boracho longitude (El Paso County, Tex., C. V. Hodgson, 1911, 1914).—About 100 meters south of the Texas & Pacific Railway track and 200 meters southwest of the new section house at Boracho. A concrete pier was built at the station, 14 by 26 inches in cross section, with a notch in the top to give room for the reversing apparatus of the transit. The station is marked by a bronze station mark with the words "Astronomical Station" stamped on the disk in addition to the regular inscription. The station is due south of *Boracho latitude station*, described below, and 6.565 meters (21.54 feet) distant.

Boracho latitude (El Paso County, Tex., C. V. Hodgson, 1911, 1914).—Identical with the triangulation station of the same name marked by a cross on the top of a stone post, 6 by 8 by 20 inches, which projects 1 inch above the ground. A stone post, 6 inches square on top, with a square hole at the center ½ inch deep, surrounded by the letters "U. S. B. M.," is on the south side of the track, directly opposite the section house and 152.34 meters (499.8 feet) from the station in azimuth 235° 05′. The south end of the roof of the Boracho store and post office is 122.74 meters (402.7 feet) from the station in azimuth 262° 27′, and the west end of the roof of the section house is in azimuth 224° 45′. The southeast corner of a large adobe corral is about 40 meters N. 40° E. from the station.

Bowie, northwest base, longitude (Clay County, Tex., O. B. French, 1907).—Identical with *Bowie, northwest base, azimuth*, described below.

Bowie, northwest base, latitude (Clay County, Tex., W. H. Burger, 1906).—Distant 1.708 meters (5.60 feet), or 0".06 south and 1.299 meters (4.26 feet) east from *Bowie northwest base azimuth*, described below. The station was marked by a pier, probably of wood.

Bowie, northwest base, azimuth (Clay County, Tex., W. H. Burger, 1906, 1907).—Identical with the triangulation station of the same name, on a prominent knoll 1 mile southeast of Bellevue, which is on the Fort Worth & Denver City Railway. The station is on land of J. D. Orton, and is marked by a copper bolt leaded into bed rock 3 feet below the surface of the ground, over which is placed a pier of cement and concrete containing a standard bronze station mark, which is the surface mark. The reference mark is on the fence line between Orton's ranch and that to the north. It is a red sandstone post 12 inches deep and 6 inches square, with a hole 1 inch in diameter drilled in the center of the top, which projects 3 inches above the ground. The following azimuths and distances are from the station: Reference mark, 159.16 meters (522.2 feet) 176° 42′; southwest corner of Orton's house, 123.74 meters (406.0 feet), 262° 27′; southwest fence corner of Orton's garden, 22.6 meters (74 feet), 191° 12′.

For notes in regard to marking of stations see p. 130.

Brenner azimuth (Hidalgo County, Tex., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name about 5 miles west of Raymondville, ¼ mile west of the Cameron-Hidalgo County line, and 75 meters north of the center of the wagon road leading west from Raymondville, near the center of a small cleared but uncultivated field belonging to J. P. Brenner, of Raymondville. The station is marked according to notes 1b and 7a, with a reference mark, note 11b, set in the line of telephone poles along the road, 70.75 meters (232.1 feet) from the station in azimuth 346° 10′ 59″.

Brownsville longitude (Cameron County, Tex., E. D. Preston, 1885, 1916).—On the Fort Brown reservation at Brownsville, 47.06 meters (154.4 feet) from the southeast corner of the porch on the south side of the post hospital; 35.79 meters (117.4 feet) in azimuth 265° 58′ from the International Boundary Commission boundary post "R. P. 44," which is a concrete monument 1 foot high standing at the northeast corner of the hospital; the station is about 7 meters west from the row of palm trees on the west side of the roadway. At the station the northern spire of the Matamoras Cathedral is in azimuth 30° 32′; the northeast corner of the post hospital, 48.89 meters (160.4 feet) is in azimuth 82° 20′; the southeast corner of the post hospital, distant 47.06 meters (154.4 feet), is in azimuth 64° 03′. Other distances and azimuths are as follows: Water tank at Fort Brown, 216.71 meters (711.0 feet), 325° 33′; wireless, steel tower, 128.29 meters (420.9 feet), 137° 48′. The station is marked by a large iron cap buried 2 feet under the ground, surmounted by a cylindrical cement mark 12 inches in diameter and 12 inches deep, with a standard station mark in its top, the mark being flush with the surface of the ground. The geodetic position of the station was determined by traverse from station *Garrison*.

Brownsville latitude (Cameron County, Tex., E. D. Preston, 1885, 1916).—Identical with *Brownsville longitude*, described above.

Bynum latitude (Mitchell County, Tex., Edwin Smith, 1912).—Distant 1.945 meters (6.38 feet) west and 0.08 meter (0.3 foot) or 0″.00 of latitude north of *Bynum azimuth*, described below.

Bynum azimuth (Mitchell County, Tex., J. S. Hill, 1909, 1912).—Identical with the triangulation station of the same name 3 miles south of Westbrook, a town on the Texas & Pacific Railway, on a round top hill, in a pasture belonging to G. D. Bynum, of Colorado, Tex., and about 170 meters west of his tenant house. The south gable of Boswell's house is distant about 230 meters in azimuth 270° 10′. The underground mark is the point of a 40d. nail projecting ¼ inch above the concrete that fills an iron pipe, 1½ inches in diameter, and 12 inches long, which in turn is embedded in a cylinder of concrete 12 inches in diameter and 12 inches long. The surface mark is similar to the underground mark, except that the cylinder of concrete and iron pipe are each 24 inches long and the cylinder is 20 inches in diameter. The top of the underground mark is 30 inches below the surface of the ground, and 6 inches of sand or earth separate it from the surface mark. The reference mark is the point of a 40d. nail projecting ¼ inch above the concrete that fills a 1½-inch iron pipe, which in turn is embedded in a cylinder of concrete 12 inches in diameter and 24 inches long. It is 14.612 meters (47.94 feet) from the station in azimuth 356° 44′.

Chamliss latitude (Hamilton County, Tex., W. H. Burger, 1906).—Identical with *Chamliss azimuth*, described below.

Chamliss azimuth (Hamilton County, Tex., W. H. Burger, 1906).—Identical with the triangulation station of the same name, about 3 miles south of the town of Hamilton, on the more northern of two prominent knolls on the land of J. M. Chamliss, 100 meters northwest of his house. The station is marked as follows: A hole 20 inches in diameter was dug, 16 inches deep down to bedrock, and then a hole 8 inches deep and 3 inches in diameter was drilled in the rock; this lower hole was nearly filled with cement and in the cement a 60d. wire nail was inserted, the point of the nail being 2 inches below the surface of the rock; the lower hole was then filled with sand level with the rock and a piece of terra-cotta pipe 16 inches long was placed and a standard disk station mark inserted in the top to mark the station. The reference mark is a 4-inch terra-cotta pipe 2 feet long, set in a hole 1 foot in diameter, both pipe and hole being filled with concrete. The top of the pipe is level with the surface of the ground. A 60d. nail is placed in the top of the pipe and projects ¼ inch above it. The reference mark is near the Hamilton-Lampasas road, at a fence corner which is the northeast corner of Chamliss's property and is 271.296 meters (890.08 feet) from the station in azimuth 240° 04′ 48″.

Cisco (U. S. G. S.) longitude (Eastland County, Tex., R. S. Woodward, 1889).—At Cisco, on a hill near the intersection of Fourth Street and Avenue F. The station is 17.71 meters (58.1 feet) north and 4.94 meters (16.2 feet) west of a well hole cased with iron tubing to a depth of 1,500 feet. The station is marked by a pier similar to that at *Spearville (U. S. G. S.) longitude* (Kansas). (See p. 183.) The station is a geodetic point.

Cisco (U. S. G. S.) latitude (Eastland County, Tex., R. S. Woodward, 1889).—Identical with *Cisco (U. S. G. S.) longitude*, described above.

Conway longitude (Carson County, Tex., W. B. Fairfield, 1920).—In the town of Conway at the railroad station on the Rock Island Railroad right of way. The station was marked by a temporary wooden pier 18.91 meters (62.0 feet) south and 1.21 meters (4.0 feet) west of the United States Coast and Geodetic Survey bench mark on the railroad right of way at Conway station and 64.870 meters (212.83 feet) or 2″.11 north and 684.177 meters (2,244.67 feet) or 27″.05 east of *Conway azimuth*, described below.

Conway latitude (Carson County, Tex., W. B. Fairfield, 1920).—Identical with *Conway longitude*, described above.

For notes in regard to marking of stations see p. 130.

Conway azimuth (Carson County, Tex., E. O. Heaton, 1921).—Identical with the triangulation station of the same name, about 0.4 mile west of the railway station at Conway, on the Rock Island Railroad right of way, about 35 meters south of the main track, 15 meters east of a railway switch, 15 meters north of the south right-of-way fence, and 50 meters east of the north-and-south fence where the road makes a slight jog. The station is marked according to notes 1a and 7a, with two reference marks, note 11a. The first is 20.75 meters (68.1 feet) from the station in azimuth 2° 54′; the second is 55.63 meters (182.5 feet) from the station in azimuth 115° 25′.

Dentonio azimuth (Dimmit County, Tex., C. L. Garner, 1917).—Identical with the triangulation station of the same name, about 1½ miles southeast of Dentonio. To reach the station from Dentonio, take the road south for Catarina ranch, 1¼ miles across a small valley and up a fairly steep hill; turn to the east and follow the ridge ½ mile to the station, which is on the highest part and at the eastern extremity of the highest hill in the vicinity. The station is marked by a bronze tablet in concrete, as described in notes 1a and 7c, with a reference mark, a bronze tablet in concrete, as described in note 11a, 11.210 meters (36.78 feet) from the station in azimuth 171° 40′.

Dollar Point latitude (Galveston County, Tex., R. H. Fauntleroy, 1848).—Identical with *Dollar Point azimuth*, now lost.

Dollar Point azimuth (Galveston County, Tex., J. E. Hilgard, 1848).—Lost.

Donna longitude (Hidalgo County, Tex., C. V. Hodgson, 1913; 1916).—Distant 0.17 meter (0.6 foot) north and 31.607 meters (103.70 feet) or 1″.14 west from *Donna azimuth*, described below. The station was marked originally by a tack in the center of a concrete pier, but in 1913 the pier was found broken off even with the surface of the ground, the base being in place.

Donna azimuth (Hidalgo County, Tex., C. V. Hodgson, 1913; 1917).—Identical with the triangulation station of the same name, about ½ mile southeast of Donna, on the west side of a large irrigation canal, on land owned by Doctor Roberts, of Donna. The station is marked according to notes 1b and 7a, with a reference mark, note 11b, 31.58 meters (103.6 feet) from the station in azimuth 8° 07′ 08″. "Donna 1913" was stamped on the metal station and reference marks. A Mexican jacal is 25 meters east of north from the station.

Dryden east base longitude (Terrell County, Tex., W. B. Fairfield, 1919).—Marked by a temporary wooden pier, 12.34 meters (40.5 feet) or 0″.40 due north from *Dryden east base azimuth*, described below.

Dryden east base latitude (Terrell County, Tex., W. B. Fairfield, 1919).—Identical with *Dryden east base longitude*, described above.

Dryden east base azimuth (Terrell County, Tex., E. H. Pagenhart, 1918; 1919).—Identical with the triangulation station of the same name, on the first ridge about ¾ mile east of Dryden railroad station, on the prolongation of the north rail tangent of the main track of the Southern Pacific Railway. The station is on Bassett's ranch, about 300 feet south of the railroad track, and is marked by a bronze tablet in concrete, as described in notes 1a and 7a, with a reference mark, a bronze tablet in concrete, as described in note 11a, 45.97 meters (150.8 feet) from the station in azimuth 58° 04′.

Eagle azimuth (El Paso County, Tex., J. S. Hill, 1909).—Identical with the triangulation station of the same name on the highest peak of the Eagle Mountains, locally known as Eagle Peak, 25 miles southeast of Sierra Bianca, a town at the junction of the Southern Pacific and Texas & Pacific Railways, and 8⅓ miles direct, or 13 miles by road and trail from Dalberg, a station on the Southern Pacific. It is 2 miles northwest of the "Francisco" sheep ranch and on the same peak as the United States Geological Survey station *Eagle*, the marking of which could not be found. The station is marked according to note 2, with a reference mark, a cross cut on a rock over the edge of the hill, 5.77 meters (18.9 feet) from the station in azimuth 177° 01′.

El Paso longitude (El Paso County, Tex., G. R. Putnam, 1892; 1899; C. V. Hodgson, 1911; 1913).—The station of 1892 was located in the United States military reservation, now Cleveland Park, about 250 meters nearly due west from the plaza of El Paso, in the block bounded by Missouri, Santa Fe, El Paso, and Franklin Streets. The station is now lost. The following connections with geodetic points were made: *El Paso courthouse, highest flagstaff*, is 660.8 meters (2,168 feet) or 25″.11 of longitude east and 173.6 meters (570 feet) or 5″.64 of latitude south of the station; the *Federal building, highest flagstaff*, is 280.75 meters (921.1 feet) or 10″.66 of longitude east and 107.00 meters (351.0 feet) or 3″.47 of latitude south of the station; a stone even with the surface of the ground, in the plaza, west of the fountain, supposed to be Wheeler's longitude and latitude station of 1878 (now lost), was 246.1 meters (807 feet) or 9″.35 of longitude east and 31.8 meters (104 feet) or 1″.03 of latitude south of the station. The station of 1911–1913 is in the same part of the square that the old station was in; that is, in the western part of what is now Cleveland Park, about 30 meters west of the new concrete band stand. The pier is built of concrete, 18 inches by 34 inches in cross section and with its foundation 3 feet below the ground. The station of 1911–1913 is 2.28 meters (7.48 feet) due south of triangulation station *West*, not marked, and 119.44 meters (391.9 feet) north, and 277.63 meters (910.9 feet) or 10″.55 west of triangulation station *Mills*, which is the tall iron flagstaff on the new Mills Building, opposite post office; 156.06 meters (512.0 feet) north and 381.82 meters (1,252.7 feet) or 14″.50 west of triangulation station *Weather* an iron pole on weather bureau; and 191.21 meters (627.3 feet) north and 727.04 meters (2,385.3 feet) or 27″.62 west of *El Paso courthouse flagstaff*, and is therefore 0s.166 of longitude west of the station of 1892.

El Paso latitude (El Paso County, Tex., G. R. Putnam, 1892).—Due west 1.28 meters (4.2 feet) from the longitude station of the same year described above. The station is now lost.

For notes in regard to marking of stations see p. 130.

Estes latitude (Ward County, Tex., C. V. Hodgson, 1914).—Identical with *Estes azimuth*, described below.

Estes azimuth (Ward County, Tex., J. S. Hill, 1909; 1914).—Identical with the triangulation station of the same name, 7¼ miles direct, or 9 miles by road, S. 30° W. from Monahans, a town on the Texas & Pacific Railway, 5½ miles direct S. 10° E. from the section house or Aroya switch on the same railroad, on land owned by E. W. Estes, and 400 meters northeast of his house. The windmill and cottonwood trees at Mr. Estes' house may be seen from Monahans, the trees being very prominent and the only ones in the vicinity. The underground mark is a 40d. wire nail cemented into a drill hole in the solid rock, the point of the nail projecting about ¼ inch. The surface mark is a cap station mark with an inscription similar to the standard bronze station marker, screwed to the top of a 3-inch pipe 30 inches long, which is embedded in a concrete cylinder 20 inches in diameter and 30 inches long. The reference mark is a ¾-inch iron rod 18 inches long, set in a cylinder of concrete 12 inches in diameter and 18 inches long. It is 21.279 meters (69.81 feet) from the station in azimuth 276° 03′. Estes' windmill is about ¼ mile from the station in azimuth 31° 01′.

Fronton azimuth (Cameron County, Tex., W. H. Burger, 1905; 1906).—Identical with the triangulation station of the same name, in the town of Point Isabel, on the same ridge and about 90 meters north of the lighthouse, and in the yard of Mrs. Wren. The station is marked as follows: The subsurface mark is a beer bottle 8 inches long filled with concrete and incased in a cylinder of concrete. The bottle is 2½ feet below the surface of the ground. Over the subsurface mark was placed a layer of sand and earth 6 inches thick, and upon this was set the surface mark, consisting of a piece of terra-cotta sewer pipe 6 inches in diameter and 26 inches long, filled with concrete and incased in a cylinder of concrete 18 inches in diameter and 26 inches long; in the center of the top of the pipe was embedded a bottle. A nail has its point projecting ¼ inch above the concrete. The top of the cylinder of concrete has the letters "U. S. C. & G. S. 1905" around the top. The reference mark is a piece of sewer pipe 6 inches in diameter and 26 inches long; the pipe is set in concrete and then filled with concrete, with a 12d. nail set down in the center of the top of the pipe, its point projecting ¼ inch above the concrete. From the station the northwest corner of Mrs. Wren's house bears N. 37° E., 12.210 meters (40.06 feet); the southwest corner of the porch bears N. 78° E., 3.310 meters (10.86 feet); the southwest corner of the yard fence bears S. 56° E., 6.570 meters (21.56 feet); and the southwest yard fence, in the direction S. 37° W., is distant 1.010 meters (3.31 feet).

Galveston longitude (Galveston County, Tex., E. Goodfellow, 1868; Edwin Smith and C. H. Sinclair, 1885; Edwin Smith and G. R. Putnam, 1895).—The station of 1868 was marked by a stone crock with a bottle in the center buried almost a foot below the surface of the ground. Two wooden posts were sunk flush with the surface of the ground at a distance of 4.4 meters (14 feet) east and west from the station. The station of 1868 is 94.81 meters (311.1 feet) or 3″.514 or 0ˢ.234 east and 127.10 meters (416.99 feet) south of the north tower of the cathedral. The station of 1885 was placed in the square to the west of the station of 1868. It was marked only by wooden posts and was 71.49 meters (234.5 feet) or 2″.647 or 0ˢ.177 west of the north tower of the cathedral and 171.92 meters (564.0 feet) south of it. The station of 1895 is near the middle of the north side of the Ball High School square. It is 11.3 meters (37 feet) from the street curb at Avenue G, 34.2 meters (112 feet) from the north basement doorsill of the Ball High School, and 50.66 meters (166.2 feet) or 1″.875 or 0ˢ.125 west and 112.89 meters (370.4 feet) south of the north tower of the cathedral. The station is marked by the foundation of the brick pier. *Galveston Cathedral north tower* is a geodetic point.

Galveston Island east base latitude (Galveston County, Tex., G. W. Dean, 1853).—An unmarked point 15.76 meters (51.7 feet) or 0″.51 of latitude north and 44.12 meters (144.8 feet) east of *Galveston Island east base azimuth*, described below.

Galveston Island east base azimuth (Galveston County, Tex., G. W. Dean, 1853).—Identical with the triangulation station of the same name on Galveston Island, about ½ mile from the Gulf shore. The station is marked by a cross in a bolt in a cement post, 2 feet below the surface. The station can be recovered, if at all, by triangulation only.

Gilbert latitude (Parker County, Tex., W. H. Burger, 1906).—Identical with *Gilbert azimuth*, described below.

Gilbert azimuth (Parker County, Tex., W. H. Burger, 1906).—Identical with the triangulation station of the same name 6½ miles by road north of west from Weatherford, 1½ miles north of the railway station at Lambert, ½ mile north of the Weatherford-Mineral Wells wagon road, and ½ mile south of the Blue Springs-Weatherford road, at about the center of the prominent bare ridge, on land of Mrs. A. N. Spivey. The station is marked in a manner similar to *Alice azimuth* (see p. 245). The reference mark is similar to the station mark and distant from it 109.831 meters (360.34 feet) in azimuth 261° 56′ 39″. It is in a fence line east of the station and near the top of the ridge.

Higgins (U. S. G. L. O.) longitude (Lipscomb County, Tex., Arthur D. Kidder and Augustus MacConnel, 1903.—About ¼ mile north of the Sante Fe Railroad and near the one hundredth meridian. The station is marked by a concrete pier in the shape of a frustum of a pyramid, the upper base 18 by 24 inches, lower base 24 by 30 inches, extending 36 inches below and 30 inches above the ground.

Higgins (U. S. G. L. O.) latitude (Lipscomb County, Tex., Arthur D. Kidder and Augustus MacConnel, 1903).—The station is 77.10 meters (252.78 feet) or 2″.50 of latitude due south of the boundary monument

For notes in regard to marking of stations see p. 130.

which is near the northeast point of a rolling ridge which bears northeast and southwest. The monument is a concrete monument set in heavy galvanized iron. The monument is in the shape of a frustum of a cone, upper diameter 16 inches, lower diameter 24 inches, altitude 60 inches; set 26 inches in the ground on solid rock and extending 34 inches above ground. It is marked on the southwest face "36° 30′ N. L., 100° W. L., 1903" and is surrounded by a circular mound of earth and stones. A white sandstone, 2 by 8 by 14 inches, lying on the ground and marking the position for the quarter section corner of sections 4 and 5, T. 23 N., R. 26 W., Indian meridian, Oklahoma, bears N. 58° 11′ E., distant about 180 feet. The terminal monument of the Cimarron base line, a sandstone 16 by 12 by 48 inches above ground, marked on the north "100° W. L.," on the east "I. T.," on the south "N. E. Cor Texas," and on the west "36° 30′ N. L.," is about 243 feet south and 1,754 feet west from the station.

Jacksonville longitude (Cherokee County, Tex., C. H. Sinclair, 1890, J. E. McGrath, 1919).—The station of 1890, now lost, was 84.80 meters (278.2 feet) or 3″.23 east and 363.09 meters (1,191.2 feet) or 11″.79 north of the *Methodist Church spire.* The station of 1919 is in the grounds of the Baptist College, near the Lamar Street line of the college property and a little east of the roadway extending across the campus and in front of the college building. The station is marked by a temporary wooden pier, 9.44 meters (31.0 feet) or 0″.31 due north of the center of *Jacksonville azimuth,* described below.

Jacksonville latitude (Cherokee County, Tex., C. H. Sinclair, 1890; J. E. McGrath, 1919).—The stations are each identical with the longitude stations of the same name and date, described above.

Jacksonville azimuth (Cherokee County, Tex., C. L. Garner, 1919).—Identical with the triangulation station *Jacksonville Laplace,* on the south side of the grounds of the Baptist University of Jacksonville, 3.0 meters (10 feet) north of the drain gutter, about 8 meters north of the center of Lamar Street, about 9 meters east of the road and walk leading from Lamar Street to the building, and 60 meters from the center of the door of the building. The station is marked according to notes 1a and 7a, the disk being stamped "JAX LAPLACE." The reference mark, note 11a, is 13.86 meters (45.5 feet) from the station is azimuth 95° 49′. The cupola of the university is in azimuth 163° 37′ 40″.

Johnstone longitude (Val Verde County, Tex., J. E. McGrath, 1919).—Marked by a temporary wooden pier, 6.578 meters (21.58 feet) or 0″.24 west and 2.722 meters (8.93 feet) or 0″.09 south of *Johnstone azimuth,* described below.

Johnstone latitude (Val Verde County, Tex., J. E. McGrath, 1919).—Identical with *Johnstone longitude* described above.

Johnstone azimuth (Val Verde County, Tex., C. L. Garner, 1918; 1919).—Identical with the triangulation station of the same name about 8½ miles east of Del Rio, 12 meters south of the Southern Pacific Railway tracks at Johnstone siding, 15 meters east of the station board, and 3 meters north of the wire fence on the north side of the main road. The station is marked by a bronze tablet in concrete, as described in notes 1a and 7c, with a reference mark, a bronze tablet in concrete, as described in note 11a, 6.742 meters (22.12 feet) from the station in azimuth 268° 43′. Precise level bench mark E-31 is 220.35 meters (722.9 feet) from the station in azimuth 248° 08′.

Jupiter latitude (Brazoria County, Tex., G. W. Dean, 1853).—An unmarked point 26.46 meters (86.8 feet) or 0″.86 of latitude north and 9.94 meters (32.6 feet) east of *Jupiter azimuth,* now lost.

Jupiter azimuth (Brazoria County, Tex., G. W. Dean, 1853).—Identical with the triangulation station of the same name, now lost.

Karnes latitude (Karnes County, Tex., W. H. Burger, 1906).—Marked by a wooden pier 4.84 meters (15.9 feet) due east of *Karnes azimuth,* described below.

Karnes azimuth (Karnes County, Tex., W. H. Burger, 1904; 1906).—Identical with the triangulation station of the same name about ¾ mile southwest of Karnes City, 125 paces south of the Karnes City and Campbellton wagon road, on land belonging to Robert Salge, 26.91 meters (88.3 feet) from the southwestern gable of his house and 16.93 meters (55.5 feet) southwest of the southwest corner of his yard. The azimuth of the southwest gable of Mr. Salge's house from the station is 253° 18′ 20″. The reference mark, a concrete block 12 inches in diameter, is near the southeast corner of Mr. Salge's yard, 0.08 meter (0.3 foot) from the east fence, 0.46 meter (1.5 feet) from the south fence, and 30.024 meters (98.50 feet) from the station in azimuth 283° 08′ 51″. The station is marked by a standard disk station mark in a 2-inch gas pipe set in concrete.

Lacasa latitude (Stephens County, Tex., Edwin Smith, 1912).—Marked by a wooden tripod 2.71 meters (8.9 feet) east and 0.012 meter (0.04 foot) south of *Lacasa azimuth,* described below.

Lacasa azimuth (Stephens County, Tex., William Bowie, 1908; 1912).—Identical with the triangulation station of the same name 13 miles due north of Ranger, a town on the Texas & Pacific Railway, 3 miles north of Lacasa post office and 1 mile west of the Ranger-Caddo road, on top of the highest peak of a very prominent ridge. The peak is somewhat rounded and is partly covered with low trees. The station is on the property of Robert Millholland and is 6.80 meters (22.3 feet) south of the fence between his property and that of Matt Stevenson. The center of Millholland's house is about 200 meters from the station in azimuth 348° 38′. The station is marked by the point of a 40d. nail projecting ¼ inch above the concrete that fills an iron pipe 1½ inches in diameter and 12 inches long, which in turn is embedded in a cylinder of concrete, 12 inches in diameter and 12 inches long. The surface mark is similar to the underground mark, except that the cylinder of concrete

For notes in regard to marking of stations see p. 130.

and the iron pipe are each 24 inches long and the cylinder is 20 inches in diameter. The top of the underground mark is 30 inches below the surface of the ground, and 6 inches of sand or earth separates it from the surface mark. The reference mark is the point of a 40d. nail projecting ¼ inch above the concrete that fills an iron pipe 1½ inches in diameter and 24 inches long, which in turn is embedded in a cylinder of concrete 12 inches in diameter and 24 inches long. It is 25.96 meters (85.2 feet) from the station in azimuth 97° 10″.

Laguna Madre, north base, latitude (Nueces County, Tex., W. H. Burger, 1905).—Marked by a wooden pier 10.03 meters (32.9 feet) due east of *Laguna Madre north base azimuth* described below.

Laguna Madre, north base, azimuth (Nueces County, Tex., R. E. Halter, 1882; 1912).—Identical with the triangulation station of the same name about 2½ miles south of Flour Bluff and about 250 meters back from the west shore of the Laguna Madre, in a cleared field, formerly in cultivation but now in pasture, belonging to William Hoffman (or to William Turcotte), living in Corpus Christi. The station is 67 paces from Hoffman's windmill and 162 paces S. 34° W. from where his house once stood. The station was marked in 1883 as follows: A pit 7 feet square was excavated to a depth of 2 feet; in the center of the pit an irregular stone about 14 inches square and 10 inches thick was set. A hole was drilled in the top of this stone and filled with lead and the point marked thereon with cross lines. Resting on this stone stands a piece of white marble 2½ feet long and 6 inches square, with the letters "U. S." on its south face, "C. & G." on its east face, and "SUR" and "VEY" on its north and west faces, respectively, the letters being near the top and deeply cut. In the top of the marble post was drilled a hole 1 inch in diameter and 3 inches deep; this hole was filled with lead and the center marked thereon by cross lines, which in 1905 had become erased. The post stands 1 inch above the ground. Around this post were laid symmetrically, first, two layers of brick each 5 feet square, then two layers each 3 feet square, then 1 layer 2 feet square, and finally 1 layer 1½ feet square. Sand and loose rock was then filled in the whole, forming a compact mass. The bricks used were a concrete of lime and shells and were 12 by 6 by 4 inches in size. The stone used for the underground mark and for filling in around the station was a conglomerate of small shells found in the vicinity of Baffins Bay. The reference mark is a piece of terra-cotta pipe, 4 inches in diameter and 2 feet long, filled with concrete and embedded in a cylinder of concrete 18 inches in diameter and 2 feet long. In the center of its top is placed a 60d. steel spike, head down, its point projecting about ¼ inch above the surface of the concrete, which was finished with ½ inch of neat cement mortar and marked with the letters "U. S. R. M. 1905." The reference mark is 13.99 meters (45.9 feet) from the station in azimuth 135° 21′. The following azimuths are from the triangulation station: North gable of Grant's ranch house on Mustang Island, 272° 14′ 40″; east end of ridge of two-story farmhouse, distant 2 miles, 35° 32′ 09″; windmill, distant 1½ miles, 206° 07′ 38″.

Laplace longitude (Maverick County, Tex., W. B. Fairfield, 1919).—Marked by a temporary wooden pier 3.52 meters (11.5 feet) or 0″.11 of latitude due north of *Laplace azimuth*, described below.

Laplace latitude (Maverick County, Tex., W. B. Fairfield, 1919).—Identical with *Laplace longitude*, described above.

Laplace azimuth (Maverick County, Tex., C. L. Garner, 1918; 1919).—Identical with the triangulation station of the same name on "Hillcrest," the first hill northeast of Eagle Pass, on the highest part of the hill, about ½ mile from the courthouse, 90 meters northeast and 24 meters south from the road encircling the hill, 10 meters north of the range formed by the standpipe on the hill and the Eagle Pass clubhouse, and on range with the courthouse and the southern end of the express office. The station is marked by a bronze tablet set in concrete, as described in note 1a, with a reference mark, a bronze tablet, as described in note 12a, set in solid rock 4 meters north of the road, 39.990 meters (131.20 feet) from the station in azimuth 181° 11′. The standpipe is 100 meters from the station in azimuth 311° 22′.

Laredo longitude (Webb County, Tex., E. Smith, G. R. Putnam, 1895; 1919).—Marked by a brick pier 62.627 meters (205.47 feet) or 2″.04 north and 43.034 meters (141.19 feet) or 1″.57 west of *Laredo north wireless tower*. The station is 37.95 meters (124.5 feet) S. 62° W. (mag.) from northeast entrance to Fat McIntosh (center of gateway in line of Victoria Street), and 94.34 meters (309.5 feet) S. 36° E. (mag.) from east corner of hospital. The pier has a cross section of 17 by 27 inches, with 24 inches of the pier below the surface and 36 inches above. A brass plate, 8 by 11 inches, bolted to the top of the pier bears the following inscription: "U. S. Coast and Geodetic Survey, latitude 27° 30′ 29″.7, longitude 99° 31′ 02″.58."

Laredo latitude (Webb County, Tex., G. R. Putnam, 1895; 1919).—Distant 1.74 meters (5.7 feet) due west from *Laredo longitude*, described above.

Laredo azimuth (Webb County, Tex., C. L. Garner, 1917).—Identical with the triangulation station of the same name which was reported lost in 1922.

Lavaca latitude (Calhoun County, Tex., E. Goodfellow, 1868).—Marked by three yellow pine blocks 8.87 meters (29.1 feet) or 0″.29 north and 12.71 meters (41.7 feet) east from *Lavaca azimuth*, described below.

Lavaca azimuth (Calhoun County, Tex., G. W. Dean, 1868).—Identical with the triangulation station of the same name, on the west side of Lavaca Bay, about 1 mile north of Port Lavaca. The station is marked by a bottle buried 1 foot below the surface of the ground, and by 4 trough-shaped iron posts each 6 feet from the station, north, east, south, and west.

Lee azimuth (Freestone County, Tex., C. L. Garner, 1919).—Identical with the triangulation station of the same name about 4 miles north of Oakwood, 4 miles south of Butler, ⅛ mile west of the Oakwood-Butler

For notes in regard to marking of stations see p. 130.

road, on top of a sandy cultivated hill, owned by Ben Lee, whose house is about 100 meters to the northeast of the station. The station is about 30 meters north of a lane leading to the east, and the road leading up to the station from the Butler-Oakwood road is a long narrow lane in deep sand. The station is marked according to notes 1a and 7a, with a reference mark, note 11a, 35.43 meters (116.2 feet) distant in azimuth 311° 59′ 41″. The tall smokestack at Palestine is in azimuth 23° 28′ 43″.

Matagorda longitude (Matagorda County, Tex., C. V. Hodgson, 1911).—Station is 29.59 meters (97.1 feet) north, and 78.37 meters (257.1 feet) or 2″.89 east of triangulation station *Bay View, 1906*, on the old Bay View Hotel. It is about 200 meters S. 20° W. (mag.) from the railroad station, in a vacant square belonging to the town. A concrete pier, 18 by 24 inches, with a foundation 24 inches below the ground, has a brass disk similar to the standard disk triangulation station mark, but inscribed "Astronomic Station," set in the center of the notch in the pier. The observatory which was built around the pier was left standing. The station is 2.13 meters (6.5 feet) due north of the geodetic point *Matagorda 2*, which was not marked.

Matagorda, south base, azimuth (Matagorda County, Tex., R. E. Halter, 1883).—Identical with the triangulation station of the same name, which is now lost.

Miller latitude (Bee County, Tex., W. H. Burger, 1905).—Very nearly in the center of a north and south lane and 4.50 meters (14.8 feet) due west of *Miller azimuth*, described below.

Miller azimuth (Bee County, Tex., W. H. Burger, 1904; 1905).—Identical with the triangulation station of the same name 9 miles by road S. 25° W. from Beeville on the east fence line of the Beeville, Almos schoolhouse, and Mathis wagon road, on the west side of a large pasture owned by I. J. Miller, cashier of the Commercial Bank of Beeville. This pasture is known as the Berry pasture, having been owned until recently by P. H. Berry, proprietor of a livery and feed stable in Beeville. The station is 1.55 meters (5.1 feet) west of the east fence of a lane, 35.440 meters (116.27 feet) north of the south boundary of the Berry pasture, and 191 paces south of the gate opening into the pasture. The station was marked in the same manner as *Alice azimuth*. (see p. 245). The reference mark is 48.403 meters (158.80 feet) from the station in azimuth 180° 21′ 40″. The following azimuths are from the station: Southeast chimney of J. G. Roundtree's house, distant 1¼ miles, 56° 32′ 31″; largest chimney on Bud Clare's house, distant 1¼ miles, 243° 56′ 21″.

Mission latitude (Comal County, Tex., W. H. Burger, 1906).—Marked by a wooden pier 5.10 meters (16.7 feet) due east of *Mission azimuth*, described below.

Mission azimuth (Comal County, Tex., W. H. Burger, 1906).—Identical with the triangulation station of the same name on Mission Hill, 3 miles by road west of New Braunfels, on land owned by Frank Careth and about 40 paces N. 5° W. (mag.) from the northwest corner of his house, and on the top of the same hill. It is identical with the United States Geological Survey station *Mission Hill*, and is marked with their usual pipe, which projects 0.85 foot above the ground. The tower is to be boarded up and used as a granary by Mr. Careth. The reference mark is close to the fence line on the top of the hill, 0.67 meter (2.2 feet) west from the fence and 1.77 meters (5.8 feet) and 2.41 meters (7.9 feet) north and south, respectively, from two large trees near the tower to which the fence is nailed. Distances and azimuths to various points are as follows: Reference mark, 6.493 meters (21.30 feet) S. 22° 45′ E. (mag.); south gable of Frank Careth's house, about 50 paces, 0° 40′ 33″; flagpole on the courthouse at New Braunfels, 2½ miles, 288° 09′ 01″; standpipe of the city water tower, New Braunfels, 2½ miles, 295° 38′ 01″. The reference mark is a 60d. nail set in a pipe filled with concrete, with the letters "U. S. C. & G. S., 1903" cut in the cement. Beneath it is a smaller pipe.

Monahans (U. S. G. L. O.) longitude (Winkler County, Tex., Arthur D. Kidder and Augustus MacConnel, 1903).—About 990 feet north of the depot of the Texas & Pacific Railroad at Monahans, near the one hundred and third meridian. The station is marked as at *Higgins longitude* (see p. 249).

Monahans (U. S. G. L. O.) latitude (Winkler County, Tex., Arthur D. Kidder and Augustus MacConnel, 1903).—The station is 557.9 meters (1,832.2 feet) or 18″.13 of latitude due south of the boundary momument, which is near the southeast corner of New Mexico, at the point of intersection of the one hundred and third meridian and thirty-second parallel. The monument is a concrete monument set in heavy galvanized iron. The monument is in the shape of a frustum of a cone, upper diameter 16 inches, lower diameter 24 inches, altitude 60 inches, set 30 inches in the ground on a chalky hardpan, extending 30 inches above ground and marked on the northwest face "32° N. L. 103° W. L. 1903," and surrounded by a large circular mound of stone. A subsurface witness mark, a barrel placed 36 inches below surface, filled three-fourths full of concrete, is 26 feet east and 1,832 feet south of the station.

Monument azimuth (Starr County, Tex., C. V. Hodgson, 1917).—Identical with the triangulation station of the same name about 3 miles east of Riogrande, on a rocky point of the terrace or bench, 150 meters (492 feet) north of the military road. A brick monument, easily visible from the road, is 12.9 meters (42 feet) from the station in azimuth 124° 26′ 46″. Monument R. P. 4, International Boundary Commission Survey, a few meters north of the road, is 150.58 meters (494.0 feet) from the station in azimuth 82° 57′ 12″. The station is marked by a bronze tablet in concrete, as described in notes 1a and 7c, with a reference mark, a bronze tablet in concrete, as described in note 11a, 11.76 meters (38.6 feet) from the station in azimuth 228° 36′ 50″.

Pilot latitude (Erath County, Tex., W. H. Burger, 1906).—Identical with *Pilot azimuth*, described below.

Pilot azimuth (Erath County, Tex., W. H. Burger, 1906).—Identical with the triangulation station of the same name, 5 miles northeast of Stephenville and ¾ mile south of the upper Stephenville-Granbury wagon

For notes in regard to marking of stations see p. 130.

road, on the northwest side of a round flat-topped peak known as "Pilot Knob," about 60 meters northeast of a pond of water on the western side of the hill, and on land owned by J. W. Chenault. The station is marked in the same manner as *Gilbert azimuth* (see p. 249) except that the underground mark is a 60d. nail set in concrete. The reference mark is in the southwest corner of Chenault's garden and is 315.473 meters (1,035.01 feet) from the station in azimuth 62° 29′ 22″.

Point Isabel longitude (Cameron County, Tex., Edwin Smith, and J. E. McGrath, 1906).—Marked by a concrete pier 21.21 meters (69.6 feet) north and 10.60 meters (34.8 feet) or 0″.38 east of *Fronton azimuth* (see p. 249).

Point Isabel, east base, azimuth (Cameron County, Tex., R. E. Halter, 1886; 1913).—Identical with the triangulation station of the same name, about 2.8 miles from Point Isabel, about 250 meters (820 feet) from the shore of Laguna Madre, on hard land near a motte. The station is marked as follows: The subsurface mark is a beer bottle 8 inches long filled with concrete and incased in a cylinder of concrete. The bottle is 2½ feet below the surface of the ground. Over the subsurface mark was placed a layer of sand and earth 6 inches thick and upon this was set the surface mark, consisting of a piece of terra-cotta sewer pipe 6 inches in diameter and 26 inches long, filled with concrete and incased in a cylinder of concrete 18 inches in diameter and 26 inches long. In the center of the top of the pipe was embedded a bottle. A nail has its point projecting ¼ inch above the concrete. The top of the cylinder of concrete bears the letters "U. S. C. & G. S. 1905" around the top. The reference mark is a piece of sewer pipe 6 inches in diameter and 26 inches long; the pipe is set in concrete and then filled with concrete, with a 12d. nail set head down in the center of the top of the pipe, its point projecting ¼ inch above the concrete. The reference mark is 11.685 meters (38.34 feet) from the station in azimuth 232° 30′.

Pyle azimuth (Pecos County, Tex., E. H. Pagenhart, 1917).—Identical with the triangulation station of the same name, about 15 miles northwest from Longfellow, 5 miles northeast from the old Purinton ranch, 3 miles north from the old Baxter ranch, now headquarters for the Pyle ranch, 1 mile southeast from Bull trap mill and tank in Big Canyon, on top of the mesa, and about ¾ mile from a dim road which leads up and across the mesa. The station is marked by a bronze tablet in a bowlder, as described in notes 4 and 9c, with a reference mark, a bronze tablet in a bowlder, as described in note 12c, 19.54 meters (64.1 feet) distant in azimuth 156° 47′.

Raymond azimuth (Cameron County, Tex., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name about 2½ miles east of Raymondville, ¾ mile east of the crossroads at the northwest corner of the Raymond farm, ¼ mile east of a small lake at the side of the road. and about 25 meters north of the center of the wagon road. The station is marked as in notes 1b and 7a, with a reference mark, note 11b, set in the fence line on the south side of the road, 32.26 meters (105.8 feet) from the station in azimuth 340° 42′ 26″ and at the same elevation as the station.

Red River (U. S. G. L. O.) longitude (Childress County, Tex., Arthur D. Kidder and Augustus MacConnel, 1902; 1923).—Identical with triangulation station of the same name about 3 miles east of Kirkland, ¼ mile north of the Fort Worth & Denver Railroad, ¼ mile north of the Quanah-Childress highway, on land owned by H. M. Thomas. The station is in a small cultivated field about 100 meters northeast of Mr. Thomas's house, and near the one hundredth meridian. The station is marked by a concrete pier in the shape of a frustum of a pyramid, the upper base 18 by 24 inches, lower base 24 by 30 inches, set 30 inches in the ground on solid rock, and extending 30 inches above the surface. A point on the meridian boundary between Childress and Hardeman counties, marked by a sandstone 10 by 18 inches above ground, with letters "C C" on west face and "H C" on east face, bears S. 77° 24′ E., and is distant 2,610 feet.

Rio Grande latitude (Cameron County, Tex., W. H. Emory, 1853; 1867).—Identical with the triangulation station *Rio Grande Observatory*, which is on a barren hill about 15 feet above tidewater, on the United States side of the mouth of the Rio Grande River. The station was marked by a monument of masonry, crosslines marking the center. In 1867 the crosslines were gone, what was probably only the base of the monument remaining; its center was considered the center of the station. The hill on which the station was standing being in danger of washing away, was protected with planking.

Rio Grande (U. S. G. L. O.) latitude (El Paso County, Tex., Arthur D. Kidder and Augustus MacConnel, 1903). The station is 118 meters (387 feet) or 3″.83 of latitude due south of the boundary monument, which is near the boundary between New Mexico and Texas at the point of intersection of the thirty-second parallel and the Rio Grande River. The station is marked by a concrete monument set in galvanized iron. The monument is in the shape of a frustum of a cone, upper diameter 16 inches, lower diameter 24 inches, altitude 60 inches, set 28 inches in the ground, on a concrete base 8 inches deep, extending 32 inches above ground, marked on the east face "32° N. L. 1903," and surrounded by a circular mound of stones. The closing corner of secs. 35 and 36, T. 26 S., R. 3 E., New Mexico principal meridian, on the Texas and New Mexico boundary, a conglomerate stone 6 by 9 inches by 10 inches above ground, marked "C C" on the south, 1 groove on the east, and 5 grooves on the west face, bears N. 89° 55′ E., distant 1,892 feet from the station. Mile corner 208, set in 1911 by the United States and Texas Boundary Commission, a hollow iron pipe, 36 inches long and 3 inches in diameter, filled with concrete, flanged at the bottom and surmounted with a brass cap, set 24 inches in the ground, is 35 feet north and 1,875 feet west of the station. It is marked as follows: On the north "New

For notes in regard to marking of stations see p. 130.

Mexico," on the south "Texas"; it is also marked "Clark Boundary 1859 Mile Corner No. 208 General Land Office reestablishment 1911, United States Boundary Commissions."

Robbins azimuth (Kleberg County, Tex., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name which is about 4½ miles, in azimuth 81° 27′ 25″, from the Riveria schoolhouse and ¾ mile north of the Riveria Beach Railroad, on land owned by Mr. S. C. Kile, of San Antonio, and now rented by Mr. Charles Robbins. The southeast corner of Mr. Robbins's house is 22.6 meters (74.1 feet) distant in azimuth 70° 53′ 28″. The station is marked as in notes 1b and 7a, with a reference mark, note 11b, set 25.442 meters (83.47 feet) from the station in azimuth 172° 17′ 33″ and at the same elevation as the station mark.

Round latitude (Reeves County, Tex., C. V. Hodgson, 1914).—Identical with *Round azimuth,* described below.

Round azimuth (Reeves County, Tex., J. S. Hill, 1909; 1922).—Identical with the triangulation station of the same name 12 miles direct, or 14 miles by road, N. 25° W. from Toyah, a town on the Texas & Pacific Railway, on a very prominent hill, known as Round Mountain, which is in a pasture owned by Dug Coalson and 1½ miles northeast of his house, and is visible from Toyah. To reach the station from Toyah, go north and west on the "Dug Coalson" road to his house and from there to the top of the mountain. The underground mark is a disk station mark cemented into a drill hole in a rock. The surface mark is a cap station mark on a pipe surrounded by earth and rock. The reference mark, a ¾-inch iron rod 18 inches long set in a cylinder of concrete 12 inches in diameter and 20 inches long, is 16.236 meters (53.27 feet) from the station in azimuth 196° 55′.

Sabine Pass longitude (Jefferson County, Tex., C. V. Hodgson, 1911).—About 200 meters south of the railroad station, on the unimproved marshy flats, and in the south corner of the intersection of two graded but unsurfaced and untraveled streets, about 20 meters from the middle of the street to the northwest and about 30 meters from the street to the northeast. Station is 199.5 meters (654.5 feet) north, and 270.9 meters (888.8 feet) or 10″.08 east of *spire on Baptist Church.* The station is marked by a pier of concrete, with a foundation 2½ feet below the surface, and with a cross section of 18 by 34 inches. In the middle of the north and south notch in the top of the pier is a brass station mark, similar to the ordinary station mark, but bearing the words "Astronomical station."

Sabine latitude (Jefferson County, Tex., E. B. Roberts, 1921).—About 40 meters east of the Southern Pacific Railway station at Sabine. The land is flat in the vicinity. The instrument was mounted on a portable aluminum pier sunk about a foot in the sand and resting on large stones. The station is 15″.91 of latitude north and 66″.98 of longitude west of *Sabine Pass Lighthouse, 1874.*

Sears latitude (Jones County, Tex., Edwin Smith, 1912).—Distant 2.325 meters (7.63 feet) west and 0.080 meter (0.26 foot) or 0″.00 of latitude north of *Sears azimuth,* described below.

Sears azimuth (Jones County, Tex., W. Bowie, 1908; 1912).—Identical with the triangulation station of the same name 9 miles by road, or 6 miles direct, N. 13° 30′ W. from Merkel, a town on the Texas & Pacific Railroad, and 1 mile east of the Merkel-Neinda public road, on a prominent flat-topped hill in the pasture of John Sears, of Whiteright, Grayson County. The station is 3 miles south of the village of Noodle, which is on the main public road. It is in clear pasture land on the highest part of the western one of the two most southern spurs of the hill, 115 meters west of a north and south ravine, about 60 paces northeast of the head of a ravine running southwest and about 300 meters northeast of the end of the spur. The underground mark is an old-type station mark, similar to the standard station mark except that the disk has a raised rim and that the legend on the depressed part within the rim consists only of the following raised letters: "U. S. C. & G. S." It is cemented into a drill hole in the solid rock. The surface mark, is the point of a 4d. nail projecting ¼ inch above the concrete, which fills an iron pipe 1½ inches in diameter, which in turn is embedded in a concrete cylinder 20 inches in diameter. The reference mark is the point of a 40d. nail, projecting ¼ inch above the concrete that fills an iron pipe 1½ inches in diameter and 24 inches long, which in turn is embedded in a cylinder of concrete 12 inches in diameter and 24 inches long. It is 12.94 meters (42.5 feet) from the station in azimuth 262° 47′. The east gable of a house in the southwest corner of the pasture, near the Merkel-Neinda road, is about ¾ mile from the station in azimuth 73° 46′.

Sierra Blanca (U. S. G. S.) longitude (Hudspeth County, Tex., R. S. Woodward, 1890).—About 200 feet south of the Southern Pacific Railway. The station is marked by a pier similar to that at *Spearville (U. S. G. S.) longitude* (Kansas). (See p. 183.)

Sierra Blanca (U. S. G. S.) latitude (Hudspeth County, Tex., R. S. Woodward, 1890).—Identical with *Sierra Blanca (U. S. G. S.) longitude,* described above.

Smith latitude (Ector County, Tex., Edwin Smith, 1912).—Distant 2.075 meters (6.81 feet) due west of *Smith azimuth,* described below.

Smith azimuth (Ector County, Tex., J. S. Hill, 1909; 1912).—Identical with the triangulation station of the same name 10½ miles direct, or 14 miles by road, N. 35° W. from Odessa, a town on the Texas & Pacific Railway, ¾ mile west of the main county road, on a ranch owned by R. W. Smith, and 1 mile southwest of his residence. The underground mark is a disk station mark set in a cylinder of concrete 10 inches in diameter and 8 inches long. The surface mark is a cap station mark screwed on a 3-inch iron pipe 30 inches long, which is embedded in a concrete cylinder 20 inches in diameter and 30 inches long. The reference mark, a ¾-inch

For notes in regard to marking of stations see p. 130.

iron rod 18 inches long, set in a cylinder of concrete, 12 inches in diameter and 20 inches long, is 20.684 meters (67.86 feet) from the station in azimuth 88° 12′. Smith's windmill is about ¾ mile from the station in azimuth 204° 19′.

Spofford (U. S. G. S.) longitude (Kinney County, Tex., S. S. Gannett, 1896).—At Spofford, in lot 9, block 20, facing the railroad reservation, 258 feet northward from the track and 426 feet north northwest from the water tank. The station is marked by a pier.

Spofford (U. S. G. S.) latitude (Kinney County, Tex., S. S. Gannett, 1896).—Identical with *Spofford (U. S. G. S.) longitude*, described above.

Springgap azimuth (Callahan County, Tex., W. Bowie, 1908).—Identical with the triangulation station of the same name, 12 miles by road southwest of Putnam, 12 miles by road southeast of Baird, towns on the Texas & Pacific Railway, and ½ mile south of the Baird-Brownwood public road, near the northwest corner of the Springgap Mountains. It is on a peak having a flat top partly covered with brush, and is 475 paces S. 80° E. from the extreme northwest corner of the top of the mountain, on property belonging to Richard Cordwell, of Admiral. The underground mark is a 40d. wire nail cemented into a drill hole in the solid rock, the point of the nail projecting ¼ inch. The surface mark is the point of a 40d. nail projecting ¼ inch above the concrete that fills an iron pipe 1½ inches in diameter, which in turn is embedded in a cylinder of concrete 20 inches in diameter. Reference mark No. 1, a cross with a drill hole at its center and marked with the letters "U. S. C. & G. S." cut into a ledge of rock at the edge of the bluff, is 44.022 meters (144.43 feet) from the station in azimuth 204° 35′. Reference mark No. 2, a pipe set in concrete, is 12.705 meters (41.68 feet) from the station, in azimuth 214° 45′. From the station the south gable of the Admiral church is distant about 2 miles, in azimuth 172° 35′; the south gable of J. H. Brown's house is distant about ½ mile in azimuth 198° 50′.

Stanton longitude (Martin County, Tex., E. Smith, 1911; 1919).—Marked by a standard disk triangulation marker, with the words "Astronomical Station" inscribed thereon, set in the center of a concrete pier 2.26 meters (7.4 feet) or 0″.07 due south of *Stanton azimuth*, described below.

Stanton latitude (Martin County, Tex., Edwin Smith, 1912; 1919).—Identical with *Stanton longitude*, described above.

Stanton azimuth (Martin County, Tex., J. S. Hill, 1909; 1919).—Identical with the triangulation station of the same name about 1 mile S. 54° E. from the city water tower at Stanton, a town on the Texas & Pacific Railway, on the highest point of a narrow ridge running north and south and about ½ mile south of the railroad. The underground mark is similar to that of *Lacasa azimuth* (see p. 250), except that the iron pipe is embedded in an irregular mass of concrete instead of a cylinder of concrete. The surface mark is a cap station mark screwed onto a 3-inch iron pipe 30 inches long, which is embedded in a cylinder of concrete 20 inches in diameter and 30 inches long. The reference mark is the point of a 40d. nail, projecting about ¼ inch above the concrete that fills an iron pipe 1½ inches in diameter and 24 inches long, which in turn is embedded in a cylinder of concrete 12 inches in diameter and 24 inches long. It is 20.260 meters (66.47 feet) from the station in azimuth 64° 06′. The Stanton courthouse cupola is about 1 mile distant in azimuth 109° 54′.

Star azimuth (Jeff Davis County, Tex., E. H. Pagenhart, 1917).—Identical with the triangulation station of the same name about 15 miles south of Balmorhea, a town on the Pecos Valley & Toyahvale Railway, 18 miles north of Fort Davis, near the center, east and west, of a flat-topped mesa known as "Star Mountain" and about 15 meters from the north cliff. The station is marked by a bronze tablet set in bedrock, as described in note 2, with a reference mark, a bronze tablet set in a bowlder, as described in note 12c, set in a rock about 2 feet square and 18 inches high about midway of the ridge north and south, 14.06 meters (46.1 feet) from the station in azimuth 158° 22′. The United States Geological Survey triangulation station is about 40 meters south of the north edge of the cliff and is a flat-topped rock, 18 inches by 12 inches, almost flush with the ground, and is 28.32 meters (92.9 feet) from the station in azimuth 80° 49′. A lone trimmed cedar tree is 27 meters distant in azimuth 82° 18′.

Tehuacana longitude (Limestone County, Tex., W. B. Fairfield, 1919).—Marked by a concrete pier 5.11 meters (16.8 feet) or 0″.17 south and 0.54 meter (1.8 feet) or 0″.02 west from *Tehuacana azimuth*, described below.

Tehuacana latitude (Limestone County, Tex., W. B. Fairfield, 1919).—Identical with *Tehuacana longitude*, described above.

Tecuacana azimuth (Limestone County, Tex., C. L. Garner, 1919).—Identical with the triangulation station of the same name, in the south part of the town of Tehuacana, on the highest point of the ridge, about 150 meters west of the Tehuacana-Mexia road, in a small vacant lot owned by W. C. McAfee, 35 meters north of his house and 15 meters east of his stables. The station is marked according to note 3, with a reference mark, note 12d, 36.59 meters (120.0 feet) from the station in azimuth 1° 57′ 00″. Westminster University is about ⅓ mile distant in azimuth 207° 15′ 43″.

Texline (U. S. G. L. O.) longitude (Dallam County, Tex., Arthur D. Kidder and Augustus MacConnel 1903).—About 8½ miles south of the northwest corner of the Texas panhandle, near the one hundred and third meridian, near the track of the Fort Worth & Denver Railroad at Texline, Tex. The station is marked by a concrete pier in the shape of a frustum of a pyramid, the upper base 18 by 24 inches, lower base 24 by 30 inches, extending 30 inches below and 30 inches above the surface of the ground.

For notes in regard to marking of stations see p. 130.

Texline (U. S. G. L. O.) latitude (Dallam County, Tex., Arthur D. Kidder and Augustus MacConnel, 1903).—The station is 103 meters (337.9 feet) or 3".34 of latitude due south of the boundary monument, which is near the northwest corner of the Texas panhandle, at the point of intersection of the one hundred and third meridian with parallel 36° 30′ 00", and in the S. E. ¼ fractional sec. 8, T. 26 N., R. 37 E., New Mexico principal meridian, and is a concrete monument set in heavy galvanized iron. The monument is in the shape of a frustum of a cone—upper diameter, 16 inches; lower diameter, 24 inches; altitude, 60 inches—set 36 inches in the ground on a chalky hardpan, and extending 24 inches above ground, and is marked on the southeast face "36° 30′ N. L. 103° W. L. 1903," and surrounded by a large circular mound of earth. The initial monument of the Cimarron base line and meridian, a gray sandstone, 14 by 16 inches and 40 inches above ground, marked "103 W. L." on the south, "36° 30′ N. L." on the east, "C. M." on the north, and "N. M." on the west face and "1881" on top, with witness pits 36 by 36 inches north, south, east, and west at distances of 8 feet, is N. 76° 11′ E., distant 638 feet.

Topo latitude (Cameron County, Tex., W. H. Burger, 1905).—Marked by a wooden pier 3.90 meters (12.8 feet) west and 0.3 meter (1 foot) or 0".01 south of *Topo triangulation station*, which is about 30 miles S. 60° E. from Katherine (on the St. Louis, Brownsville & Mexico Railway), in the King pasture, on the old Topo ranch, near the old Topo landing on the mainland side of Laguna Madre, on a small island connected at low tide with the mainland to the south by a narrow strip of sand. The station is 7 meters (23 feet) north of the south shore and 57 paces east of the west shore of the island, which at this point is about 10 feet above tidewater. The island is the most southerly of the group in this vicinity. The station was originally marked as follows: A concrete pyramid or coral rock was buried 3 to 4 feet below the surface of the ground, having in its top a drill hole filled with lead. Above this was placed a cedar stub, with a copper tack in its top, the stub projecting about 12 inches above the ground. Four cedar reference stubs were placed around the station 8 feet from the center. In 1905 two of the reference stubs were still standing, the station being midway between them; the subsurface mark was also intact and was left in place. Over it was placed a new surface mark consisting of a tile 26 inches long, filled with concrete and having a bottle also filled with concrete placed in its upper end; a copper nail in the bottle marks the center of the station. There was placed 6 inches of sand between the station and the underground marks. The tile projects about 8 inches above the ground.

Venada azimuth (Cameron County, Tex., R. E. Halter, 1881).—Identical with the triangulation station of the same name on the second range of sand hills near the outside beach of Padre Island, on the highest hill in the vicinity. The station was marked by a concrete pyramid or coral rock buried 3 to 4 feet below the surface of the ground, and having in its top a drill hole filled with lead. Above the underground mark was placed a cedar stub, with a copper tack in its top, the stub projecting about 12 inches above the ground. Four cedar reference stubs were placed at distances of 8 feet from the center stub. In 1913 reported probably lost.

Zapata azimuth (Zapata County, Tex., C. L. Garner, 1917).—Identical with the triangulation station of the same name about 1 mile east of the town of Zapata, 20 meters south of the military road, on top of the highest point in the vicinity and where the road leading northeast branches from the military road. The station is marked by a bronze tablet in concrete, as described in notes 1a and 7c, with a reference mark, a bronze table in concrete, as described in note 11a, 9.535 meters (31.28 feet) from the station in azimuth 14° 11′.

UTAH

Antelope latitude (Davis County, Utah, P. A. Welker, 1892).—Marked by a brick pier 10.44 meters, (34.3 feet) or 0".33 of latitude south in azimuth 13° 34′ from *Antelope azimuth*, described below.

Antelope azimuth (Davis County, Utah, P. A. Welker, 1892).—Identical with the triangulation station of the same name, on the highest point of Antelope Island, in Great Salt Lake. The station is marked by a copper bolt set in solid rock and surrounded by a hollow brick pier 28 inches square supporting a red sandstone cap, which bears a second copper bolt directly above the first and is inscribed with a triangle and the legend "U. S. C. & G. Survey, 1892." The station is nearly surrounded by a ring wall of rocks about 4 feet high, with an inner diameter of 10 feet. Three reference marks, each a drill hole in solid rock, are just outside the wall at the following distances and azimuths from the station: 2.43 meters (8.0 feet), 40° 57′; 2.58 meters (8.5 feet), 174° 22′; and 2.30 meters (7.5 feet), 293° 42′. The vertical circle station is 8.75 meters (28.7 feet) distant.

Beaver (U. S. E.) latitude (Beaver County, Utah, J. H. Clark, 1872).—Identical with triangulation station *Beaver flagstaff (U. S. E.)*, in the main plaza of the town of Beaver, a short distance east of the church and between the church and the main street running north and south.

Deseret latitude (Tooele County, Utah, P. A. Welker, 1892).—Marked by a stone and brick pier, 10.85 meters (35.6 feet), or 0".31 of latitude south, in azimuth 27° 42′ from *Deseret azimuth*, described below.

Deseret azimuth (Tooele County, Utah, William Eimbeck, 1892).—Identical with the triangulation station of the same name, on the summit of the highest peak of the Onaqui Mountains, about 8 miles a little west of south from Grantsville and about 12 miles east from Stickton. The station is marked by a copper bolt set in solid rock between the bases of three small piers. The station is nearly surrounded by a ring wall of rocks 4 feet high, with an inner diameter of 11 feet. Three reference marks are outside the wall at the following distances and azimuths from the station: 3.10 meters (10.2 feet), 322° 53′; 2.18 meters (7.2 feet), 88° 08′; and 2.62 meters (8.6 feet), 198° 38′.

For notes in regard to marking of stations see p. 130.

Green River longitude (Emery County, Utah, C. H. Sinclair, 1898).—On the railroad right of way, 65 paces west of the depot at Green River, 64 paces southwest of the railroad water tank and 50 paces from the railroad. The station is marked by a brick pier 17 by 25 inches, 3 feet above the ground and is 12.40 meters (40.7 feet) or 0".40 of latitude south of *Green River south meridian*, and 627.67 meters (2,059.3 feet) or 20".35 of latitude south of *Green River north meridian*. Both these points are marked by a drill hole in a sandstone approximately 10 by 10 inches by 2½ feet long, set flush with the ground.

Green River latitude (Emery County, Utah, C. H. Sinclair, 1898).—Marked by a brick pier 17 inches square 1.30 meters (4.3 feet) due west of *Green River longitude*, described above.

Gunnison (U. S. E.) latitude (Sanpete County, Utah, W. W. Marryatt, 1872; 1890).—Identical with the triangulation station *Gunnison astronomic*, which is in Sam Pitch Valley, in the southwestern part of the town of Gunnison, 2½ miles east of Sevier River and near the north banks of Sam Pitch Creek. No description of the marking is available.

Ibepah latitude (Juab County, Utah, E. P. Austin, 1889).—Marked by a masonry pier 21.2 meters (70 feet) or 0".22 of latitude north, in azimuth 108° 51′ from *Ibepah azimuth*, described below.

Ibepah azimuth (Juab County, Utah, W. Eimbeck and P. A. Welker, 1889).—Identical with the triangulation station of the same name, about 15 miles a little east of the south from Ibepah post office, on Ibepah Peak, in the Deep Creek range of mountains. The peak has the general appearance of the roof of a house with the ridge extending east and west. It terminates in two principal summits of equal height, one at the extreme western end of the crest and the other near the middle, the station being on the latter. The station is marked by a copper bolt in a drill hole in the solid rock, over which is a layer of masonry, built between the bases of three small brick piers. The station is nearly surrounded by a ring wall of rocks 5 feet high, with an inner diameter of 11 feet. Four drill holes in solid rock are just outside the wall at the following distances and azimuths from the station: 2.97 meters (9.7 feet), 246° 20′; 3.07 meters (10.1 feet), 300° 12′; 3.25 meters (10.7 feet), 91° 32′; and 3.18 meters (10.4 feet), 134° 32′.

Lund longitude (Iron County, Utah, J. E. McGrath, 1916).—About 600 feet northwest of the railroad depot in the town of Lund. The station is 0.907 meter (2.98 feet) or 0".04 of longitude east and 26.973 meters (88.49 feet) or 0".87 of latitude south of triangulation station *Lund*, which is marked according to note 1a. The determination of the geodetic position of station *Lund* has not yet been completed.

Lund latitude (Iron County, Utah, J. E. McGrath, 1916).—Identical with *Lund longitude*, described above.

Mount Ellen latitude (Garfield County, Utah, P. A. Welker, 1891).—Marked by a brick pier 15.02 meters (49.3 feet) or 0".48 of latitude south, in azimuth 5° 20′ from *Mount Ellen azimuth*, described below.

Mount Ellen azimuth (Garfield County, Utah, W. Eimbeck, 1891).—Identical with the triangulation station of the same name, on the summit of Mount Ellen, the northern peak of the Henry Mountains. The station is marked by a copper bolt embedded in concrete and a few inches above the bolt by a drill hole in another rock set between the bases of three small brick piers. The station is nearly surrounded by a ring wall of rocks 4½ feet high, with an inner diameter of 11 feet. Three reference marks, each a drill hole filled with plaster of Paris in the solid surface rock, are just outside the wall at the following distances and azimuths from the station: 2.41 meters (7.9 feet), 23° 35′; 2.44 meters (8.0 feet), 144° 45′; and 2.39 meters (7.8 feet), 263° 34′.

Mount Nebo latitude (Juab County, Utah, J. H. Turner, 1887).—Marked by a brick pier 23.25 meters (76.3 feet) (given 25.25 meters in latitude record) or 0".59 of latitude south in azimuth 321° 35′ from *Mount Nebo azimuth*, described below. The pier is partly surrounded by a square rock wall.

Mount Nebo azimuth (Juab County, Utah, W. Eimbeck, 1887; 1919).—Identical with the triangulation station of the same name, on the southernmost summit of Mount Nebo, and marked by a copper bolt in a drill hole in the solid rock. Three small brick piers used in mounting the instrument are about the station, and these in turn are nearly surrounded by a ring wall of rocks 10 or 12 feet in diameter. Four reference marks, each consisting of a drill hole in the rock, are just outside the wall at the following distances and azimuths from the station: 2.56 meters (8.4 feet), 38° 01′; 2.66 meters (8.7 feet), 121° 28′; 4.25 meters (13.9 feet), 204° 16′; and 3.32 meters (10.9 feet), 309° 39′. Two additional reference marks, probably standard reference marks, are, respectively, 2.280 meters (7.48 feet), distant in azimuth 202° 46′, and 1.756 meters (5.76 feet) distant in azimuth 340° 23′. The vertical circle station, partly surrounded by a circular stone wall, is 4.60 meters (15.1 feet) from the station in azimuth 49° 00′.

Mount Waas latitude (Grand County, Utah, J. Nelson, 1893).—Marked by a concrete pier 28.213 meters (92.56 feet) or 0".88 of latitude, south, in approximate azimuth 329° from *Mount Waas azimuth*, described below.

Mount Waas azimuth (Grand County, Utah, W. Eimbeck and J. Nelson, 1893).—Identical with the triangulation station of the same name, on the highest point of Mount Waas, the third prominent peak from the north end of La Sal Mountains. The station is marked by a cross in a copper bolt which is set in a drill hole in the rock between the bases of three small brick piers. The station is surrounded by a ring wall of rocks 4 feet high with an inner diameter of 10 feet. Four reference marks, each probably consisting of a drill hole in the rock, are just outside the wall, at the following distances and azimuths from the station: 2.24 meters (7.3 feet), 3° 58′; 2.29 meters (7.5 feet), 104° 19′; 2.18 meters (7.2 feet), 186° 37′; and 2.21 meters (7.3 feet), 275° 45′.

For notes in regard to marking of stations see p. 130.

Oasis longitude (Millard County, Utah, C. H. Sinclair, 1898).—On the west side of the Oregon Short-line Railroad near the depot at Oasis. From the station the southeast corner of the post office is about 85 meters north 2° east, the southwest corner of the railroad depot is about 70 meters north 47° east, the door of Thompson's store is about 76 meters south 87½° east, and the southeast corner of a light brick house is about 44 meters south 74° west. The station is marked by a brick pier and is 5.22 meters (17.1 feet) due south of *Oasis south meridian*, an unmarked geodetic point.

Oasis latitude (Millard County, Utah, Fremont Morse, 1898).—Marked by a brick pier 1.37 meters (4.5 feet) due west of Oasis *longitude*, described above.

Ogden longitude (Weber County, Utah, C. H. Sinclair, 1886; 1891).—The east pier in the west room of the brick and stone observatory established by Lieutenant Wheeler in 1873. It is on the ridge above the west bank of the Weber River, directly opposite Ogden, and about 1½ miles from the courthouse. The station is a geodetic point. The observatory was removed in 1890.

Ogden (U. S. E.) latitude (Weber County, Utah, F. Kampf, 1873; J. H. Clark, 1874; 1891).—Identical with *Ogden longitude*, described above.

Ogden azimuth (Weber County, Utah, W. Eimbeck, 1891).—Marked by a copper bolt in the brick masonry foundation of the pier, which is about 5 meters south of *Ogden longitude*, described above.

Ogden Peak latitude (Weber County, Utah, J. H. Turner, 1888).—Marked by a brick pier 13.2 meters (43 feet) or 0".02 of latitude north, in azimuth 92° 01′ from *Ogden Peak azimuth*, described below.

Ogden Peak azimuth (Weber County, Utah, W. Eimbeck, 1888).—Identical with the triangulation station of the same name, on a peak of the Wasatch Mountains, about 4 miles east of Ogden. The station is marked by a copper bolt in a drill hole in solid rock. It is also marked by a drill hole in a flat rock embedded in the masonry built between the bases of three small piers. The station is nearly surrounded by a ring wall of rocks, with an inner diameter of about 11 feet. Three reference marks, each a drill hole in solid rock filled with lead, are just outside the ring wall, at the following distances and azimuths from the station: 2.84 meters (9.3 feet), 22° 35′; 2.93 meters (9.6 feet), 177° 55′; and 2.55 meters (8.4 feet), 288° 43′. The vertical circle station, with a ring wall similar to that about the station, is 7.0 meters (23 feet) distant in azimuth 310° 43′. The magnetic station is 20.4 meters (67 feet) from the station in azimuth 323° 56′.

Patmos Head latitude (Carbon County, Utah, P. A. Welker, 1890).—Marked by a brick and stone pier 56.76 meters (186.2 feet) or 1".81 of latitude north, in azimuth 190° 12′ from *Patmos Head azimuth*, described below.

Patmos Head azimuth (Carbon County, Utah, W. Eimbeck, 1890).—Identical with the triangulation station of the same name, on Patmos Head, one of the peaks of the range of mountains known as West Tavaputs plateau, and the highest point within several miles. The station is about 12½ miles southeast from Sunnyside and 3 miles southeast of the upper end of Dry Canyon, and is marked by a copper bolt in a rock embedded in the ground, and about 8 inches above the bolt by a drill hole in another rock which is cemented to the lower one. Three small brick piers are around the station, and the whole is surrounded by a ring wall of rocks 3½ feet high with an inner diameter of 11 feet. Four reference marks are outside the ring wall at the following distances and azimuths from the station: Drill hole in rock, 2.59 meters (8.5 feet), 233° 16′; drill hole in rock 2.62 meters (8.6 feet), 327° 07′; copper bolt in rock, 3.45 meters (11.3 feet), 343° 16′; and a stump, 3.35 meters (11.0 feet), 90° 06′.

Promontory latitude (Boxelder County, Utah, P. A. Welker, 1892).—Marked by a stone and brick pier 16.61 meters (54.5 feet), or 0".01 of latitude south, in azimuth 88° 41′ from *Promontory azimuth*, described below,

Promontory azimuth (Boxelder County, Utah, W. Eimbeck, 1892).—Identical with the triangulation station of the same name, on the most southeastern summit of the Promontory Mountains, on Promontory Peninsula, which extends into the Great Salt Lake from the north. The station is marked by a cross in a copper bolt set in solid rock and surrounded by a hollow brick pier 32 inches square supporting a red sandstone cap, which bears a second copper bolt directly above the first and is inscribed with a triangle and the legend "U. S. C. & G. Survey, 1892." The station is nearly surrounded by a ring wall of rocks 4 feet high, with an inner diameter of 12 feet. Three reference marks, each a drill hole in solid rock, are just outside the wall, at the following distances and azimuths from the station: 2.50 meters (8.2 feet), 213° 32′; 2.44 meters (8.0 feet), 314° 08′; and 2.71 meters (8.9 feet), 70° 48′. The vertical circle station is in azimuth 11° 11′.

St. George (U. S. E.) latitude (Washington County, Utah, A. R. Marvine, 1871).—In the town of St. George, 30 feet from the southern door of the schoolhouse, 72 feet from the street running east and west, and 150 feet from Main Street. The station is marked by a sandstone pier, extending 24 inches above the surface of the ground.

Salt Lake City longitude (Salt Lake County, Utah, G. W. Dean, 1869; 1923).—In the southeast corner of Temple Block, now a park, 16.02 meters (52.6 feet) from the east wall of the park, 30.54 meters (100.2 feet) from the south wall, and 35.87 meters (117.7 feet) from the Great Salt Lake base and meridian stone of 1847, which is S. 33° E. from the station at the southeast corner outside of the concrete wall that surrounds Temple Block. The station is marked by a brass bolt in the top of a red sandstone pier and is 24.82 meters (81.4 feet) or 0".81 of latitude north, and 1.01 meters (3.3 feet) or 0".04 of longitude east of *Salt Lake City azimuth*.

For notes in regard to marking of stations see p. 130.

Salt Lake City latitude (Salt Lake County, Utah, F. H. Agnew, 1869).—Marked by a red sandstone post 22 inches square and 5 feet long, projecting 3 feet above ground, 1.46 meters (4.8 feet) due east of *Salt Lake City longitude*, described above.

Salt Lake City azimuth (Salt Lake County, Utah, W. Eimbeck, 1893).—See *Salt Lake City longitude* described above.

Utah-Arizona boundary latitude station No. 1 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1901).—The station is 2,222.0 meters (7,291 feet) or 72″.1 of latitude due north of the boundary monument, which is on the east boundary of Nevada, on meridional line established by Isaac P. James in 1870, near the head of a small dry gulch, and 158.5 meters (520 feet) south of the James three hundredth mile corner. The monument is a red sandstone shaft, 12 by 16 inches, 6 feet long, and marked as follows: On the northwest, "Nevada"; on the northeast, "Utah"; on the southeast "Arizona"; and on the southwest "Intl. Mont., 37 N. L. 1901." The shaft is surrounded by a circular mound of stone, and three pits, each 36 by 36 by 18 inches, are 6 feet, respectively, north, south, and east of the station.

Utah-Arizona boundary latitude station No. 2 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1901).—The station is 40.44 meters (132.66 feet) or 1″.31 of latitude due north of the boundary monument, which is the fifty-first mile corner east of the southwest corner of Utah, at the mouth of a little valley that joins a larger one from the south. The monument is a sandstone shaft, 14 by 12 inches, 6 feet long, set 3 feet in the ground, marked as follows: On the north, "Utah"; on the east, "37 N. L."; on the south, "Arizona"; and on the west, "51 M." A circular mound of stones is around the shaft, and four witness pits, each 36 by 36 by 18 inches, are 6 feet distant, respectively, north, south, east, and west.

Utah-Arizona boundary latitude station No. 3 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1901).—The station is 258.91 meters (849.42 feet) or 8″.40 of latitude due south of the boundary monument, which is at the ninety-fourth mile corner east of the southwest corner of Utah, in a little valley about 2½ miles southwest of Seepes Springs. The monument is a sandstone shaft, 12 by 15 inches, 6 feet long, set 3 feet in the ground and marked as follows: On the north, "Utah"; on the east, "37 N. L."; on the south, "Arizona"; and on the west, "94 M." A circular mound of stones surrounds the shaft and four witness pits, each 36 by 36 by 18 inches, are 6 feet, respectively, north, south, east, and west from the station. The following bearings and distances are from the station: Round red butte, N. 37° 30′ W., about 500 meters; stone monument on top of a long red butte, N. 70° 15′ W., about ½ mile; flagstaff on Flag Point, top of Vermillion cliffs north of Navajo wells, N. 41° 05′ E.

Utah-Arizona boundary latitude station No. 4 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1901).—The station is 2,055.94 meters (6,745.2 feet) or 66″.69 of latitude due north of the boundary monument, which is at the west base of a large sandstone butte with a spire that rises 1,000 feet, and is called State Line Butte and 152.332 miles east of the southwest corner of Utah. The monument is a sandstone shaft, 12 by 28 inches, 6 feet long, set 3 feet in the ground and marked as follows: On the north, "Utah"; on the east, "37 N. L."; on the south "Arizona"; and on the west, "152.332 M." A circular mound of stones surrounds the shaft and four witness pits, each 36 by 36 by 18 inches, are 6 feet, respectively, north, south, east, and west from the station. Chimney Rock bears N. 32° W., and the "Tower" bears S. 25° W.

Utah-Arizona boundary latitude station No. 5 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1901).—The station is 704.1 meters (2,310 feet) on 22″.85 of latitude north and 2,608.55 meters (8,558.2 feet) or 105″.50 of longitude west of the boundary monument which is in the open country, in a wide canyon, about 1½ miles north of the head of the canyon and 199.75 miles east of the southwest corner of Utah. The monument is a sandstone shaft, 12 by 30 inches, 6 feet long, set 3 feet in the ground, and marked as follows: On the north, "Utah"; on the east, "37 N. L."; on the south, "Arizona"; and on the west, "199.75 M." A circular mound of stones surrounds the shaft and four witness pits, each 36 by 36 by 18 inches, are 6 feet, respectively, north, south, east, and west of the station. The following bearings are from the station: Obelisk, a great column of rocks about 700 feet high, N. 41° E., northwest salient of the mesa, about 1,000 feet above the valley, N. 86° 30′ E.

Utah-Arizona boundary latitude station No. 6 (U. S. G. L. O.) (H. B. Carpenter and Augustus MacConnel, 1901).—The station is 1,730.05 meters (5,676 feet) or 56″.12 of latitude due north of the boundary monument, which is at the two hundred and fiftieth mile corner east of the southwest corner of Utah. The monument is a sandstone shaft, 12 by 14 inches, 6 feet long, set 3 feet in the ground, and marked as follows: On the north, "Utah"; on the east "37 N. L."; on the south, "Arizona"; and on the west, "250 M." A circular mound of stone surrounds the shaft and four witness pits, each 36 by 36 by 18 inches, are distant 6 feet, respectively, north, south, east, and west from the station. The following bearings and distances are from the station: Turret Butte, N. 16° 14′ E., about 4 miles; a butte of trap rock about 100 feet high, north, 1,770 meters; El Capitan, N. 40° W. Sharp peak S. 27° 18′ W. about 4 miles distant.

Waddoup latitude (Davis County, Utah, O. B. French, 1892).—Distant 61.81 meters (202.8 feet) or 2″.00 of latitude south and 149.54 meters (490.6 feet) east from *Waddoup azimuth*, described below. The magnetic station is 5 meters (16 feet) east of the latitude station.

Waddoup azimuth (Davis County, Utah, W. Eimbeck, 1892).—Identical with the triangulation station of the same name, about ¾ mile southeast of Centerville, 27 meters (89 feet) north and 88 meters (289 feet) west

For notes in regard to marking of stations see p. 130.

of the southeast corner of the NW. ¼ sec. 18, T. 2 N., R. 1 E., on the west side of Thomas Waddoup's barnyard, 24 meters (79 feet) west of his residence. The Union Pacific Railroad station at Centerville is in the northwest quarter of the same quarter section. The station is marked by a copper bolt in the top of a granite post 2 feet long, dressed 7 inches square at the top, set 2 feet below the general surface of the ground. This mark is surrounded by a hollow brick pier 32 inches square and 4 feet above ground, on the top of which is a sandstone cap 4 inches thick. The station is marked on this cap by a drill hole surrounded by a triangle and the inscription "U. S. C. & G. Survey, 1892."

Wasatch latitude (San Pete County, Utah, P. A. Welker, 1890).—Marked by a brick pier 121.0 meters (397 feet) or 3".06 of latitude north, in azimuth 218° 41′ from *Wasatch azimuth*, described below.

Wasatch azimuth (San Pete County, Utah, W. Eimbeck, 1890).—Identical with the triangulation station of the same name, on a small peak or table near the southern end of the Wasatch Mountain Range, the highest point of this part of the range. The station was marked by two copper bolts in a drill hole in a limestone rock, the lower bolt being leaded and the upper bolt cemented in the hole. About the station are three small brick piers, and the whole is surrounded by a ring wall of rocks 4 feet high with an inner diameter of 11½ feet. Four reference marks, each consisting of a brick set on end and marked with a drill hole filled with plaster of Paris, are just outside the wall at the following distances and azimuths from the station: 2.40 meters (7.9 feet), 32° 12′; 2.33 meters (7.6 feet), 91° 39′; 2.51 meters (8.2 feet), 164° 26′; 2.33 meters (7.6 feet), 305° 39′. In 1919 a new station, *Wasatch 2*, was established inside the wall of stones and marked, according to note 1, with a bottle for an underground mark. Two reference marks, note 1, are in respective azimuths 99° 34′ and 355° 11′ from the new station.

VERMONT

Burlington latitude (Chittenden County, Vt., A. T. Mosman, 1870).—The zenith telescope pier was about 16 feet due east of *Burlington azimuth*, described below. The pier was of brick laid in cement, sunk 2 feet below the surface and capped with a marble slab. There was a similar pier for the transit instrument.

Burlington azimuth (Chittenden County, Vt., A. T. Mosman, 1870).—Identical with the triangulation station of the same name on a lot on Union Street, the property of Mr. Edgley, and distant 22.10 meters (72.5 feet) southwest from the southwest corner of the southwest wing of his house. The station is 25.6 meters (84 feet) from the line between Edgley's lot and that of Mr. Blodgett. A copper nail was placed in a block 1.5 meters (5 feet) north of the station. The station is marked by an iron cone buried 38 inches below the surface of the ground.

Killington latitude (Rutland County, Vt., W. H. Burger, 1907).—Identical with *Killington azimuth*, described below.

Killington azimuth (Rutland County, Vt. W. H. Burger, 1907).—Identical with the triangulation station of the same name, about 14 miles by road and trail from Rutland and on the summit of Killington Peak, a bare rock about 100 feet long and 20 to 25 feet wide. The station is about 12 feet from the east end and about 10 feet from the southeast edge of the ledge and is marked by a copper bolt surrounded by a triangle. Three holes in the rocks, each having an arrow pointing toward the station, are at the following distances and directions from the station: 2.392 meters (7.85 feet) north of east, 1.774 meters (5.82 feet) south, 2.652 meters (8.70 feet) west of north. In addition there are two bolts in the rocks, one 2.332 meters (7.65 feet) southeast and the other 2.115 meters (6.94 feet) southwest.

Mount Mansfield azimuth (Lamoille County, Vt., W. H. Burger, 1907).—Identical with the triangulation station of the same name on the "Nose" of the mountain of the same name, and about 215 feet above the ledge on which the hotel is located. The station is marked by a bolt in the rock, surmounted by a pier of solid concrete, triangular in form and about 4 feet high. A spike in the top of the pier marks center. A similar pier is 10.06 meters (33.0 feet) from the station in azimuth 13° 57′. Two iron bolts were set in the rock each having an arrow pointing toward the station, one 2.14 meters (7.0 feet) distant in azimuth 81° 58′ and the other 3.84 meters (12.6 feet) distant in azimuth 346° 27′.

VIRGINIA

Big Knob latitude (Scott County, Va., W. H. Burger, 1907).—Identical with *Big Knob azimuth*, described below.

Big Knob azimuth (Scott County, Va., W. H. Burger, 1907).—Identical with the triangulation station of the same name, about 5½ miles northeast of Gate City, and about 2½ miles by road from Hilton, in the Clinch Mountain range. The station is marked by the intersection of two cross lines in a large rock level with the surface of the ground. The rock has the letters "U. S. C. S." in the spaces formed by the grooves. The following directions and distances are from the station: Chimney, 0° 00′ 00″; arrow at hole in rock, distant 12.01 meters (39.4 feet), 16° 39′; arrow at hole in rock, 6.61 meters (21.7 feet), 46° 37′; arrow at hole in rock, 15.15 meters (49.7 feet), 89° 41′.

Boykins azimuth (Southampton County, Va., J. A. Bond, 1918).—Identical with the traverse station of the same name on the Seaboard Air Line Railway, 160 meters west of the depot at Boykins, on the south side of the track, 15.54 meters (51.0 feet) from the south rail of the main track, nearly due south of a point midway between the third and fourth switch targets west of the Boykins depot, 2 meters south of the road running parallel to the track, 3 meters southwest of the fifth telegraph pole west of the depot, and 1 meter north of the fence line. The

For notes in regard to marking of stations see p. 130.

station is marked as described in notes 1a and 7c, with a reference mark, as described in note 11a, on the opposite side of the track in the southwest corner of a new one-story brick building and distant 53.21 meters (174.6 feet) from the station in azimuth 198° 31′ 46″.

Bull Run latitude (Fauquier County, Va., F. Blake, jr., 1871).—Distant 19.330 meters (63.42 feet) or 0″.63 of latitude north and 5.145 meters (16.88 feet) east of *Bull Run azimuth*, described below.

Bull Run azimuth (Fauquier County, Va., C. O. Boutelle, 1871; 1892).—Identical with the triangulation station of the same name on the highest summit of the range called Bull Run Mountains, extending south-southwest from Aldie to below "Thoroughfare Gap." The station is a mile east-northeast of Hopewell, and 4½ miles in the same direction from Plains railroad station and post office, and is marked by a brass bolt set in the rock. Four reference marks, each a square cut in the rock, with the diagonal pointing toward the station and a hole drilled in the center, are located as follows: Distant 6.33 meters (20.8 feet) in azimuth 172° 05′; distant 7.54 meters (24.7 feet) in azimuth 277° 07′; distant 7.33 meters (24.0 feet) in azimuth 2° 45′; distant 5.54 meters (18.2 feet) in azimuth 69° 54′.

Cahas latitude (Franklin County, Va., W. H. Burger, 1907).—Identical with *Cahas azimuth*, described below.

Cahas azimuth (Franklin County, Va., W. H. Burger, 1907).—Identical with the triangulation station of the same name, about 8 miles from Boone Mill and 2½ miles from Daniel Bowman's house. The station is marked by a ½-inch drill hole 2 inches deep cut in the solid rock 22 inches below the surface of the ground. Two reference marks, each a copper bolt set in the rock and covered by a cairn, are 1.829 meters (6.00 feet), respectively, south and east from the station.

Cape Henry latitude (Princess Anne County, Va., Geo. Davidson, 1866).—Distant 8.90 meters (29.2 feet) west and 2.16 meters (7.1 feet) or 0″.07 of latitude south of *Cape Henry lighthouse azimuth*, described below.

Cape Henry Lighthouse azimuth (Princess Anne County, Va., R. D. Cutts, 1866; 1896).—Identical with the triangulation station *Cape Henry Lighthouse (old)*, which is the center of the old unused lighthouse, about 100 meters from the new lighthouse.

Charlottesville, McCormick Observatory, longitude (Albemarle County, Va., C. H. Sinclair and F. H. Parsons, 1882, 1910).—Identical with the triangulation station *McCormick Observatory longitude* station, which is about 24 feet east of the large equatorial dome of McCormick's observatory. The station is marked by a drill hole in an 8 by 8 inch granite block.

Charlottesville, McCormick Observatory, latitude (Albemarle County, Va., F. H. Parsons, 1882, 1910).—Identical with *Charlottesville, McCormick Observatory longitude*, described above.

Church azimuth (Nansemond County, Va., J. A. Bond, 1918, 1919).—Identical with the traverse station of the same name, on the right of way of the Virginian Railway, ¾ mile west from the depot at Suffolk on the first curve, and on the top of a small embankment, 3 meters above and 15 meters north of the track. The station is 175 meters west of the Virginian Railway water tank, 25 meters south of the southwesternmost of a group of small negro cabins around a small negro church, and is directly in the line of telegraph poles and also in line between a church spire and the city standpipe. It is marked as described in notes 1a and 7c, with a reference mark, note 11a, 16.435 meters (53.92 feet) distant in azimuth 240° 12′ 05″.

Clark latitude (Orange County, Va., Francis Blake, jr., 1871).—Distant 7.6 meters (25 feet) or 0″.25 of latitude north and 15.39 meters (50.5 feet) east of *Clark azimuth*, described below.

Clark azimuth (Orange County, Va., C. O. Boutelle, 1871).—Identical with the triangulation station of the same name, on the summit of the mountain of the same name, and marked by a large flat bottle filled with ashes and buried 30 inches below the surface of the ground. The surface mark is a limestone post 7 inches square on top and 30 inches long, with deep diagonal lines running north and south and east and west, and with the letters "U. S. C. S." inscribed thereon. Four other limestone posts, each 6 inches square and 30 inches long, and each 5 feet from the station, are, respectively, north, east, south, and west from the station. An arrowhead and one diagonal on each post points to the station.

Covington longitude (Alleghany County, Va., C. H. Sinclair, 1883, 1884).—On the west side of the Chesapeake & Ohio Railroad and 12.972 meters (42.56 feet) from the southwest corner of the depot, 18.181 meters (59.65 feet) from the northwest corner of the depot, 14.3 meters (47 feet) from the southeast corner of Fudge & McClintock's barroom, and 4.05 meters (13.3 feet) from the fence due west. The station is marked by a brick pier laid in cement. A meridian stone is close by a high bank, near a stone wall that incloses at the McCurdy greenhouse. It is a quartz pebble, 2 feet long, set in the solid slate formation 94.625 meters (310.45 feet) due north of the station.

Covington latitude, (Alleghany County, Va., C. H. Sinclair, 1883, 1884).—Identical with *Covington longitude*, described above.

Elliott Knob latitude (Augusta County, Va., W. B. Fairfield, 1878).—Distant 8.8 meters (29 feet) or 0″.29 of latitude north and 1.5 meters (5 feet) west of *Elliott Knob azimuth*, described below. The station is 4 feet east of a brick pier used for time observations.

Elliott Knob azimuth (Augusta County, Va., A. T. Mosman, 1878).—Identical with the triangulation station of the same name marked by a copper bolt 5 inches long set in lead in a large bowlder. Four marble reference posts, each 6 inches square, 30 inches long, and marked with two cross lines, one of which terminates

For notes in regard to marking of stations see p. 130.

in an arrow pointing to the station, are distant 8 feet, respectively, north, east, south, and west from the station. Inclosing the north marble post is the artificial horizon pier, built of stone and brick, 16 by 20 inches, sunk 40 inches below the ground and having its top flush with the surface.

Goodson longitude (Washington County, Va., A. T. Mosman, 1869).—Lost.

Goodson latitude (Washington County, Va., A. T. Mosman, 1869).—Lost.

Hines latitude (Norfolk County, Va., C. H. Sinclair, 1887).—At the cross roads about ½ mile west of the Dismal Swamp, on land of Doctor Hines, whose house is said to be half in Virginia and half in North Carolina. Station is 29.26 meters (96.0 feet) or 0".95 of latitude north and 0.533 meter (1.75 feet) west of a granite boundary stone placed in the center of a stump.

Knott Island, north end, latitude (Princess Anne County, Va., A. T. Mosman, 1873).—Distant 253.814 meters (832.72 feet) due west from *Knott Island north end azimuth*, described below.

Knott Island, north end, azimuth (Princess Anne County, Va., A. T. Mosman, 1869, 1887).—Identical with the triangulation station of the same name on the north end of Knott Island, north of the Virginia line, on the east side of the island, on a hard border of a marsh 2 meters from the water. The station is marked by a copper nail in the top of a stake driven through an earthenware cone. Half of the cone is exposed, and the ground near by is washing rapidly, so the station may now be lost. Two cedar posts are 3 feet, respectively, north and east of the station.

Leesburg latitude (Loudoun County, Va., C. H. Sinclair, 1897).—On the grounds of Leesburg Academy, on the west side of the building, nearly due west and halfway between the fence and the academy. Two meridian stones, 8 by 8 by 24 inches, were placed so as to project 2 inches out of the ground. The north one of brownstone and the south one is marble. Each has a deep cross cut in the upper surface to mark the center. The latitude observations, which were made at a point 72.86 meters (239.04 feet) due south of the north meridian stone, were only intended to be approximate for the purpose of selecting a location for a possible variation of latitude station.

Long Mountain latitude (Campbell County, Va., A. T. Mosman, 1875).—Distant 2.1 meters (7 feet) east and 0.49 meter (1.6 feet) or 0".02 of latitude north of *Long Mountain azimuth*, described below.

Long Mountain azimuth (Campbell County, Va., A. T. Mosman, 1875).—Identical with the triangulation station of the same name on the highest part of the second knob of Long Mountain. The station is marked by a marble post 3 feet long, with cross lines and the letters "U. S. C. S." cut thereon. Four other marble posts, each having diagonals with an arrow pointing to the station, are 8 feet distant, respectively, north, east, south, and west from the station. The artificial horizon pier is in line between the station and the north reference post, and the transit pier is a little north of the line between the station and the east reference post.

Mount Weather longitude (Loudoun County, Va., Edwin Smith, 1907).—Distant 28.4 meters (93.1 feet) or 0".92 of latitude north and 3.4 meters (11.2 feet) or 0".14 of longitude east from *Mount Weather azimuth*, now lost. The longitude station is about 25 meters north of the driveway and is marked by a concrete pier, which is probably recoverable.

Mount Weather latitude (Loudoun County, Va., Edwin Smith, 1907).—Identical with *Mount Weather longitude*, described above.

Mount Weather azimuth (Loudoun County, Va., W. B. Fairfield, 1907).—The northeast chimney of the Weather Bureau building at Mount Weather, destroyed by fire in 1907.

Rogers latitude (Grayson County, Va., W. H. Burger, 1907).—Identical with *Rogers azimuth*, described below.

Rogers azimuth (Grayson County, Va., W. H. Burger, 1907).—Identical with the triangulation station of the same name, on the top of Mount Rogers, locally known as "Balsam," on a large rock, the highest point and easily found. The station is marked by a 1-inch drill hole with two grooves running north and south, and east and west, and is inscribed with the letters "U. S. C. S." cut in the form of a square.

Roslyn (Petersburg) longitude (Chesterfield County, Va., G. W. Dean, 1852; 1892).—About ½ mile north of Petersburg, on the west bank of the Appomattox River, in a cultivated field about 30 yards from the brink of the hill above the railroad. The longitude station is the easternmost of two granite piers marked with a ½-inch hole in the center and is 0".39 west and 0".02 of latitude north of *Roslyn azimuth*, described below.

Roslyn (Petersburg) latitude (Chesterfield County, Va., G. W. Dean, 1852; 1892).—The westernmost of the two piers described above under *Roslyn longitude*, and 0.48 meter (1.6 feet) or 0".02 of latitude north and 11.76 meters (38.6 feet) west of *Roslyn azimuth*, described below.

Roslyn azimuth (Chesterfield County, Va., A. D. Bache and W. P. Trowbridge, 1852; 1854).—Identical with the triangulation station of the same name, now probably lost. It was marked by three marble pillars 6 inches square and about 18 inches long, the top marked by diagonals, forming a cross. They are placed 2 feet distant from the station, two in a north and south line and the third in an east and west line from the station point. The underground station mark is a cone and stub with a nail driven into it.

Staunton longitude (Augusta County, Va., A. T. Mosman, 1869; 1878).—Identical with the triangulation station, *Staunton astronomical latitude and longitude station of 1869*, which is in a field a short distance east of Doctor Sears's house. No description of the marking is available.

For notes in regard to marking of stations see p. 130.

Staunton latitude (Augusta County, Va., A. T. Mosman, 1869; 1878).—Identical with *Staunton lontigude*, described above.

Strasburg longitude (Shenandoah County, Va., Edwin Smith and G. W. Dean, 1881).—Marked by a brick pier within the old earthworks to the north of the town of Strasburg. The pier is 33 inches by 11½ inches and extends 36 inches above the ground. The station is a geodetic point.

Strasburg latitude (Shenandoah County, Va., C. H. Sinclair, 1881).—Distant 0.381 meter (1.25 feet) or 0".01 of latitude south and 4.801 meters (15.75 feet) west of *Strasburg longitude*, described above.

Suffolk longitude (Nansemond County, Va., J. E. McGrath, 1919).—Distant 6.658 meters (21.84 feet) 0".22 of latitude north and 29.625 meters (97.19 feet) or 1".19 of longitude east of traverse station *Suffolk*, on the right of way of the Seaboard Air Line Railway, 200 meters east of the depot at Suffolk, on the top of the embankment about 15 feet higher than the track, 36 meters west of the west line of the bridge, 6 meters south of the south rail, and 1 meter north of a fence. The triangulation station is marked as described in notes 1a and 7c, with a reference mark, note 11a, 38.77 meters (127.2 feet) from the station in azimuth 258° 01′ 32″.

Suffolk latitude (Nansemond County, Va., J. E. McGrath, 1919).—Identical with *Suffolk longitude*, described above.

Tangier Island latitude (Accomac County, Va., A. T. Mosman, 1871).—Distant 1.83 meters (6.0 feet) or 0".03 of latitude north in azimuth 122° from *Tangier Island azimuth*, described below.

Tangier Island azimuth (Accomac County, Va., A. T. Mosman, 1871).—Identical with the triangulation station of the same name, which is marked by a copper nail in a pine post 10 inches in diameter. The following distances and azimuths are from the station: Copper tack in cedar post, 15.2 meters (50 feet), 257° 11′ 22″; copper tack in cedar post to the south, 4.11 meters (13.5 feet); stump, 21.24 meters (69.7 feet); northwest corner of cistern of old beach house, 107.47 meters (352.6 feet), 24°.

White Rock latitude (Lee County, Va., and Harlin County, Ky., W. H. Burger, 1907).—Identical with *White Rock azimuth*, described below.

White Rock azimuth (Lee County, Va., and Harlin County, Ky., W. H. Burger, 1907).—Identical with the triangulation station of the same name on the State line between Virginia and Kentucky, about 3 miles by road and trail from Ewing. The station is marked by a drill hole at the intersection of two cross lines on a large rock nearly level with the surface of the ground. Around the drill hole in the form of a square are the letters "U. S. C. S." Three reference marks, each a drill hole at the intersection of two grooves, one of which terminates in an arrow pointing toward the station, are on rocks located as follows: Distant 2.7 meters (9 feet), S. 41° 06′ E.; distant 9.220 meters (30.25 feet), S. 12° 21′ W.; and distant 4.261 meters (13.98 feet), N. 89° 25′ W.

Wolftrap latitude (Mathews County, Va., A. T. Mosman, 1871).—Distant 1.58 meters (5.2 feet) west and 0.82 meter (2.7 feet) or 0".03 of latitude north from *Wolftrap azimuth*, now lost.

Wolftrap azimuth (Mathews County, Va., A. T. Mosman, 1871).—Lost.

WASHINGTON

Bel azimuth (Pierce County, Wash., J. S. Hill, 1905).—Identical with the triangulation station of the same name, on a high rocky peak known as "Bel Jacket," about 10 or 12 miles a little south of west of Mount Rainier, and about 9½ miles by road from Ashford. The station is marked by an old-type station mark, which is a bronze disk with the raised letters "U. S. C. & G. S." Three reference marks, each a drill or punch hole in the top of a ⅜-inch copper bolt, which is leaded or cemented into a drill hole in the rock, with the top of the bolt flush with the surface, are at the following distances and azimuths from the station: 7.26 meters (23.8 feet), 328° 46′; 5.24 meters (17.2 feet), 16° 22′; and 5.94 meters (19.5 feet), 188° 29′. A drill hole is 16.89 meters (55.4 feet) from the station in azimuth 15° 01′.

Blaine longitude (Whatcom County, Wash., Edwin Smith, 1908).—Marked by an iron nail in a concrete pier 3.315 meters (10.88 feet) north and 0.580 meter (1.90 feet) or 0".03 of longitude west of triangulation station *Miller*, which is 3 paces from the edge of the bluff overlooking the spur of the Great Northern Railway running from the main lines to the wharf and 49.16 meters (161.3 feet) from the southwest corner of D. S. Miller's yard fence at the intersection of Cedar Street and Washington Avenue, and is marked by a standard disk station mark cemented into a granite stone. An unused electric-light pole is 1.01 meters (3.3 feet) S. 7°E. from the station.

Cape Disappointment latitude (Pacific County, Wash., Geo. Davidson, 1851; 1874).—Distant 272.3 meters south and 288.5 meters west of the triangulation station *Cape Disappointment*, which is on the sidehill on the most eastern spur of Cape Disappointment. The triangulation station is marked by stake driven 3 feet into the broken rock; around this are three other stakes each about 6 feet distant. The latitude station is also 83 meters north and 275.3 meters east of Cape Disappointment Lighthouse. The latitude station is itself a geodetic point.

Carson latitude (U. S. & C.) (Ferry County, Wash., C. H. Sinclair, 1901).—About 400 meters west from Kettle River, on the first high bench west of the road from Grand Forks, British Columbia, to Nelson, Wash., and distant 5.03 meters (16.5 feet) or 0".16 of latitude south and 10.09 meters (33.1 feet) west from boundary monument No. 154 (old No. 53) of the United States-Canada boundary. An iron post marking the southern end of a meridian line is 16.5 feet north and 20.4 feet east of the station.

For notes in regard to marking of stations see p. 130.

Classet azimuth (Clallam County, Wash., W. H. Burger, 1908; 1921).—Identical with the triangulation station of the same name, on the second point west from Neale Bay, 5 paces from the edge of the cliff to the north and 6 paces from the edge of the cliff to the west. The station is marked by a large stone surmounted by a concrete pier, 12 by 12 by 50 inches, with a wire running through the center. A blazed tree is 8.69 meters (28.5 feet) to the northward and another is in line to station *Juniper*, distant 7.65 meters (25.2 feet). A stump up the hill to the south is marked by a triangle of nails and is 8.08 meters (26.5 feet) distant.

Ellensburg (U. S. G. S.) longitude (Kittitas County, Wash., S. S. Gannett, 1895).—In the grounds of the State normal school, 173 feet west of the center of the tower of the school building. The station is marked by a pier.

Ellensburg (U. S. G. S.) latitude (Kittitas County, Wash., S. S. Gannett, 1895).—Identical with *Ellensburg (U. S. G. S) longitude*, described above.

False Dungeness latitude (Clallam County, Wash., Geo. Davidson, 1852).—At the head of False Dungenes Bay, between the bay beach and the Indian burial ground. The station is marked by the transit block, which was left in the ground.

Goose 2 azimuth (Pacific County, Wash., E. H. Pagenhart, 1911; 1922).—Identical with the triangulation station of the same name, about ¾ mile north of the dock at Bay Center, on top of the bluff at Goose Point. The station is marked as described in note 1, the concrete being in the form of triangular prism. The reference mark, note 11c, is distant 6.17 meters (20.2 feet). In 1922 the station was near the edge of the bluff and in danger of being lost. A new station, *Goose 3*, was established 3.833 meters (12.58 feet) from *Goose 2*, in azimuth 266° 52′. This station is marked as described in note 1c. Two reference marks, each a triangle of nails in a triangular blaze on a tree, are located as follows: 15.851 meters (52.00 feet) distant in azimuth 268° 20′; and 12.970 meters (42.55 feet) distant in azimuth 344° 18′.

Kalama longitude (Cowlitz County, Wash., Geo. Davidson, 1873).—Identical with triangulation station *Kalama astronomic*, now lost.

Kalama latitude (Cowlitz County, Wash., W. Eimbeck, 1873).—The latitude station was 1.96 meters (6.42 feet) due west of *Kalama longitude*, described above.

Kalama azimuth (Cowlitz County, Wash., W. Eimbeck, 1873).—Identical with the triangulation station of the same name, now lost.

Lam azimuth (Cowlitz County, Wash., J. S. Hill, 1906).—Identical with the triangulation station of the same name, on the highest part of the heavily wooded summit of Elk Mountain, about 35 miles northeast of Woodland. The station is marked by an old-type station mark, which is a bronze disk with the raised letters "U. S. C. & G. S.," cemented into a drill hole in the rock. Two reference marks, each as described under station *Bel azimuth* (see above), are at the following distances and azimuth from the station: 6.28 meters (20.6 feet), 36° 56′; and 10.84 meters (35.6 feet), 319° 02′.

Langley azimuth (Chehalis County, Wash., E. H. Pagenhart, 1911; 1914).—Identical with the triangulation station of the same name, about 19 miles from Aberdeen and 1¾ miles from Copalis Crossing, a station on the Moclips branch of the Northern Pacific Railroad, 150 meters west from the highest point of the Pacific Beach automobile road as it passes over Langley Hill, and 35 meters east of the road. The station is marked by a Geological Survey bench mark in a sandstone block set in a mass of cement. A reference mark, note 11b, is about 4 feet back from the top of the cut, on the uphill side of the road, distant (surface measurement) 58.11 meters (190.6 feet) from the station. A second reference mark, a cement post about 18 inches long, with an arrow pointing to the station and the letters "R. M." cut in the top, is in line with the station and the first reference mark and distant (surface measurement) 18.19 meters (59.7 feet).

Lummi Island latitude (Whatcom County, Wash., Geo. Davidson, 1853; 1859).—On the east side of Lummie Island and about 1½ miles from the northern extremity, on a low sandy point. Distant 9.1 meters (30 feet) due west from the triangulation station *Lummi Island astronomic station*, which is marked by a drill hole in a stone buried 1 foot below the surface. The surface is marked by three stubs each 6 feet from the station. The station is now probably lost.

Pioneer azimuth (Chehalis County, Wash., E. H. Pagenhart, 1911).—Identical with the triangulation station of the same name, about 22 miles south from Montesano, about 6 miles by trail from the ranch of Robert Hislop (Vesta post office), on the top of the most prominent hill in the locality. The station is marked by a standard disk station mark set in a stone flush with the ground and covered by a cairn. The subsurface mark is a bottle buried 3 feet deep. Reference mark No. 1 is a cartridge driven in the center of a triangular blaze on a deformed tree, 6.33 meters (20.8 feet) from the station in azimuth 307° 41′. Reference mark No. 2 is a standard disk reference mark in a stone flush with the ground and covered by a cairn, distant 13.25 meters (43.5 feet) from the station in azimuth 0° 41′. Reference mark No. 3, similar to No. 2, is 16.29 meters (53.4 feet) from the station in azimuth 87° 32′.

Point Hanson azimuth (Grays Harbor County, Wash., A. T. Mosman, 1860).—Identical with the triangulation station *Port Hanson astronomical*, on the highest knob of the ridge on the fast land bounding the south side of the marsh, about 30 paces east of McKee's store, and near an Indian grave. The station is marked by three stubs, with copper nails, each 6 feet from center, two of which are in line nearly north and south of the station and the third at right angles to this line. The underground mark is a block of wood with a ½-inch hole bored in it.

For notes in regard to marking of stations see p. 130.

Point Hudson latitude (Jefferson County, Wash., Geo. Davidson, 1852; 1882).—Distant 114.0 meters (374 feet) or 3″.69 of latitude south and 148.5 meters (487 feet) west of *Point Hudson azimuth.* Both latitude and azimuth stations are now lost.

Point Hudson azimuth (Jefferson County, Wash., Geo. Davidson, 1856).—Identical with the triangulation station of the same name, now lost.

Port Townsend longitude (Jefferson County, Wash., R. A. Marr, 1888; 1919).—Close to the northeast corner and in the grounds of the marine hospital, the old hospital having been torn down and a new one erected across the street from the old one. The station is in lot 1, block 102, 3.48 meters (11.4 feet) west of the east fence and 5.02 meters (16.5 feet) north of the north face of the hospital. The station is marked by a brass bolt through a brass plate in the center of a stone pier and is 75.379 meters (247.31 feet) in azimuth 127° 31′ 56″ or 2″.89 of longitude west from *Port Townsend azimuth*, described below.

Port Townsend azimuth (Jefferson County, Wash., W. H. Burger, 1908; 1921).—Identical with the triangulation station of the same name, on the edge of the bluff southeast of the marine hospital, on exact line between *Port Townsend longitude*, described above, and triangulation station *Kilisut 2.* The station is about 4 paces back from the edge of the bluff, 0.7 meter (2.3 feet) east of the east property line of the street bounding the marine hospital on the east, 35.71 meters (117.2 feet) south from the southwest corner post of lot 11, block 100, 26.72 meters (87.7 feet) southeast from the northeast corner of lot 2, block 91, on a vacant lot (lot 8, block 92) belonging to Doctor Maas. The station is marked by a 6-inch by 26-inch section of sewer pipe, with the top filled with cement and an inverted nail placed therein. The center of the steel weather signal tower is 17.54 meters (57.5 feet) westward from the station.

Rain azimuth (Thurston County, Wash., E. H. Pagenhart, 1911).—Identical with the triangulation station of the same name, about 10 meters northwest of the highest point of a prominent high hill, about 4 miles south-southeast of the town of Rainier, about 1,200 feet above it, and just visible over the top of the timber from the town. It is probably in sec. 33, T. 16 N., R. 1 E., and it is about a mile west-northwest of the ranch on the top of ridge owned by N. N. Bungard. The station is marked according to note 2, the subsurface mark in a bowlder about 10 by 12 by 12 inches and 15 inches below the surface of the ground; the surface mark in a bowlder 12 by 20 by 20 inches. Two reference marks, described in note 4, are located as follows: One in a large bowlder at the highest part of the hill, 8.75 meters (28.7 feet) from the station in azimuth 8° 54′, and the other in a bowlder at some distance down the slope of the hill and 13.78 meters (45.2 feet) from the station in azimuth 218° 42′.

Russell (U. S. & C.) latitude (Ferry County, Wash., C. H. Sinclair, 1901).—On the south and west sides of Kettle River, in the bend made by the river to the south toward the Columbia, and close to or in the town of Laurier, 2 miles south of Cascade, British Columbia. The station is 2.10 meters (6.9 feet) or 0″.07 south and 7.59 meters (24.9 feet) east of monument No. 164 (old No. 43, British No. 119) of the International Boundary Survey. Russell azimuth station is 5 inches south and 98 feet east of monument No. 164. A meridian post of railroad iron, about 7 feet long, sunk 4 feet in the ground and inscribed "SOUTH MERIDIAN, 1901," is almost identical with the azimuth station.

Seattle longitude (King County, Wash., J. J. Gilbert, 1886; 1905; E. Smith, 1905; O. B. French, 1908).—The station of 1886, in the grounds of the old university, is now lost. The station of 1905 is 26.24 meters (86.1 feet) or 0ˢ.084 of longitude east and 61.67 meters (202.3 feet) north of the station of 1886 and was marked by a concrete pier. In 1908 a Canadian party was replacing the pier of 1905 with a larger one, and the Coast Survey party occupied a point 6.64 meters due south of it. The station of 1886 is a geodetic point.

Seattle, University of Washington, longitude (King County, Wash., E. Smith, 1908; 1911).—The station is the transit pier of the University of Washington, in the west wing of the building, in the observatory. The pier is 18 by 24 inches on top and 36 inches above the floor, and is made of brick capped with a single stone. The station is a geodetic point.

Seattle latitude (King County, Wash., R. A. Marr, 1888).—Marked by a brick and cement pier 21.43 meters (70.3 feet) due east of the longitude station of 1886, which is now lost.

Scarborough Harbor latitude (Clallam County, Wash., Geo. Davidson, 1852).—Distant 1.667 meters (5.47 feet) east of a point marked by two bottles, one buried 4 feet below the surface and the other just above the first. The surface is marked by three stubs, two in line with the point nearly north and south and the third at right angles to this line. The stubs are about 6 feet from the point. A copper nail in the stump of a flagstaff is 19.583 meters (64.25 feet) from the point marked by the stubs.

Spokane longitude (Spokane County, Wash., R. A. Marr, 1888; 1896).—On the north side of the Spokane River, in the grounds of the county courthouse. The station is marked by a pier of brick and cement, extending 18 inches below the surface of the ground. It is 54.20 meters (177.8 feet) south and 10.16 meters (33.3 feet) or 0″.49 of longitude west of the courthouse cupola, 34.96 meters (114.7 feet) from the southeast corner of the jail, 45.49 meters (149.2 feet) from the southwest corner of a stone and brick addition to the courthouse.

Spokane (U. S. G. S.) latitude (Spokane County, Wash., S. S. Gannett, 1896).—In the grounds of the new county courthouse, near the southeast corner of the lot, 30 feet south and 128 feet east of the courthouse cupola. The station is 20.54 meters (67.4 feet) east of *Spokane longitude*, described above.

Tacoma longitude (Pierce County, Wash., C. H. Sinclair and Geo. Davidson, 1894; 1905).—Identical with *Tacoma azimuth*, described below.

For notes in regard to marking of stations see p. 130.

Tacoma latitude (Pierce County, Wash., C. H. Sinclair, 1894).—Marked by a brick pier 17 inches square and 5½ feet long, and 3.734 meters (12.25 feet) due east from *Tacoma azimuth*, described below.

Tacoma astronomic azimuth (Pierce County, Wash., O. B. French and J. S. Hill, 1892; 1905).—Identical with the triangulation station *Tacoma astronomic station*, in Wright's Park, upon a small knoll a few paces north of the park walk. The station is marked by a stone pier, with the letters "C. & G. S." cut on the top. A granite post is south of the station in the same meridian

Walla Walla longitude (Walla Walla County, Wash., C. H. Sinclair and Edwin Smith, 1887; J. E. McGrath, 1916).—The station of 1887 was on grounds now occupied by the hall of records for Walla Walla County. It was 34.263 meters (112.41 feet) or 1".59 of longitude west and 14.222 meters (46.66 feet) or 0".46 of latitude south of the flagpole on the county courthouse. The station of 1916 was located in a lot belonging to J. C. Muntinga, just north of the curb line of Birch Street and nearly in the prolongation of the center line of Chase Street. The station was not permanently marked. It was connected by traverse with the station of 1887 and is 5".96 of latitude south and 8".545 (0s.570) of longitude east of that station.

Walla Walla latitude (Walla Walla County, Wash., C. H. Sinclair, 1887).—Identical with the longitude station of 1887, described above, which is now lost.

WEST VIRGINIA

Cameron longitude (Marshall County, W. Va., A. T. Mosman, 1864).—Not described.

Charleston longitude (Kanawha County, W. Va., G. W. Dean, 1881; 1883).—Identical with the triangulation station *Charleston astronomic*, in the northwestern part of the statehouse grounds at Charleston. The station is marked by a sandstone pier, resting on a heavy masonry foundation. The pier is inscribed "U. S. Coast and Geodetic Survey, 1881." It was learned in 1883 that the statehouse was to be remodeled. Measurements were made to the location of a proposed new cupola. The station is 41.94 meters (137.6 feet) west and 5.00 meters (16. 7 feet) south of this cupola.

Charleston latitude (Kanawha County, W. Va., F. H. Parsons, C. Schenk, and C. Terry, 1883).—Identical with *Charleston longitude*, described above.

Clarksburg longitude (Harrison County, W. Va., A. T. Mosman, 1863).—Marked by a wooden stub 9.32 meters (30.6 feet) from the south front of the academy (extended) and 27.7 meters (91 feet) from the east side of the academy (extended). The academy is on the highest ground in Clarksburg, commanding a view of the entire town.

Gauley Bridge longitude (Fayette County, W. Va., A. T. Mosman, 1864).—Not described.

Grafton longitude (Taylor County, W. Va., A. T. Mosman, 1864).—On the north side of the Baltimore & Ohio Railroad, between the Powell House and a red brick house, being 18 feet north of the line connecting the southeast corner of the brick house and the southwest corner of the Powell House, the offset being measured at a distance of 77 feet from the Powell House corner and 117 feet from the brick house corner. Point marked by a bottle 22 inches below surface of ground.

Harvey latitude (Monongalia County, W. Va., C. H. Sinclair, 1883).—About 2½ miles south of Morris Cross Roads, Pa., 1 mile east of the Cheat River, and 300 feet east of the house of Albert Harvey. The station is 10.85 meters (35.6 feet) or 0".35 of latitude south of a mound of stone and earth on the West Virginia and Pennsylvania boundary, 16.31 meters (53.5 feet) southeast from a large red oak, 2.99 meters (9.8 feet) south-southeast from a large white oak stump, 7.6 meters (25 feet) west from a small red oak tree, and 8.72 meters (28.6 feet) southwest from a red oak stump.

Keeney latitude (Summers County, W. Va., A. T. Mosman, 1880).—Distant 23.2 meters (76 feet) in azimuth 181° 41′ 48″, or 0".75 of latitude north from *Keeney azimuth*, described below. Marked by solid oak block.

Keeney azimuth (Summers County, W. Va., A. T. Mosman, 1880).—Identical with the triangulation station of the same name, which is about 4 miles northwest of Alderson station on the Chesapeake & Ohio Railway, on the extreme northern and highest part of Keeney Mountain. The underground mark is a bottle set in cement about 2½ feet below the ground. The surface mark is a cross in the top of a stone post, 6 inches square and 30 inches long, inscribed with the letters "U. S. C. & G. S." Four other stone posts, 6 inches square and 30 inches long, each marked with a diagonal cross with an arrowhead at the end of one diagonal pointing toward the station, are located as follows: 2.15 meters (7.1 feet) north, 2.11 meters (6.9 feet) south, 2.17 meters (7.1 feet) east, and 2.15 meters (7.1 feet) west.

Martinsburg longitude (Berkeley County, W. Va., A. T. Mosman, 1864).—Not described.

Mount Morris latitude (Monongalia County, W. Va., C. H. Sinclair, 1883).—About 1 mile south of Mount Morris, Pa., on land of the Kennedy Coal Co., alongside the road and 12.95 meters (42.5 feet) from the house of Morris Hamilton. A stone said to be on the Pennsylvania and West Virginia State line is 5.30 meters (17.4 feet) east and 2.484 meters (8.15 feet) or 0".08 of latitude north of the station.

Parkersburg longitude (Wood County, W. Va., A. T. Mosman, 1864).—Not described.

Piney latitude (Cabell County, W. Va., W. B. Fairfield, 1883).—Marked by a concrete pier 13.640 meters (44.75 feet) or 0".44 of latitude north of *Piney azimuth*, described below.

For notes in regard to marking of stations see p. 130.

Piney azimuth (Cabell County, W. Va., A. T. Mosman and W. B. Fairfield, 1883; 1891).—Identical with the triangulation station of the same name, which is on a ridge near the Putnam County line, about 2 miles northwest of Hurricane station, on the Chesapeake & Ohio Railway. The station was marked originally by an earthenware pyramid 2 feet below the ground, with a hexagonal concrete pier built over it. As the pier was built, a spike was inserted in the concrete about every 12 inches in height directly above the apex of the pyramid. The pier was found broken off at the surface of the ground in 1891, but by digging down about 6 inches one of the spikes at the center of the pier was found. The station was then remarked by building a dome of concrete, 2 feet in diameter and about 1 foot high, on the old foundation and inserting a spike at the center directly above the old spike. The letters "U. S. C. & G. S." were inscribed in the dome. Four reference marks, consisting of concrete blocks 8 inches square and about 2 feet long, are at the following distances and directions from the station: 1.90 meters (6.2 feet) north, 1.80 meters (5.9 feet) east, 1.81 meters (5.9) feet south, and 1.84 meters (6.0 feet) west.

Point Pleasant longitude (Mason County, W. Va., A. T. Mosman, 1864).—Not described.

Wheeling longitude (Ohio County, W. Va., A. T. Mosman, 1864).—Not described.

WISCONSIN

Ada 1 (U. S. L. S.) latitude (Ozaukee County, Wis., C. F. Powell, 1873).—Distant 0.61 meter (2.0 feet) or 0".02 of latitude south and 17.50 meters (57.7 feet) west of traverse station *Ada 1* of the United States Lake Survey which is on the west shore of Lake Michigan, 8 miles north of Port Washington, or Ozaukee, and about 7 meters from the waters edge. The traverse station is marked by a stone post set 2 feet below the ground surface. Three cedar posts, each 4 inches in diameter, rising 2.5 feet above the ground, faced on the side toward the station and marked "U. S.," and surrounded by a pyramid of loose stones, were set as references; one bearing N. 15° 15′ E, distant 19.81 meters (65.0 feet); one bearing N. 73° 19′ W., distant 19.75 meters (64.8 feet;) and one bearing S. 16° 04′ W., distant 19.66 meters (64.5 feet). A limekiln is approximately 27 meters to the southwest. The latitude station is marked by a post.

Aminicon River (U. S. L. S.) latitude (Douglas County, Wis., G. Y. Wisner, 1871).—Distant 5.90 meters (19.4 feet) or 0".19 of latitude south and 7.20 meters (23.62 feet) east of *Aminicon River (U. S. L. S.) azimuth*, described below. The station is marked by a large pine post.

Aminicon River (U. S. L. S.) azimuth (Douglas County, Wis., G. Y. Wisner, 1871).—Identical with triangulation station *Aminicon River*, of the United States Lake Survey, on the south shore of Lake Superior, about ¼ mile west of the mouth of Aminicon River. The station is marked by a stone post set with its top about 3 feet below the surface of the ground, with a second stone with its top rising nearly to the surface, set directly over the first. Three reference stumps of birch are blazed and marked "N.," "S.," "W.," respectively, by means of nails driven into the wood. The stump marked "N." is 4.30 meters (14.1 feet) from the station, the one marked "S." is 1.295 meters (4.25 feet) distant, and that marked "W." is 2.93 meters (9.6 feet) distant.

Babe azimuth (Oconto County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 1½ miles north of Bonita, 135 meters north of railroad bridge No. 50 and 26.6 meters (87 feet) west of the west rail of the Chicago & North Western Railway track. The station is marked as described in notes 1a and 7a, with a reference mark, note 11a, distant 16.09 meters (52.8 feet) in azimuth 210° 52′.

Boyers Bluff (U. S. L. S.) latitude (Door County, Wis., C. A. Young, 1865).—Distant 10.89 meters (35.7 feet) or 0".35 of latitude south and 25.24 meters (82.8 feet) east from *Boyers Bluff, 1864*. The station is marked by a post. Three stone reference posts are set each 10 feet from the latitude station bearing north, south, and east, respectively. *Boyers Bluff, 1864*, was destroyed and a new triangulation station, *Boyers Bluff, 1871*, was established in the same or nearly the same position. It is on the northwest side of Washington Island, about 15 feet back from the edge of the bluff, and is marked by a stone post. A reference stone is 24 feet S. 43° E. and a second reference stone is 15½ feet N. 33° W. from the station.

Bruce (U. S. L. S.) azimuth (Brown County, Wis., A. R. Flint, 1872; 1921).—Identical with triangulation station *Bruce* of the U. S. Lake Survey in the SE. ¼ NW. ¼ sec. 25, Preble Township, about 6 miles east of Green Bay, on the top of a cultivated hill and about 250 meters south of the house of John Deprey. The station is about ¼ mile east of road No. 54 at a point about 6.8 miles from Green Bay post office and is marked as described in note 1a. Reference mark No. 1, a stone post 6 inches square and 2 feet long, surrounded by cement at the top, is 182.32 meters (598.2 feet) distant in azimuth 94° 19′ 43″; reference mark No. 2, note 11a, is 23.88 meters (78.3 feet) distant in azimuth 126° 12′ 09″; reference mark No. 3, a stone post 6 inches square with a hole in the center, is 15.14 meters (49.7 feet) distant in azimuth 195° 04′ 37″.

Brule River (U. S. L. S.) latitude (Douglas County, Wis., G. A. Marr, 1871).—Distant 3.6 meters (12 feet) or 0".12 of latitude south and 20.7 meters (68 feet) west of triangulation station *Brule* of the United States Lake Survey, on the south shore of Lake Superior, 19 feet above the lake, and about 1 mile east of the mouth of Bois Brule River. The triangulation station is not marked, the latitude station being marked by a post. A second post, under which is a bowlder with a cross on its upper surface, is 21.12 meters (69.3 feet) directly south of the latitude station.

For notes in regard to marking of stations see p. 130.

Buffalo azimuth (Rock County, Wis., E. C. States, 1920).—Identical with the traverse station of the same name, about 1¾ miles west of Clinton, on the north side of the Chicago, Milwaukee & St. Paul Railway track, ½ mile west of the first section-line road crossing west of Clinton, in an orchard, and 17.02 meters (55.8 feet) north of the north and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the north side of the railroad property line fence, 20.48 meters (67.2 feet) from the station in azimuth 264° 09′.

Burlington azimuth (Racine County, Wis., E. C. States, 1920).—Identical with the traverse station of the same name, at Burlington, about 385 yards east of the Chicago, Milwaukee & St. Paul Railway station, on the north side of the track, 330 yards east of the intersection of Market and McHenry Streets, on the north edge of Market Street, 55 yards north of semaphore signal No. 26/6, and 27.18 meters (89.2 feet) north of the north and nearest rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track, near the fence line, 9.68 meters (31.8 feet) from the station in azimuth 97° 55′.

Carter azimuth (Forest County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about ½ mile south of the railroad station at Carter, 175 meters south of a sawmill, 60 meters west of the sawmill company's store, 4 meters north of the center of the road leading from trail 32 to the store, and 135.645 meters (445.03 feet) from the west and nearest rail of the Chicago & North Western Railway. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the opposite side of the roadway from the station, and distant 22.725 meters (74.56 feet) in azimuth 338° 04′ 09″.

Chalmers azimuth (Oneida County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, which is about 1¼ miles west of Tripoli, 175 meters west of the intersection of trail 14 with the Minneapolis, St. Paul & Sault Ste. Marie Railway, on the extension of the north rail from the east and west, and 14.30 meters (46.9 feet) south of the railroad. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is 23.14 meters (75.9 feet) from the station in azimuth 85° 59′ 30″.

Claybanks (U. S. L. S.) latitude (Door County, Wis., S. W. Robinson, 1866; C. F. Powell, 1872).—The station of 1866 is 119.76 meters (392.9 feet) or 3″.88 of latitude south and 99.19 meters (325.4 feet) west of traverse station *Claybanks*, of the United States Lake Survey. The station of 1872 is 471.72 meters (1,547.6 feet) or 15″.28 of latitude north and 242.95 meters (797.1 feet) east of the traverse station. *Claybanks* traverse station is about 4 miles northeast from Port Wing, near the west shore of Lake Michigan, 61 feet above the lake surface, 8½ miles northward from Ahnepee, about 15 feet back from the edge of the bank, 120 feet from the edge of the lake, and 330 feet from the wagon road running from Ahnepee to Claybanks. The station is marked by a stone post set 3½ feet below the ground. The surface mark is a wrought-iron spike driven into sandstone. Three stone reference posts, with square tops rising 10 inches above the ground, with holes in their centers and the letters "U. S." cut on them, were set as follows: One S. 39° 38′ W., distant 154.66 meters (507.4 feet); one N. 27° 15′ E. distant 145.42 meters (477.1 feet); and one N. 53° 16′ W., distant 46.12 meters (151.3 feet). Both latitude stations were marked by posts. The observations at each station were reduced to traverse station Claybanks and a weighted mean taken.

Detour (U. S. L. S.) azimuth (Bayfield County, Wis., W. Bowie, 1908).—Identical with the United States Lake Survey triangulation station of the same name, which is on the south shore of Lake Superior, on the sand point which is nearly due south of Sand Island, and about 6 meters from the edge of the soft sandstone bluff. The station is marked by a stone post. Three reference stones are, respectively, east, south, and west from the station, each 15 feet distant.

Door Bluff (U. S. L. S.) latitude (Door County, Wis., S. W. Robinson, 1865).—Distant 22.53 meters (73. 9 feet) or 0″.73 of latitude south and 15.65 meters (51.3 feet) west of triangulation station *Door Bluff 1874* of the United States Lake Survey, on the east shore of Green Bay, on Deaths Door Bluff, 34 feet back from the edge of the west side of the bluff, and 100 feet above the lake. The triangulation station is marked by a stone post set over a cross cut in the solid rock. Cedar reference stakes, each 10 feet distant and each surrounded by a pile of stones, were driven on the north, east, and south sides of the station. The latitude station is marked by a stone post.

Dover (U. S. L. S.) azimuth (Racine County, Wis., E. C. States, 1920).—Identical with the United States Lake Survey triangulation station of the same name, which is about 1½ miles east of Kansasville, in the southwest quarter of section 6, Dover Township, on a small knoll, 275 yards northeast of the J. W. Payne homestead. The station mark is a bronze tablet set in concrete, as described in note 1a, and the underground mark is a stone set so that its upper end is 27 inches below the surface of the ground. Two reference stones are set in the road south of the station. One bears S. 14° 13′ E. distant 318.58 meters (1,045.2 feet) from the station, and the other bears S. 35° 08′ W. distant 190.42 meters (624.7 feet) from the station. The elevation of the ground at the station is 860 feet.

Fennimore longitude (Grant County, Wis., W. B. Fairfield and Edwin Smith, 1901).—On Parker Street in the northeast corner of the second vacant lot north of Casper Street, about 12 feet from the curb line and 10 feet south of the north side of the lot. The station is about 200 feet south of the Chicago & North Western

For notes in regard to marking of stations see p. 130.

Railway Parker Street crossing, and is marked by a brick pier. The station is 217.8 meters (715 feet) north and 23.50 meters (77.1 feet) or 1".04 of longitude east of the *Fennimore High School, ball on lightning rod.*

Fitzsimmons latitude (Sauk County, Wis., C. O. Boutelle, 1887).—Distant 9.045 meters (29.68 feet) or 0".29 of latitude north and 2.913 meters (9.56 feet) east of *Fitzsimmons azimuth* (see below).

Fitzsimmons azimuth (Sauk County, Wis., C. O. Boutelle, 1887).—Identical with the triangulation station of the same name. No description available.

Fond azimuth (Walworth County, Wis., E. C. States, 1920).—Identical with the traverse station of the same name, about 2 miles west of Elkhorn, on the north side of the Chicago, Milwaukee & St. Paul Railway track, in the southwest corner of the second field, ¼ mile east of a road which runs north and south past Delavan Prairie district No. 7 school, and 18.60 meters (61.0 feet) north of the north and nearest rail. The station, underground, and reference mark are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track, near the fence corner, 15.22 meters (49.9 feet) from the station in azimuth 25° 44′.

Fort Howard (U. S. L. S.) longitude (Brown County, Wis., C. A. Young, 1864; 1921).—Distant 1,488.71 meters (4,884.2 feet) north and 2,106.42 meters (6,910.8 feet) or 95".36 of longitude east from triangulation station *Fort Howard, 1872*, of the United States Lake Survey, which is about 160 meters northeast of Ninth Street, 13.4 meters (44 feet) southeast of Fourteenth Avenue, 98 meters northwest of Thirteenth Avenue, on the west side of Fox River, in that part of Green Bay formerly known as Fort Howard. The station is marked by a stone post, with its upper end 4 feet below the surface of the ground. A similar stone post marks the surface. Two reference stones are set on the north side of Ninth Street. The west reference stone is 0.56 meter (1.8 feet) from the edge of the sidewalk toward the center of the street and 9.78 meters (32.1 feet) from the center of Fourteenth Avenue, and 152.44 meters (500.1 feet) from the station S. 57° 05′ W. The east reference stone is 0.31 meter (1 foot) north of the north edge of the sidewalk, 28.1 meters (92 feet) southeast of the center of Thirteenth Avenue, and 202.94 meters (665.8 feet) from the station S.16° 26′ E.

Fort Howard (U. S. L. S.) latitude (Brown County, Wis., James Carr, 1862).—Distant 853.05 meters (2,798.7 feet) north and 236.34 meters (775.4 feet) west from the center of the cupola of the courthouse at Green Bay; 83.15 meters (272.8 feet) due north from a stone meridian post; 491.52 meters (1,612.6 feet) due south of a second stone meridian post. Station is 1,489.37 meters (4,886.4 feet) or 48".24 of latitude north and 2,107.05 meters (6,912.9 feet) east from triangulation station *Fort Howard* of the United States Lake Survey, descrived above is connection with *Fort Howard (U. S. L. S.) longitude.* The latitude station is marked by a wooden post.

Fox Point (U. S. L. S.) latitude (Milwaukee County, Wis., C. F. Powell, 1873).—Distant 2.71 meters (8.9 feet) or 0".09 of latitude north and 20.15 meters (66.1 feet) west from traverse station *Fox Point* of the United States Lake Survey, on the west shore of Lake Michigan, 98 feet above the lake, and about 8 miles north of Milwaukee. The traverse station is marked by a stone post; the latitude station by a post. From the traverse station another post bears N. 7° 38′ E., distant 4.48 meters (14.7 feet); the northeast corner of Vruwink's house bears S. 35° 13′ W., distant 160.9 meters (527.9 feet).

Gordon azimuth (Douglas County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, which is located at Gordon, about 180 meters north of the depot of the Minneapolis, St. Paul & Sault Ste. Marie Railway, 50 meters south of the north end of the first curve north of the depot, 125 meters south of milepost 421, and 100 meters north of railway overhead bridge K 420 H. The station is 9.06 meters (29.7 feet) west of the west rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a and 11a. The reference mark is 20.76 meters (68.1 feet) from the station in azimuth 348° 11′ 34″.

Gratiot's Grove latitude (Lafayette County, Wis., G. E. Brown, 1880).—About 30 feet due east of *Gratiot's Grove azimuth* (see below). Marked by a black walnut log sunk 4 feet in the ground.

Gratiot's Grove azimuth (Lafayette County, Wis., G. E. Brown, 1880).—No description available.

Green Bay east base azimuth (Brown County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, in the north end of the city of Green Bay, 200 meters west of the office of the Bay Ice Co., on the west side of Fox River, 200 meters west of Broadway Street, and 2.4 meters (8 feet) south of the center line of the main line of the Chicago & North Western Railway track and between the Chicago & North Western Railway and the Green Bay & Western Railway. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is 53.15 meters (174.4 feet) in azimuth 335° 58′.

Green Island (U. S. L. S.) latitude (Marinette County (?) Wis., James Carr, 1862).—The station was 9".10 of latitude north of the dome of Green Island Lighthouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, page 739.)

Harding azimuth (Oneida County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 1 mile east of Starks, 65 meters west of milepost 228, 135 meters west of railroad culvert 228 P, and 11.485 meters (37.68 feet) north of the Minneapolis, St. Paul & Sault Ste. Marie Railway. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a, a reference tablet being used as the underground mark. The reference mark is 18.89 meters (62.0 feet) from the station in azimuth 359° 08′.

For notes in regard to marking of stations see p. 130.

High azimuth (Oconto County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 1⅛ miles south of Lakewood, ¼ mile north of Lakewood Junction, 200 meters east of the Chicago & North Western Railway, on the south and west shoulder of a long ridge, about 50 feet above the tracks, and at a point nearly east of the end of a long curve south of Lakewood. The station, underground. and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is 14.65 meters (48.1 feet) from the station in azimuth 204° 41′ 47″.

Kewaunee (U. S. L. S.) latitude (Kewaunee County, Wis., C. G. Powell, 1873).—Distant 0.11 meter (0.4 foot) or 0″.00 south and 13.08 meters (42.9 feet) west from traverse station *Kewaunee* of the United States Lake Survey, on the west shore of Lake Michigan, near the mouth of the Kewaunee River. The traverse station is about 6 meters from the edge of the bank and about 40 meters from the water's edge and is marked by a stone post. Two stone reference posts, 2 feet long and 6 inches square, projecting 10 inches above the surface of the ground, with a small hole and the letters "U. S." cut in the top of each, are set as follows: One S. 26° 13′ W., distant 36.76 meters (120.6 feet); the other N. 32° 29′ W., distant 34.78 meters (114.1 feet) from the traverse station. The latitude station is marked by a post.

La Crosse longitude (La Crosse County, Wis., F. Blake, jr., 1873).—In the courthouse square 2.26 meters (7.4 feet) east of *La Crosse latitude*, described below. The station is marked by the foundation of a pier.

La Crosse latitude (La Crosse County, Wis., F. Blake, jr., 1873).—Marked by a pier with the inscription "Latitude, Longitude, U. S. Coast Survey, 1873." The center of the pier is 22.19 meters (72.8 feet) from the southeast corner of the courthouse and 15.164 meters (49.75 feet) from the southeast corner of the jail.

Lake azimuth (Washburn County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about ¼ mile north of the station at Stone Lake, on the west side of the track of the Minneapolis, St. Paul & Sault Ste. Marie Railway. The station is on the extension of the west rail from the north at the first curve north of Stone Lake and is 19.0 meters (62 feet) west of the west rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a and 11a. The reference mark is on the same side of the track, 20.27 meters (66.5 feet) from the station in azimuth 326° 28′ 40″.

Laona azimuth (Forest County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 200 meters south of the railroad station at Laona, 100 meters south of a warehouse, 50 meters northwest of a chute for loading cattle, and 41.90 meters (137.5 feet) west of the west rail of the main line of the Chicago & North Western Railway. The station and reference marks are bronze tablets set in concrete, as described in notes 1a and 11a. The reference mark is 21.375 meters (70.13 feet) from the station in azimuth 353° 54′ 59″.

Lem azimuth (Sawyer County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about ¾ mile north of Lemington, on the east side of the track of the Minneapolis, St. Paul & Sault Ste. Marie Railway, on the extension of the east rail from the south on the first curve north of Lemington. The station is 175 meters north of the point of tangency of the curve, 120 meters north of railroad bridge K 377 A, and 6.03 meters (19.8 feet) east of the rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is 14.77 meters (48.5 feet) from the station in azimuth 285° 18′ 48″.

Long azimuth (Washburn County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, which is about 2 miles south of Stanbery, on the west side of the track of the Minneapolis, St. Paul & Sault Ste. Marie Railway, on the apex of the high-banked cut, about 100 meters north of road crossing. The station is about 3 feet from the edge of the bank and about 30 feet from the railroad property line. It is 13.39 meters (43.9 feet) from the west rail at an angle of 30°. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is 23.46 meters (77.0 feet) from the station in azimuth 129° 14′ 48″.

Madison longitude (Dane County, Wis., Francis Blake, jr., 1873; 1885; C. G. Comstock, 1895).—The station of 1873 is distant 2.425 meters (7.96 feet) or 0″.11 east of the triangulation station *Madison astronomical latitude* station, described below. The station is also 25″.15 or 1ˢ.677 of longitude east of the meridian circle of Washburn Observatory. It is 7″.09 east of the dome of the main building. In 1885 only the subsurface marks remained. The station of 1895 is in the student's observatory of the University of Wisconsin, 25.0 meters (82 feet) north and 60.4 meters (198 feet) or 2″.67 or 0ˢ.178 of longitude east of the center of the meridian circle of Washburn Observatory. It is also 4″.43 of latitude north and 22″.48 or 1ˢ.499 of longitude west of the station of 1873.

Madison latitude (Dane County, Wis., Francis Blake, jr., 1873; 1885).—indentical with the triangulation station *Madison astronomical latitude* station, which is in the grounds of Wisconsin State University, about halfway up the hill which rises from the head of State Street, to the main university building. The station was marked by a stone pier due west of the longitude station of 1873, described above. The latitude station is 71.26 meters (233.8 feet) from the northeast corner of South College and 71.69 meters (235.2 feet) from the southeast corner of North College.

Manson azimuth (Oneida County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 1 mile west of Manson, on the extension of the south rail from the west at the first curve west of Manson, 80 meters east of the point of tangency, 40 meters west of the fourth telegraph pole west of

For notes in regard to marking of stations see p. 130.

milepost 203, and 1.81 meters (5.9 feet) south of the Minneapolis, St. Paul & Sault Ste. Marie Railway. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a and 11a. The reference mark is on the opposite side of the track and is 16.83 meters (55.2 feet) from the station in azimuth 171° 16′ 03″.

Massive azimuth (Rusk County, Wis., E. C. States, 1921; 1922).—Identical with the traverse station of the same name, about ⅞ mile north of the Minneapolis, St. Paul & Sault Ste. Marie Railway depot at Ladysmith, 75 meters north of the south switch stand for passing track along the Chicago-Duluth division of the railway, 6 meters south of a private road crossing, and 2.29 meters (7.5 feet) east of the east rail of the track. The station is marked by a bronze tablet set in concrete, as described in note 1a.

Menominee (U. S. L. S.) longitude (Marinette County, Wis., S. W. Robinson, 1865).—The station was 113″.08 of longitude west of *Menominee*, a triangulation station of the United States Lake Survey, which is on the southwest corner of Almeda and Bird (1905 name) Streets, Menekaunee, Wis., 30 feet south and 9.7 feet west of northeast corner of lot, and 3.2 feet north and 8 feet east of northeast corner of house (1905). The triangulation station was marked by a stone with its top about 3 feet below the surface, directly over which is another with its top about about at surface. Reference stones were placed as follows: 1874 stones, distant, respectively, 20.50 meters (67.3 feet) in azimuth 219° 48′ and 20.70 meters (67.9 feet) in azimuth 300° 38′; 1905 stones, distant, respectively, 19.92 meters (65.3 feet) in azimuth 219° 52′ and 19.10 meters (62.7 feet) in azimuth 351° 40′.

Menominee (U. S. L. S.) latitude (Marinette County, Wis., S. W. Robinson, 1865).—The station was 43″.35 of latitude north of *Menominee*, a triangulation station of the United States Lake Survey, described above. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 739.)

Minnesota Junction (U. S. L. S.) latitude (Dodge County, Wis., A. R. Flint, 1873).—Identical with *Minnesota Junction (U. S. L. S.) azimuth*, described below.

Minnesota Junction (U. S. L. S.) azimuth (Dodge County, Wis., A. R. Flint, 1873).—Identical with triangulation station *Minnesota Junction* of the United States Lake Survey, in the SW. ¼ SE. ¼, sec. 29, Burnett Township, and 338 feet above the lake. The station is marked by a stone post set with its top 4 feet below ground surface. Directly over this stone was set a large oak post. A reference stone, set in the road south of the station, is distant 140.57 meters (461.2 feet) S. 36° 54′ E.; a stone post marking the southwest corner of the southeast quarter of section 29 is 345.32 meters (1, 132.9 feet) S. 69° 15′ W.; a hole drilled in a large bowlder is 36.89 meters (121.0 feet) N. 87° 23′ E. from the station.

Mount azimuth (Oconto County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 95 meters north of the Chicago & North Western depot at Mountain, 20 meters northeast of a coaling station, almost due west of a brick garage, and 18.65 meters (61.2 feet) east of the east rail of the main line. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a and 11a. The reference mark is 21.65 meters (71.0 feet) from the station in azimuth 163° 19′ 12″.

Night azimuth (Wood County, Wis., E. C. States, 1921; 1922).—Identical with the traverse station of the same name at Wisconsin Rapids, on the east side of the track of the Minneapolis, St. Paul & Sault Ste. Marie Railway, on the extension of the west rail from the north, at the first curve north of the depot at Wisconsin Rapids, 125 meters south of the Fairbanks Morse track scale, 75 meters north of an unnumbered railway culvert, 205 meters south of railway culvert No. J 24 Q, 400 meters northeast of the water tank of the Andawagam Furniture Co., and 11.767 meters (38.61 feet) east of the east rail of the Minneapolis, St. Paul & Sault Ste. Marie Railway and 15.538 meters (50.98 feet) west of the west rail of the Chicago & North Western Railway. The station and underground marks are bronze tablets set in concrete, as described in notes 1a and 7a.

North azimuth (Forest County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, which is ⅞ mile east of Argonne, on the extension of the south rail of the tangent from the west, 175 meters east of the point of tangency, 200 meters east of the second road crossing east of the railroad station at Argonne, 80 meters west of milepost 245 and 8.66 meters (28.4 feet) north of the north rail of the Minneapolis, St. Paul & Sault Ste. Marie Railway. The station and reference marks are bronze tablets set in concrete, as described in notes 1a and 11a. The reference mark is 17.18 meters (56.4 feet) from the station in azimuth 257° 14′ 55″.

North Sheboygan (U. S. L. S.) latitude (Sheboygan County, Wis., M. R. Brown, 1866).—Distant 32.91 meters (108.0 feet) or 1″.07 of latitude north and 42.79 meters (140.4 feet) west from traverse station *North Sheboygan* of the United States Lake Survey, on the west shore of Lake Michigan, northeast of Sheboygan, near the lighthouse. The traverse station is marked by two stones set one above the other, the upper one being the surface mark. Three stone reference posts were set as follows, the bearings being approximate: One south, distant 19.35 meters (63.5 feet); one west, distant 8.44 meters (27.7 feet); and one north, 10.88 meters (35.7 feet) from the station. The center of the lighthouse is 103.39 meters (339.2 feet) S. 36° 08′ W. from the traverse station. The latitude station is marked by a post.

Outer Island (U. S. L. S.) latitude (Ashland County, Wis., G. Y. Wisner, 1870).—Distant 10.77 meters (35.3 feet) or 0″.35 of latitude north and 3.35 meters (11.0 feet) east from triangulation station *Outer Island*, of the United States Lake Survey, which was reported lost in 1901. The latitude station is marked by a wooden post.

For notes in regard to marking of stations see p. 130.

Owen azimuth (Clark County, Wis., E. C. States, 1921; 1922).—Identical with the traverse station of the same name at Owen, about 50 meters south of the depot of the Minneapolis, St. Paul & Sault Ste. Marie Railway, on the east side of the track, and 4 feet from the edge of the board walk leading southeast from the station platform. The station is about midway between the second and third telegraph poles south of the depot and 35 meters south of the iron semaphore on the same side of the track, and 5.925 meters (19.44 feet) from the east rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track, 28.812 meters (94.53 feet) from the station in azimuth 140° 35′ 45″.

Park azimuth (Taylor County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, which is about ¾ mile south of Gilman, on the east side of the track of the Minneapolis, St. Paul & Sault Ste. Marie Railway, at the intersection of the extension of west rail from the north end and the east rail from the south, 100 meters north of highway trail 64 crossing, and 12 meters west from the trail. The station is 9.437 meters (30.96 feet) east of the east rail. The station and underground marks are bronze tablets set in concrete, as described in notes 1a and 7a.

Point azimuth (Oconto County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 1 mile west of the Chicago & North Western Railway depot at Gillett, 200 meters west of the road crossing, on the north side of the railroad leading west from Gillett, and in the fork of a wye. The station is in the extension of the tangent of the west rail of the wye and 2.535 meters (8.32 feet) north of the north rail of the east-and-west track. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a, the underground mark being a reference tablet. The reference mark is on the south side of the track 0.2 meter (0.7 foot) north of the property fence line and 33.35 meters (109.42 feet) from the station in azimuth 290° 05′ 06″.

Point Creek (U. S. L. S.) latitude (Manitowoc County, Wis., C. F. Powell, 1873).—Distant 17.20 meters (56.4 feet) or 0″.56 of latitude south and 7.14 meters (23.4 feet) west from traverse station *Point Creek* of the United States Lake Survey, on the west shore of Lake Michigan, about 15 miles north of Sheboygan, 9 miles south of Manitowoc village, and about 151 meters north of the mouth of Point Creek. The traverse station is about 36 meters from the edge of the lake and 64 feet above it, and is marked by two stone posts set one above the other, the upper one projecting 1 foot above the surface of the ground. Three stone reference posts, each projecting about 10 inches above the surface and having the letters "U. S." cut on them, are set as follows: One N. 5° 12′ E., distant 48.65 meters (159.6 feet); one N. 78° 28′ W., distant 35.87 meters (117.7 feet); and one S. 37° 05′ W., distant 37.12 meters (121.8 feet) from the traverse station. A post bears N. 0° 19′ W., distant 4.91 meters (16.1 feet) from the traverse station. The latitude station is marked by a post.

Prentice azimuth (Price County, Wis., E. C. States, 1921; 1922).—Identical with the traverse station of the same name at Prentice, 7 meters west of the Minneapolis, St. Paul & Sault Ste. Marie Railway depot platform, on the south side of the track of the line running east and west. The station is 3.47 meters (11.4 feet) south of the south rail of the east-and-west line and 5.195 meters (17.04 feet) west of the north-and-south line. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the south side of the track, 31.64 meters (103.8 feet) from the station, in azimuth 15° 10′ 10″.

Pulaski azimuth (Oconto County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 350 meters south of the depot at Pulaski, on the west side of the Chicago & North Western Railway, on the top of the highest knoll south of the station, and 8.315 meters (27.3 feet) from the nearest rail. The station, underground, and reference marks are bronze tablets, set in concrete, as described in notes 1a, 7a and 11a. The reference mark is on the east side of the railroad 0.10 meter (0.3 foot) west of the fence line and 39.22 meters (128.7 feet) from the station in azimuth 294° 46′ 30″.

Quarry Bluff azimuth (Sauk County, Wis., J. E. Davies, 1875).—Identical with the triangulation station of the same name, on a bluff about 2 miles north and 1 mile east of Spring Green, on the extreme northwest corner of NE. ¼ NE. ¼ sec. 6, T. 8 N., R. 4 E. The station is marked by an iron bolt ½ inch by 5 inches, sunk in the ledge 4 inches and secured by sulphur.

Rawleys Point (U. S. L. S.) latitude (Manitowoc County, Wis., S. W. Robinson, 1866; C. F. Powell, 1872).—The station of 1866, marked by a post, is 912.99 meters (2,995.4 feet) or 29″.58 of latitude south and 231.16 meters (758.4 feet) west of traverse station *Rawleys Point* or *Two Rivers* of the United States Lake Survey. The station of 1872, marked by a post, is 0.16 meter (0.5 foot) or 0″.01 of latitude north and 12.04 meters (39.5 feet) west of the same traverse station. The traverse station is on the west shore of Lake Michigan, about 5 miles north of Two Rivers, and about 1,000 meters south of Twin River Point Lighthouse. The station is marked by a stone post set 2 feet below the surface of the ground. Three stone reference posts, rising about 10 inches above the ground and marked with the letters "U. S.," are set as follows: One N. 15° 49′ E., distant 43.34 meters (142.2 feet); one N. 82° 23′ W., distant 56.02 meters (183.8 feet); and one S. 17° 49′ W., distant 44.93 meters (147.4 feet) from the traverse station. The observations at each station were reduced to traverse station Two Rivers and a weighted mean taken.

Rhinelander azimuth (Oneida County, Wis., E. C. States, 1921; 1922).—Identical with the traverse station of the same name, about 1 mile east of the Minneapolis, St. Paul & Sault Ste. Marie Railway station at

For notes in regard to marking of stations see p. 130.

Rhinelander, 15 meters northeast of the intersection of Eagle and Mason Streets, 6 meters southeast of the southeast corner of the second overhead bridge east of the above station, and 40.514 meters (132.92 feet) south of the railroad. The station and reference marks are bronze tablets set in concrete, as described in notes 1a and 11a. The reference mark is on the opposite side of Mason Street, 18.21 meters (59.7 feet) from the station in azimuth 18° 18′ 10″.

Robert azimuth (Marathon County, Wis., C. A. Egner, 1921).—Identical with the traverse station of the same name, about 2½ miles north of Marshfield, on the west side of the Minneapolis, St. Paul & Sault Ste. Marie Railway, 700 meters south of milepost 284, 125 meters north of a private wagon road crossing, and 50 meters west of the main road running parallel with the track. The station is 10.225 meters (33.55 feet) west of the west rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the opposite side of the track, 26.461 meters (86.81 feet) from the station in azimuth 245° 30′ 01″.

Rock Island (U. S. L. S.) latitude (Door County, Wis., James Carr, 1862).—The station was 4″.88 of latitude south of Rock Island Lighthouse. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 738.)

Smook azimuth (Price County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, 1 mile east of Hawkins, on the south side of the Minneapolis, St. Paul & Sault Ste. Marie Railway, on the extension of the north rail from the east and west at the second curve east of Hawkins. The station is 7.325 meters (24.03 feet) south of the south rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is on the same side of the track, 9.94 meters (32.6 feet) from the station in azimuth 289° 19′ 56″.

Somers (U. S. L. S.) latitude (Kenosha County, Wis., William Bowie, 1908).—Identical with *Somers azimuth*, described below.

Somers (U. S. L. S.) azimuth (Kenosha County, Wis., William Bowie, 1908).—Identical with the triangulation station of the United States Lake Survey of the same name, about 1½ miles east and 1½ miles south of Somers, in the SE. ¼ NE. ¼ sec. 22, Somers Township, about 100 meters east of the Chicago-Milwaukee road, 23 meters east of the north gable of Solentine's barn, and 2.580 meters (8.46 feet) east-northeast of the northeast corner of an implement house built on the east side of a large barn. The station is marked by a stone post, projecting 2½ feet above the ground. Three reference stones are in fence line on the east boundary line of section 22. The more northerly stone is in the corner of a lot north of the barn and is 117.73 meters (386.3 feet) N. 13° 13′ E. from the station. The most southerly stone is in the corner of the lot to the south of the barn at the half-section corner and is 189.23 meters (620.8 feet) S. 7° 56′ E. from the station. The third reference stone is just east of the barn, in a road, under the gate in the fence and is 27.37 meters (89.8 feet) N. 76° 07′ E. from the station.

South Sheboygan (U. S. L. S.) latitude (Sheboygan County, Wis., C. F. Powell, 1872).—The station is 0″.09 of latitude north of traverse station *South Sheboygan*, of the United States Lake Survey, on the west shore of Lake Michigan, about 5 miles south of Sheboygan and 23 meters back from the beach. The traverse station is marked by a stone post set 3 feet below the ground surface and inclosed in a barrel. Four stone reference posts were set as follows, the bearings being approximate: One north, distant 8.60 meters (28.2 feet); one south, 10.03 meters (32.9 feet); one east, 17.98 meters (59.0 feet); and one west, 25.06 meters (82.2 feet) from the traverse station.

Spring Green east base azimuth (Sauk County, Wis., J. E. Davies, 1875).—Identical with the triangulation station of the same name, close by the road from Spring Green to Old Helena Ferry, ½ mile south of Wilcox's farm, in the extreme southwest corner of the SW. ¼ SE. ¼ sec. 18, T. 8 N., R. 4 E. The station is marked by a copper bolt in a block of magnesia limestone, which is set in solid masonry. The whole is surrounded by a wooden curbing and a rough capstone placed over the pier, with a triangle cut thereon to mark the station. The stone has the letters "U. S. C. S." inscribed on it.

Valley Junction (U. S. L. S.) longitude (Monroe County, Wis., S. W. Robinson, 1873).—The station was 77″.40 of longitude east of section corner on fourth principal meridian at northeast corner of sec. 1, T. 18, N., R. 1 W. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 759.)

Valley Junction (U. S. L. S.) latitude (Monroe County, Wis., S. W. Robinson, 1873).—The station was 706″.24 south of southwest corner of sec. 31, T. 21 N., R. 3 E., on correction line. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 741.)

Wabeno azimuth (Forest County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about 100 meters north of the railroad depot at Wabeno, 60 meters north of the section tool house, 60 meters south of the switch stand for a spur leading into Rousch's Lumber Co., and 9.765 meters (32.04 feet) west of the west rail of the Chicago & North Western Railway. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is 18.72 meters (61.4 feet) from the station in azimuth 196° 58′ 06″.

Way azimuth (Douglas County, Wis., E. C. States, 1921).—Identical with the traverse station of the same name, about ⅛ mile north of Way, a flag stop on the Minneapolis, St. Paul & Sault Ste. Marie Railway, on the east side of the track, near the center of the first curve north of the railway station. The station is 225 meters south of the first road crossing north of Way and 250 meters north of milepost 446. It is 28.415 meters

For notes in regard to marking of stations see p. 130.

(93.22 feet) east of the east rail. The station, underground, and reference marks are bronze tablets set in concrete, as described in notes 1a, 7a, and 11a. The reference mark is 10.025 meters (32.89 feet) from the station in azimuth 135° 08′ 57″.

Yerkes Observatory longitude (Walworth County, Wis., C. H. Sinclair, 1900).—The transit pier in the transit room at the east end of the main building of Yerkes Observatory at Williams Bay. The station is 80.59 meters (264.4 feet) or 3ˢ.53 or 0ˢ.235 of longitude east of the center of the 40-inch equatorial.

Yerkes Observatory latitude (Walworth County, Wis., O. B. French, 1900).—Identical with *Yerkes Observatory longitude*, described above.

WYOMING

Alkali latitude (Weston County, Wyo., C. V. Hodgson, 1913).—Distant 5.060 meters (16.60 feet) or 0″.16 of latitude south in azimuth 8° 32′ from *Alkali azimuth*, described below.

Alkali azimuth (Weston County, Wyo., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name on Alkali Butte, the best known butte within 30 miles, at the head of Muskrat, Robbers Roost, and Alkali Creeks, about 22 miles west of south from Newcastle. The station is 29 meters from the south end of the butte and is marked according to note 3. A 1-inch drill hole in the solid rock is 0.92 meter below the station and 17.180 meters (56.36 feet) distant in azimuth 177° 48′. The United States Geological Survey station *Alkali*, marked by a 1-inch copper bolt set in bedrock, is 0.17 meter below the station and 28.640 meters (93.96 feet) distant in azimuth 20° 14′.

Cambria latitude (Weston County, Wyo., C. V. Hodgson, 1913).—Distant 0.115 meter (0.38 foot) north and 1.865 meters (6.12 feet) east of *Cambria azimuth*, described below.

Cambria azimuth (Weston County, Wyo., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name, about 7 miles north of Cambria and 1½ miles west of the Cambria-Horton wagon road, on a flat-topped ridge extending east and west, locally known as Sweetwater Mountain. The station is on the highest part of the ridge, a few meters from the abrupt slope to the north and about 140 meters east of a small cultivated field. It is marked according to notes 1b and 7b. A reference mark, note 11b, is 1.4 meters below the station and 27.67 meters (90.8 feet) distant in azimuth 52° 38′.

Cheyenne (U. S. E.) latitude (Laramie County, Wyo., J. H. Clark, 1872).—In the western part of the town of Cheyenne, in lot 11, block 413, and northwest from the junction of the branch road leading to the depot of Fort D. A. Russell, with the main stem of the Union Pacific Railroad. The station is probably marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Coleman latitude (Laramie County, Wyo., C. V. Hodgson, 1913).—Distant 0.045 meter (0.15 foot) south and 0.05 meter (0.2 foot) west from *Coleman* triangulation station, about 13 miles northwest of Hartville Junction, on the Colorado & Southern Railway, and 7½ miles west of north from M. F. Coleman's ranch, which is on the Wheatland-Douglas road where it crosses Cottonwood Creek. The station is 1½ miles north of this wagon road, just west of a large table-topped ridge devoid of trees, on the top and near the western slope of a round-topped knoll on which slope are three trees, two near the top and one near the bottom. The triangulation station is marked according to note 3. A reference mark, note 12d, is in the top of a large rounded bowlder at the top of the western slope of the knoll, 0.26 meter below the station and 20.90 meters (68.6 feet) from the station in azimuth 122° 36′. A cairn, 6 feet in diameter at the bottom and 6 feet high, is 11.8 meters (39 feet) distant in azimuth 107° 48′. A triangular blaze on the nearest pine tree is 13 meters (43 feet) from the station in azimuth 62° 02′.

Fort Fred Steele (U. S. E.) latitude (Carbon County, Wyo., J. H. Clark, 1872).—In the military reservation at Fort Fred Steele, in the rear of the sutler's store and just across a ravine to the west of the railroad track. The station is marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Green River (U. S. E.) latitude (Sweetwater County, Wyo., W. W. Maryatt, 1873).—In the center of the settlement, near the railroad depot, 160.4 feet north and 213 feet east of the nearer rail of the track, which here runs northwest. The station is marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Jireh College latitude (Converse County, Wyo., C. V. Hodgson, 1913).—Distant 67.868 meters (222.66 feet) or 2″.20 of latitude north in azimuth 180° 13′ from *Jireh College cupola*, east of the town of Keeline.

Kirtley latitude (Converse County, Wyo., C. V. Hodgson, 1913).—Distant 0.04 meter (0.1 foot) west and 0.07 meter (0.2 foot) south of triangulation station *Kirtley*, about 3⅛ miles north and 1⅛ miles east of Kirtley post office, on the highest knob in the SE. ¼ sec. 5, T. 33 N., R 60 W., ¼ mile south of some conspicuous high chalky cliffs. The station is 375 meters N. 43° E., from the southwest corner of the above section and is marked according to notes 1b and 7b. A reference mark, note 11b, is 0.49 meter below the station and 125.713 meters (412.44 feet) distant in azimuth 158° 50′ 30″.

Laramie (U. S. E.) latitude (Albany County, Wyo., J. H. Clark, 1872).—In an open lot near the center of the city, a short distance northeast from the depot. The station is marked by a pier similar to that at *Colorado Springs (U. S. E.) latitude* (see p. 155).

Ragged azimuth (Albany County, Wyo., C. V. Hodgson, 1912).—Identical with the triangulation station of the same name, about 10 miles west of Horse Creek, a post office on the Colorado & Southern Railway, 8 miles west of McLaughlin's ranch and ½ mile south of the North Fork of Horse Creek, on the highest rock of

For notes in regard to marking of stations see p. 130.

a group of pinnacles known as Ragged Top Mountain. The rock referred to is the middle one of three prominent peaks on the most western ridge and is about 300 meters west of an old wood road in a canyon opening to the south. The station is marked by a United States Geological Survey bench mark tablet set in solid rock. The tablet has a triangle cut in the top and is stamped "Elevation above sea level 8230 feet." A reference mark, note 12b, is 0.20 meter below the station and 3.12 meters (10.2 feet) distant in azimuth 185° 04′.

Sheridan (U. S. G. S.) longitude (Sheridan County, Wyo., S. S. Gannett, 1896).—At Sheridan, at the corner of Crook and Fourth Streets, and about 400 feet southeast of the Burlington depot. The station is marked by a pier.

Sheridan (U. S. G. S.) latitude (Sheridan County, Wyo., S. S. Gannett, 1896).—Identical with *Sheridan (U. S. G. S.) longitude*, described above.

Sherman longitude (Albany County, Wyo., R. D. Cutts, 1872).—Identical with the triangulation station *Sherman astronomical observatory*, about 250 meters south-southeast of the railroad station at Sherman, on the crest of a hill on the west end of which is a pile of rocks. The station is just east of this pile of rocks and is marked by a drill hole 2 inches in diameter and 10 inches deep filled with lead.

Sherman latitude (Albany County, Wyo., A. T. Mosman, 1872).—Identical with *Sherman longitude*, described above.

Sundance latitude (Crook County, Wyo., C. V. Hodgson, 1913).—Distant 0.05 meter (0.2 foot) north and 0.03 meter (0.1 foot) east of Sundance triangulation station, about 6 miles northwest of Sundance, on the most westerly one of the Warren Peaks, which are the highest peaks of the Bearlodge Mountains. The peak is sharp and the station is about 3 meters from the highest point, on which there is a cairn 8 feet high. The triangulation station is marked according to notes 1b and 7b, with a reference mark, note 12b, on the north slope of the hill about 11 feet below the station and 22.77 meters (74.7 feet) distant in azimuth 288° 20′. The azimuth of the cairn is 261° 31′.

Twin azimuth (Laramie County, Wyo., C. V. Hodgson, 1912).—Identical with the triangulation station of the same name, on the highest point of the more eastern one of the two peaks of Twin Mountain, about 20 miles a little south of west from Cheyenne and 7 miles by road southwest of Granite Canyon, a station on the Union Pacific Railroad. The station is marked according to note 3, with a reference mark, note 12b, 0.15 meter above the station and 3.494 meters (11.46 feet) distant in azimuth 159° 58′. The bronze tablet marking the United States Geological Survey station *East Twin* is 0.16 meter above the station and 2.674 meters (8.77 feet) distant in azimuth 96° 08′.

Wheatland longitude (Laramie County, Wyo., H. A. Seran, 1912).—An unmarked point 6.41 meters (21.0 feet) or 0″.21 of latitude south, and 25.21 meters (82.7 feet) or 1″.10 of longitude east of *Wheatland standpipe*, the center of the conical top of the tall red steel water tank at Wheatland, on a ridge on the open prairie about 1,100 meters S. 29° W. from the railroad and telegraph office and 400 meters east of the railroad.

Wheatland latitude (Laramie County, Wyo., C. V. Hodgson, 1913).—Identical with *Wheatland longitude*, described above.

Whitaker latitude (Laramie County, Wyo., C. V. Hodgson, 1913).—Identical with the triangulation station of the same name about 18 miles north and 8½ miles west of Cheyenne and 3 miles south and ¾ mile east of the D. R. Whitaker ranch buildings on Horse Creek. The station is on rolling prairie land at the highest point of the divide between Pole Creek and Horse Creek, about ¾ mile northeast of the Cheyenne-Whitaker ranch road, at the point where the road passes the quarter-section corner and bench mark referred to below. The station is marked according to notes 1b and 7b, with a reference mark, note 11b, 1.17 meters below the station and 91.038 meters (298.68 feet) in azimuth 270° 57′. The southwest corner post of sec. 33, T. 17 N., R. 68 W., is 800.12 meters (2,625.1 feet) distant in azimuth 45° 37′. The United States Geological Survey iron-pipe bench mark "6702 Denver" is 1,110.82 meters (3,644.4 feet) distant in azimuth 59° 55′ 30″. A cairn is 8 meters from the station on the line toward Ragged Top Mountain.

Willow azimuth (Converse County, Wyo., C. V. Hodgson, 1912).—Identical with the triangulation station of the same name, about 5 miles north of Willow post office and 7 miles S. 21° W. from Manville, on the most northern and western high hill in that vicinity. The hill is a bare-topped ridge about 350 meters in length north and south, with a rim of rock along the east side and gentle slopes to the west. The station is near the south end of the highest part of the ridge, about 190 meters from the north end of the hill, and is marked according to note 3. A reference mark, note 12d, is in the top of a small bowlder, 10 inches above the surface of the ground and 11.218 meters (36.80 feet) from the station in azimuth 286° 41′.

Wyoming-Colorado boundary monument, milepost 44, latitude (Laramie County, Wyo., C. V. Hodgson, 1913).—An unmarked point 14.838 meters (48.68 feet) or 0″.48 of latitude due north of the triangulation station *Colorado-Wyoming boundary monument, milepost 44*, about 11 miles west of south of Cheyenne, on the ranch of the Warren Live Stock Co., about ½ mile southeast of their ranch house. The monument is a dressed red sandstone post standing about 4 feet above the surface of the ground and is surrounded by a mound of loose rock. It is marked as follows: "44M" on the east side, "Colorado" on the south, "41 N. L. 1873" on the west, and "Wyoming" on the north. It is the only permanent boundary monument for several miles in either direction. The triangulation station is marked by a standard disk station mark set in the top of the monument. A reference mark, note 11b, is in a fence line near an angle in the fence, 3.92 meters below the station and 110.184 meters (361.50 feet) distant in azimuth 75° 18′.

For notes in regard to marking of stations see p. 130.

Yellowstone Lake longitude (Yellowstone National Park, Wyo., C. H. Sinclair and G. R. Putnam, 1892).—On the open space on the shore of Yellowstone Lake, about ½ mile northeast of the Lake Hotel and about a mile or more southwest of the outlet of the lake, about 12 meters east of the road from the Lake Hotel to the Grand Canyon. The station is marked by a pier of brick and cement, 25 by 17 inches in cross section. Two meridian stones were set. The first is 1.66 meters (5.4 feet) south of the pier. It is about 7 by 9 inches at the top, 3½ feet long, and rests upon a base stone about 1 foot thick. The second is 335.36 meters (1,100.3 feet) south of the pier. It is wedge shaped at the top, about 3½ feet long, and rests upon a base stone about 1 foot thick. Both stones have a cross cut on the top to mark the meridian. The magnetic station is 69.1 meters (227 feet) north of the longitude station in the prolongation of the meridian.

Yellowstone Lake latitude (Yellowstone National Park, Wyo., G. R. Putnam, 1892).—Marked by a brick and cement pier 17 by 17 inches in cross section and 1.271 meters (4.17 feet) due west of *Yellowstone Lake longitude*, described above.

UNITED STATES ISLANDS AND FOREIGN

Beechy Head azimuth (Canada, British Columbia, Wash., W. H. Burger, 1908; 1909).—Identical with the triangulation station of the same name, on Vancouver Island about 1½ miles by trail a little northwest from the northwest part of Beecher Bay. To the north about ½ mile distant are two other knobs somewhat higher than the one on which the station is located. The station is marked by a concrete pier and is ¾ inch due east from the copper wire in the pier. The station is also marked by a drill hole in the rock under the pier.

Columbia River east (U. S. & C.) latitude (Canada, British Columbia, C. H. Sinclair, 1901).—About 200 meters east of the river, 15 meters west of the railroad, and 20 meters northwest of the railroad depot platform at Boundary, a town just south of the boundary line between the United States and Canada. The station is 5.1 meters (17 feet) north of the boundary line at a point 740 meters east of monument 118, 10 meters northeast of a post of railroad iron set on the boundary, and is marked by a pier of 3 railroad ties. A second post of railroad iron is on top of the bluff about ½ mile to the east.

Gargantua (U. S. L. S.) latitude (Canada, Ontario, A. R. Flint, 1869).—Distant 10.04 meters (32.9 feet) or 0″.33 of latitude north and 4.73 meters (15.52 feet) east of *Gargantua (U. S. L. S.) azimuth*, described below. The station is marked by a stone post.

Gargantua (U. S. L. S.) azimuth (Canada, Ontario, ———, 1895).—Identical with the triangulation station *Gargantua* of the United States Lake Survey, on the east coast of Lake Superior, 4 or 5 miles southeast of Cape Gargantua. The front of the hill facing the lake rises nearly perpendicularly, and there are no large hills in the immediate vicinity. The station is marked by a brass point, about ¼ inch in diameter, set in the rock.

Goderich (U. S. L. S.) longitude (Canada, Ontario, O. M. Poe, 1860).—No description. The station was 2″.25 of longitude east of the courthouse at Goderich. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 754.)

Goderich (U. S. L. S.) latitude (Canada, Ontario, O. M. Poe, 1860).—No description. The station was 14″.59 of latitude south of the courthouse at Goderich. (See Professional Papers, Corps of Engineers, United States Army, No. 24, p. 742.)

Johnstown (U. S. L. S.) azimuth (Canada, Ontario, L. Foote, 1873; 1901).—Identical with the triangulation station *Johnstown* of the United States Lake Survey, on the Canadian side of the St. Lawrence River, about 4 miles below Prescott, on a point west of Johnstown Church. The station is marked by two stones set one directly over the other, the top of the lower being about 3 feet below the surface and that of the upper about 1 foot below the surface. A round chisel hole in the top of a large bowlder upstream and toward the shore of the river is 15.42 meters (50.6 feet) distant, measured on the slope. The middle of the south end of a large bowlder downstream and toward the river is 22.10 meters (72.5 feet) distant, measured on the slope. The nearer of two apple trees west of north is 39.29 meters (128.9 feet) distant. An apple tree to the southwest and near the top of the bank is 76.38 meters (250.6 feet) distant.

Michipicoten (U. S. L. S.) latitude (Canada, Ontario, O. B. Wheeler, 1869; 1893).—Distant 26.33 meters (86.4 feet) or 0″.85 of latitude south and 25.49 meters (83.6 feet) west of *Michipicoten* triangulation station of the United States Lake Survey, on the northwest side and highest part of Michipicoten Island. The triangulation station is marked by a cross cut in the solid surface rock. The latitude station is marked by a stone post.

Midway (U. S. & C.) latitude (Canada, British Columbia, C. H. Sinclair, 1901).—About 80 feet west of Boundary Creek, and 19.39 meters (63.6 feet) due north of Midway azimuth station, which lies exactly in line between two boundary monuments, No. 141 (old No. 66), on the high mountain 1 mile west, and No. 144 (old No. 63), on the green hill ⅜ mile east. A bridge crosses the stream just south of the line and azimuth station. The azimuth station is the south end of a meridian and is marked by an iron post, 3½ inches in diameter and 4 feet long. A brass cap, placed on the top, has cut in it "S. MERIDIAN, 1901." A similar post is ⅜ mile due north. A stone pile, the remains of an old chimney, is 25 feet due west of the latitude station. Mr. McQueen's house is about 200 feet west of the latitude station, and a second stone pile, said to be the remains of an old chimney, is due north of the house. The nearest stone pyramid, No. 143 (old No. 64, British No. 98) is on the east side of Boundary Creek, at the top of the second bench. Latitude station was marked by a post.

For notes in regard to marking of stations see p. 130.

Montreal longitude (Canada, Quebec, R. L. Faris and C. H. Sinclair, 1896).—The eastern pier of the astronomic observatory at McGill College.

St. Ignace post No. 1 (U. S. L. S.) latitude (Canada, Ontario, O. B. Wheeler, 1866).—Distant 16.89 meters (55.4 feet) or 0".55 of latitude south and 28.71 meters (94.2 feet) west from the triangulation station *St. Ignace*, of the United States Lake Survey, on the most elevated part of Isle St. Ignace and about 5 miles from its eastern end. The triangulation station is marked by a cross cut in the solid surface rock. The latitude station is probably marked by a stone post. The observations at posts Nos. 1, 2, and 3 were reduced to triangulation station St. Ignace and a weighted mean taken.

St. Ignace post No. 2 (U. S. L. S.) latitude (Canada, Ontario, G. Y. Wisner, 1867).—Distant 93.76 meters (307.6 feet) or 3".04 of latitude south and 78.97 meters (259.1 feet) west of triangulation station *St. Ignace*, of the United States Lake Survey. (See under *St. Ignace post No. 1 (U. S. L. S.) latitude.*) The latitude station is probably marked by a stone post.

St. Ignace post No. 3 (U. S. L. S.) latitude (Canada, Ontario, G. Y. Wisner, 1867).—Distant 16.98 meters (55.7 feet) or 0".55 of latitude south and 28.56 meters (93.7 feet) west of triangulation station *St. Ignace*, of the United States Lake Survey. (See under *St. Ignace post No. 1 (U. S. L. S.) latitude.*) The latitude station is probably marked by a stone post.

St. Ignace post No. 4 (U. S. L. S.) latitude (Canada, Ontario, O. B. Wheeler, 1866).—Distant 2,217.09 meters (7,273.9 feet) or 71".77 of latitude south and 3,374.28 meters (11,070.5 feet) east of triangulation station *St. Ignace* of the United States Lake Survey. (See under *St. Ignace post No. 1 (U. S. L. S.) latitude.*) The latitude station is probably marked by a stone post.

St. Ignace post No. 5 (U. S. L. S.) latitude (Canada, Ontario, G. A. Marr, 1871).—Distant 4,687.66 meters (15,379.4 feet) or 151".75 of latitude south and 1,010.10 meters (3,314.0 feet) west of triangulation station *St. Ignace*, of the United States Lake Survey. (See under *St. Ignace post No. 1 (U. S. L. S.) latitude.*) The latitude station is probably marked by a stone post.

St. Ignace post No. 6 (U. S. L. S.) latitude (Canada, Ontario, G. A. Marr, 1871).—Distant 7,104.03 meters (23,307.1 feet) or 229".98 of latitude north and 11.86 meters (38.9 feet) east of triangulation station *St. Ignace*, of the United States Lake Survey. (See under *St. Ignace post No. 1 (U. S. L. S.) latitude.*) The latitude station is probably marked by a stone post.

Silicia Creek (U. S. & C.) latitude (Canada, British Columbia, C. H. Sinclair, 1901).—On the left bank of Silicia Creek, a tributary of Chilliwack River, and about ½ mile above the mouth of Glacier Creek, 32 miles from Chilliwack, British Columbia. The station is on a bench about 60 feet above the creek, and the mountain slopes up steeply from it to the south and west. The station is marked by an iron pipe surrounded by a cairn. The pipe is of wrought iron, 3½ inches in diameter and 4 feet long. It is covered by a brass cap, marked with a cross and the inscription "1859 LAT. 49° 00′ 34".34 1901." An old wooden post, 2 feet in diameter, probably used in 1859 for the mounting of instruments, is 2 feet east of the station. A large bowlder is 4.82 meters (15.8 feet) southeast of the old post. In the highest part of the bowlder is set a bronze plate stamped "Witness, 15.8 feet." An arrow points to the old post. The old post was used as the instrument support in 1901. Monument 55 of the United States and Canadian Boundary Survey is 3,480 feet south and 3,110 feet east of the latitude station.

Tip Top, north post (U. S. L. S.), latitude (Canada, Ontario, O. B. Wheeler, 1867).—Distant 19.88 meters (65.2 feet) or 0".64 of latitude north and 20.88 meters (68.5 feet) west of triangulation station *Tip Top* of the United States Lake Survey, about 10 miles north of Otter Head, 8 miles northeast of "Simmons Harbor," on the northeast shore of Lake Superior. The triangulation station is marked by a brass frustum leaded into the solid surface rock. Over this frustum is a tripod about 3 feet high, loaded with stones to keep it in position. The latitude station is marked by a large bowlder. (See *Tip Top south post* below.)

Tip Top, south post (U. S. L. S.), latitude (Canada, Ontario, O. B. Wheeler, 1867).—Distant 1.82 meters (6.0 feet) or 0".06 of latitude north and 20.80 meters (68.2 feet) west of triangulation station *Tip Top*, of the United States Lake Survey. (See under *Tip Top north post (U. S. L. S.) latitude.*) The station is marked by a large bowlder. In addition to this bowlder and the one on which the north post latitude station is located, a third bowlder is on the highest point of the hill, distant 83.52 meters (274.0 feet) from the triangulation station in azimuth 71° 28′. The observations at Tip Top north post and Tip Top south post were reduced to triangulation station Tip Top and a weighted mean taken.

Greenwich longitude (England, 1866).—Coincident with the meridian of zero longitude, which is the optical axis of the transit instrument of the Royal Observatory.

Brest longitude (France, Francis Blake, jr., 1872).—Located on the Place du Champs de Bataille, opposite the building on the Rue St. Yves occupied by the cable company. Station was marked by a sandstone pot in which was placed a bottle containing the lines "Observations astronomique faite dans le mois de Juin et Juillet 1872 par Monsieur Blake Ingenieur des Etats Unis d'Amerique." The instrument was mounted on a pier of granite posts. Station is 0ˢ.444 of longitude east of the Tower of St. Louis.

Paris longitude (France, L. F. Folain, 1872).—The large transit (La Lunette Meridienne) of the Paris Observatory was used in the longitude determinations. It is 0ˢ.12 of longitude east of the meridian of Paris.

For notes in regard to marking of stations see p. 130.

Guam longitude (Guam Island, Edwin Smith, 1903).—On the Orote Peninsula near the north limits of the grounds of the Commercial Pacific Cable Co. The concrete pier is built upon the solid coral rock, near the edge of the bluff, about 330 feet nearly northwest of the temporary office of the cable company and about 80 feet above sea level.

Honolulu longitude (Hawaiian Islands, Edwin Smith, 1903).—In the grounds of the United States Navy station, 88.97 meters (291.9 feet) north and 505.97 meters (1,660.0 feet) east of Harbor Light. Station marked by a concrete pier 14 by 26 inches in cross section, and 3 feet high, resting on a concrete foundation, 3 by 4 feet in cross section, which in turn rests upon coral rock 2½ feet below surface of ground. North of the center of the pier, and 3.435 meters (11.27 feet) therefrom, is a galvanized-iron pipe 2½ feet long set in cement, with its center marked by a copper bolt. This is a point of the Territorial survey.

Foilhommerum longitude (Ireland, B. A. Gould and A. T. Mosman, 1866).—On Valentia Island, 5½ miles west of Knightstown, close to and northeast of the telegraph house on Foilhommerum Bay. The observatory was protected by rising ground on the northwest; it was bolted to large stones in the ground; and the piers were of stone.

Frederickton longitude (New Brunswick, Canada, W. Boydone Jack, 1857).—In the observatory of Doctor Toldervy, near Province Hall.

Hearts Content longitude (Newfoundland, G. W. Dean and E. Goodfellow, 1866).—On the eastern shore of Hearts Content harbor, on land belonging to the telegraph company, about west from and on opposite side of road from the telegraph office. Marked by a block of sandstone 5 feet long, and 32 by 12 inches in cross section, sunk in the ground to a depth of about 2 feet. Station is 83 feet south and 243 feet west of the cross on the tower of the Episcopal Church.

Tacubaya longitude (Mexico, Camilo A. Gonzales, 1895).—At the Mexican National Observatory at Tacubaya near the City of Mexico.

Halifax longitude (Nova Scotia, Canada, Captain Shortland, R. N., 1851).—The station was in the naval yard observatory.

Manila longitude (Philippine Islands, Fremont Morse, 1903).—In the walled city of Manila, in the block fronting on Calle Audiencia, between Calle Postigo and Calle Claveria, and 9.48 meters (31.1 feet) from the house line on the first-named street. Station is in a quadrangle formed by the foundation of a projected government building (Spanish), and opposite the plaza in front of the government building commonly known as the Ayuntamiento. Two massive granite blocks were set for the instrument piers, their centers being in an east and west line and 5.5 feet apart. The eastern pier is the longitude station. *Cathedral dome* is 46.98 meters (154.1 feet) or 1″.53 of latitude south and 100.67 meters (330.3 feet) or 3″.36 of longitude east of the station.

St. Pierre (Miquelon Islands, E. Goodfellow, 1872).—On the island of St. Pierre, the most southern and eastern of three islands forming the Miquelon group off the south coast of Newfoundland, and just to the westward of the entrance to Placentia Bay. The station is just outside and north of the town of St. Pierre, being referred to Galantry Head Light by chart plotting and scaling. It is 2,122 meters north and 1,331 meters west of the light. It was marked by monument constructed of a granite slab, 26 by 30 inches and 7 inches thick, set in the ground (14 inches below the surface) as a foundation; in the center of the slab is a drill hole with copper bolt to mark point. Upon this foundation was set a pier 21 by 15 inches and 49 inches long, projecting 35 inches above the ground. A ¾-inch copper bolt 3 inches long, with cross lines to mark the point, is set in the top of the pier, which is inscribed "U. S. C. S. 1872." A wooden fence 7 feet square was placed around the pier.

Midway longitude (Midway Island, Fremont Morse, 1903).—On a prominent sand dune, about 15 feet above highwater and 240 feet northeast from the temporary office of the Commercial Pacific Cable Co. The station is marked by a bottle buried 3 feet below the surface of the ground. The surface mark is a concrete pier, 16 by 24 inches in cross section, and 32 inches above ground.

For notes in regard to marking of stations see p. 130.

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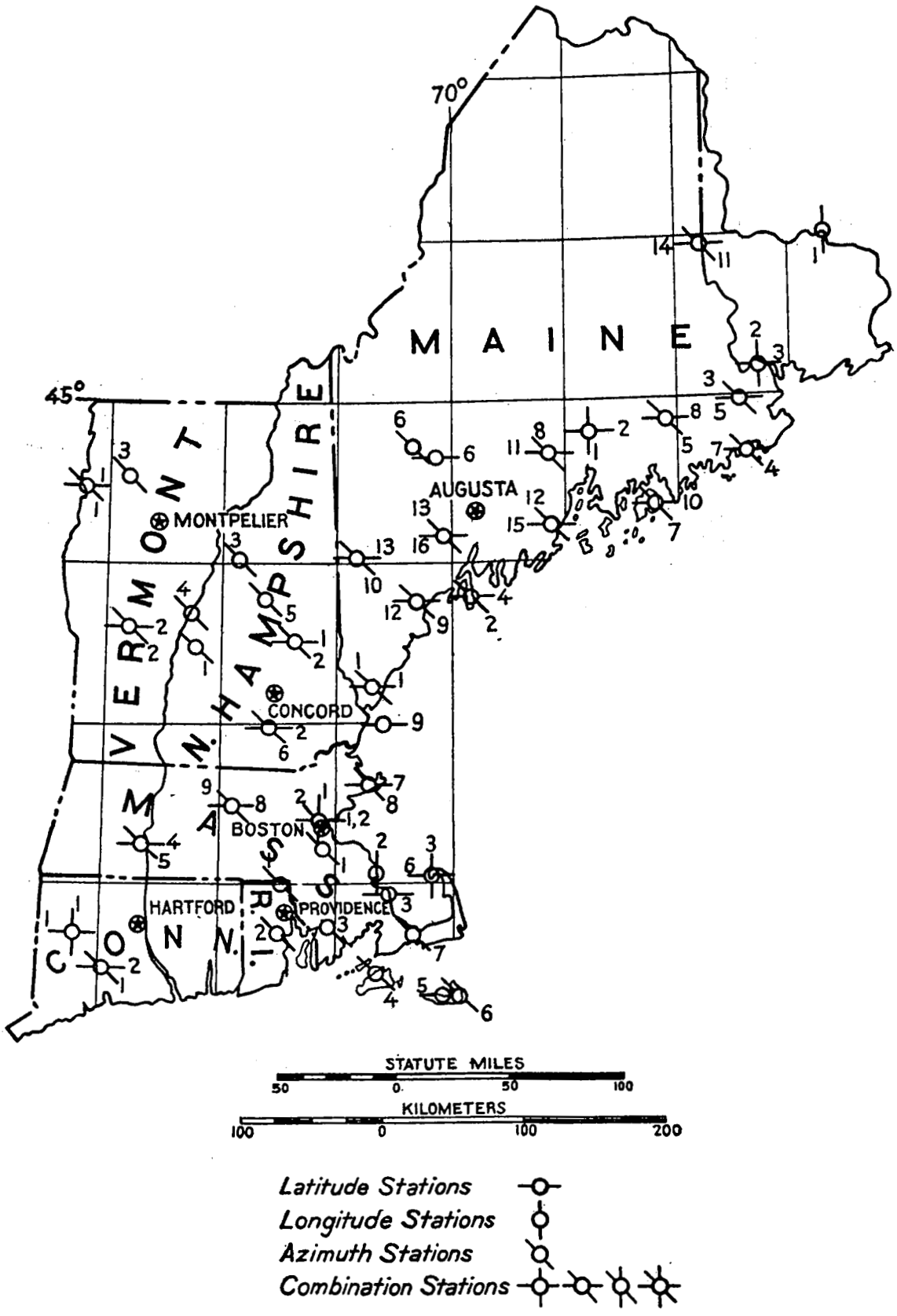

FIG. 15.—Astronomic stations in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island

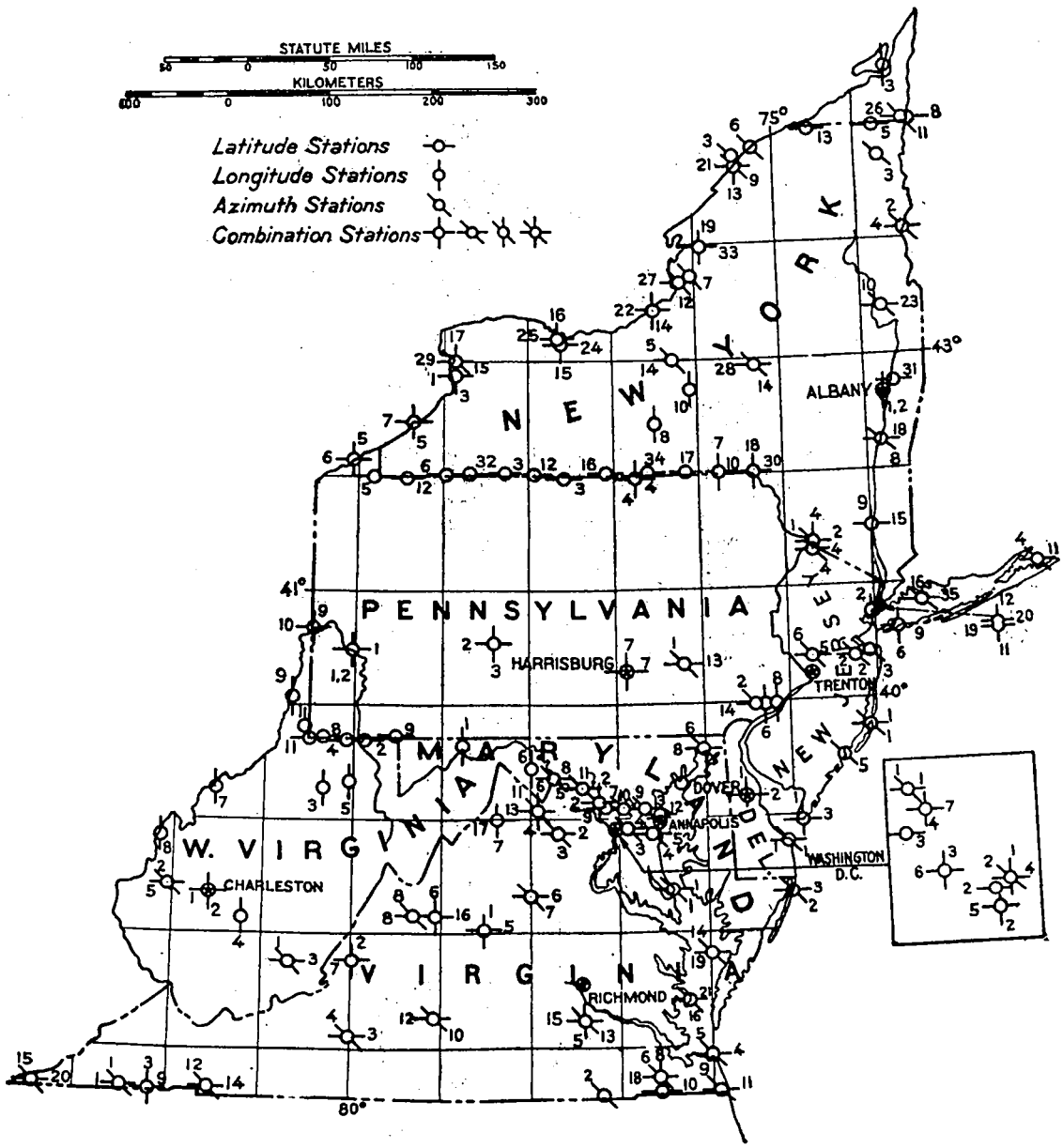

FIG. 16.—Astronomic stations in New York, Pennsylvania, New Jersey, Delaware, Maryland, District of Columbia, Virginia, and West Virginia

NOTE.—Station in Maryland near the D of the name Dover is latitude station No. 7.

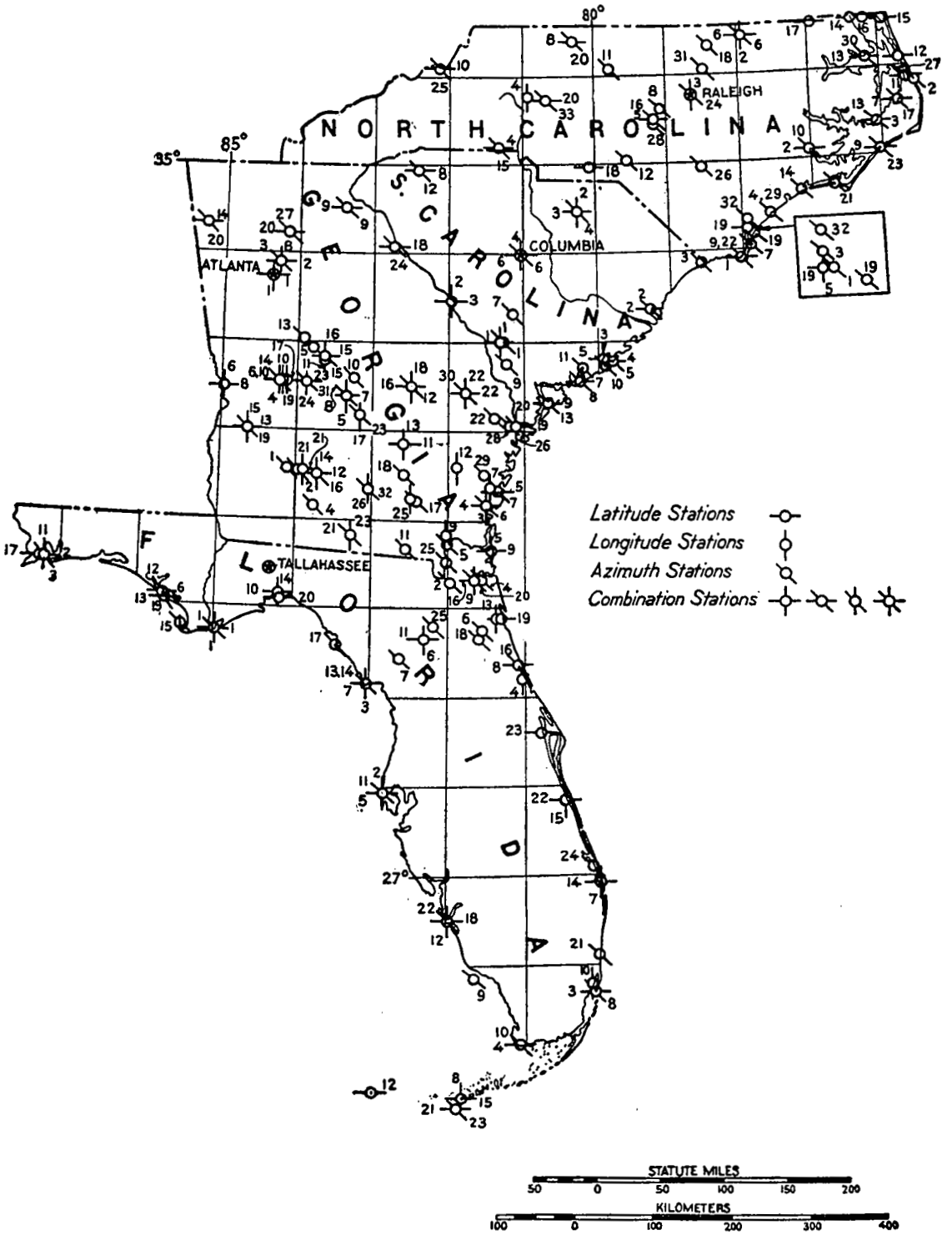

FIG. 17.—Astronomic stations in North Carolina, South Carolina, Georgia, and Florida

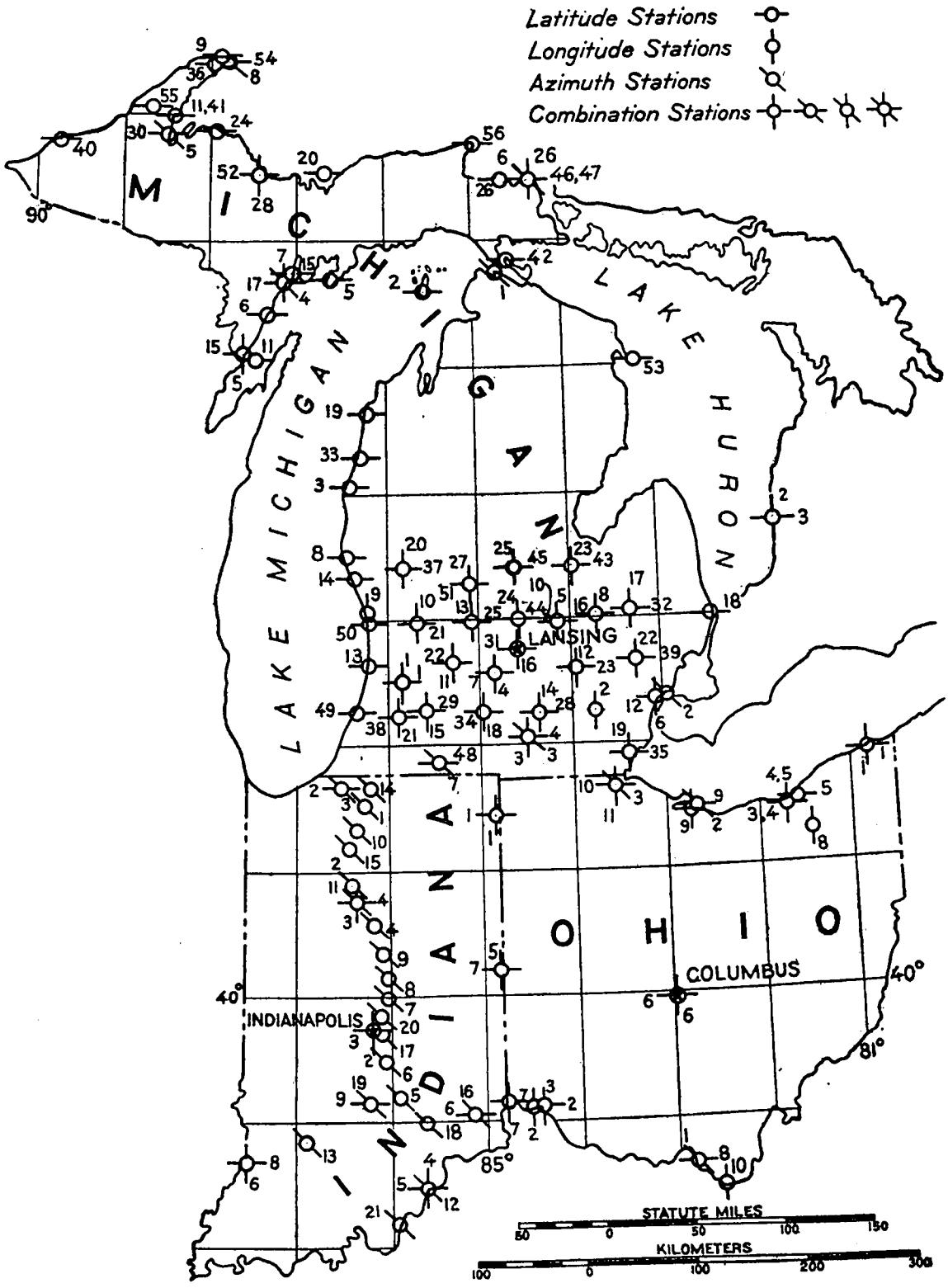

FIG. 18.—Astronomic stations in Michigan, Ohio, and Indiana

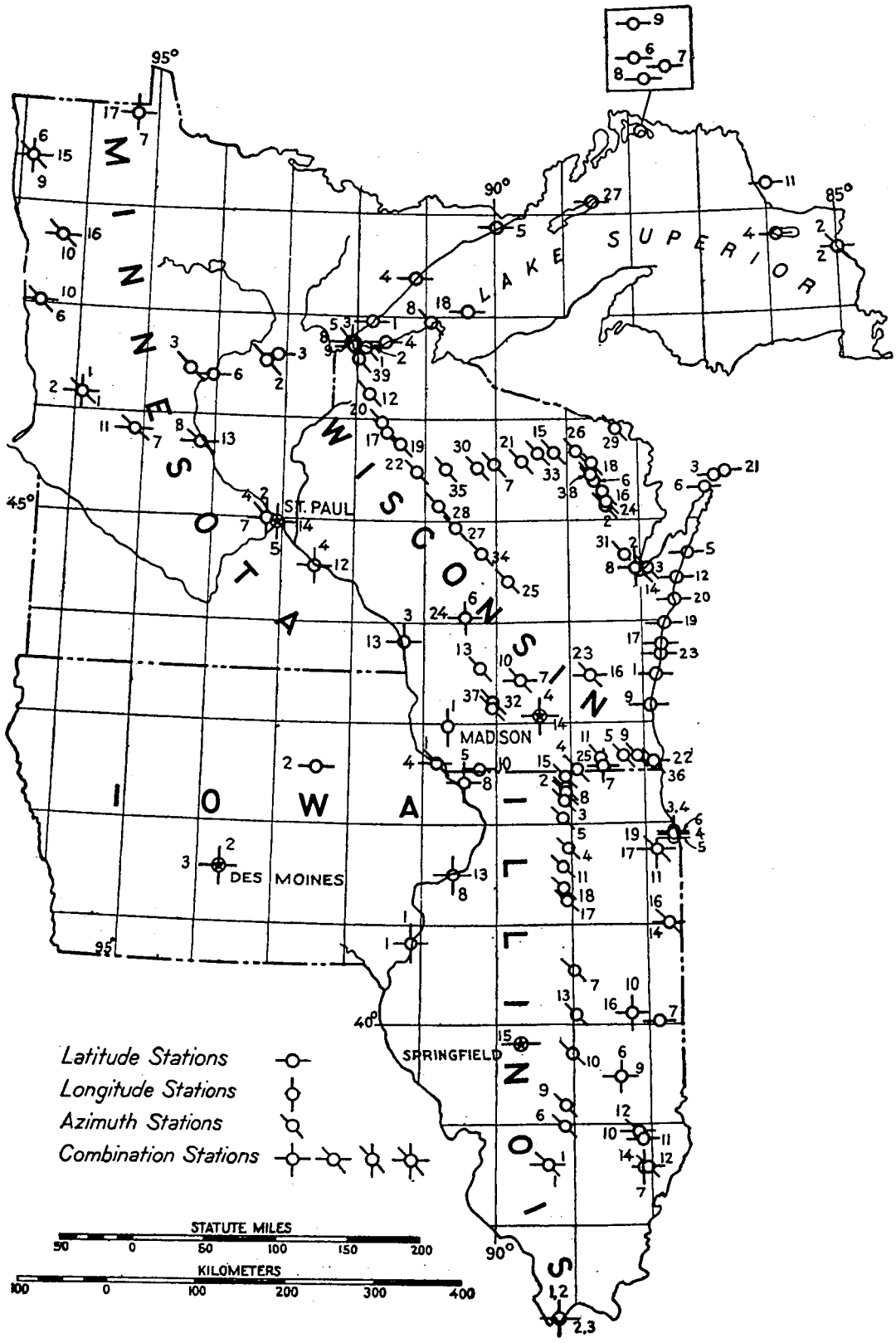

FIG. 19.—Astronomic stations in Wisconsin, Minnesota, Illinois, and Iowa

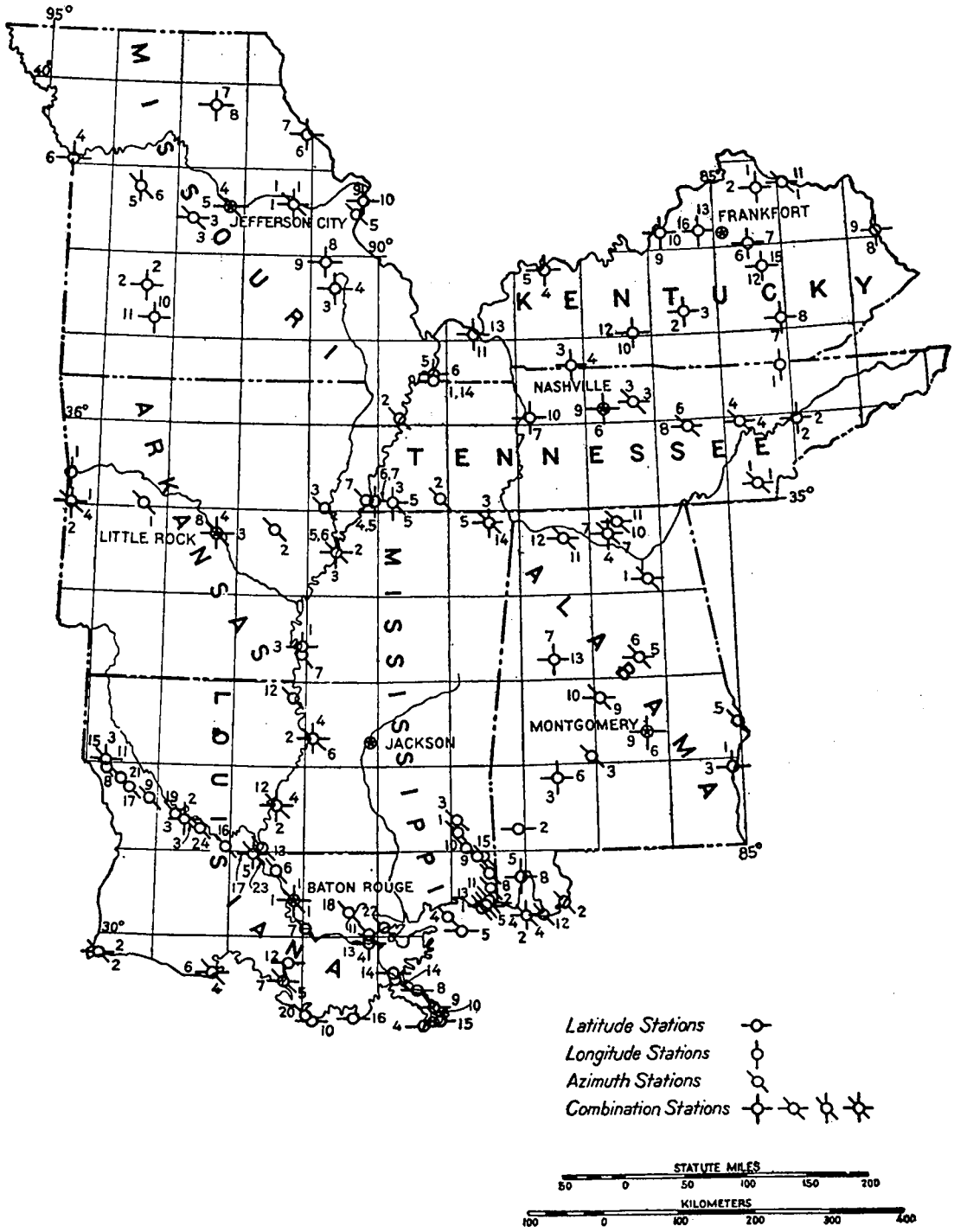

FIG. 20.—Astronomic stations in Kentucky, Tennessee, Alabama, Mississippi, Missouri, Arkansas, and Louisiana

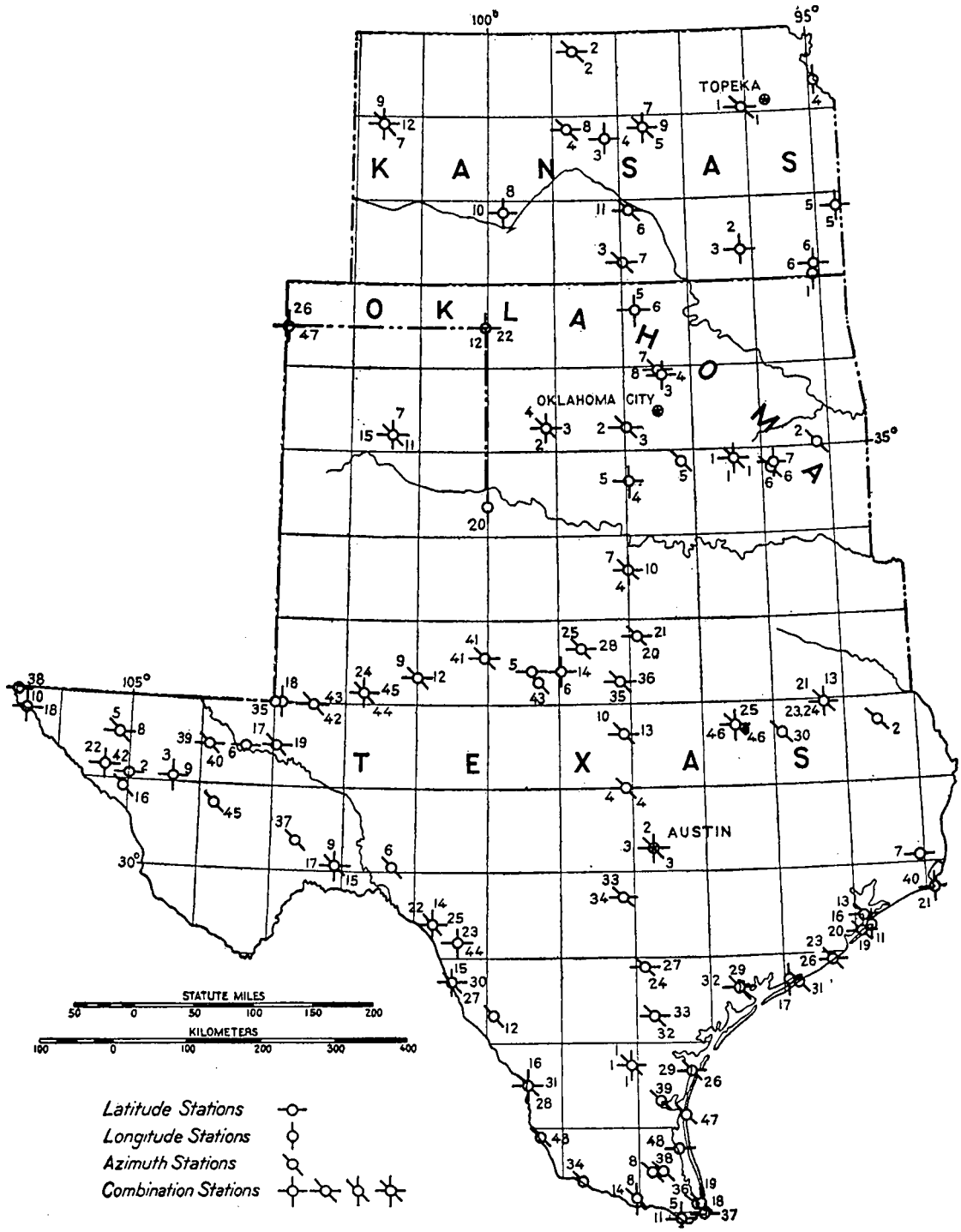

FIG. 21.—Astronomic stations in Kansas, Oklahoma, and Texas

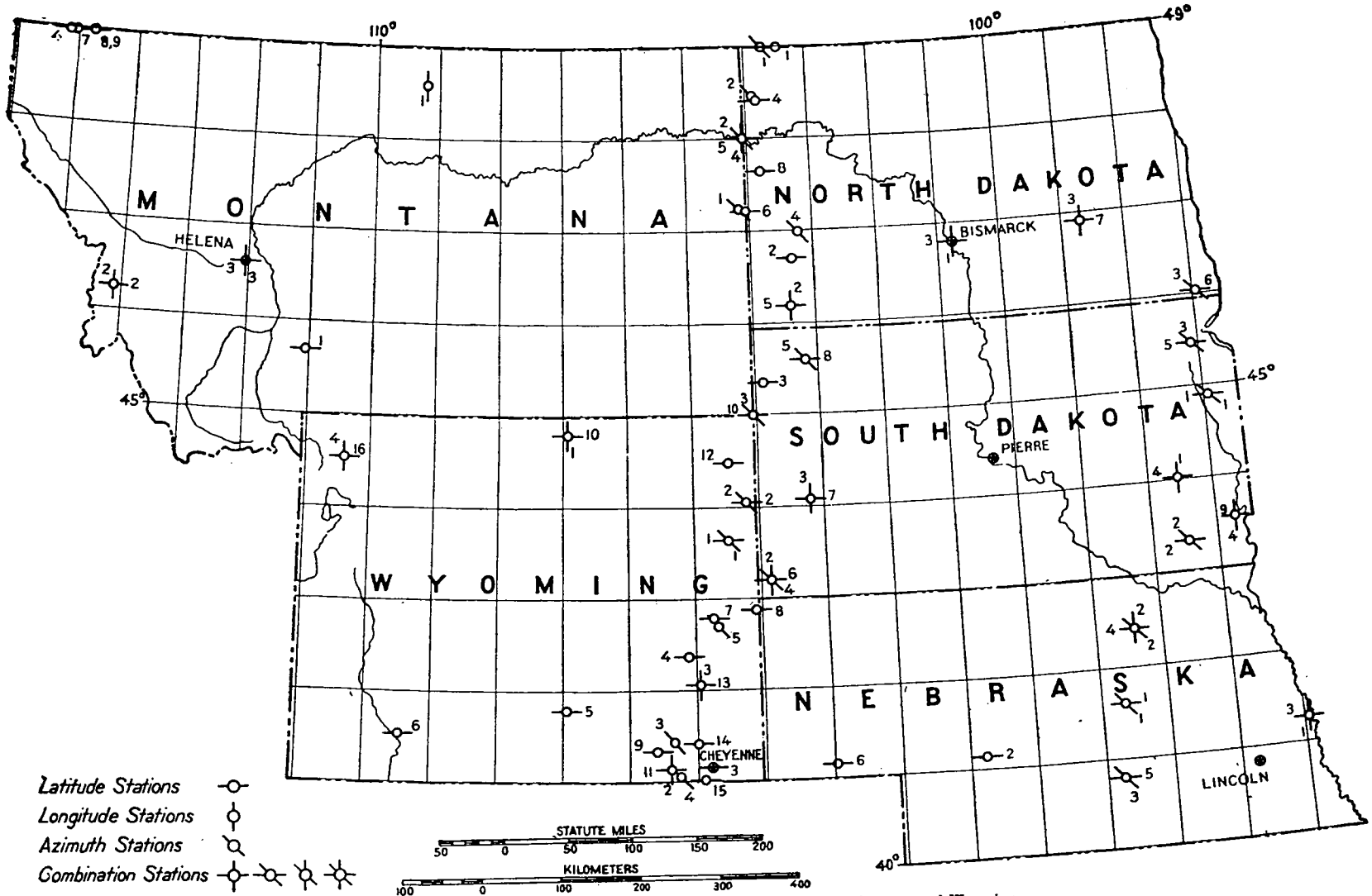

FIG. 22.—Astronomic stations in North Dakota, South Dakota, Nebraska, Montana, and Wyoming

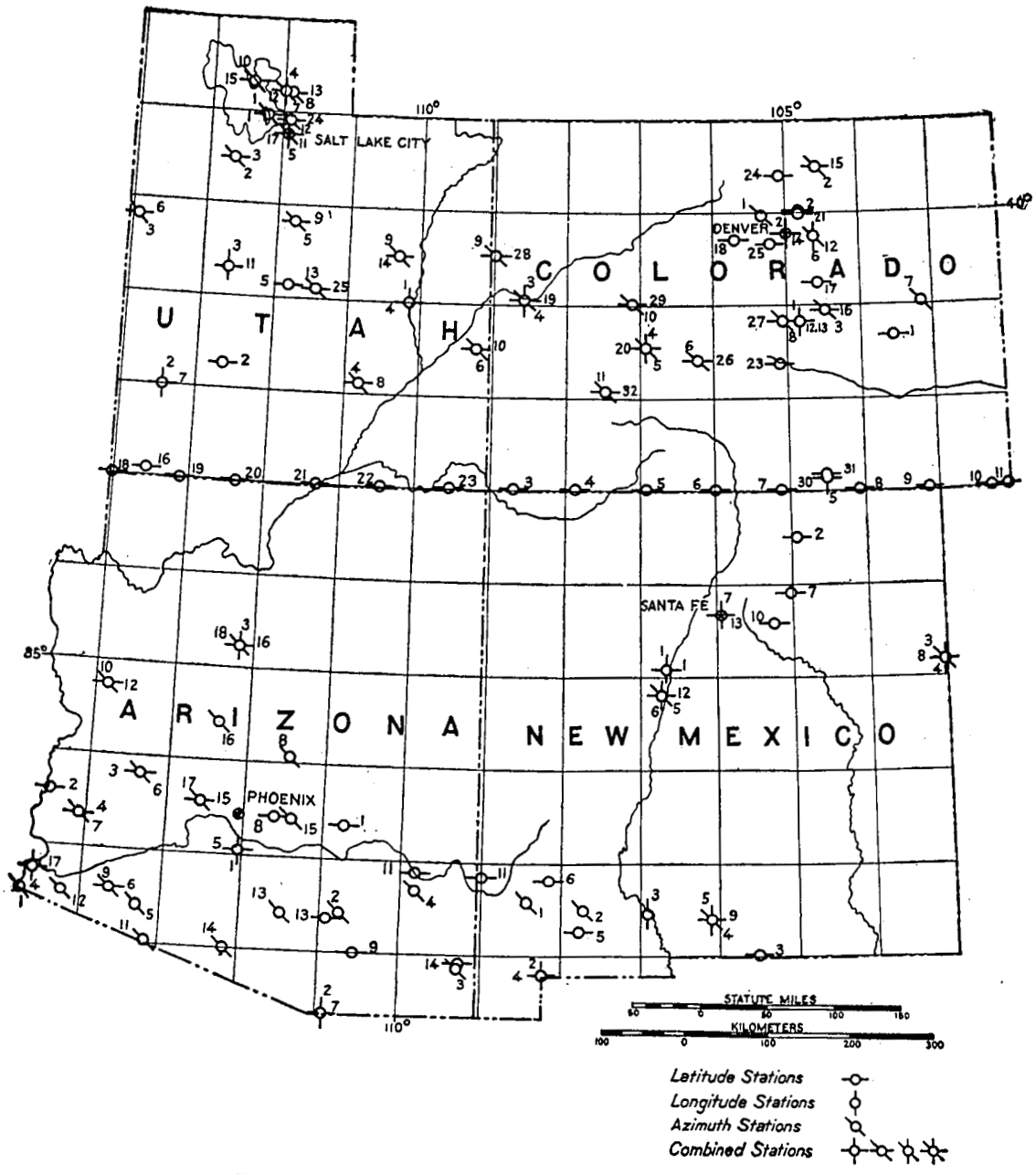

FIG. 23.—Astronomic stations in Colorado, New Mexico, Utah, and Arizona

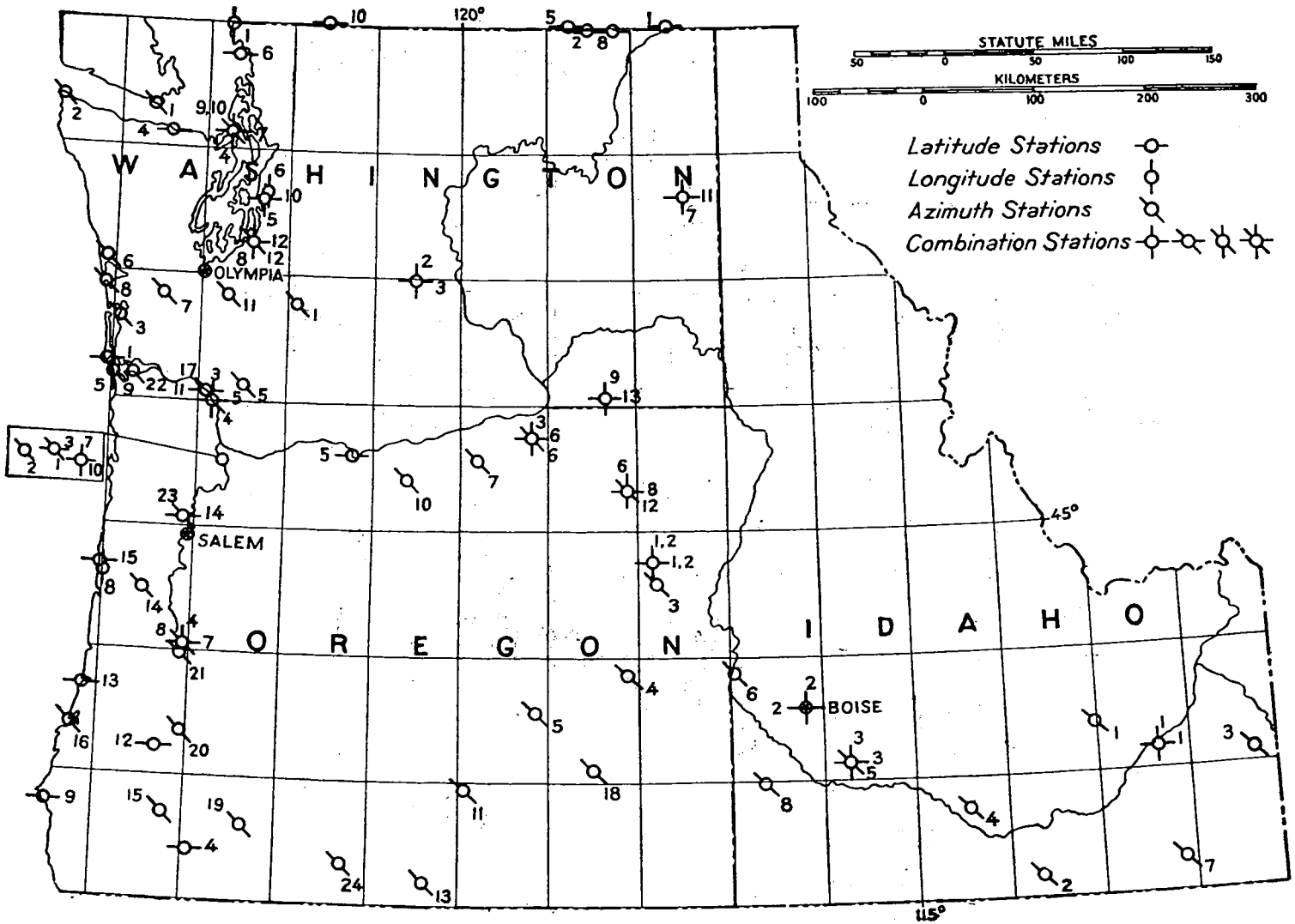

FIG. 24.—Astronomic stations in Idaho, Washington, and Oregon

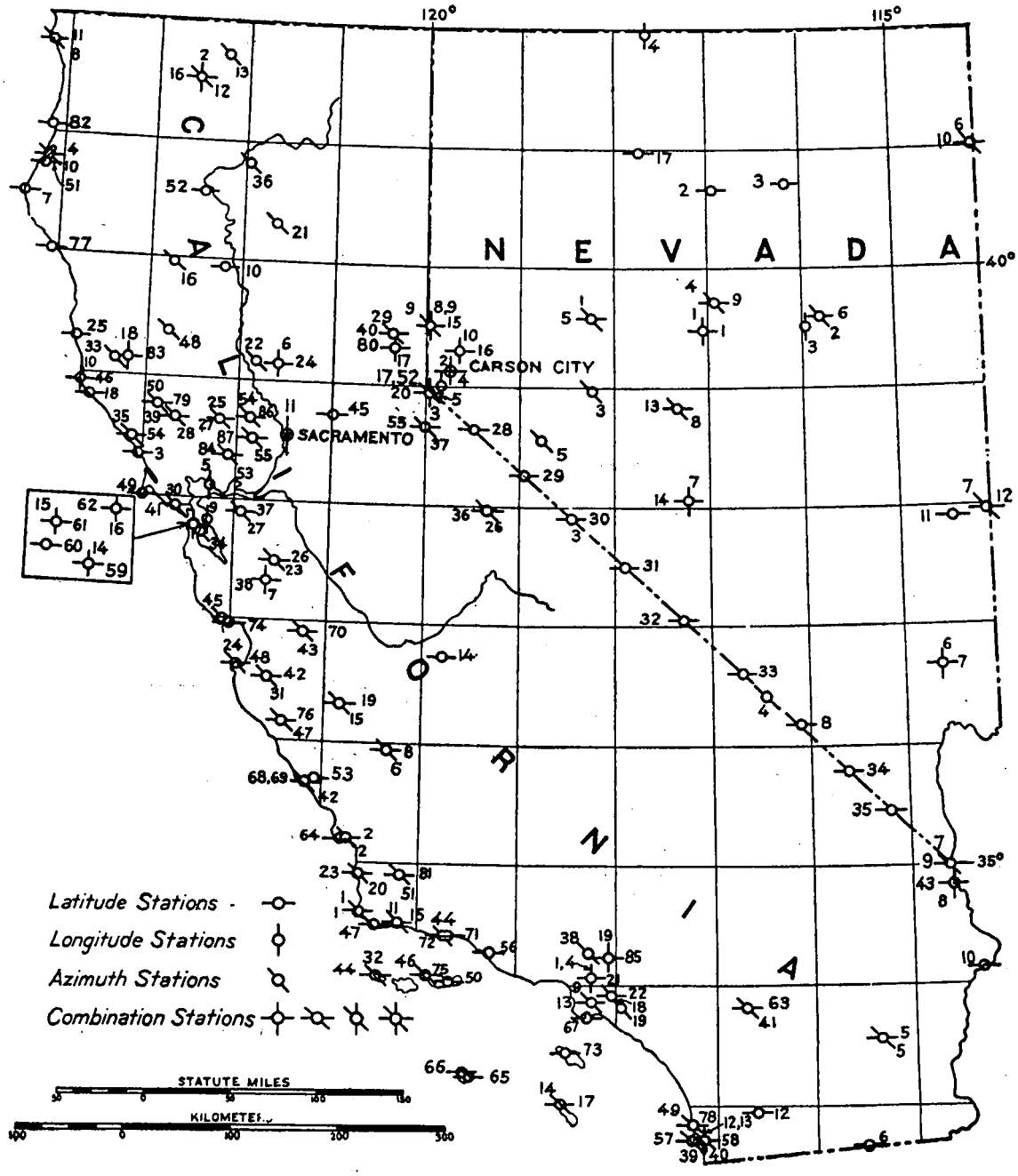

FIG. 25.—Astronomic stations in Nevada and California

EXPLANATION OF INDEX

The stations are arranged alphabetically under each State, and stations of each of the three classes, latitude, longitude, and azimuth, are numbered consecutively under each State. Each station is represented by its corresponding number on the index sketches, Figures 15–25.

The last column of the index gives references to a number of publications, and for convenience in indexing each of these publications is given a reference letter as indicated in the following list:

MISCELLANEOUS PUBLICATIONS

Name of publication	Reference letter
United States Geological Survey, Bulletin No. 49	A
United States Geological Survey, Bulletin No. 70	B
Report upon United States geographical surveys west of the 100th meridian, Lieut. Geo. M. Wheeler, United States Army, Vol. II, 1877	C
Annual Report upon United States geographical surveys west of the 100th meridian, Lieut. Geo. M. Wheeler, United States Army, App. FF, 1874	D
Annual Report United States geographical surveys west of the 100th meridian, Lieut. Geo. M. Wheeler, United States Army, App. 00, 1879	E
Astronomical report geographical surveys and explorations west of the 100th meridian, Lieut. Geo. M. Wheeler, United States Army, 1874	F
Determination of the difference in longitude between each two of the stations, Washington, Cambridge, and Far Rockaway, United States Coast and Geodetic Survey Special Publication No. 35	G
Lick Observatory Bulletin No. 130	H
Publications of the University of Pennsylvania, Astronomical Series, Vol. I, Part I, 1912	I
Popular astronomy, Vol. XXVII, No. 6, Charles Clayton Wylie, 1919	J
Telegraphic Longitudes, United States Coast and Geodetic Survey Report for 1904, App. No. 4	K
Observations and calculations and field notes of the establishment of the point of intersection of the true 100th meridian with the Red River, Arthur D. Kidder, Examiner of Surveys, United States General Land Office, 1903	L
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The international latitude service at Gaithersburg, Md., and Ukiah, Calif., United States Coast and Geodetic Survey Report for 1900, App. 5, pp. 495–520	N
Primary triangulation on the 104th meridian, and on the 39th parallel in Colorado, Utah, and Nevada, United States Coast and Geodetic Survey Special Publication No. 19	O
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Precise triangulation and traverse in Indiana, United States Coast and Geodetic Survey Special Publication No. 79	S
California-Oregon arc of precise triangulation, United States Coast and Geodetic Survey Special Publication No. 84	T
Precise traverse, Racine, Wis., to Vandalia, Ill., United States Coast and Geodetic Survey Special Publication No. 86	U

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INDEX TO STATIONS

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
ALABAMA (Fig. 20)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Aurora latitude	1						52		92	131		304			
Aurora azimuth	1							72	120	131					
Bear Point azimuth	2							72	120	131					
Coon latitude	2						52		92	131		310			
Ethridge azimuth	3							72	120	131					
Eufaula longitude	1	Apalachicola, Fla	29	11		34			108	131					
		Macon, Ga	30	11		34									
Eufaula latitude	3						52		92	131					
Fort Morgan longitude	2	Mobile, Ala	299	21		40			108	131					
Fort Morgan latitude	4						52		92	131		313			
Fort Morgan azimuth	4							72	120	132					
Girard azimuth	5							72	120	132					
Kahatchee latitude	5						52		92	132		307			
Kahatchee azimuth	6							72	120	132					
Lower Peach Tree longitude	3	Mobile, Ala	23	10	31	34			108	132		323			
		Montgomery, Ala	22	10	31	34						322			
Lower Peach Tree latitude	6						52		92	132		309			
Madison longtitude	4	Nashville, Tenn	331	22	32	41			108	132					
		Strickland, Miss	330	22	32	41									
Madison latitude	7						52		92	132					
Madison azimuth	7							72	120	132					
Mobile longitude	5	Fort Morgan, Ala	299	21		40			108	132					
		Lower Peach Tree, Ala	23	10	31	34						323-324			
		New Orleans, La	27	10	31	34						323-324			
		Pensacola, Fla	31	11		34									
Mobile latitude	8						52		92	132		310, 311			
Montgomery longitude	6	Lower Peach Tree, Ala	22	10	31	34			108	132		322-325			
		Macon, Ga	21	10	31	34						322-325			
Montgomery latitude	9						52		92	133		307, 308			
Montgomery north meridian stone azimuth.								72	120	133					
Perry latitude	10						52		92	133					
Perry azimuth	9							72	120	133					
Smithers latitude	11						52		92	133					
Smithers azimuth	10							72	120	133					
Tanyard latitude	12						52		92	133					
Tanyard azimuth	11							72	120	133					
Tuscaloosa (U. S. G. S.) longitude	7	St. Louis, Mo	17	29		44			108	133					
Tuscaloosa (U. S. G. S.) latitude	13						66		92	133					
West Gulfshore azimuth	12							72	120	133					
ARIZONA (Fig. 23)															
Arizona-Utah boundary. (*See* Utah-Arizona boundary, Utah.)															
Azimuth (U. S. G. S.) latitude	1						52		92	133					
Boundary Monument No. 204 azimuth.	1							72	120	133					
Catalina azimuth	2							72	120	134					
Chiricahua azimuth	3							72	120	134					
Ehrenberg (U. S. G. S.) latitude	2						52		92	134					
Graham (U. S. G. S.) azimuth	4							72	120	134					
Granite azimuth	5							72	120	134					
Harquahalla latitude	3						52		92	134					
Harquahalla azimuth	6							72	120	134					
Kofa latitude	4						52		92	134					
Kofa azimuth	7							72	120	134					
Maricopa longitude	1	El Paso, Tex	256	19		39			108	134					
Maricopa latitude	5						52		92	134					
Mazatzal azimuth	8							72	120	135					
Mohawk latitude	6						52		93	135					
Mohawk azimuth	9							72	120	135					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
ARIZONA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Nogales longitude	2	El Paso, Tex	223	18		39			108	135			236, 246–257		
		Yuma, Ariz	222	18		39							236, 246–257		
Nogales latitude	7						52		93	135					
Nogales azimuth [1]															
Number Three (U. S. G. S.) latitude.	8						52		93	135					
Pantano Railroad station (U. S. G. S.) latitude.	9						52		93	135					
Parker School (U. S. G. S.) latitude	10						52		93	135					
Pima Church (U. S. G. S.) latitude	11						52		93	135					
Pine latitude	12						52		93	135					
Pine azimuth	10							72	120	135					
Pusch (U. S. G. S.) latitude	13						52		93	135					
Quitavaquita azimuth	11							72	120	135					
Sawmill (U. S. G. S.) latitude	14						52		93	135					
Sheep azimuth	12							72	120	136					
Silver Bell azimuth	13							72	120	136					
South Mountain azimuth	14							72	120	136					
Superstition (U. S. G. S.) azimuth	15							72	120	136					
Union azimuth	16							72	120	136					
Whitetank latitude	15						52		93	136					
Whitetank azimuth	17							72	120	136					
Williams Laplace longitude	3	Los Lunas, N. Mex	389	24	33	42			108	136					
		Needles, Calif	390	24	33	42									
Williams Laplace latitude	16						52		93	136					
Williams Laplace azimuth	18							72	120	136					
Yuma longitude	4	Los Angeles, Calif	221	17		39			108	136			235, 246–257		
		Nogales, Ariz	222	18		39							236, 246–257		
		San Diego 1892, Calif	220	17		39							235, 246–257		
Yuma latitude	17						52		93	136					
Yuma azimuth [2]															
ARKANSAS (Fig. 20)															
Danville azimuth	1							72	120	137					
DeVall azimuth	2							72	120	137					
Forrest azimuth	3							72	120	137					
Fort Smith longitude	1	Little Rock, Ark	163	15		37			137	108					
Forth Smith latitude. (*See* p. 51.)															
Hartford longitude	2	Allen, Okla	383	24	33	42			108	137					
		Little Rock, Ark	382	24	33	42									
Hartford latitude	1						52		93	137					
Hartford azimuth	4							72	120	137					
Helena longitude	3	Nashville, Tenn	115	13		36			108	137					
Helena latitude	2						52		93	137					
Helena azimuth	5							72	120	137					
Helena midbase azimuth	6							72	120	137					
Hopefield south base azimuth	7							72	120	138					
Little Rock longitude	4	Atlanta, Ga	239	19		39			108	138			243, 246–257		
		El Paso, Tex	226	18		39							238, 246–257		
		Fort Smith, Ark	163	15		37									
		Galveston, Tex	160	15		37							221, 246–257		
		Hartford, Ark	382	24	33	42									
		Kansas City, Mo	162	15		37							222, 246–257		
		Martin, Tenn	328	22	32	41									
		St. Louis, Mo	142	25											
		Texarkana, Ark	161	15		37									
		Torras, La	381	23	33	42									
Little Rock latitude	3						52		93	138					
Little Rock northwest base azimuth	8							72	120	138					
Texarkana longitude	5	Little Rock, Ark	161	15		37			108	138					
Texarkana latitude. (*See* p. 51.)															

[1] See Report of the International Boundary Commission United States and Mexico west of the Rio Grande, 1891–1896, pp. 70, 71, 110.
[2] See Report of the International Boundary Commission United States and Mexico west of the Rio Grande, 1891–1896, pp. 70, 71, 112.

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 283)
CALIFORNIA (Fig. 25)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Arguello latitude	1						52		93	138					
Arguello azimuth	1							73	120	138					
Avila latitude	2						52		93	138					
Avila azimuth	2							73	120	138					
Bodega latitude	3						52		93	139	731				
Boundary line T 59 azimuth	3							73	120	139					
Boundary line T 101 east azimuth	4							73	120	139					
Bucksport latitude	4						52		93	139					
Buenavista (Los Angeles) longitude	1	San Francisco, Washington Square, Calif.	68	12		35			108	139					
Butte latitude	5						52		93	139					
Butte azimuth	5							73	120	139					
Calexico (U. S. G. S.) latitude	6						52		93	139					
California-Nevada boundary:															
Monument No. 28 latitude	28						53		93	144					
Monument No. 41 latitude	29						53		93	144					
Monument No. 59 latitude	30						53		93	144					
Monument No. 74 latitude	31						53		93	144					
Monument No. 88 latitude	32						53		93	144					
Monument No. 97 latitude	33						53		93	144					
Monument No. 120 latitude	34						53		93	145					
Monument No. 129 latitude	35						53		93	145					
Cape Mendocino latitude	7						52		93	139					
Castle Mount latitude	8						52		93	139					
Castle Mount azimuth	6							73	120	139					
Chabot Observatory. (*See* Oakland.)															
Colorado River, Von Schmidt's east latitude post latitude	9						52		93	139					
Colorado River azimuth	7							73	120	140					
Corning latitude	10						52		93	140					
Crescent City latitude	11						52		93	140					
Crescent City azimuth	8							73	120	140					
Cuyamaca latitude	12						52		93	140					
Dominguez Hill latitude	13						52		93	140					
Dominguez Hill azimuth	9							73	120	140					
Eureka azimuth	10							73	120	140					
Fresno (U. S. E.) latitude	14						68		93	140					E, 42-47
Gaviota latitude	15						52		93	140					
Gaviota azimuth	11							73	120	141					
Gazelle longitude	2	Sacramento, Calif.	302	21		40			108	141					
Gazelle latitude	16						52		93	141					
Gazelle astronomic azimuth	12							73	120	141					
Goosenest azimuth	13							73	120	141					T, 35, 36
Harbor latitude	17						52		93	141					
Harbor azimuth, 1878	14							73	120	141					
Harbor azimuth, 1908	14							73	120	141					
Havens Anchorage latitude	18						52		93	141					
Hepsedam latitude	19						52		93	141					
Hepsedam azimuth	15							73	120	141					
Kent azimuth	16							73	120	141					
Lake Tahoe, southeast end longitude	3	Carson City, Nev.	227	18		39			108	142	820				
Lake Tahoe, southeast end latitude	20						53		93	142	708				
Lake Tahoe, southeast end azimuth	17							73	120	142	790, 791				
Lick Observatory (Mount Hamilton) longitude	7	Mare Island (U. S. N.), Calif.	5	30		46			108	145					H
		San Francisco, Lafayette Park, Calif.	185	16		38					814		259-261		
Lick Observatory (Mount Hamilton) latitude	38						53		94	145	714				
Los Angeles (Buenavista) longitude.	1	San Francisco, Washington Square, Calif.	68	12		35			108	139					
Los Angeles longitude	4	Needles, Calif.	193	16		38			108	142			229, 246-257		
		Sacramento, Calif.	189	16		38							228, 246-257		
		San Diego, 1892, Calif.	219	17		39							234, 246-257		
		San Francisco, Lafayette Park, Calif.	191	16		38							229, 246-257		
		Wilson Peak (Mount Wilson), Calif.	270	20		40									
		Yuma, Ariz.	221	17		39							235, 246-257		

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
CALIFORNIA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Los Angeles latitude	21						53		93	142					
Los Angeles, northwest base latitude	22						53		93	142					
Los Angeles, northwest base azimuth	18							73	120	142					
Los Angeles, southeast base azimuth	19							73	120	142					
Lospe latitude	23						53		93	142					
Lospe azimuth	20							73	120	143					
Lyons azimuth	21							73	120	143					
Mare Island (U. S. N.) longitude	5	Mount Hamilton, Lick Observatory, Calif.	5	30		46			108	143					H
Marysville longitude	6	Sacramento, Calif.	190	16		38			108	143	816				
Marysville latitude	24						53		93	143	713				
Marysville Butte azimuth	22							73	120	143					
Mendocino City latitude	25						53		93	143	732				
Mocho latitude	26						53		93	143	712				
Mocho azimuth, 1887	23							73	120	143	793				
Mocho azimuth, 1907	23							73	120	143					
Monterey Bay azimuth	24							73	121	144					
Monticello latitude	27						53		93	144	719				
Monticello azimuth	25							73	121	144	797				
Monument No. 28, California-Nevada boundary latitude.	28						53		93	144					
Monument No. 41, California-Nevada boundary latitude.	29						53		93	144					
Monument No. 59, California-Nevada boundary latitude.	30						53		93	144					
Monument No. 74, California-Nevada boundary latitude.	31						53		93	144					
Monument No. 88, California-Nevada boundary latitude.	32						53		93	144					
Monument No. 97, California-Nevada boundary latitude.	33						53		93	144					
Monument No. 120, California-Nevada boundary latitude.	34						53		93	145					
Monument No. 129, California-Nevada boundary latitude.	35						53		93	145					
Mount Conness latitude	36						53		93	145	709				
Mount Conness azimuth	28							73	121	145	790				
Mount Diablo latitude	37						53		94	145	717				
Mount Diablo azimuth	27							73	121	145	795, 796				
Mount Hamilton (Lick Observatory) longitude.	7	Mare Island (U. S. N.), Calif.	5	30		46			108	145					H
		San Francisco, Lafayette Park, Calif.	185	16		38					814		259-261		
Mount Hamilton (Lick Observatory) latitude.	38						53		94	145	714				
Mount Helena latitude	39						53		94	145	726				
Mount Helena azimuth	28							73	121	145	798, 799				
Mount Lola latitude	40						53		94	146	711				
Mount Lola azimuth	29							73	121	146	792, 793				
Mount Tamalpais latitude	41						53		94	146	725				
Mount Tamalpais azimuth, 1882	30							73	121	146	798				
Mount Tamalpais azimuth, 1907	30							73	121	146					
Mount Toro latitude	42						53		94	146					
Mount Toro azimuth, 1885	31							73	121	146					
Mount Toro azimuth, 1907	31							73	121	146					
Mount Wilson (Wilson Peak) longitude.	19	Los Angeles, Calif.	270	20		40			109	153					
Mount Wilson (Wilson Peak) latitude.	85						54		94	153					
Needles longitude	8	Los Angeles, Calif.	193	16		38			108	146			229, 246-257		
		Moapa, Nev.	343	22	33	41									
		Santa Fe, N. Mex.	229	18		39							238, 246-257		
		Williams Laplace, Ariz.	390	24	33	42									
Needles latitude, 1889	43						53			146					
Needles latitude, 1895	43						53		94	146					
New San Miguel latitude	44						53		94	146					
New San Miguel azimuth	32							73	121	146					
Oakland (Chabot Observatory) longitude.	9	San Francisco, Lafayette Park, Calif.	192	16		38			108	147					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
CALIFORNIA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Paxton azimuth	33							73	121	147	799, 800				
Pine Hill latitude	45						53		94	147					
Point Arena longitude	10	Sacramento, Calif.	188	16	32	38			108	147	815, 823, 825				
		San Francisco, Lafayette Park, Calif.	187	16	32	38					815, 823, 825				
Point Arena latitude	46						53		94	147	732				
Point Avisadero azimuth	34							73	121	147					
Point Conception latitude	47						53		94	147					
Point Pinos latitude	48						53		94	147					
Point Reyes latitude	49						53		94	147	731				
Prisoners Harbor latitude	50						53		94	148					
Red Bluff latitude	51						53		94	148					
Redding latitude	52						53		94	148					
Rocky Butte latitude	53						53		94	148					
Ross Mountain latitude	54						53		94	148	727, 728				
Ross Mountain azimuth	35							73	121	148					
Round azimuth	36							73	121	148					
Round Top latitude	55						53		94	148	710				
Round Top azimuth	37							73	121	148	791, 792				
Sacramento longitude	11	Gazelle, Calif.	302	21		40			108	149					
		Los Angeles, Calif.	189	16		38							228, 246–257		
		Marysville, Calif.	190	16		38					816, 823				
		Point Arena, Calif.	188	16	32	38					815, 823, 825				
		San Francisco, Lafayette Park, Calif.	186	16		38							228, 246–257		
		Verdi, Nev.	194	16	32	38					816, 823, 825				
San Buenaventura latitude	56						53		94	149					
San Buenaventura azimuth	38							73	121	149					
San Diego, 1871, longitude	12	San Francisco, Washington Square, Calif.	70	12		35			108	149					
San Diego, 1892, longitude	13	Los Angeles, Calif.	219	17		39			109	149			234, 246–257		
		Yuma, Ariz.	220	17		39							235, 246–257		
San Diego, 1851, latitude	57						53		94	149					
San Diego, 1892, latitude	58						53		94	149					
San Diego, 1851, azimuth	39							73	121	149					
San Diego astronomic, 1908, azimuth.	40							73	121	149					
San Francisco, Lafayette Park, longitude.	14	Ellensburg (U. S. G. S.), Wash.	16	29		44			109	149					
		Eugene (U. S. G. S.), Oreg.	14	29		44									
		Fort Selden, N. Mex.	147	14		37									
		Los Angeles, Calif.	191	16		38							229, 246–257		
		Mount Hamilton, Lick Observatory, Calif.	185	16		38					814		259–261		
		Oakland, Calif.	192	16		38									
		Point Arena, Calif.	187	16	32	38					815, 823, 825				
		Portland, Oreg.	176	16		37							224, 246–257		
		Sacramento, Calif.	186	16		38							228, 246–257		
		Salt Lake City, Utah	174	15		37							224, 246–257		
		San Francisco, Presidio (new), Calif.	248	19		39					820				
		San Francisco, Washington Square, Calif.	175	16		37					814				
San Francisco, Lafayette Park, latitude.	59						53		94	149	720, 721				

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
CALIFORNIA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	K
San Francisco, Presidio (new), longitude.	15	Honolulu, Hawaii	261	20		40			109	149					
		San Francisco, Lafayette Park, Calif.	248	19		39					820				
		Ukiah, Calif.	251	19		39					821				
San Francisco, Presidio (old), latitude.	60						53		94	149	721–723				
San Francisco, Presidio (new), latitude.	61						53		94	149	724				
San Francisco, Washington Square, longitude.	16	Buenavista (Los Angeles), Calif.	68	12		35			109	149					
		Cambridge, Mass.	54	25											
		Kalama, Wash.	95	12		35									
		Omaha, Nebr.	51	25											
		Salt Lake City, Utah	52	25											
		San Diego, 1871, Calif.	70	12		35									
		San Francisco, Lafayette Park, Calif.	175	16		37					814				
		Seattle, 1871, Wash.	72	25											
		Summit, Calif.	116	13	32	36									
		Verdi east base, Nev.	81	12		35									
San Francisco, Washington Square, latitude.	62						54		94	150	720				
San Jacinto latitude	63						54		94	150					
San Jacinto azimuth	41							73	121	150					
San Luis Obispo latitude	64						54		94	150					
San Nicolas, 1852, latitude	65						54		94	150					
San Nicolas, 1908, latitude	66						54		94	150					
San Pedro latitude	67						54		94	150					
San Simeon, 1852, latitude	68						54		94	150					
San Simeon, 1874, latitude	69						54		94	150					
San Simeon azimuth	42							73	121	150					
Santa Ana latitude	70						54		94	150					
Santa Ana azimuth	43							73	121	150					
Santa Barbara, 1852, latitude	71						54		94	150					
Santa Barbara, 1869, latitude	72						54		94	150					
Santa Barbara azimuth	44							73	121	151					
Santa Catalina Island latitude	73						54		94	151					
Santa Cruz latitude	74						54		94	151					
Santa Cruz azimuth	45							73	121	151					
Santa Cruz West latitude	75						54		94	151					
Santa Cruz West azimuth	46							73	121	151					
Santa Lucia latitude	76						54		94	151					
Santa Lucia azimuth	47							73	121	151					
Shelter Cove latitude	77						54		94	151					
Snow Mountain east azimuth	48							73	121	151					
Soledad latitude	78						54		94	151					
Soledad azimuth	49							73	121	152					
Sulphur Peak latitude	79						54		94	152	728, 729				
Sulphur Peak azimuth	50							73	121	152					
Summit longitude	17	San Francisco, Washington Square, Calif.	116	13	32	36			109	152					
		Washington, U. S. Naval Observatory (old site), D. C.	114	13	32	36									
Summit latitude	80						54		94	152					
Tepusquet latitude	81						54		94	152					
Tepusquet azimuth	51							74	121	152					
Trinidad latitude	82						54		94	152					
Turning Point azimuth	52							74	121	152					
Ukiah longitude	18	San Francisco, Presidio (new), Calif.	251	19		39			109	152	821				
Ukiah latitude	83						54		94	152	730				
Vaca latitude	84						54		94	152	718				
Vaca azimuth	53							74	121	152	796, 797				
Wilson Peak (Mount Wilson) longitude.	19	Los Angeles, Calif.	270	20		40			109	153					
Wilson Peak (Mount Wilson) latitude.	85						54		94	153					
Yolo northwest base latitude	86						54		94	153	716				
Yolo northwest base azimuth	54							74	121	153	794, 795				
Yolo southeast base latitude	87						54		94	153	715				
Yolo southeast base azimuth	55							74	121	153	794				

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
COLORADO (Fig. 23)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Adobe latitude	1						54		94	153	676				
Boulder azimuth	1							74	121	154					
Brighton latitude	2						54		94	154					
Colorado-New Mexico boundary (U. S. G. L. O.):															
No. 1 latitude	3						67		94	154					
No. 2 latitude	4						67		94	154					
No. 3 latitude	5						67		94	154					
No. 4 latitude	6						67		95	154					
No. 5 latitude	7						67		95	154					
No. 6 latitude	8						67		95	155					
No. 7 latitude	9						67		95	155					
Colorado-Oklahoma boundary (U. S. G. L. O.):															
No. 8 latitude	10						67		95	155					
No. 9 latitude	11						67		95	155					
Colorado Springs longitude	1	Grand Junction, Colo	171	15		37			109	155	813				
		Gunnison, Colo	170	15		37					813				
		Kansas City, Mo	164	15		37							222, 246–257		
		Omaha, Nebr	94	25											
		Santa Fe, N. Mex	168	15		37							223, 246–257		
		Salt Lake City, Utah	172	15		37							223, 246–257		
		Wallace, Kans	167	15	32	37					812, 824				
Colorado Springs latitude	12						54		95	155	677				
Colorado Springs (U.S.E.) latitude	13						68		95	155					F, 70–77
Denver longitude	2	Omaha, Nebr	92	12		35			109	155					
Denver latitude	14						54		95	156					
Dewey latitude	15						54		95	156					
Dewey azimuth	2							74	121	156					
El Paso east base latitude	16						54		95	156	677				
El Paso east base azimuth	3							74	121	156	770				
Elbert latitude	17						54		95	156					
Georgetown (U. S. E.) latitude	18						68		95	156					C, 231–237
Grand Junction longitude	3	Colorado Springs, Colo	171	15		37			109	156	813				
Grand Junction latitude	19						54		95	156	683				
Grand Junction azimuth	4							74	121	156	774				
Gunnison longitude	4	Colorado Springs, Colo	170	15		37			109	156	813				
Gunnison latitude	20						54		95	156	681				
Gunnison azimuth	5							74	121	156	772				
Hughes (U. S. E.) latitude	21						68		95	156					C, 256–263
Julesburg longitude		Omaha, Nebr	62	25											
Julesburg (U. S. E.) latitude	22						68		95	157					C, 446–448
Labran (U. S. E.) latitude	23						68		95	157					C, 281–288
Loveland latitude	24						54		95	157					
Morrison latitude	25						54		95	157					
Mount Ouray latitude	26						54		95	157	679				
Mount Ouray azimuth	6							74	121	157	771, 772				
Overland azimuth	7							74	121	157	769, 770				
Pikes Peak latitude	27						54		95	157	678				
Pikes Peak azimuth	8							74	121	157	771				
Tavaputs latitude	28						54		95	157	684				
Tavaputs azimuth	9							74	121	157	775				
Treasury Mountain latitude	29						54		95	158	680				
Treasury Mountain azimuth	10							74	121	158	773				
Trinidad longitude	5	Omaha, Nebr	97	13		35			109	158					
Trinidad latitude	30						54		95	158					
Trinidad (U. S. E.) latitude	31						68		95	158					C, 304–312
Uncompahgre latitude	32						54		95	158	682				
Uncompahgre azimuth	11							74	121	158	773, 774				
Watkins longitude	6	Omaha, Nebr	323	21		41			109	158					
Watkins astronomic azimuth	12							74	121	158					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(10) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
CONNECTICUT (Fig. 15)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Camp Columbia (C. U.) longitude	1	Washington, U. S. Naval Observatory (new site), D. C.	6	30		46			109	158					
Camp Columbia (C. U.) latitude	1						54		95	158					
Sandford latitude	2						54		95	158		286			
Sandford azimuth	1							74	121	158		343, 344			
DELAWARE (Fig. 16)															
Cape Henlopen latitude	1						54		95	159	628				
Cape Henlopen Lighthouse azimuth.	1							74	121	159	745	347			
Dover longitude	1	Washington, C. & G. S. Office, D. C.	249	19		39			109	159	821				
Dover latitude	2						54		95	159	629				
DIST. OF COLUMBIA (Fig. 16)															
Causten latitude	1						54		95	159	643				
Causten azimuth	1							74	121	159	750	350			
Washington:															
Four-and-one-half St. latitude	2						54		95	159					
Georgetown College Observatory latitude.	3						55		95	159	644				
Seaton longitude	1	Cambridge, Mass	45	25					109	159					
		Charleston, Gibbes Observatory, S. C.	9	25											
		Petersburg (Roslyn), Va.	14	10	31	34						320, 324			
		Philadelphia, Pa	8	25											
		Raleigh, N. C	15	10	31	34						320, 324			
		Washington, U. S. Naval Observatory (old site), D. C.	47	11	31	35						319, 324			
Seaton latitude	4						55		95	159	638				
Seaton azimuth	2							74	121	159	749, 750	349			
U. S. Coast and Geodetic Survey Office longitude.	2	Allegheny Observatory (new site), Pa.	286	20		40			109	159					
		Dover, Del	249	19		39					821				
		Gaithersburg, Md	255	19		39									
		Mount Weather, Va	287	20		40									
		New York City, Manhattan Square, N. Y.	311	21		41									
		Rochester, N. Y	335	22		41									
		Suffolk, Va	371	23	33	42									
		Washington, U. S. Naval Observatory (old site), D. C.	244	19	32	39							258–261		
		Washington, U. S. Naval Observatory (new site), D. C.	250	19	32	39							259–261		
U. S. Coast and Geodetic Survey Office latitude.	5						55		95	160	639–641				
U. S. Naval Observatory (old site) longitude.	3	Atlanta, Ga	121	13		36			109	160			211, 246–257		
		Augusta, Ga	205	17		38									
		Altoona, Pa	201	17		38									
		Burt, Pa	105	13		36									
		Cambridge, Mass	46	25											
		Cambridge, Mass	86	25											
		Cambridge, Mass	243	19		39							244, 246–257		
		Cameron, W. Va	34	11		34									
		Cape May, N. J	128	14		36							214, 246–257		
		Charlottesville, Va	136	14		36					810				
		Charleston, S. C	240	19		39							243, 246–257		
		Cincinnati (Mt. Lookout), Ohio.	130	14		36							216, 246–257		
		Clarksburg, W. Va	32	11		34									
		Columbus, Ohio	107	13	32	36									
		Covington, Va	158	15		37									
		Cumberland, Md	40	11		34									
		Detroit, Mich	23	28										715	

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
DISTRICT OF COLUMBIA—Continued															
Washington—Continued.	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
U. S. Naval Observatory (old site) longitude (continued).		Finn, N. Y	106	13		36									
		Gainesville, Fla	206	17		38									
		Gauley Bridge, W. Va	39	11		34									
		Goodson, Va	63	11		35									
		Grafton, W. Va	33	11		34									
		Harrisburg, Pa	109	13		36									
		Ithaca, N. Y	241	19	32	39									
		Jacksonville, 1890, Tex	207	25											
		Jersey City, N. J	4	10	31	34									
		Key West, Fla	98	25											
		Martinsburg, W. Va	41	11		34									
		Nashville, Tenn	108	25											
		Parkersburg, W. Va	36	11		34									
		Philadelphia, Pa	1	25											
		Philadelphia, Pa	2	10	31	34									
		Point Pleasant, W. Va	37	11		34									
		St. Louis, Mo	67	25											
		St. Pierre Island	87	25											
		Savannah, Ga	100	13	32	35									
		South Point, Ohio	38	11		34									
		Staunton, Va	56	11		35									
		Strasburg, Va	129	14		36					809				
		Statesville, N. C	120	13		36						319			
		Summit, Calif	114	13	32	36									
		Travis, N. Y	104	13		36									
		Washington, Seaton, D. C.	47	11	31	35						319, 324			
		Washington, U. S. Coast and Geodetic Survey Office, D. C.	244	19	32	39							258-261		
		Washington, U. S. Naval Observatory (new site) D. C.	2	30	32	46							257-261		
		Wheeling, W. Va	35	11		34									
U. S. Naval Observatory (old site) latitude.	6						55		95	160	641				
U. S. Naval Observatory (new site) longitude.	4	Baker (U. S. N.), Oreg	8	30		46			109	160					J
		Cambridge, Mass	327	22	32	41									G
		Camp Columbia (C. U.), Conn.	6	30		46									
		Far Rockaway, N. Y	325	22	32	41									G
		Flower Observatory, Pa	7	30		46									I
		Washington, U. S. Coast and Geodetic Survey Office, D. C.	250	19	32	39							259-261		
		Washington, U. S. Naval Observatory (old site), D. C.	2	30	32	46							257-261		
U. S. Naval Observatory (new site) latitude.	7						55		95	160	642				
FLORIDA (Fig. 17)															
Apalachicola longitude	1	Eufaula, Ala	29	11		34			109	160					
Apalachicola latitude	1						55		95	160					
Apalachicola azimuth	1							74	121	160					
Baldwin azimuth	2							74	121	160					
Barkley Point 2 latitude	2						55		95	160					
Barkley Point 2 azimuth	3							74	121	160					
Belleview longitude	2	Daytona, Fla	301	21		40			109	161					
Bluff azimuth	4							74	121	161					
Boulogne azimuth	5							74	121	161					
Bridgeport azimuth	6							74	121	161					
Bronson azimuth	7							74	121	161					
Cape Florida (Key Biscayne south base) latitude.	3						55		95	161					
Cape Florida (Key Biscayne south base) azimuth.	8							74	121	161					
Cape Romano azimuth	9							74	121	161					
Cape Sable latitude	4						55		95	162					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
FLORIDA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Cape Sable azimuth	10							74	121	162					
Cedar Keys longitude	3	Savannah, Ga	101	13		35			109	162					
Clearwater Harbor latitude	5						55		95	162					
Clearwater Harbor astronomic azimuth.	11							74	122	162					
Davis Point 2 latitude	6						55		96	162					
Davis Point 2 azimuth	12							74	122	162					
Daytona longitude	4	Belleview, Fla	301	21		40			109	162					
		Fernandina, Fla	279	20	32	40									
		St. Marks, Fla	300	21		40									
		Sebastian, Fla	278	20	32	40									
Depot Key latitude	7						55		96	162					
Depot Key, 1852, azimuth	13							74	122	162					
Depot Key, 1874, azimuth	14							75	122	162					
Eagle Point azimuth	15							75	122	162					
Esperanza latitude	8						55		96	162					
Esperanza azimuth	16							75	122	162					
Fernandina longitude	5	Atlanta, Ga	280	20	32	40			109	162					
		Brunswick southeast base, Ga.	351	23	33	41									
		Darien, Ga	281	20	32	40									
		Daytona, Fla	279	20	32	40									
		Lancaster 2 (U. S. E.), Fla.	352	23	33	41									
Fernandina latitude	9						55		96	162					
Fog Island azimuth	17							75	122	163					
Fort St. Marks latitude	10						55		96	163					
Gainesville longitude	6	Washington, U. S. Naval Observatory (old site), D. C.	206	17		38			109	163					
Gainesville latitude	11						55		96	163					
Garden Key latitude	12						55		96	163					
Harts Point (Hart) azimuth	18							75	122	163					
Hurricane Island latitude	13						55		96	163					
Hurricane Island azimuth	19							75	122	163					
Jupiter Inlet longitude	7	Miami, Fla	276	20	32	40			109	163					
		Sebastian, Fla	277	20	32	40									
Jupiter Inlet latitude	14						55		96	163					
Key Biscayne south base (Cape Florida) azimuth	8							74	121	161					
Key West longitude	8	Atlanta, Ga	238	19		39			109	163			242, 246–257		
		Charleston, S. C	237	18		39							242, 246–257		
		Miami, Fla	275	20	32	40									
		Washington, U. S. Naval Observatory (old site), D. C.	98	25											
Key West latitude	15						55		96	163					
Lancaster 2 (U. S. E.) longitude	9	Fernandina, Fla	352	23	33	41			109	164					
		Folkston, Ga	353	23	33	41									
Lancaster 2 (U. S. E.) latitude	16						55		96	164					
Lancaster 2 (U. S. E.) azimuth	20							75	122	164					
Lauderdale azimuth	21							75	122	164					
Miami longitude	10	Jupiter Inlet, Fla	276	20	32	40			109	164					
		Key West, Fla	275	20	32	40									
Pensacola longitude	11	Mobile, Ala	31	11		34			109	164					
Pensacola latitude	17						55		96	164					
Punta Rasa longitude	12	Savannah, Ga	99	13		35			109	164					
Punta Rasa latitude	18						55		96	164					
Punta Rasa azimuth	22							75	122	164					
St. Augustine longitude	13	Savannah, Ga	145	14		37			109	164					
St. Augustine latitude	19						55		96	164					
St. Marks longitude	14	Daytona, Fla	300	21		40			109	164					
St. Marks latitude	20						55		96	164					
Sand Key latitude	21						55		96	164					
Sand Key azimuth	23							75	122	165					
Sebastian longitude	15	Daytona, Fla	278	20	32	40			109	165					
		Jupiter Inlet, Fla	277	20	32	40									
Sebastian latitude	22						55		96	165					
Ten 2 azimuth	24							75	122	165					
Titusville latitude	23						55		96	165					
Waldo azimuth	25							75	122	165					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
GEORGIA (Fig. 17)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Albany azimuth	1							75	122	165					
Artesia azimuth	2							75	122	165					
Atlanta longitude	1	Baton Rouge, La	126	14		36			110	165					
		Charleston, S. C	127	14		36							214, 246–257		
		Doraville, Ga	284	20	32	40									
		Fernandina, Fla	280	20	32	40									
		Hump, Ga	344	22	33	41									
		Key West, Fla	238	19		39							242, 246–257		
		Knoxville, Tenn	298	21		40									
		Little Rock, Ark	239	19		39							243, 246–257		
		Nashville, Tenn	123	13		36							212, 246–257		
		New Orleans, La	125	13		36							213, 246–257		
		Savannah, Ga	102	13	32	36									
		Washington, U. S. Naval Observatory (old site), D. C.	121	13		36							211, 246–257		
Atlanta latitude	1						55		96	166		306			
Atlanta middle base latitude	2						55		96	166		305, 306			
Atlanta middle base azimuth	3							75	122	166					
Augusta longitude	2	Washington, U. S. Naval Observatory (old site), D. C.	205	17		38			110	166					
Augusta latitude	3						55		96	166					
Battle azimuth	4							75	122	166					
Brook azimuth	5							75	122	166					
Brunswick southeast base longitude	3	Fernandina, Fla	351	23	33	41			110	166					
		Jesup, Ga	350	23	33	41									
Brunswick southeast base latitude	4						55		96	166					
Brunswick southeast base azimuth	6							75	122	166					
Butler longitude	4	Columbus E, Ga	361	23	33	41			110	167					
		Harmon, Ga	362	23	33	42									
Butler, 1872, latitude	5						55		96	166					
Butler, 1918, latitude	6						55		96	167					
Butler (St. Simon Island) azimuth	7							75	122	167					
Cochran longitude	5	Hump, Ga	346	22	33	41			110	167					
		Mud, Ga	347	22	33	41									
Cochran latitude	7						55		96	167					
Cochran azimuth	8							75	122	167					
Columbus E longitude	6	Butler, Ga	361	23	33	41			110	167					
		Kimbrough, Ga	360	23	33	41									
Columbus E latitude	8						55		96	167					
Currahee latitude	9						55		96	167		299, 300			
Currahee azimuth	9							75	122	167					
Danville azimuth	10							75	122	167					
Darien longitude	7	Allendale, S. C	282	20	32	40			110	167					
		Fernandina, Fla	281	20	32	40									
Doraville longitude	8	Allendale, S. C	283	20	32	40			110	168					
		Atlanta, Ga	284	20	32	40									
Fargo azimuth	11							75	122	168					
Fay azimuth	12							75	122	168					
Folkston longitude	9	Lancaster 2 (U. S. E.), Fla.	353	23	33	41			110	168					
		Waresboro, Ga	354	23	33	41									
Forsyth east base azimuth	13							75	122	168					
Harmon longitude	10	Butler, Ga	362	23	33	42			110	168					
		Riley, Ga	363	23	33	42									
Harmon latitude	10						55		96	168					
Harmon azimuth	14							75	122	168					
Hump longitude	11	Atlanta, Ga	344	22	33	41			110	168					
		Cochran, Ga	346	22	33	41									
		Valley, Ga	345	22	33	41									
Hump azimuth	15							75	122	168					
Jake azimuth	16							75	122	168					
Jesup longitude	12	Brunswick southeast base, Ga.	350	23	33	41			110	169					
		Joint, Ga	349	22	33	41									
Joffre azimuth	17							75	122	169					
Joint longitude	13	Jesup, Ga	349	22	33	41			110	169					
		Mud, Ga	348	22	33	41									

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 263)
GEORGIA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Joint latitude	11						55		96	169					
Joint azimuth	18							75	122	169					
Jones longitude	14	Sylvester D, Ga	358	23	33	41			110	169					
		Willacoochee, Ga	357	23	33	41									
Jones latitude	12						55		96	169					
Kimbrough longitude	15	Columbus E, Ga	360	23	33	41			110	169					
		Sylvester D, Ga	359	23	33	41									
Kimbrough latitude	13						55		96	169					
Kimbrough azimuth	19							75	122	169					
Lavender latitude	14						55		96	169		301			
Lavender azimuth	20							75	122	169					
Lowndes azimuth	21							75	122	170					
Macon longitude	16	Columbia, S. C	19	10	31	34			110	170		322, 323, 325			
		Eufaula, Ala	30	11		34									
		Montgomery, Ala	21	10	31	34						322, 323, 325			
Macon latitude	15						55		96	170					
Meldrim azimuth	22							75	122	170					
Mud longitude	17	Cochran, Ga	347	22	33	41			110	170					
		Joint, Ga	348	22	33	41									
Mud azimuth	23							75	122	170					
Norris longitude	18	Turner, Ga	366	23	33	42			110	170					
		Valley, Ga	365	23	33	42									
Norris latitude	16						55		96	170					
Riley longitude	19	Harmon, Ga	363	23	33	42			110	170					
		Valley, Ga	364	23	33	42									
Riley latitude	17						55		96	170					
Rose Hill latitude	18						55		96	170					
Rose Hill azimuth	24							75	122	170					
St. George azimuth	25							75	122	171					
Savannah longitude	20	Atlanta, Ga	102	13	32	36			110	171					
		Cedar Keys, Fla	101	13		35									
		Charleston, S. C	10	10	32	34									
		Punta Rasa, Fla	99	13		35									
		St. Augustine, Fla	145	14		37									
		Washinton, U. S. Naval Observatory (old site), D. C.	100	13	32	35									
Savannah latitude	19						56		96	171					
Savannah Exchange azimuth	26							75	122	171					
Sawnee latitude	20						56		96	171		302, 303			
Sawnee azimuth	27							75	122	171					
Sylvester D longitude	21	Jones, Ga	358	23	33	41			110	171					
		Kimbrough, Ga	359	23	33	41									
Sylvester D latitude	21						56		96	171					
Telfair azimuth	28							75	122	171					
Townsend azimuth	29							75	122	171					
Turner longitude	22	Bethune I, S. C	367	23	33	42			110	171					
		Norris, Ga	366	23	33	42									
Turner latitude	22						56		96	171					
Turner azimuth	30							75	122	171					
Valdosta longitude	23	Willacoochee, Ga	356	23		41			110	171					
Valley longitude	24	Hump, Ga	345	22	33	41			110	172					
		Norris, Ga	365	23	33	42									
		Riley, Ga	364	23	33	42									
Valley latitude	23						56		96	172					
Valley azimuth	31							75	122	172					
Waresboro longitude	25	Folkston, Ga	354	23	33	41			110	172					
		Willacoochee, Ga	355	23	33	41									
Willacoochee longitude	26	Jones, Ga	357	23	33	41			110	172					
		Valdosta, Ga	356	23		41									
		Waresboro, Ga	355	23	33	41									
Willacoochee azimuth	32							75	122	172					
IDAHO (Fig. 24)															
Big Butte azimuth	1							75	122	172					Q, 54-56
Blackfoot longitude	1	Mountain Home, Idaho	339	22	32	41			110	172					Q, 53
		Salt Lake City, Utah	340	22	32	41									Q, 53, 54
Blackfoot latitude	1						56		96	172					Q, 50, 51
Boise (U. S G. S.) longitude	2	St. Louis, Mo	8	29		44			110	172					B, 23-71

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
IDAHO—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Boise (U. S. G. S.) latitude	2						66		96	172					B, 16, 21
Cache azimuth	2							75	122	173					Q, 54-56
Caribou azimuth	3							75	122	173					Q, 54-56
Flat azimuth	4							75	122	173					Q, 54-56
Mountain Home longitude	3	Blackfoot, Idaho	339	22	32	41			110	173					Q, 53
		La Grande, Oreg	338	22	32	41									Q, 52, 53
Mountain Home latitude	3						56		96	173					Q, 50, 51
Mountain Home azimuth	5							75	122	173					Q, 54-56
Nyssa azimuth	6							75	122	173					Q, 54-56
Oxford azimuth	7							75	122	173					Q, 54-56
Silver azimuth	8							75	122	173					Q, 54-56
ILLINOIS (Fig. 19)															
Bording latitude	1						56		96	173	665				
Bording azimuth	1							76	122	173	764				
Cairo (U. S. L. S.) longitude	1	Detroit, Mich	53	27		44			110	173				757	
Cairo (U. S. L. S.) latitude	2						64		96	173				751	
Cairo, longitude	2	Nashville, Tenn	111	13		36			110	173					
Cairo latitude	3						56		96	174					
Chicago (U. S. L. S.) longitude	3	Detroit, Mich	6	26		43			110	174				756	
Chicago (U. S. L. S.) latitude	4						64		96	174				750	
Chicago, 1883, longitude										174					
Chicago, 1883, latitude	5						56		96	174					
Chicago, Dearborn Observatory longitude.		Cedar Falls, Iowa	64	25											
Chicago, 1891, longitude	4	Detroit, Mich	212	17		38			110	174			233, 246-257		
		Louisville, Ky	157	15		37							220, 246-257		
		Minneapolis, Minn	213	17		38							233, 246-257		
Chicago, 1891, latitude	6						56		96	174					
Cumberland azimuth	2							76	122	174					U, 57
De Witt azimuth	3							76	122	174					U, 57
Fairmount (U. S. L. S.) latitude	7						64		96	174				631, 632	
Fred azimuth	4							76	122	174					U, 57
Galena (U. S. L. S.) longitude	5	Detroit, Mich	27	27		43			110	175				762	
Galena (U. S. L. S.) latitude	8						64		96	175				748	
Gallatin azimuth	5							76	122	175					U, 57
Garner azimuth	6							76	122	175					U, 57
Kerrick azimuth	7							76	122	175					U, 57
Latham azimuth	8							76	122	175					U, 57
Leach azimuth	9							76	122	175					U, 57
Macon azimuth	10							76	122	175					U, 57
Mattoon longitude	6	Omaha, Nebr	57	11		35			110	175					
Mattoon latitude	9						56		96	176					
Mendota azimuth	11							76	123	176					U, 57
Newton latitude	10						56		96	176	664				
Newton azimuth	12							76	123	176	763, 764				
Olney (U. S. L. S.) longitude. (*See* Parkersburg.)															
Olney west base (U. S. L. S.) latitude.	11						64		97	176	664			632, 633	
Ospur azimuth	13							76	123	176					U, 57
Parkersburg (Olney) (U. S. L. S.) longitude.	7	Detroit, Mich	58	28		44			110	176	808			725-727	S, 70
Parkersburg (U. S. L. S.) latitude	12						64		97	176	664			633, 634	
Parkersburg (U. S. L. S.) azimuth	14							86	123	176	762, 763			673, 686	
Rock Island (U. S. L. S.) longitude	8	Detroit, Mich	55	28		44			110	176				763	
Rock Island (U. S. L. S.) latitude	13						64		97	176				751	

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
ILLINOIS—Continued															
Rockton azimuth	15							76	123	177					U 57
St. Anne (U. S. L. S.) latitude	14						56		97	177					
St. Anne (U. S. L. S.) azimuth	16							76	123	177					
Springfield longitude	9	Omaha, Nebr	58	11	32	36			111	177					
		Omaha, Nebr	144	14	32	37									
		St. Louis, Mo	143	14	32	37									
Springfield latitude	15						56		97	177					
Tonica azimuth	17							76	123	177					U, 57
Urbana longitude	10	Madison, Wis	4	30		46			111	177					
Urbana latitude	16						56		97	177					
Vinson azimuth	18							76	123	177					U, 57
Willow Springs (U. S. L. S.) longitude.	11	Detroit, Mich	50	27		44			111	177				724, 725	S, 70
Willow Springs (U. S. L. S.) latitude.	17						64		97	177				630, 631	
Willow Springs (U. S. L. S.) azimuth.	19							86	123	177				664–673	
INDIANA (Fig. 18)															
Aman azimuth	1							76	123	178					S, 69
Boon azimuth	2							76	123	178					S, 69
Butler longitude	1	St. Louis, Mo	217	17		38			111	178					
Butler latitude	1						56		97	178					
Carlisle (U. S. L. S.) latitude	2						56		97	178					
Carlisle (U. S. L. S.) azimuth	3							76	123	178					
Cassedy azimuth	4							76	123	178					S, 69
Clay azimuth	5							76	123	178					S, 69
Dubois azimuth	6							76	123	178					S, 69
Hancock azimuth	7							76	123	178					S, 69
Henry azimuth	8							76	123	179					S, 69
Indianapolis longitude	2	Kansas City, Mo	146	14		37			111	179					
Indianapolis latitude	3						56		97	179					
Jackson azimuth	9							76	123	179					S, 69
Joseph azimuth	10							76	123	179					S, 69
Leonda azimuth	11							76	123	179					S, 69
Logansport longitude	3	Louisville, Ky	150	15		37			111	179					
Logansport latitude	4						56		97	179					
O and M longitude	4	Nashville, Tenn	332	22		41			111	179					S, 70
O and M latitude	5						56		97	179					
O and M azimuth	12							76	123	179					
Osborn azimuth	13							76	123	179	762				
Penn azimuth	14							76	123	180					S, 69
Porter azimuth	15							76	123	180					S, 69
Reizin latitude	6						56		97	180	661				
Reizin azimuth	16							76	123	180	760, 761				
Sherman azimuth	17							76	123	180					S, 69
Tripp azimuth	18							76	123	180					S, 69
Union City longitude	5	St. Louis, Mo	216	17		38			111	180					
Union City latitude	7						56		97	180					
Vincennes longitude	6	Nashville, Tenn	134	14	32	36			111	180	809, 823, 824				S, 70
		St. Louis, Mo	135	14	32	36					810, 823, 824				
Vincennes latitude	8						56		97	180	663				
Weed Patch latitude	9						56		97	181	662				
Weed Patch azimuth	19							76	123	181	761				
Western azimuth	20							76	123	181					S, 69
Williams azimuth	21							76	123	181					
IOWA (Fig. 19)															
Burlington longitude	1	Omaha, Nebr	59	11		35			111	181					
Burlington latitude	1						56		97	181					
Cedar Falls longitude		Chicago, Dearborn Observatory, Ill.	64	25											
Cedar Falls latitude	2						56		97	181					
Des Moines longitude	2	Omaha, Nebr	60	11		35			111	181					
Des Moines latitude	3						56		97	181					
Sherrills Mound latitude	4						56		97	181					
Sherrills Mound azimuth	1							76	123	181					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 263)
KANSAS (Fig. 21)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Adams latitude	1						56		97	181	671				
Adams azimuth	1							76	123	181	767, 768				
Brown latitude	2						56		97	181					
Brown azimuth	2							76	123	182					
Chetopah longitude	1	St. Louis, Mo	71	12		35			111	182					
Elk Falls (U. S. G. S.) longitude	2	St. Louis, Mo	2	29		44			111	182					A, 39-131
Elk Falls (U. S. G. S.) latitude	3						66		97	182					A, 23-24, 34
Ellsworth longitude	3	Kansas City, Mo	165	15	32	37			111	182	811, 823, 824				
		Wallace, Kans	166	15	32	37					812, 823, 824				
Ellsworth latitude	4						56		97	182	673				
Fort Leavenworth Observatory (U. S. L. S.) longitude.	4	Detroit, Mich	26	27		43			111	182				765	
Fort Scott (U. S. G. S.) longitude	5	St. Louis, Mo	3	29		44			111	182					A, 39-131
Fort Scott (U. S. G. S.) latitude	5						66		97	182					A, 25-26, 35
Oswego (U. S. G. S.) longitude	6	St. Louis, Mo	1	29		44			111	182					A, 39-131
Oswego (U. S. G. S.) latitude	6						66		97	182					A, 21, 22, 33
Quarry latitude	7						56		97	182					
Quarry azimuth	3							76	123	182					
Russell southeast base latitude	8						56		97	182	674				
Russell southeast base azimuth	4							77	123	182	769				
Salina west base longitude	7	Omaha, Nebr	294	21		40			111	182					
Salina west base latitude	9						56		97	183	672				
Salina west base azimuth	5							77	123	183	768				
Spearville (U. S. G. S.) longitude	8	St. Louis, Mo	7	29		44			111	183					B, 23-71
Spearville (U. S. G. S.) latitude	10						66		97	183					B, 14, 20
Sunflower latitude	11						56		97	183					
Sunflower azimuth	6							77	123	183					
Wallace longitude	9	Colorado Springs, Colo	167	15	32	37			111	183	812, 824				
		Ellsworth, Kans	166	15	32	37					812, 824				
Wallace latitude	12						56		97	183	675				
Wallace azimuth	7							77	123	183					
KENTUCKY (Fig. 20)															
Bushy Pond latitude	1						56		97	183					
Falmouth longitude	1	Cambridge, Mass	79	12		35			111	183					
Falmouth latitude	2						56		97	184					
Greensburg longitude	2	Louisville, Ky	151	15		37			111	184					
Greensburg latitude	3						56		97	184					
Guthrie longitude	3	St. Louis, Mo	139	14		37			111	184					
Guthrie latiude	4						56		97	184					
Henderson longitude	4	St. Louis, Mo	140	14		37			111	184					
Henderson latitude	5						56		97	184					
Hickman longitude	5	Nashville, Tenn	112	13		36			111	184					
Hickman latitude	6						56		97	184					
Lexington longtitude	6	Louisville, Ky	149	15		37			111	184					
Lexington latitude	7						56		97	184					
London longitude	7	St. Louis, Mo	138	14		37			111	184					
London latitude	8						56		97	184					
Louisa longitude	8	Louisville, Ky	150	15		37			111	184					
Louisa latitude	9						56		97	184					
Louisville longitude	9	Charleston, W. Va	155	15		37			111	184	811				S, 70
		Chicago, Ill	157	15		37							220, 246-257		
		Greensburg, Ky	151	15		37									
		Jellico, Tenn	152	15		37									
		Lexington, Ky	149	15		37									
		Logansport, Ind	156	15		37									
		Louisa, Ky	150	15		37									
		Nashville, Tenn	122	13		36							212, 246-257		
		Richmond, Ky	153	15		37									
		Smiths Ferry, Pa	154	15		37									

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 283)
KENTUCKY—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Louisville latitude	10						56		97	184					
Minerva latitude	11						56		97	184	659				
Minerva azimuth	1							77	123	184	759, 760				
Oakland longitude	10	Cambridge, Mass	77	12		35			111	185					
Oakland latitude	12						56		97	185					
Paducah longitude	11	Nashville, Tenn	110	13		36			111	185					
Paducah latitude	13						56		97	185					
Reelfoot Lake latitude	14						56		97	185					
Richmond longitude	12	Louisville, Ky	153	15		37			111	185					
Richmond latitude	15						56		97	185					
Shelbyville longitude	13	Cambridge, Mass	78	12		35			111	185					
Shelbyville latitude	16						56		97	185					
LOUISIANA (Fig. 20)															
Baton Rouge longitude	1	Atlanta, Ga	126	14		36			111	185					
Baton Rouge latitude	1						57		97	185					
Baton Rouge Barracks azimuth	1							77	123	185					
Blue Buck Ridge west base latitude	2						57		97	185					
Blue Buck Ridge west base azimuth	2							77	123	185					
Boyce longitude	2	Man, La	379	23	33	42			111	186					
		Torras, La	380	23	33	42									
Boyce latitude	3						57		97	186					
Boyce azimuth	3							77	123	186					
Burwood latitude	4						57		97	186					
Chandeleur Island latitude	5						57		97	186					
Chenier Tigre west base latitude	6						57		98	186					
Chenier Tigre west base azimuth	4							77	123	186					
Deer Island latitude	7						57		98	186					
Deer Island azimuth	5							77	123	186					
Depot azimuth	6							77	123	186					
Donaldsonville north base azimuth	7							77	123	186					
Field azimuth	8							77	123	187					
Flora azimuth	9							77	123	187					
Fort St. Philip latitude	8						57		98	187					
Head of Passes longitude		New Orleans, La	26	25											
Head of Passes latitude	9						57		98	187					
Head of Passes azimuth	10							77	123	187					
Isle Dernier latitude	10						57		98	187					
Lake Pontchartrain east base azimuth.	11							77	123	187					
Lake Providence north base azimuth.	12							77	123	187					
Lums Point southwest base azimuth.	13							77	123	187					
Magnolia lower base azimuth	14							77	123	187					
Man longitude	3	Boyce, La	379	23	33	42			111	187					
		Jacksonville, 1919, Tex	378	23	33	42									
Man latitude	11						57		98	187					
Man azimuth	15							77	123	188					
Mansura azimuth	16							77	123	188					
Marthaville azimuth	17							77	123	188					
Morgan City latitude	12						57		98	188					
New Orleans longitude	4	Atlanta, Ga	125	13		36			111	188			213, 246–257		
		Austin, Tex	235	18		39							240, 246–257		
		Galveston, Tex	48	25											
		Head of Passes, La	26	25											
		Mobile, Ala	27	10	31	34						323			
		Nashville, Tenn	124	13		36							213, 246–257		
New Orleans latitude	13						57		98	188		314, 315			
Pass Manchac north base azimuth	18							77	123	188					
Point a la Hache latitude	14						57		98	188					
Port Eads latitude	15						57		98	188					
Quary azimuth	19							77	123	188					
Raccoon azimuth	20							77	124	188					
Sodus azimuth	21							77	124	189					
South Point southwest base azimuth.	22							77	124	189					
Timbalier Island latitude	16						57		98	189					
Torras longitude	5	Boyce, La	380	23	33	42			111	189					
		Little Rock, Ark	381	23	33	42									
Torras latitude	17						57		98	189					
Torras azimuth	23							77	124	189					
Zeman azimuth	24							77	124	189					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 283)
MAINE (Fig. 15)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Agamenticus latitude	1						57		98	189		276, 277			
Agamenticus azimuth	1							77	124	189		334, 335			
Bangor longitude	1	Calais, Me.	24	10		34			111	189		318			
		Cambridge, Mass	11	25											
		Halifax, Nova Scotia	13	10	31	34									
Bangor latitude	2						57		98	189		257			
Calais longitude	2	Bangor, Me.	24	10		34			111	189		318			
		Cambridge, Mass	236	18		39							241, 246–257		
		Frederickton, New Brunswick.	25	10		34									
		Hearts Content, Newfoundland.	44	11		35							206, 246–257		
Calais latitude	3						57		98	189		253, 254			
Cape Small latitude	4						57		98	190		271, 272			
Cape Small azimuth	2							77	124	190		332			
Cooper latitude	5						57		98	190		255			
Cooper azimuth	3							77	124	190		328			
Farmington latitude	6						57		98	190		258, 259			
Howard latitude	7						57		98	190		263, 264			
Howard azimuth	4							77	124	190		328, 329			
Humpback latitude	8						57		98	190		256			
Humpback azimuth	5							77	124	190		329			
Isles of Shoals latitude	9						57		98	190		278			
Mount Blue azimuth	6							77	124	190					
Mount Desert latitude	10						57		98	191		264–266			
Mount Desert azimuth	7							77	124	191		330			
Mount Harris latitude	11						57		98	191		260–263			
Mount Harris azimuth	8							77	124	191		330–331			
Mount Independence latitude	12						57		98	191		272–274			
Mount Independence azimuth	9							77	124	191		333			
Mount Pleasant latitude	13						57		98	191		270, 271			
Mount Pleasant azimuth	10							77	124	191		334			
Pole Hill latitude	14						57		98	191					
Pole Hill azimuth	11							78	124	191					
Ragged Mountain latitude	15						57		98	191		266–268			
Ragged Mountain azimuth	12							78	124	192		331			
Sebattus latitude	16						57		98	192		269			
Sebattus azimuth	13							78	124	192		332, 333			
MARYLAND (Fig. 16)															
Calvert latitude	1						58		98	192	632				
Calvert azimuth	1							78	124	192	746				
Cumberland longitude	1	Washington, U. S. Naval Observatory (old site), D. C.	40	11		34			111	192					
Davis azimuth	2							78	124	192					
Gaithersburg longitude	2	Washington, U. S. Coast and Geodetic Survey Office, D. C.	255	19		39			111	192					
Gaithersburg latitude	2						58		98	192					
Gantt latitude	3						58		98	192					
Hill latitude	4						58		98	192	636				
Hill azimuth	3							78	124	192	748	348, 349			
Marriott latitude	5						58		98	193	633, 634				
Marriott azimuth	4							78	124	193	747	348			
Maryland Heights latitude	6						58		98	193	645, 646				
Maryland Heights azimuth	5							78	124	193	752	350, 351			
Pooles Island latitude	7						58		98	193	631				
Principio latitude	8						58		98	193	630				
Principio azimuth	6							78	124	193	745, 746	347			
Rockville latitude	9						58		98	193	644				
Soper latitude	10						58		98	193	637				
Soper azimuth	7							78	124	193	749	349			
Sugarloaf latitude	11						58		98	194	644				
Sugarloaf azimuth	8							78	124	194	751	350			
Taylor latitude	12						58		98	194	633				
Webb latitude	13						58		98	194	635				
Webb azimuth	9							78	124	194	747, 748	348			

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 283)
MASSACHUSETTS (Fig. 15)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Blue Hill azimuth	1							78	124	194		339			
Cambridge, Cloverden Observatory latitude.	1						58		98	194		282			
Cambridge, Harvard College Observatory, longitude.	1	Albany, Dudley Observatory (old site), N. Y.	245	10		39			112	194			244, 246–257		
		Allegheny Observatory (old site), Pa.	55	11	31	35									
		do	73	12	31	35									
		Bangor, Me	11	25											
		Burlington, Vt	69	25											
		Calais, Me	236	18		39							241, 246–257		
		Carpenters Point, N. Y.	90	12		35									
		Cleveland, Ohio	76	12	32	35									
		Columbus, Ohio	74	12	32	35									
		Detroit, Mich	60, 130a	28		44, 36							215, 246–257		
		Duxbury, Mass	65	11		35							207, 246–257		
		Falmouth, Ky	79	12		35									
		Far Rockaway, N. Y	320	22	32	41									G
		Halifax, Nova Scotia	12	10	31	34									
		Ithaca, N. Y	242	19	32	39									
		Montreal, Canada	1, 148a	30		46, 37							219, 246–257		
		New York City, Rutherford's Observatory, N. Y.	5	25											
		Oakland, Ky	77	12		35									
		Omaha, Nebr	49	25											
		Provincetown, Mass	258	19		40									
		Salt Lake City, Utah	53	25											
		San Francisco, Washington Square, Calif.	54	25											
		St. Pierre, St. Pierre Island.	88	12		35							210, 246–257		
		Shelbyville, Ky	78	12		35									
		Washington, Seaton, D. C.	45	25											
		Washington, U. S. Naval Observatory (old site), D. C.	46, 86	25											
		do	243	19		39							244, 246–257		
		Washington, U. S. Naval Observatory (new site), D. C.	327	22	32	41									G
Cambridge, Harvard College Observatory, latitude.	2						58		98	194		281			
Cambridge Observatory, west transit azimuth.	2							78	124	194		338			
Copecut azimuth	3							78	124	194		341			
Duxbury longitude	2	Brest, France	66	12		35			112	195			207, 246–257		
		Cambridge, Mass	65	11		35							207, 246–257		
Harvard College Observatory (*See* Cambridge.)															
Indian azimuth	4							78	124	195		340			
Manomet latitude	3						58		98	195		284, 285			
Mount Tom latitude	4						58		98	195		282, 283			
Mount Tom azimuth	5							78	124	195		343			
Nantucket latitude	5						58		98	195					
Provincetown longitude	3	Cambridge, Mass	258	19		40			112	195					
Provincetown latitude	6						58		98	195					
Sankaty Head Lighthouse azimuth.	6							78	124	195					
Shootflying azimuth	7							78	124	195		339, 340			
Thompson latitude	7						58		98	195		279			
Thompson azimuth	8							78	124	195		336, 337			
Wachusett latitude	8						58		98	195		280, 281			
Wachusett azimuth	9							78	124	196		337			

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
MICHIGAN (Fig. 18)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
A Mackinac west base (U. S. L. S.) azimuth.	1							86	124	196					
Allegan (U. S. L. S.) longitude	1	Detroit, Mich	45	27		43			112	196				762	
Allegan (U. S. L. S.) latitude	1						64		98	196				748	
Ann Arbor (U. S. L. S.) longitude	2	Detroit, Mich	4, 5	26		43			112	196				716, 717	
		Sault St. Marie, Mich	62	28		44									(1)
Beaver Island (U. S. L. S.) latitude	2						64		98	196				738	
Belle Isle azimuth post (U. S. L. S.) azimuth.	2							86	124	196					
Big Pointe au Sable (U. S. L. S.) latitude.	3						64		98	196				741	
Bunday (U. S. L. S.) longitude	3	Detroit, Mich	307	21		40			112	196					
Bunday (U. S. L. S.) latitude	4						58		98	196					
Bunday (U. S. L. S.) azimuth	3							78	124	196					
Burnt Bluff (U. S. L. S.) latitude	5						64		98	196				737	
Cedar River (U. S. L. S.) latitude	6						64		99	196				738	
Charlotte (U. S. L. S.) longitude	4	Detroit, Mich	39	27		43			112	197				761	
Charlotte (U. S. L. S.) latitude	7						64		99	197				747	
Clay Banks (U. S. L. S.) latitude	8						64		99	197				743	
Copper Harbor (Fort Wilkins) latitude.	9						64		99	197				734	
Corunna (U. S. L. S.) longitude	5	Detroit, Mich	34	27		43			112	197				760	
Corunna (U. S. L. S.) latitude	10						64		99	197				745	
Crebassa (U. S. L. S.) latitude	11						64		99	197				735	
Detroit longitude	6	Albany, Dudley Observatory (old site), N. Y.	211	17		38			112	197			232, 246–257		
		Allegan (U. S. L. S.), Mich.	45	27		43								762	
		Ann Arbor (U. S. L. S.), Mich.	4, 5	26		43								716, 717	
		Bunday, Mich	307	21		40									
		Cambridge, Mass	60, 130a	28		44, 36							215, 246–257		
		Cairo, (U. S. L. S.), Ill	53	27		44								757	
		Charlotte (U. S. L. S.), Mich.	39	27		43								761	
		Chicago (U. S. L. S.), Ill	6	26		43								756	
		Chicago, Ill	212	17		38							233, 246–257		
		Cleveland (U. S. L. S.), Ohio	20	26		43								757	
		Corunna (U. S. L. S.), Mich.	34	27		43								760	
		Flint, (U. S. L. S.), Mich.	32	27		43								760	
		Fort Leavenworth (U. S. L. S.), Kans.	26	27		43								765	
		Fort McDermit (U. S. L. S.), Nev.	59	28		44								764	
		Fort Howard (U. S. L. S.), Wis.	7	26		43								718–721	
		Galena (U. S. L. S.), Ill	27	27		43								762	
		Goderich (U. S. L. S.), Ontario, Canada.	2	26		43								754	
		Grand Haven (U. S. L. S.), Mich.	3	26		43								755	
		Grand Rapids (U. S. L. S.), Mich.	36	27		43								761	
		Hastings (U. S. L. S.), Mich.	41	27		43								761	
		Howell (U. S. L. S.), Mich.	37	27		43								761	
		Hudson (U. S. L. S.), Ohio.	1	26		43								757	
		Ionia (U. S. L. S.), Mich.	35	27		43								760	
		Jackson (U. S. L. S.), Mich.	43	27		43								762	
		Kalamazoo (U. S. L. S.), Mich.	44	27		43								762	

[1] See Report of Chief of Engineers United States Army, App. DDD, p. 3386.

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
MICHIGAN—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Detroit longitude (continued)		Lansing (U. S. L. S.), Mich.	38	27		43								761	
		Lapeer (U. S. L. S.), Mich.	31	27		43								760	
		Louisiana (U. S. L. S.), Mo.	57	28		44								763	
		Mannsville (U. S. L. S.), N. Y.	48	27		43								731	
		Marshall (U. S. L. S.), Mich.	42	27		43								762	
		Memphis (U. S. L. S.), Tenn.	54	27		44								758	
		Minnesota Point (U. S. L. S.), Minn.	25	27		43								717, 718	
		Monroe (U. S. L. S.), Mich.	21	26		43								756	
		Newaygo (U. S. L. S.), Mich.	49	27		43								759	
		Ogden (U. S. L. S.), Utah.	29	28										764	
		Parkersburg (Olney) (U. S. L. S.), Ill.	58	28		44					808			725–727	
		Paw Paw (U. S. L. S.), Mich.	46	27		43								763	
		Pontiac (U. S. L. S.), Mich.	30	27		43								761	
		Red Wing (U. S. L. S.), Minn.	56	28		44								759	
		Rock Island (U. S. L. S.), Ill.	55	28		44								763	
		Saginaw (U. S. L. S.), Mich.	51	27		44								759	
		St. Johns (U. S. L. S.), Mich.	33	27		43								760	
		St. Louis (U. S. L. S.), Mich.	52	27		44								759	
		Sandusky (U. S. L. S.), Ohio.	19	26		43								757	
		Stanton (U. S. L. S.), Mich.	47	27		43								760	
		Toledo (U. S. L. S.), Ohio.	61	28		44								727–729	
		Tonawanda (U. S. L. S.), N. Y.	40	27		43								730	
		Valley Junction (U. S. L. S.), Wis.	28	27		43								759	
		Washington, U. S. Naval Observatory (old site), D. C.	23	28										715	
		Willow Springs (U. S. L. S.), Ill.	50	27		44								724, 725	
Detroit (U. S. L. S.) longitude										197					
Detroit (U. S. L. S.) latitude	12						64		99	197				748	
Douglas (U. S. L. S.) latitude	13						64		99	197				747	
Duck Lake (U. S. L. S.) latitude	14						64		99	197				744	
Escanaba (U. S. L. S.) longitude	7	Thones Hill (Marquette) (U. S. L. S.), Mich.	8	26		43			112	198				723	
		Fort Howard (U. S. L. S.), Wis.	9	26		43								722	
Escanaba (U. S. L. S.) latitude	15						64		99	198				737	
Flint (U. S. L. S.) longitude	8	Detroit, Mich	32	27		43			112	198				760	
Flint (U. S. L. S.) latitude	16						64		99	198				745	
Ford River (U. S. L. S.) latitude	17						64		99	198				626, 627	
Fort River (U. S. L. S.) azimuth	4							86	124	198				648–652	
Fort Gratiot (U. S. L. S.) latitude	18						64		99	198				745	
Fort Wilkins. (*See* Copper Harbor.)															
Frankfort (Pointe aux Bec Scies) (U. S. L. S.) latitude.	19						64		99	198				740	
Grand Haven (U. S. L. S.) longitude.	9	Detroit, Mich	3	26		43			112	198				755	
Grand Island (U. S. L. S.) latitude	20						64		99	198				736	
Grand Rapids (U. S. L. S.) longitude.	10	Detroit, Mch	36	27		43			112	198				761	
Grand Rapids (U. S. L. S.) latitude	21						64		99	198				746	
Hastings (U. S. L. S.) longitude	11	Detroit, Mich	41	27		43			112	198				761	
Hastings (U. S. L. S.) latitude	22						64		99	198				747	
Howell (U. S. L. S.) longitude	12	Detroit, Mich	37	27		43			112	198				761	

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
MICHIGAN—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Howell (U. S. L. S.) latitude	23						64		99	198				747	
Huron Mountains (U. S. L. S.) latitude.	24						64		99	198				626	
Ionia (U. S. L. S.) longitude	13	Detroit, Mich	35	27		43			112	199				760	
Ionia (U. S. L. S.) latitude	25						64		99	199				745	
Iroquois Point (U. S. L. S.) latitude	26						64		99	199				737	
Isle Royale (U. S. L. S.) latitude	27						64		99	199				733	
Jackson (U. S. L. S.) longitude	14	Detroit, Mich	43	27		43			112	199				762	
Jackson (U. S. L. S.) latitude	28						64		99	199				749	
Kalamazoo (U. S. L. S.) longitude	15	Detroit, Mich	44	27		43			112	199				762	
Kalamazoo (U. S. L. S.) latitude	29						64		99	199				749	
Keweenaw Point south base (U. S. L. S.) latitude.	30						64		99	199				623–625	
Keweenaw Point south base (U. S. L. S.) azimuth.	5							86	124	199				645–648	
Lansing (U. S. L. S.) longitude	16	Detroit, Mich	38	27		43			112	199				761	
Lansing (U. S. L. S.) latitude	31						64		99	199				746	
Lapeer (U. S. L. S.) longitude	17	Detroit, Mich	31	27		43			112	199				760	
Lapeer (U. S. L. S.) latitude	32						64		99	199				745	
Manistee (U. S. L. S.) latitude	33						64		99	199				741	
Marshall (U. S. L. S.) longitude	18	Detroit, Mich	42	27		43			112	200				762	
Marshall (U. S. L. S.) latitude	34						64		99	200				749	
Monroe (U. S. L. S.) longitude	19	Detroit, Mich	21	26		43			112	200				756	S, 70
Monroe (U. S. L. S.) latitude	35						64		99	200				750	
Mount Houghton (U. S. L. S.) latitude.	36						64		99	200				734	
Newaygo (U. S. L. S.) longitude	20	Detroit, Mich	49	27		43			112	200				759	
Newaygo (U. S. L. S.) latitude	37						64		99	200				743	
Paw Paw (U. S. L. S.) longitude	21	Detroit, Mich	46	27		43			112	200				763	
Paw Paw (U. S. L. S.) latitude	38						64		99	200				749	
Pontiac (U. S. L. S.) longitude	22	Detroit, Mich	30	27		43			112	200				761	
Pontiac (U. S. L. S.) latitude	39						64		99	200				747	
Porcupine Mountain (U. S. L. S.) latitude.	40						64		99	200				735	
Portage Entry (U. S. L. S.) latitude	41						64		99	200				735	
Round Island (U. S. L. S.) latitude	42						64		99	200					
Saginaw (U. S. L. S.) longitude	23	Detroit, Mich	51	27		44			112	200				750	
Saginaw (U. S. L. S.) latitude	43						64		99	200				743	
St. Johns (U. S. L. S.) longitude	24	Detroit, Mich	33	27		43			112	200				760	
St. Johns (U. S. L. S.) latitude	44						64		99	200				745	
St. Louis (U. S. L. S.) longitude	25	Detroit, Mich	52	27		44			112	200				759	
St. Louis (U. S. L. S.) latitude	45						65		99	201				744	
Sault Ste. Marie (U. S. L. S.) longitude.	26	Ann Arbor (U. S. L. S.), Mich.	62	28		44			112	201					(2)
Sault Ste. Marie (U. S. L. S.), 1867, latitude.	46						65		99	201				737	
Sault Ste. Marie, east pier (U. S. L. S.), 1893, latitude.	47						65		99	201					
Sault Ste. Marie Observatory west pier (U. S. L. S.) azimuth.	6							86	124	201					
Sherman (U. S. L. S.) latitude	48						58		99	201					
Sherman (U. S. L. S.) azimuth	7							78	124	201					
South Haven (U. S. L. S.) latitude	49						65		99	201				749	
South Twin Sisters (Grand Haven) (U. S. L. S.) latitude.	50						65		99	201				746	
Stanton (U. S. L. S.) longitude	27	Detroit, Mich	47	27		43			112	201				760	
Stanton (U. S. L. S.) latitude	51						65		99	201				744	
Taquamenon Island latitude [1]															
Thones Hill (Marquette) (U. S. L. S.) longitude.	28	Escanaba (U. S. L. S.), Mich.	8	26		43			112	201				723	
Thones Hill (Marquette) (U. S. L. S.) latitude.	52						65		99	201				737	
Thunder Bay Island (U. S. L. S.) latitude.	53						65		99	201				739	
Vulcan (U. S. L. S.) latitude	54						65		99	201				625	
Vulcan (U. S. L. S.) azimuth	8							78	124	201					
Wheal Kate (U. S. L. S.) latitude	55						65		99	202				734	
Whitefish Point (U. S. L. S.) latitude.	56						65		99	202				736	

[1] See Report of Chief of Engineers, United States Army, App. DDD, p. 3386.
[2] See The Figure of the Earth and Isostasy from Measurements in the United States, by John F. Hayford, 1909, p. 14.

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.F.	Miscellaneous (see p. 293)
	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
MINNESOTA (Fig. 19)															
Buchanan (U.S.L.S.) latitude	1						65		100	202				735	
Dalton longitude	1	Bismarck, N. Dak	306	21	32	40			113	202					
		Howard, S. Dak	289	20	32	40									
		Stephen, Minn	288	20	32	40									
Dalton latitude	2						58		100	202					
Dalton astronomic azimuth	1							78	124	202					
Douglas latitude	3						58		100	202					
Duluth (Minnesota Point north base) (U. S. L. S.) longitude.	3	Detroit, Mich	25	27		43			113	203				717	
		St. Paul (U. S. L. S.) Minn.	24	26		43								718, 753	
East Sawteeth (U. S. L. S.) latitude.	4						65		100	202				734	
Farquhars Knob (U.S.L.S.) latitude.	5						65		100	202				733	
Grindle azimuth	2							78	124	202					
Gull azimuth	3							78	124	203					
Jones latitude	6						58		100	203					
Minneapolis longitude	2	Bismarck, N. Dak	204	17		38			113	203			231, 246–257		
		Chicago, Ill	213	17		38							233, 246–257		
		Madison, Wis	3	30		46									
		Omaha, Nebr	93	25											
		Omaha, Nebr	214	17		38							234, 246–257		
		Omaha, Nebr	334	22		41									
		Stephen, Minn	285	20											
		Warroad (U. S. & C.)	333	22		41									
Minneapolis latitude	7						58		100	203					
Minneapolis azimuth	4							78	124	203					
Minnesota Point north base (Duluth) (U. S. L. S.) longitude.	3	Detroit, Mich	25	27		43			113	203				717	
		St. Paul (U. S. L. S.), Minn.	24	26		43								718, 753	
Minnesota Point north base (U. S. L. S.) latitude.	8						65		100	203				625	
Minnesota Point north base (U. S. L. S.) azimuth.	5							86	124	203				641, 642	
Minnesota Point south base (U. S. L. S.) latitude.	9						65		100	204				736	
Morken latitude	10						58		100	204					
Morken azimuth	6							78	124	204					
Osakis latitude	11						58		100	204					
Osakis azimuth	7							79	124	204					
Red River (U. S. & C.) latitude [4]															
Red Wing (U. S. L. S.) longitude	4	Detroit, Mich	56	28		44			113	204				750	
Red Wing (U. S. L. C.) latitude	12						65		100	204				740	
Royalton south base latitude	13						58		100	204					
Royalton south base azimuth	8							79	124	204					
St. Paul (U. S. L. S.) longitude	5	Minnesota Point (Duluth) (U. S. L. S.), Minn.	24	27		43			113	205				753	
St. Paul (U. S. L. S.) latitude	14						65		100	205				739	
Stephen west base longitude	6	Bismarck, N. Dak	305	21	32	40			113	205					
		Dalton, Minn	288	20	32	40									
		Minneapolis, Minn	285	20											
Stephen west base latitude	15						58		100	205					
Stephen west base azimuth	9							79	124	205					
Tilden latitude	16						58		100	205					
Tilden azimuth	10							79	124	205					
Warroad south base (U. S. & C.) longitude.	7	Minneapolis, Minn	333	22		41			113	205					
Warroad south base (U. S. & C.) latitude.	17						68		100	205					
West Roseau (U. S. & C.) latitude [4]															
MISSISSIPPI (Fig. 20)															
Ben azimuth	1							79	124	205					
Big azimuth	2							79	124	206					
Camel azimuth	3							79	124	206					
Cat Island azimuth	4							79	124	206					
East Pascagoula latitude	1						58		100	206		312, 313			
East Pascagoula azimuth	5							79	124	206					
Fort (Vicksburg) longitude	4	Nashville, Tenn	118	13		36			113	206					
Fort (Vicksburg) latitude	2						58		100	206					
Fort (Vicksburg) azimuth	6							79	125	206					
Greenville longitude	1	Nashville, Tenn	119	13		36			113	206					

[4] See Supplementary investigation in 1909 of the Figure of the Earth and Isostasy, by John F. Hayford, 1910, p. 13.

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
MISSISSIPPI—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Greenville latitude	3						58		100	206					
Greenville south base azimuth	7							79	125	206					
Hub azimuth	8							79	125	206					
Jago azimuth	9							79	125	207					
Leaf azimuth	10							79	125	207					
Moss Point azimuth	11							79	125	207					
Natchez longitude	2	Nashville, Tenn	117	13		36			113	207					
Natchez latitude	4						58		100	207					
Natchez, Lookout near, azimuth	12							79	125	207					
Pascagoula east base azimuth	13							79	125	207					
Strickland longitude	3	Madison, Ala	330	22	32	41			113	207					
		Martin, Tenn	329	22	32	41									
Strickland latitude	5						58		100	207					
Strickland azimuth	14							79	125	207					
Vant azimuth	15							79	125	207					
Vicksburg (Fort) longitude	4	Nashville, Tenn	118	13		36			113	206					
Vicksburg (Fort) latitude	2						58		100	206					
Vicksburg (Fort) azimuth	6							79	125	206					
MISSOURI (Fig. 20)															
Berger longitude	1	Omaha, Nebr	291	21		40			113	208					
Berger latitude	1						58		100	208	765				
Berger azimuth	1							79	125	208					
Bolivar (U. S. G. S.) longitude	2	St. Louis, Mo	5	29		44			113	208					A, 39–131
Bolivar (U. S. G. S.) latitude	2						66		100	208					A, 29, 37
Cottonwood Point north base azimuth.	2							79	125	208					
Hunter latitude	3						58		100	208	669				
Hunter azimuth	3							79	125	208	766, 767				
Ironton longitude	3	St. Louis, Mo	208	17		38			113	208					
Ironton latitude	4						58		100	208					
Jefferson City latitude	5						58		100	208	668				
Jefferson City azimuth	4							79	125	208	766				
Kansas City longitude	4	Colorado Springs, Colo	164	15		37			113	209			222, 246–257		
		Ellsworth, Kans	165	15	32	37					811, 824				
		Indianapolis, Ind	146	14		37									
		Little Rock, Ark	162	15		37							222, 246–257		
		Omaha, Nebr	148	15		37							219, 246–257		
		St. Louis, Mo	137	14		37							218, 246–257		
Kansas City latitude	6						58		100	209	670				
Kleinschmidt azimuth	5							79	125	209	764, 765				
Knob Noster longitude	5	Omaha, Nebr	292	21		40			113	209					
Knob Noster azimuth	6							79	125	209					
Louisiana (U. S. L. S.) longitude	6	Detroit, Mich	57	28		44			113	209				763	
Louisiana (U. S. L. S.) latitude	7						65		100	209				751	
Macon longitude	7	St. Louis, Mo	218	17		38			113	209					
Macon latitude	8						58		100	209					
Potosi longitude	8	St. Louis, Mo	209	17		38			113	209					
Potosi latitude	9						58		100	209					
St. Louis longitude	9	Albuquerque (U. S. G. S.), N. Mex.	6	29		44			113	209					A, 39–131
		Baker (U. S. G. S.), Oreg.	22	29		44									
		Boise City (U. S. G. S.), Idaho.	8	29		44									
		Bolivar (U. S. G. S.), Mo.	5	29		44									A, 39–131
		Butler, Ind	217	17		38									
		Chetopah, Kans	71	12		35									
		Cincinnati (Mount Lookout), Ohio.	132	14		36							217, 246–257		
		Cisco (U. S. G. S.), Tex	9	29		44									
		Elk Falls (U. S. G. S.), Kans.	2	29		44									A, 39–131
		Elizabethtown, Ohio	215	17		38									
		Fort Scott (U. S. G. S.), Kans.	3	29		44									A, 39–131
		Guthrie, Ky	139	14		37									

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
MISSOURI—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
St. Louis longitude (continued)		Guthrie (U. S. G. S.), Okla.	13	29		44									
		Hamilton (U. S. G. S.), Mont.	21	29		44									
		Henderson, Ky	140	14		37									
		Ironton, Mo	208	17		38									
		Jamestown (U. S. G. S.), N. Dak.	12	29		44									
		Kansas City, Mo	137	14		37							218, 246-257		
		Little Rock, Ark	142	25											
		London, Ky	138	14		37									
		Macon, Mo	218	17		38									
		Nashville, Tenn	133	14		36							217, 246-257		
		Omaha, Nebr	141	14		37							218, 246-257		
		Oswego (U. S. G. S.), Kans.	1	29		44									A, 39-131
		Potosi, Mo	209	17		38									
		Rapid City (U. S. G. S.), S. Dak.	11	29		44									
		Red River (U. S. G. L. O.), Tex.	1	30		45									L
		Savanna (U. S. G. S.), Okla.	15	29		44									
		Sheridan (U. S. G. S.), Wyo.	18	29		44									
		Sierra Blanca (U. S. G. S.), Tex.	10	29		44									
		Sioux Falls, (U. S. G. S.). S. Dak.	19	29		44									
		Spearville (U. S. G. S.), Kans.	7	29		44									
		Spofford (U. S. G. S.), Tex.	20	29		44									
		Springfield, Ill	143	14	32	37									
		Springfield (U. S. G. S.), Mo.	4	29		44									A, 39-131
		Tuscaloosa (U. S. G. S.), Ala.	17	29		44									
		Union City, Ind	216	17		38									
		Vincennes, Ind	135	14	32	36					810, 824				
		Washington, U. S. Naval Observatory (old site), D. C.	67	25											
		Waverly (U. S. G. S.), Tenn.	23	29		44									
		Yerkes Observatory, Wis.	257	19		39									
St. Louis latitude	10						58		100	209	666, 667				
Springfield (U. S. G. S.) longitude	10	St. Louis, Mo	4	29		44			113	210					A, 39-131
Springfield (U. S. G. S.) latitude	11						66		100	210					A, 27, 36
MONTANA (Fig. 22)															
Blue azimuth	1							79	125	210					
Bozeman (U. S. E.) latitude	1						68		100	210					C, 380-384
Chinook longitude	1	Helena, Mont	263	20		40			113	210					
Hamilton (U. S. G. S.) longitude	2	St. Louis, Mo	21	29		44			113	210					
Hamilton (U. S. G. S.) latitude	2						66		100	210					
Helena longitude	3	Bismarck, N. Dak	203	17		38			113	210			230, 246-257		
		Chinook, Mont	263	20		40									
		Salt Lake City, Utah	202	17		38							230, 246-257		
		Spokane, Wash	184	16		38									
		Walla Walla, Wash	183	16		38							227, 246-257		
		Yellow Stone Lake, Wyo.	225	18		39									
Helena latitude	3						59		100	210					
Kootenai River east (U. S. & C.) latitude.	4						68		100	210					
Mondak longitude	4	Omaha, Nebr	319	21		41			113	210					
Mondak latitude	5						59		100	210					
Mondak azimuth	2							79	125	210					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
MONTANA—Continued															
Montana-North Dakota boundary latitude.	6						59		100	211					
Tobacco Plains (U. S. & C.) latitude.	7						68		100	211					
Wigwam (U. S. & C.) latitude	8						68		100	211					
Wigwam 2 (U. S. & C.) latitude	9						68		100	211					
Wymonkota azimuth	3							79	125	211					
Wyoming northeast corner eccentric latitude.	10						59		100	211					
NEBRASKA (Fig. 22)															
Bushnell longitude		Omaha, Nebr	61	25											
Daily latitude	1						59		100	211					
Daily azimuth	1							79	125	211					
North Platte (U. S. E.) latitude	2						68		100	212					C, 456–458
Omaha longitude	1	Berger, Mo	291	21		40			113	212					
		Bowman, N. Dak	320	21		41									
		Burlington, Iowa	59	11		35									
		Bushnell, Nebr	61	25											
		Cambridge, Mass	49	25											
		Colorado Springs, Colo	94	25											
		Denver, Colo	92	12		35									
		Des Moines, Iowa	60	11		35									
		Fennimore, Wis	259	19		40									
		Howard, S. Dak	293	21	32	40									
		Julesburg, Colo	62	25											
		Kansas City, Mo	148	15		37							219, 246–257		
		Knob Noster, Mo	292	21		40									
		La Crosse, Wis	96	13		35									
		Madison, Wis	91	25											
		Mattoon, Ill	57	11		35									
		Minneapolis, Minn	93	25											
		Minneapolis, Minn	214	17		38							234, 246–257		
		Minneapolis, Minn	334	22		41									
		Mondak, Mont	319	21		41									
		Page southwest base, Nebr.	290	20	32	40									
		Provo, S. Dak	321	21		41									
		St. Louis, Mo	141	14		37							218, 246–257		
		Salina west base, Kans	294	21		40									
		Salt Lake City, Utah	50	11		35							206, 246–252		
		San Francisco, Washington Square, Calif.	51	25											
		Springfield, Ill	58	11	32	35									
		Springfield, Ill	144	11	32	37									
		Trinidad, Colo	97	13		35									
		Watkins, Colo	323	21		41									
		Wheatland, Wyo	322	21		41									
Omaha latitude	3						59		100	212					
Page southwest base longitude	2	Howard, S. Dak	295	21	32	40			113	212					
		Omaha, Nebr	290	20	32	40									
Page southwest base latitude	4						59		100	212					
Page southwest base azimuth	2							79	125	212					
Shelton east base latitude	5						59		100	212					
Shelton east base azimuth	3							79	125	212					
Sidney Barracks (U. S. E.) latitude	6						68		100	212					C, 429–432
NEVADA (Fig. 25)															
Austin longitude	1	Carson City, Nev	108	17	32	38			113	213	818, 825				
		Eureka, Nev	199	17	32	38					819, 825				
Austin (U. S. E.) latitude	1						68		101	213					D, 52–55
Battle Mountain (U. S. E.) latitude	2						68		101	213					D, 40, 41
Carlin (U. S. E.) latitude	3						68		101	213					D, 30, 31

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
NEVADA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Carson City longitude	2	Austin, Nev	198	17	32	38			113	213	818, 825				
		Genoa, Nev	197	17		38					818				
		Lake Tahoe southeast end, Calif.	227	18		39					820				
		Tonopah, Nev	260	20		40									
		Verdi, Nev	195	17	32	38					817, 825				
		Virginia City, Nev	196	17		38					817				
Carson City latitude	4						59		101	213	705, 706				
Carson Sink latitude	5						59		101	213	704				
Carson Sink azimuth	1							79	125	213	789				
Diamond Peak latitude	6						59		101	213	701				
Diamond Peak azimuth	2							79	125	213	787				
Eureka longitude	3	Austin, Nev	199	17	32	38			113	213	819, 825				
		Salt Lake City, Utah	200	17	32	38					819, 825				
Fort McDermit (U. S. L. S.) longitude.	4	Detroit, Mich	59	28		44			113	213				764	
Geona longitude	5	Carson City, Nev	197	17		38			113	213					
Mill azimuth	3							79	125	214					
Moapa longitude	6	Lund, Utah	342	22	33	41			113	214					
		Needles, Calif	343	22	33	41									
Moapa latitude	7						59		101	214					
Monument No. 108, California-Nevada boundary latitude	8						59		101	214					
Mount Callahan latitude	9						59		101	214	702				
Mount Callahan azimuth	4							79	125	214	787, 788				
Mount Grant azimuth	5							79	125	214					
Nevada-California boundary. (*See* California-Nevada boundary, Calif.															
Pilot Peak latitude	10						59		101	214	699				
Pilot Peak azimuth	6							79	125	214	786				
Pioche (U. S. E.) latitude	11						68		101	215	701				C, 86–96
Pioche latitude	12						59		101	214	700				
Pioche azimuth	7							79	125	214	785, 786				
Toiyabe Dome latitude	13						59		101	215	703				
Toiyabe Dome azimuth	8							79	125	215	788				
Tonopah longitude	7	Carson City, Nev	260	20		40			113	215					
Tonopah latitude	14						59		101	215					
Verdi longitude	8	Carson City, Nev	195	17	32	38			113	215	817, 825				
		Sacramento, Calif	194	16	32	38					816, 825				
Verdi east base longitude	9	San Francisco, Washington Square, Calif.	81	12		35			113	215					
Verdi east base latitude	15						59		101	215	707				
Verdi east base azimuth	9							79	125	215					
Virginia City longitude	10	Carson City, Nev	196	17		38			113	215	817				
Virginia City (U. S. E.) latitude	16						68		101	215					C, 200–210
Winnemucca (U. S. E.) latitude	17						68		101	215					C, 172–182
NEW HAMSHIRE (Fig. 15)															
Croydon azimuth	1							79	125	215					
Gunstock latitude	1						59		101	216		274, 275			
Gunstock azimuth	2							79	125	216		335			
Moosilauk azimuth	3							79	125	216					
Observatory Hill azimuth	4							79	125	216					
Prospect Mount azimuth	5							79	125	216					
Unkonoonuc latitude	2						59		101	216		278, 279			
Unkonoonuc azimuth	6							79	125	216		336			
NEW JERSEY (Fig. 16)															
Barnegat Inlet latitude	1						59		101	216					
Barnegat Inlet azimuth	1							80	125	216					
Beacon Hill latitude	2						59		101	216		289			
Beacon Hill azimuth	2							80	125	216		345			
Cape May longitude	1	Albany, Dudley Observatory (old site), N. Y.	210	17		38			113	216			231, 246–257		
		Washington, U. S. Naval Observatory (old site), D. C.	128	14		36							214, 246–257		

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	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
NEW JERSEY—Continued															
Cape May latitude	3						59		101	216	626, 627				
Chapel Hill azimuth	3							80	125	216					
High Point latitude	4						59		101	217					
High Point azimuth	4							80	125	217					
Jersey City longitude	2	Philadelphia, Pa	3	10	31	34			113	217					
		Washington, U. S. Naval Observatory (old site), D. C.	4	10	31	34									
Leeds Point azimuth	5							80	125	217					
Mount Rose latitude	5						59		101	217		290			
Mount Rose azimuth	6							80	125	217		345, 346			
NEW JERSEY (Fig. 23)															
Albuquerque (U. S. G. S.) longitude.	1	St. Louis, Mo	6	29		44			114	217					A, 39–131
Albuquerque (U. S. G. S.) latitude	1						66		101	217					A, 31, 38
Burro azimuth	1							80	125	217					
Cimarron (U. S. E.) latitude	2						68		101	217					C, 412–415
Cooks azimuth	2							80	125	217					
Corduna latitude	3						59		101	217					
Corner boundary (U. S. and Mex.) longitude.	2	El Paso, Tex	224	18		39			114	218					
Corner boundary (U. S. and Mex.) latitude.	4								101	218					
Deming City water works latitude	5						59		101	218					
Fort Bayard latitude	6						59		101	218					
Fort Selden longitude	3	San Francisco, Lafayette Park, Calif.	147	14		37			114	218					
Fort Union (U. S. E.) latitude	7						68		101	218					C, 330–335
Glen Rio longitude	4	Conway, Tex	387	24	33	42			114	218					
		Los Lunas, N. Mex	388	24	33	42									
Glen Rio latitude	8						59		101	218					
Glen Rio azimuth	3							80	125	218					
Jarilla longitude	5	El Paso, Tex	314	21		41			114	218					
Jarilla latitude	9						59		101	218					
Jarilla azimuth	4							80	125	218					
Las Vegas (U. S. E.) latitude	10						68		101	218					C, 396–401
Line latitude	11						59		101	218					
Los Lunas longitude	6	Glen Rio, N. Mex	388	24	33	42			114	219					
		Williams Laplace, Ariz	380	24	33	42									
Los Lunas latitude	12						59		101	219					
Los Lunas azimuth	5							80	125	219					
New Mexico-Colorado boundary. (*See* Colorado-New Mexico boundary, Colo.)															
Santa Fe longitude	7	Colorado Springs, Colo	168	15		37			114	219			223, 246–257		
		El Paso, Tex	230	18		39							239, 246–257		
		Needles, Calif	220	16		39							238, 246–257		
Santa Fe (U. S. E.) latitude	13						68		101	219					C, 362–369
NEW YORK (Fig. 16)															
Albany, Dudley Observatory (old site) longitude.	1	Albany, Dudley Observatory (new site), N. Y.	247	19		39			114	219					
		Cambridge, Mass	245	19		39							244, 246–257		
		Cape May, N. J	210	17		38							231, 246–257		
		Detroit, Mich	211	17		38							232, 246–257		
		Montreal, Canada	246	19		39							245, 246–257		
		New York City, Rutherford's Observatory, N. Y.	28	11		34									
Albany, Dudley Observatory (new site) longitude.	2	Albany, Dudley Observatory (old site), N. Y.	247	19		39			114	219					
		Kit, N. Y	308	21		40									

Statio	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4.	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 233)
NEW YORK—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Buffalo (U. S. L. S.) longitude	3	Ashtabula (U. S. L. S.), Ohio.	17	26		43			114	219				757	
		Cleveland (U. S. L. S.), Ohio.	18	26		43								755	
		Dunkirk (U. S. L. S.) N. Y.	15	26		43								755	
		Erie (U. S. L. S.), Penn.	16	26		43								756	
		Oswego (U. S. L. S.), N. Y.	13	26		43								754	
		Rochester (U. S. L. S.), N. Y.	14	26		43								755	
Buffalo (U. S. L. S.) latitude	1						65		101	219				746	
Carpenters Point longitude	4	Cambridge, Mass	90	12		35			114	219					
Carpenters Point latitude	2						59		101	219					
Carpenters Point azimuth	1							80	125	219					
Ceres latitude	3						59		101	219					
Cheever latitude	4						59		101	220					
Cheever azimuth	2							80	125	220					
Connelly (U. S. & C.) latitude	5								101	220					
Corydon latitude	6						59		101	220					
Dannemora azimuth	3							80	125	220					
Dunkirk (U. S. L. S.) longitude	5	Buffalo (U. S. L. S.), N. Y.	15	26		43			114	220				755	
Dunkirk (U. S. L. S.) latitude	7						65		101	220				748	
Fairbanks (U. S. & C.) latitude	8								101	220					
Far Rockaway longitude	6	Cambridge, Mass	326	22	32	41			114	220					G
		Washington, U. S. Naval Observatory (new site), D. C.	325	22	32	41									G
Far Rockaway latitude	9						59		102	220					
Finn longitude	7	Washington, U. S. Naval Observatory (old site), D. C.	106	13		36			114	220					
Finn latitude	10						59		102	220					
Gardiners Island latitude	11						59		102	220					
Gardiners Island azimuth	4							80	125	220					
Genesee Valley latitude	12						59		102	221					
Hollinbeck (U. S. & C.) latitude	13								102	221					
Howlett latitude	14						59		102	221					
Howlett azimuth	5							80	125	221					
Ithaca longitude	8	Cambridge, Mass	242	19	32	39			114	221					
		Washington, U. S. Naval Observatory (old site), D. C.	241	19	32	39									
Jinks (U. S. L. S.) azimuth	6							86	125	221					
Kit longitude	9	Albany, Dudley Observatory (new site), N. Y.	308	21		40			114	221					
Kit latitude	15						59		102	221					
Lawrenceville latitude	16						59		102	221					
Little Meadows latitude	17						59		102	221					
Mannsville (U. S. L. S.) longitude	10	Detroit, Mich	48	27		43			114	222				731	
Mannsville (U. S. L. S.) azimuth	7							80	125	222					
Mount Merino latitude	18						59		102	222					
Mount Merino azimuth	8							80	125	222					
New York City, Rutherford's Observatory, longitude.	11	Cambridge, Mass	5	25					114	222					
		Albany, Dudley Observatory (old site), N. Y.	28	11		34									
New York, Rutherford's Observatory, latitude.	19						59		102	222		288			
New York, City, Manhattan Square longitude.	12	Washington, U. S. Coast and Geodetic Survey Office, D. C.	311	21		41			114	222					
New York City, Manhattan Square latitude.	20						59		102	222					
Ogdensburg (U. S. L. S.) longitude	13	Oswego (U. S. L. S.), N. Y	11	26		43			114	222				753	
Ogdensburg (U. S. L. S.) latitude	21						65		102	222				739	
Ogdensburg Lighthouse 1871 (U. S. L. S.) azimuth.	9							86	125	222					
Oswego (U. S. L. S.) longitude	14	Buffalo (U. S. L. S.), N. Y.	13	26		43			114	222				754	
		Ogdensburg (U. S. L. S.), N. Y.	11	26		43								753	
		Watertown (U. S. L. S.), N. Y.	12	26		43								754	
Oswego (U. S. L. S.) latitude	22						65		102	222				743	

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 263)
NEW YORK—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Prospect Mountain latitude	23						60		102	223					
Prospect Mountain azimuth	10							80	125	223					
Rochester (U. S. L. S.) longitude	15	Buffalo (U. S. L. S.), N. Y.	14	26		43			114	223				755	
Rochester (U. S. L. S.) latitude	24						65		102	223				744	
Rochester (Bausch & Lomb Observatory) longitude.	16	Washington, U. S. Coast and Geodetic Survey Office, D. C.	335	22		41			114	223					
Rochester (Bausch & Lomb Observatory) latitude.	25						60		102	223					
Rouses Point latitude	20						60		102	223					
Rouses Point azimuth	11							80	126	223					
Sandy Creek north base (U. S. L. S.) latitude.	27						65		102	223				638, 639	
Sandy Creek north base (U. S. L. S.) azimuth.	12							86	126	223				708–714	
Sopers Hill (U. S. L. S.) azimuth								86	126	223					
Tassel Hill latitude	28						60		102	223					
Tassel Hill azimuth	14							80	126	223					
Tonawanda (U. S. L. S.) longitude	17	Detroit, Mich	40	27		43			114	223				730	
Tonawanda (U. S. L. S.) latitude	29						65		102	223				637, 638	
Tonawanda (U. S. L. S.) azimuth	15							86	126	223				696–708	
Travis longitude	18	Washington, U. S. Naval Observatory (old site), D. C.	104	13		36			114	224					
Travis latitude	30						60		102	224					
Troy latitude	31						60		102	224					
Tuna Valley latitude	32						60		102	224					
Watertown (U. S. L. S.) longitude	19	Oswego (U. S. L. S.), N. Y.	12	26		43			114	224				754	
Watertown (U. S. L. S.) latitude	33						65		102	224				742	
Waverly latitude	34						60		102	224					
West Hills latitude	35						60		102	224		287			
West Hills azimuth	16							80	126	224		344			
NORTH CAROLINA (Fig. 17)															
Alpha azimuth	1							80	126	224					
Bodies Island azimuth	2							80	126	224					
Bridge azimuth	3							80	126	224					
Bumble azimuth	4							80	126	225					
Canaday azimuth								80	126	225					
Cox azimuth	6							80	126	225					
Cut azimuth	7							80	126	225					
De Rosset. (*See* Wilmington.)															
Dismal Swamp Canal latitude. (*See* Virginia-North Carolina boundary.)															
Dro azimuth	8							80	126	225					
Fort Johnson latitude	1						60		102	225					
Fort Johnson flagstaff azimuth	9							80	126	225					
Fort Spinola 2 latitude	2						60		102	225					
Fort Spinola 2 azimuth	10							80	126	225					
Greensboro azimuth	11							80	126	225					
Hoffman azimuth	12							80	126	225					
Hog Island latitude	3						60		102	225					
Hog Island azimuth	13							80	126	225					
Humphreys azimuth	14							80	126	225					
King latitude	4						60		102	225		295, 296			
King azimuth	15							80	126	225		355			
Knott Island latitude. (*See* Virginia-North Carolina boundary.)															
Lee longitude	1	Bethune I, S. C	368	23	33	42			115	226					
		Littleton, N. C	369	23	33	42									
Lee latitude	5						60		102	226					
Lee azimuth	16							80	126	226					
Littleton longitude	2	Lee, N. C	369	23	33	42			115	226					
		Suffolk, Va	370	23	33	42									
Littleton latitude	6						60		102	226					
Long Shoal Point latitude	7						60		102	226					
Long Shoal Point azimuth	17							80	126	226					
Mobile azimuth	18							80	126	226					
Money Point azimuth	19							80	126	226					
Moore latitude	8						60		102	226		292, 293			
Moore azimuth	20							80	126	226		352, 353			

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
NORTH CAROLINA—Contd.	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
New Macon azimuth	21							81	126	226					
New south Caswell azimuth	22							81	126	227					
Northwest latitude. (*See* Virginia-North Carolina boundary.)															
Nottaway River latitude. (*See* Virginia-North Carolina boundary.)															
Ocracoke northeast base latitude	9						60		102	227					
Ocracoke northeast base azimuth	23							81	126	227					
Portsmouth Island I latitude							60			227					
Portsmouth Island II latitude							60			227					
Raleigh longitude	3	Charleston, S. C	16	10		34			115	227		321, 324			
		Columbia, S. C	17	10	31	34						321, 324			
		Washington, Seaton, D. C.	15	10	31	34						320, 324			
Raleigh azimuth	24							81	126	227					
Roan High Bluff latitude	10						60		102	227					
Roan High Bluff azimuth	25							81	126	227					
Roseboro azimuth	26							81	126	227					
Sand Island latitude	11						60		102	227					
Sand Island azimuth	27							81	126	227					
Sanford azimuth	28							81	126	227					
Shellbank latitude	12						60		102	227					
Sloop Point 2 azimuth	29							81	126	228					
Statesville longitude	4	Washington, U. S. Naval Observatory (old site), D. C.	120	13		36			115	228		319			
Stevensons Point latitude	13						60		102	228					
Stevensons Point azimuth	30							81	126	228					
Tank azimuth	31							81	126	228					
Virginia-North Carolina boundary:															
Dismal Swamp Canal latitude	14						60		102	228					
Knott Island latitude	15						60		102	228					
Northwest latitude	16						60		102	228					
Nottaway River latitude	17						60		102	228					
Wadesboro latitude	18						60		102	228					
Wilmington (De Rosset) longitude	5	Columbia, S. C	20	10	31	34			115	228		322, 324, 325			
		Petersburg (Roslyn), Va.	18	10	31	34						321, 324, 325			
Wilmington (De Rosset) latitude	19						60		102	228					
Wilmington, St. James Church azimuth	32							81	126	228					
Young latitude	20						60		102	229		294			
Young azimuth	33							81	126	229		354			
NORTH DAKOTA (Fig. 22)															
Ambrose northeast base latitude	1						60		103	229					
Badland latitude	2						60		103	229					
Bismarck longitude	1	Dalton, Minn	306	21	32	40			115	229					
		Helena, Mont	203	17		38							230, 246-257		
		Minneapolis, Minn	204	17		38							231, 246-257		
		Stephen, Minn	305	21	32	40									
Bismarck latitude	3						60		103	229					
Bonetrail latitude	4						60		103	229					
Bowie azimuth	1							81	126	229					
Bowman longitude	2	Omaha, Nebr	320	21		41			115	229					
Bowman latitude	5						60		103	229					
Gladys azimuth	2							81	126	229					
Hankinson latitude	6						60		103	230					
Hankinson azimuth	3							81	126	230					
Jamestown (U. S. G. S.) longitude	3	St. Louis, Mo	12	29		44			115	230					
Jamestown (U. S. G. S.) latitude	7						67		103	230					
Saddle azimuth	4							81	126	230					
Sheep latitude	8						60		103	230					
OHIO (Fig. 18)															
Ashtabula (U. S. L. S.) longitude	1	Buffalo (U. S. L. S.), N. Y.	17	26		43			115	230				757	
Ashtabula (U. S. L. S.) latitude	1						65		103	230				750	
Cincinnati (Mount Adams) longitude.	2	Philadelphia, Pa	6	10		34			115	230					
Cincinnati (Mount Lookout) longitude.	3	Nashville, Tenn	131	14		36			115	230			216, 246-257		
		St. Louis, Mo	132	14		36							217, 246-257		
		Washington, U. S. Naval Observatory (old site), D. C.	130	14		36							216, 246-257		

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
OHIO—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Cincinnati (Mt. Lookout) latitude	2						60		103	230	660				
Cleveland (U. S. L. S.) longitude	4	Buffalo (U. S. L. S.), N. Y.	18	26		43			115	230				755	
		Detroit, Mich	20	26		43								757	
Cleveland (U. S. L. S.) latitude	3						65		103	230				751	
Cleveland longitude	5	Cambridge, Mass	76	12	32	35			115	230					
		Columbus, Ohio	75	12	32	35									
Cleveland latitude	4						60		103	231					
Cleveland, Case School Observatory latitude.	5						60		103	231					
Columbus longitude	6	Cambridge, Mass	74	12	32	35			115	231					
		Cleveland, Ohio	75	12	32	35									
		Nashville, Tenn	103	13	32	36									
		Washington, U. S. Naval Observatory (old site), D. C.	107	13	32	36									
Columbus latitude	6						60		103	231					
Elizabethtown longitude	7	St. Louis, Mo	215	17		38			115	231					
Elizabethtown latitude	7						60		103	231					
Gould latitude	8						60		103	231					
Gould azimuth	1							81	126	231	758, 759				
Hudson (Western Reserve College) longitude.	8	Philadelphia, Pa	7	10		34			115	231					
Hudson (Western Reserve College) (U. S. L. S.) longitude.	8	Detroit, Mich	1	26		43			115	231				757	
Sandusky (U. S. L. S.) longitude	9	Detroit, Mich	19	26		43			115	231				757	
Sandusky west base (U. S. L. S.) latitude.	9						65		103	231				636, 637	
Sandusky west base (U. S. L. S.) azimuth.	2							86	126	231				686–695	
South Point longitude	10	Washington, U. S. Naval Observatory (old site), D. C.	38	11		34			115	231					
Toledo (U. S. L. S.) longitude	11	Detroit, Mich	61	28		44			115	231				727–729	
Toledo (U. S. L. S.) latitude	10						65		103	231				635	
Toledo azimuth	3							81	126	231					
OKLAHOMA (Fig. 21)															
Allen longitude	1	Hartford, Ark	383	24	33	42			115	232					
		Pond Creek, Okla	384	24	33	42									
Allen latitude	1						61		103	232					
Allen azimuth	1							81	126	232					
Blue azimuth	2							81	126	232					
Carson latitude	2						61		103	232					
Carson azimuth	3							81	126	232					
Dill longitude	2	Conway, Tex	386	24	33	42			115	232					
		Pond Creek, Okla	385	24	33	42									
Dill latitude	3						61		103	232					
Dill azimuth	4							81	126	232					
Guthrie (U. S. G. S.) longitude	3	St. Louis, Mo	13	29		44			115	232					
Guthrie (U. S. G. S.) latitude	4						67		103	232					
Marlow longitude	4	Austin, Tex	254	19	33	30			115	232					
		Bowie northwest base, Tex.	297	21		40									
		Pond Creek, Okla	296	21	33	40									
Marlow latitude	5						61		103	232					
Oklahoma-Colorado boundary. (*See* Colorado-Oklahoma boundary, Colo.)															
Pond Creek longitude	5	Allen, Okla	384	24	33	42			115	232					
		Dill, Okla	385	24	33	42									
		Marlow, Okla	296	21	33	40									
Pond Creek latitude	6						61		103	233					
Rosedale azimuth	5							81	126	233					
Savanna (U. S. G. S.) longitude	6	St. Louis, Mo	15	29		44			115	233					
Savanna (U. S. G. S.) latitude	7						67		103	233					
Savanna south base azimuth	6							81	126	233					
Wingard latitude	8						61		103	233					
Wingard azimuth	7							81	126	233					
OREGON (Fig. 24)															
Baker (U. S. G. S.) longitude	1	St. Louis, Mo	22	29		44			115	233					
Baker (U. S. G. S.) latitude	1						67		103	233					
Baker (U. S. N.) longitude	2	Washington, U. S. Naval Observatory (new site), D. C.	8	30		46			115	233					J
Baker (U. S. N.) latitude	2						61		103	233					
Balch latitude	3						61		103	233					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
OREGON—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Balch azimuth	1							81	126	233					
Barnes azimuth	2							81	126	234					
Beaver azimuth	3							81	126	234					Q,54-56
Beulah azimuth	4							81	126	234					T,35, 36
Burns azimuth	5							81	126	234					T,35, 36
Central Point latitude	4						61		103	234					
Dalles (U. S. E.) latitude	5						68		103	234					E,36-41
Echo, longitude	3	La Grande, Oreg	337	22	32	41			115	234					Q,52
		Walla Walla, Wash	336	22	32	41									Q,51, 52
Echo, latitude	6						61		103	234					Q,50, 51
Echo azimuth	6							81	126	234					Q,54-56
Ella azimuth	7							81	126	235					Q,54-56
Eugene (U. S. G. S.) longitude	4	San Francisco, Lafayette Park, Calif.	14	29		44			115	235					
Eugene (U. S. G. S.) latitude	7						67		103	235					
Eugene astronomic azimuth	8							81	126	235					
Fort Stevens longitude	5	Seattle, University of Washington, Wash.	313	21		41			115	235					
Fort Stevens azimuth	9							81	126	235					
John azimuth	10							81	127	235					Q,54-56
Juniper azimuth	11							81	127	235					T,35, 36
La Grande longitude	6	Echo, Oreg	337	22	32	41			115	235					Q, 52
		Mountain Home, Idaho	338	22	32	41									Q,52, 53
La Grande latitude	8						61		103	235					Q,50, 51
La Grande azimuth	12							81	127	235					Q,54-56
Lakeview B. M. M-16 azimuth	13							81	127	236					T,35, 36
Mary azimuth	14							81	127	236					
Onion azimuth	15							81	127	236					
Pigeon azimuth	16							81	127	236					
Port Orford latitude	9						61		103	236					
Portland longitude	7	San Francisco, Lafayette Park, Calif.	176	16		37			115	236			224, 246-257		
		Seattle, 1886, Wash	180	16		37							226, 246-257		
		Yaquina, Oreg	179	16		37									
		Walla Walla, Wash	177	16		37							225, 246-257		
Portland latitude	10						61		103	236					
Rainier latitude	11						61		103	236					
Rainier azimuth	17							81	127	236					
Riddle azimuth	18							81	127	236					T,35, 36
Roseburg latitude	12						61		103	236					
Rust azimuth	19							82	127	237					
Scott azimuth	20							82	127	237					
Spencer azimuth	21							82	127	237					
Tongue Point Neck azimuth	22							82	127	237					
Umpquah River latitude	13						61		103	237					
Yam latitude	14						61		103	237					
Yam azimuth	23							82	127	237					
Yaquina longitude	8	Portland, Oreg	179	16		37			115	237					
Yaquina Point latitude	15						61		103	237					
Yonna azimuth	24							82	127	237					T,35, 36
PENNSYLVANIA (Fig. 16).															
Allegheny, Allegheny Observatory (old site) longitude.	1	Austin, Tex	80	12	31	35			115	238					
		Cambridge, Mass	55	11	31	35									
		Cambridge, Mass	73	12	31	35									
Allegheny, Allegheny Observatory (new site) longitude.	2	Washington, Coast and Geodetic Survey, D. C.	286	20		40			115	238					
Allegheny, Allegheny Observatory (new site) latitude.	1						61		103	238					
Altoona longitude	3	Washington, U. S. Naval Observatory (old site), D. C.	201	17		38			115	238					
Altoona latitude	2						61		103	238					
Austinburgh latitude	3						61		103	238					
Burt longitude	4	Washington, U. S. Naval Observatory (old site), D. C.	105	13		36			115	238					
Burt latitude	4						61		103	238					
Clark latitude	5						61		103	238					
Erie (U. S. L. S.) longitude	5	Buffalo (U. S. L. S.), N. Y.	16	26		43			115	238				756	
Erie (U. S. L. S) latitude	6						65		103	238				750	
Flower Observatory (U. of P.) longitude.	6	Washington, U. S. Naval Observatory (new site), D. C.	7	30		46			116	238					1
Harrisburg longitude	7	Washington, U. S. Naval Observatory (old site), D. C.	109	13		36			116	238					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
PENNSYLVANIA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Harrisburg latitude	7						61		103	238					
Jollytown latitude	8						61		103	239					
Maryland corner latitude	9						61		103	239					
Philadelphia (Old Central High School) longitude.	8	Cincinnati (Mt. Adams), Ohio.	6	10		34			116	239					
		Hudson (Western Reserve College, Ohio.)	7	10		34									
		Jersey City, N. J.	3	10	31	34									
		Washington, Seaton, D. C.	8	25											
		Washington, U. S. Naval Observatory (old site), D. C.	1	25											
		Washington, U. S. Naval Observatory (old site), D. C.	2	10	31	34									
Smiths Ferry longitude	9	Louisville, Ky	154	15		37			116	239					
Smiths Ferry latitude	10						61		103	239					
Southwest corner latitude	11						61		103	239					
Sugar Grove latitude	12						61		103	239					
Womelsdorf latitude	13						61		103	239					
Womelsdorf azimuth	1							82	127	239					
Yard latitude	14						61		103	239		291			
Yard azimuth	2							82	127	239		346			
RHODE ISLAND (Fig. 15)															
Beaconpole azimuth	1							82	127	239		341, 342			
Spencer azimuth	2							82	127	239		342			
SOUTH CAROLINA (Fig. 17)															
Allen azimuth	1							82	127	240					
Allendale longitude	1	Darien, Ga	282	20	32	40			116	240					
		Doraville, Ga	283	20	32	40									
Allendale latitude	1						61		104	240					
Allston latitude	2						61		104	240					
Allston azimuth	2							82	127	240					
Battery azimuth	3							82	127	240					
Bethune I longitude	2	Lee, N. C	368	23	33	42			116	240					
		Turner, Ga	367	23	33	42									
Bethune I latitude	3						61		104	240					
Bethune I azimuth	4							82	127	240					
Breach Inlet latitude	4						61		104	240					
Breach Inlet azimuth	5							82	127	240					
Charleston longitude	3	Atlanta, Ga	127	14		36			116	240			214, 246–257		
		Key West, Fla	237	18		39							242, 246–257		
		Raleigh, N. C	16	10	31	34						321, 324			
		Savannah, Ga	10	10	32	34									
		Washington, Seaton, D. C.	9	25											
		Washington, U. S. Naval Observatory (old site), D. C.	240	19		39							243, 246–257		
Charleston latitude	5							61		104	240				
Columbia longitude	4	Macon, Ga	19	10	31	34			116	240		322, 323			
		Raleigh, N. C	17	10	31	34						321, 323, 324			
		Wilmington (DeRosset), N. C.	20	10	31	34						322, 324			
Columbia latitude	6						61		104	240					
Columbia azimuth	6							82	127	240					
Denmark azimuth	7							82	127	241					
Edisto Island east base latitude	7						61		104	241					
Edisto Island east base azimuth	8							82	127	241					
Estill azimuth	9							82	127	241					
Fort Johnson azimuth	10							82	127	241					
New Cut azimuth	11							82	127	241					
Paris latitude	8						61		104	241		297, 298			
Paris azimuth	12							82	127	241					
Port Royal latitude	9						61		104	241					
Port Royal azimuth	13							82	127	241					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 283)
SOUTH DAKOTA (Fig. 22)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Franklin latitude	1						61		104	242					
Franklin azimuth	1							82	127	242					
Freeman latitude	2						61		104	242					
Freeman azimuth	2							82	127	242					
Harding latitude	3						61		104	242					
Howard longitude	1	Dalton, Minn	289	20	32	40			116	242					
		Omaha, Nebr	293	21	32	40									
		Page, Nebr	295	21	32	40									
Howard latitude	4						61		104	242					
Preacher Hill latitude	5						61		104	242					
Preacher Hill azimuth	3							82	127	242					
Provo longitude	2	Omaha, Nebr	321	21		41			116	242					
Provo latitude	6						61		104	242					
Provo astronomic azimuth	4							82	127	242					
Rapid City (U. S. G. S.) longitude	3	St. Louis, Mo	11	29		44			116	242					
Rapid City (U. S. G. S.) latitude	7						67		104	243					
Reva latitude	8						61		104	243					
Reva azimuth	5							82	127	243					
Sioux Falls (U. S. G. S.) longitude	4	St. Louis, Mo	19	29		44			116	243					
Sioux Falls (U. S. G. S.) latitude	9						67		104	243					
TENNESSEE (Fig. 20)															
Bean latitude	1						61		104	243					
Bean azimuth	1							82	127	243					
Hickory azimuth	2							82	127	243					
Jellico longitude	1	Louisville, Ky	152	15		37			116	243					
Jellico latitude. (*See* p. 51).															
Knoxville longitude	2	Atlanta, Ga	298	21		40			116	243					
Knoxville latitude	2						61		104	243					
Lebanon north base latitude	3						61		104	243					
Lebanon north base azimuth	3							82	127	243					
Luper latitude	4						61		104	243					
Luper azimuth	4							82	127	243					
Martin longitude	3	Little Rock, Ark	328	22	32	41			116	244					
		Strickland, Miss	329	22	32	41									
Martin latitude	5						61		104	244					
Martin azimuth	5							82	127	244					
Memphis longitude	4	Nashville, Tenn	113	13		36			116	244					
Memphis latitude	6						62		104	244					
Memphis (U. S. L. S.) longitude	5	Detroit, Mich	54	27		44			116	244				758	
Memphis (U. S. L. S.) latitude	7						65		104	244				751	
Mount Lore latitude	8						62		104	244					
Mount Lore azimuth	6							82	127	244					
Nashville longitude	6	Atlanta, Ga	123	13		36			116	244			212, 246–257		
		Cairo, Ill	111	13		36									
		Cincinnati (Mount Lookout), Ohio.	131	14		36							216, 246–257		
		Columbus, Ohio	103	13	32	36									
		Greenville, Miss	119	13		36									
		Helena, Ark	115	13		36									
		Hickman, Ky	112	13		36									
		Louisville, Ky	122	13		36							212, 246–257		
		Madison, Ala	331	22	32	41									
		Memphis, Tenn	113	13		36									
		Natchez, Miss	117	13		36									
		New Orleans, La	124	13		36							213, 246–257		
		O and M, Ind	332	22		41									
		Paducah, Ky	110	13		36									
		St. Louis, Mo	133	14		36							217, 246–257		
		Vicksburg (Fort), Miss	118	13		36									
		Vincennes, Ind	134	14	32	36					809, 824				
		Washington, U. S. Naval Observatory (old site), D. C.	108	25											
Nashville latitude	9						62		104	244					
Waverly (U. S. G. S.) longitude	7	St. Louis, Mo	23	29		44			116	244					
Waverly (U. S. G. S.) latitude	10						67		104	244					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
TEXAS (Fig. 21)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Alice longitude	1	Austin, Tex	272	20	32	40			116	244					
		Point Isabel, Tex	273	20	32	40									
Alice latitude	1						62		104	245					
Alice azimuth	1							83	127	245					
Allamore latitude	2						62		104	245					
Appleby azimuth	2							83	127	245					
Austin longitude	2	Alice, Tex	272	20	32	40			116	245					
		Allegheny Observatory (old site), Pa.	80	12	31	35									
		Donna, Tex	324	21		41									P, 84-89
		El Paso, Tex	232	18		39							239, 246-257		
		Galveston, Tex	234	18		39							240, 246-257		
		Laredo, Tex	233	18	33	39									R, 74
		Marlow, Okla	254	19	33	39									
		Matagorda, Tex	317	21		41									
		New Orleans, La	235	18		39							240, 246-257		
		Point Isabel, Tex	274	20	32	40									P, 84-89
		Sabine Pass, Tex	318	21		41									
		Tehuacana, Tex	376	23	33	42									
Austin latitude	3						62		104	245					
Austin, Capitol dome, star in hand of Liberty, azimuth.	3							83	127	245					
Bachelor latitude	4						62		104	245					
Bachelor azimuth	4							83	127	245					
Baird latitude	5						62		104	246					
Barstow latitude	6						62		104	246					
Beaumont latitude	7						62		104	246					
Black latitude	8						62		104	246					
Black azimuth	5							83	127	246					
Blue azimuth	6							83	127	246					R, 71-73
Boracho longitude	3	El Paso, Tex	315	21	33	41			116	246					R, 77
		Stanton, Tex	316	21	33	41									R, 77
Boracho latitude	9						62		104	246					
Bowie northwest base longitude	4	Marlow, Okla	297	21		40			116	246					
Bowie northwest base latitude	10						62		104	246					
Bowie northwest base azimuth	7							83	127	246					
Brenner azimuth	8							83	127	247					
Brownsville longitude	5	Galveston, Tex	159	15		37			116	247					
Brownsville latitude	11						62		104	247					
Bynum latitude	12						62		104	247					
Bynum azimuth	9							83	127	247					
Chamliss latitude	13						62		104	247					
Chamliss azimuth	10							83	127	247					
Cisco (U. S. G. S.) longitude	6	St. Louis, Mo	9	29		44			116	247					B, 23-71
Cisco (U. S. G. S.) latitude	14						67		104	247					B, 17-22
Conway longitude	7	Dill, Okla	386	24	33	42			116	247					
		Glen Rio, N. Mex	387	24	33	42									
Conway latitude	15						62		104	247					
Conway azimuth	11							83	127	248					
Dentonio azimuth	12							83	127	248					R, 71-73
Dollar Point latitude	16						62		104	248					
Dollar Point azimuth	13							83	127	248					
Donna longitude	8	Austin, Tex	324	21		41			116	248					P, 84-89
Donna azimuth	14							83	127	248					
Dryden east base longitude	9	Johnstone, Tex	374	23	33	42			116	248					R, 76
		Stanton, Tex	375	23	33	42									R, 76
Dryden east base latitude	17						62		104	248					R, 78, 79
Dryden east base azimuth	15							83	127	248					R, 71-73
Eagle azimuth	16							83	128	248					
El Paso longitude	10	Austin, Tex	232	18		39			116	248			239, 246-257		
		Boracho, Tex	315	21	33	41									R, 77
		Corner Boundary (U. S. and Mex.), N. Mex.	224	18		39									
		Jarilla, N. Mex	314	21		41									
		Little Rock, Ark	226	18		39							238, 246-257		
		Maricopa, Ariz	256	19		39									
		Nogales, Ariz	223	18		39							236, 246-257		
		Santa Fe, N. Mex	230	18		39							239, 246-257		
		Tacubaya, Mex	231	18		39									

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
TEXAS—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
El Paso latitude	18						62		104	248					
Estes latitude	19						62		104	249					
Estes azimuth	17							83	128	249					
Fronton azimuth	18							83	128	249					
Galveston longitude	11	Austin, Tex	234	18		39			116	249			240, 246–257		
		Brownsville, Tex	159	15		37									
		Little Rock, Ark	160	15		37							221, 246–257		
		New Orleans, La	48	25											
Galveston Island east base latitude	20						62		104	249					
Galveston Island east base azimuth	19							83	128	249					
Gilbert latitude	21						62		104	249					
Gilbert azimuth	20							83	128	249					
Higgins (U. S. G. L. O.) longitude	12	Red River (U. S. G. L. O.).	2	30		45			116	249					
Higgins (U. S. G. L. O.) latitude	22						67		104	249					
Jacksonville, 1890, longitude		Washington, U. S. Naval Observatory (old site), D. C.	207	25						250					
Jacksonville, 1890, latitude	23						62		104	250					
Jacksonville, 1919, longitude	13	Man, La	378	23	33	42			116	250					
		Tehuacana, Tex	377	23	33	42									
Jacksonville, 1919, latitude	24						62		104	250					
Jacksonville, 1919, azimuth	21							83	128	250					
Johnstone longitude	14	Dryden east base, Tex	374	23	33	42			116	250					R, 76
		Laplace, Tex	373	23	33	42									R, 75
Johnstone latitude	25						62		104	250					R, 78, 79
Johnstone azimuth	22							83	128	250					R, 72, 73
Jupiter latitude	26						62		104	250					
Jupiter azimuth	23							83	128	250					
Karnes latitude	27						62		104	250					
Karnes azimuth	24							83	128	250					
Lacasa latitude	28						62		104	250					
Lacasa azimuth	25							83	128	250					
Laguna Madre north base latitude	29						62		104	251					
Laguna Madre north base azimuth	26							83	128	251					
Laplace longitude	15	Johnstone, Tex	373	23	33	42			116	251					R, 75
		Laredo, Tex	372	23	33	42									R, 75
Laplace latitude	30						62		104	251					R, 78, 79
Laplace azimuth	27							83	128	251					R, 71–73
Laredo longitude	16	Austin, Tex	233	18	33	39			117	251					R, 74
		Laplace, Tex	372	23	33	42									R, 75
Laredo latitude	31						62		105	251					R, 78, 79
Laredo azimuth	28							83	128	251					R, 71–73
Lavaca latitude	32						62		105	251					
Lavaca azimuth	29							83	128	251					
Lee azimuth	30							83	128	251					
Matagorda longitude	17	Austin, Tex	317	21		41			117	252					
Matagorda south base azimuth	31							83	128	252					
Miller latitude	33						62		105	252					
Miller azimuth	32							83	128	252					
Mission latitude	34						62		105	252					
Mission azimuth	33							83	128	252					
Monahans (U. S. G. L. O.) longitude.	18	Red River (U. S. G. L. O.), Tex.	3	30		45			117	252					
Monahans (U. S. G. L. O.) latitude.	35						67		105	252					
Monument azimuth	34							83	128	252					R, 71–73
Pilot latitude	36						62		105	252					
Pilot azimuth	35							83	128	252					
Point Isabel longitude	19	Alice, Tex	273	20	32	40			117	253					
		Austin, Tex	274	20	32	40									P, 84–89
Point Isabel east base azimuth	36							83	128	253					
Pyle azimuth	37							83	128	253					R, 71–73
Raymond azimuth	38							83	128	253					
Red River (U. S. G. L. O.) longitude.	20	Higgins (U. S. G. L. O.), Tex.	2	20		45			117	253					
		Monahans (U. S. G. L. O.), Tex.	3	30		45									
		St. Louis, Mo	1	30		45									L
		Texline, (U. S. G. L. O.) Tex.	4	30		45									

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in— (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
TEXAS—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Rio Grande latitude	37						62		105	253					
Rio Grande (U. S. G. L. O.) latitude	38						67		105	253					
Robbins azimuth	39							83	128	254					
Round latitude	39						62		105	254					
Round azimuth	40							83	128	254					
Sabine Pass longitude	21	Austin, Tex	318	21		41			117	254					
Sabine latitude	40						62		105	254					
Sears latitude	41						62		105	254					
Sears azimuth	41							83	128	254					
Sierra Blanca (U. S. G. S.) longitude	22	St. Louis, Mo	10	29		44			117	254					B, 23–71
Sierra Blanca (U. S. G. S.) latitude	42						67		105	254					B, 19–23
Smith latitude	43						62		105	254					
Smith azimuth	42							83	128	254					
Spofford (U. S. G. S.) longitude	23	St. Louis, Mo	20	29		44			117	255					
Spofford (U. S. G. S.) latitude	44						67		105	255					
Springgap azimuth	43							83	128	255					
Stanton longitude	24	Boracho, Tex	316	21	33	41			117	255					R, 77
		Dryden east base, Tex	375	23	33	42									R, 76
Stanton latitude	45						62		105	255					
Stanton azimuth	44							83	128	255					
Star azimuth	45							83	128	255					R, 71–73
Tehuacana longitude	25	Austin, Tex	376	23	33	42			117	255					
		Jacksonville, 1919, Tex	377	23	33	42									
Tehuacana latitude	46						62		105	255					
Tehuacana azimuth	46							83	128	255					
Texline (U. S. G. L. O.) longitude	26	Red River (U. S. G. L. O.)	4	30		45			117	255					
Texline (U. S. G. L. O.) latitude	47						67		105	256					
Topo latitude	48						62		105	256					
Venado azimuth	47							83	128	256					
Zapata azimuth	48							83	128	256					R, 71–73
UTAH (Fig. 23)															
Antelope latitude	1						62		105	256	694				
Antelope azimuth	1							83	128	256	782, 783				
Beaver (U. S. E.) latitude	2						68		105	256	696				C, 67–71
Deseret latitude	3						62		105	256	696				
Deseret azimuth	2							83	128	256	784				
Green River longitude	1	Salt Lake City, Utah	252	19		39			117	257	822				
Green River latitude	4						62		105	257	686				
Gunnison (U. S. E.) latitude	5						68		105	257	690				C, 116–125
Ibepah latitude	6						62		105	257	698				
Ibepah azimuth	3							83	128	257	784, 785				
Lund longitude	2	Moapa, Nev	342	22	33	41			117	257					
		Salt Lake City, Utah	341	22	33	41									
Lund latitude	7						62		105	257					
Mount Ellen latitude	8						62		105	257	688				
Mount Ellen azimuth	4							83	128	257	777				
Mount Nebo latitude	9						62		105	257	690				
Mount Nebo azimuth	5							83	128	257	778, 779				
Mount Waas latitude	10						62		105	257	685				
Mount Waas azimuth	6							84	128	257	775, 776				
Oasis longitude	3	Salt Lake City, Utah	253	19		39			117	258	822				
Oasis latitude	11						62		105	258	697				
Ogden (U. S. E.) longitude	4	Detroit, Mich	29	28										764	
Ogden longitude	4	Salt Lake City, Utah	173	15		37			117	258			260, 261		
Ogden (U. S. E.) latitude	12						68		105	258	693				C, 30–54
Ogden azimuth	7							84	128	258	780, 781				
Ogden Peak latitude	13						62		105	258	691				
Ogden Peak azimuth	8							84	128	258	781, 782				
Patmos Head latitude	14						62		105	258	687				
Patmos Head azimuth	9							84	128	258	776				
Promontory latitude	15						62		105	258	695				
Promontory azimuth	10							84	128	258	783				
St. George (U. S. E.) latitude	16						68		105	258					D, 64–68

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
UTAH—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Salt Lake City, longitude	5	Blackfoot, Idaho	340	22	32	41			117	258					Q, 53, 54
		Cambridge, Mass	53	25											
		Colorado Springs, Colo	172	15		37							223, 246–257		
		Eureka, Nev	200	17	32	38					819, 825				
		Green River, Utah	252	19		39					822				
		Helena, Mont	202	17		38							230, 246 257		
		Lund, Utah	341	22	33	41									
		Oasis, Utah	253	19		39					822				
		Ogden, Utah	173	15		37							260, 261		
		Omaha, Nebr	50	11		35							206, 246–257		
		San Francisco, Lafayette Park, Calif.	174	15		37							224, 246–257		
		San Francisco, Washington Square, Calif.	52	25											
		Sherman, Wyo	82	12		35									
		Walla Walla, Wash	178	16		37							226, 246–257		
Salt Lake City latitude	17						62		105	259	692				
Salt Lake City azimuth	11							84	128	259	779				
Utah-Arizona Boundary (U. S. G. L. O.):															
Station No. 1 latitude	18						67		105	259					
Station No. 2 latitude	19						67		105	259					
Station No. 3 latitude	20						67		105	259					
Station No. 4 latitude	21						67		105	259					
Station No. 5 latitude	22						67		105	259					
Station No. 6 latitude	23						67		105	259					
Waddoup latitude	24						62		105	259	693				
Waddoup azimuth	12							84	128	259	780				
Wasatch latitude	25						62		105	260	689				
Wasatch azimuth	13							84	128	260	778				
VERMONT (Fig. 15)															
Burlington longitude		Cambridge, Mass	69	25											
Burlington latitude	1						62		105	260					
Burlington azimuth	1							84	128	260					
Killington latitude	2						62		105	260					
Killington azimuth	2							84	128	260					
Mount Mansfield azimuth	3							84	128	260					
VIRGINIA (Fig. 16)															
Big Knob latitude	1						63		105	260					
Big Knob azimuth	1							84	128	260					
Boykins azimuth	2							84	128	260					
Bull Run latitude	2						63		105	261	646, 647				
Bull Run azimuth	3							84	128	261	752, 753	351			
Cahas latitude	3						63		105	261					
Cahas azimuth	4							84	128	261					
Cape Henry latitude	4						63		105	261					
Cape Henry Lighthouse azimuth	5							84	128	261					
Charlottesville, McCormick Observatory, longitude.	1	Washington, U. S. Naval Observatory (old site), D. C.	136	14		36			117	261	810				
Charlottesville, McCormick Observatory, latitude.	5						63		105	261	650				
Church azimuth	6							84	128	261					
Clark latitude	6						63		106	261	649				
Clark azimuth	7							84	128	261	753, 754	351			
Covington longitude	2	Washington, U. S. Naval Observatory (old site), D. C.	158	15		37			117	261					
Covington latitude	7						63		106	261					
Elliott Knob latitude	8						63		106	261	652				
Elliott Knob azimuth	8							84	128	261	755, 756	352			
Goodson longitude	3	Washington, U. S. Naval Observatory (old site), D. C.	63	11		35			117	262					
Goodson latitude	9						63		106	262					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
VIRGINIA—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Hines latitude	10						63		106	262					
Knott Island, north end, latitude	11						63		106	262					
Knott Island, north end, azimuth	9							84	128	262					
Leesburg latitude										262					
Long Mountain latitude	12						63		106	262	651				
Long Mountain azimuth	10							84	128	262	754, 755	351, 352			
McCormick Observatory, Charlottesville, longitude.	1	Washington, U. S. Naval Observatory (old site), D. C.	136	14		36			117	261					
McCormick Observatory, Charlottesville, latitude.	5						63		105	261					
Mount Weather longitude	4	Washington, Coast and Geodetic Survey Office, D. C.	287	20		40			117	262					
Mount Weather latitude	13						63		106	262					
Mount Weather azimuth	11							84	128	262					
Petersburg. (*See* Roslyn.)															
Rogers latitude	14						63		106	262					
Rogers azimuth	12							84	128	262					
Roslyn (Petersburg) longitude	5	Washington, Seaton, D. C.	14	10	31	34			117	262		320, 324			
		Wilmington, (DeRosset), N. C.	18	10	31	34						321, 324			
Roslyn (Petersburg) latitude	15						63		106	262					
Roslyn azimuth	13							84	128	262					
Staunton longitude	6	Washington, U. S. Naval Observatory (old site), D. C.	56	11		35			117	262					
Staunton latitude	16						63		106	263					
Strasburg longitude	7	Washington, U. S. Naval Observatory (old site), D. C.	129	14		36			117	263	809				
Strasburg latitude	17						63		106	263	648				
Suffolk longitude	8	Littleton, N. C.	370	23	33	42			117	263					
		Washington, Coast and Geodetic Survey Office, D. C.	371	23	33	42									
Suffolk latitude	18						63		106	263					
Tangier Island latitude	19						63		106	263					
Tangier Island azimuth	14							84	128	263					
White Rock latitude	20						63		106	263					
White Rock azimuth	15							84	128	263					
Wolftrap latitude	21						63		106	263					
Wolftrap azimuth	16							84	128	263					
WASHINGTON (Fig. 24)															
Bel azimuth	1							84	129	263					
Blaine longitude	1	Seattle, 1886, Wash.	304	21		40			117	263					
Cape Disappointment latitude	1						63		106	263					
Carson (U. S. & C.) latitude	2						68		106	263					
Classet azimuth	2							84	129	264					
Ellensburg (U. S. G. S.) longitude	2	San Francisco, Lafayette Park, Calif.	16	29		44			117	264					
Ellensburg (U. S. G. S.) latitude	3						67		106	264					
False Dungeness latitude	4						63		106	264					
Goose 2 azimuth	3							84	129	264					
Kalama longitude	3	San Francisco, Washington Square, Calif.	95	12		35			117	264					
Kalama latitude	5						63		106	264					
Kalama azimuth	4							84	129	264					
Lam azimuth	5							84	129	264					
Langley azimuth	6							84	129	264					
Lummi Island latitude	6						63		106	264					
Pioneer azimuth	7							84	129	264					
Point Hanson azimuth	8							84	129	264					
Point Hudson latitude	7						63		106	265					
Point Hudson azimuth	9							84	129	265					
Port Townsend longitude	4	Seattle, 1886, Wash.	181	16		37			117	265					
Port Townsend azimuth	10							84	129	265					
Rain azimuth	11							84	129	265					
Russell (U. S. & C.) latitude	8						68		106	265					
Scarborough Harbor latitude							63		106	265					
Seattle, 1871, longitude		San Francisco, Washington Square, Calif.	72	25											

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 233)
	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
WASHINGTON—Continued															
Seattle, 1886, longitude	5	Blaine, Wash	304	21		40			117	265					
		Portland, Oreg	180	16		37							226, 246–257		
		Port Townsend, Wash	181	16		37									
		Seattle, University of Washington, Wash.	303	21		40									
		Tacoma, Wash	228	18		39									
		Walla Walla, Wash	182	16		37							227, 246–257		
Seattle, University of Washington, longitude.	6	Fort Stevens, Oreg	313	21		41			117	265					
		Seattle, 1886, Wash	303	21		40									
Seattle latitude	10						63		106	265					
Spokane longitude	7	Helena, Mont	184	16		38			117	265					
Spokane (U. S. G. S.) latitude	11						67		106	265					
Tacoma longitude	8	Seattle, 1886, Wash	228	18		39			117	265					
Tacoma latitude	12						63		106	266					
Tacoma astronomic azimuth	12							84	129	266					
Walla Walla longitude	9	Echo, Oreg	336	22	32	41									Q 51, 52
		Helena, Mont	183	16		38			117	266			227, 246–257		
		Portland, Oreg	177	16		37							225, 246–257		
		Salt Lake City, Utah	178	16		37							226, 246–257		
		Seattle, 1886, Wash	182	16		37							227, 246–257		
Walla Walla latitude	13						63		106	266					
WEST VIRGINIA (Fig. 16)															
Cameron longitude	1	Washington, U.S. Naval Observatory (old site), D. C.	34	11		34			117	266					
Charleston longitude	2	Louisville, Ky	155	15		37			117	266	811				
Charleston latitude	1						63		106	266	654–656				
Clarksburg longitude	3	Washington, U.S. Naval Observatory (old site), D. C.	32	11		34			117	266					
Gauley Bridge longitude	4	Washington, U.S. Naval Observatory (old site), D. C.	39	11		34			117	266					
Grafton longitude	5	Washington, U.S. Naval Observatory (old site), D. C.	33	11		34			117	266					
Harvey latitude	2						63		106	266					
Keeney latitude	3						63		106	266	653				
Keeney azimuth	1							85	129	266	756, 757				
Martinsburg longitude	6	Washington, U.S. Naval Observatory (old site), D. C.	41	11		34			117	266					
Mount Morris latitude	4						63		106	266					
Parkersburg longitude	7	Washington U. S. Naval Observatory (old site), D. C.	36	11		34			117	266					
Piney latitude	5						63		106	266	657				
Piney azimuth	2							85	129	267	758				
Point Pleasant longitude	8	Washington, U. S. Naval Observatory (old site), D. C.	37	11		34			117	267					
Wheeling longitude	9	Washington, U. S. Naval Observatory (old site), D. C.	35	11		34			117	267					
WISCONSIN (Fig. 19)															
Ada 1 (U. S. L. S.) latitude	1						65		106	267				743	
Aminicon (U. S. L. S.) latitude	2						65		106	267				736	
Aminicon River (U. S. L. S.) azimuth.	1							86	129	267				643–645	
Babe azimuth	2							85	129	267					
Boyers Bluff (U. S. L. S.) latitude	3						65		106	267				738	
Bruce (U. S. L. S.) azimuth	3							86	129	267				652–655	
Brule River (U. S. L. S.) latitude	4						65		106	267				736	
Buffalo azimuth	4							85	129	268					U, 57
Burlington azimuth	5							85	129	268					U, 57
Carter azimuth	6							85	129	268					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
WISCONSIN—Continued	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Chalmers azimuth	7							85	129	268					
Claybanks (U. S. L. S.) latitude	5						65		106	268				740	
Detour (U. S. L. S.) azimuth	8							85	129	268					
Door Bluff (U. S. L. S.) latitude	6						65		106	268				738	
Dover (U. S. L. S.) azimuth	9							85	129	268					U, 57
Fennimore longitude	1	Omaha, Nebr	259	19		40			118	268					
Fitzsimmons latitude	7						63		106	269					
Fitzsimmons azimuth	10							85	129	269					
Fond azimuth	11							85	129	269					U, 57
Fort Howard (U. S. L. S.) longitude.	2	Detroit, Mich	7	26		43			118	269				718–721	
		Escanaba, Mich	9	26		43								722	
		Menominee, Wis	10	26		43								722	
Fort Howard (U. S. L. S.) latitude	8						65		106	269				627, 628	
Fox Point (U. S. L. S.) latitude	9						65		106	269				744	
Gordon azimuth	12							85	129	269					
Gratiots Grove latitude	10						63		106	269					
Gratiots Grove azimuth	13							85	129	269					
Green Bay east base azimuth	14							85	129	269					
Green Island (U. S. L. S.) latitude	11						65		106	269				739	
Harding azimuth	15							85	129	269					
High azimuth	16							85	129	270					
Kewaunee (U. S. L. S.) latitude	12						65		106	270				740	
La Crosse longitude	3	Omaha, Nebr	96	13		35			118	270					
La Crosse latitude	13						63		106	270					
Lake azimuth	17							85	129	270					
Laona azimuth	18							85	129	270					
Lem azimuth	19							85	129	270					
Long azimuth	20							85	129	270					
Madison longitude	4	Minneapolis, Minn	3	30		46			118	270					
		Omaha, Nebr	91	25											
		Urbana, Ill	4	30		46									
Madison latitude	14						63		106	270					
Manson azimuth	21							85	129	270					
Massive azimuth	22							85	129	271					
Menominee (U. S. L. S.) longitude	5	Fort Howard, Wis	10	26		43			118	271				722	
Menominee (U. S. L. S.) latitude	15						66		106	271				739	
Minnesota Junction (U. S. L. S.) latitude.	16						66		106	271				628, 629	
Minnesota Junction (U. S. L. S.) azimuth.	23							86	129	271				655–663	
Mount azimuth	24							85	129	271					
Night azimuth	25							85	129	271					
North azimuth	26							85	129	271					
North Sheboygan (U. S. L. S.) latitude.	17						66		106	271				742	
Outer Island (U. S. L. S.) latitude	18						66		106	271				735	
Owen azimuth	27							85	129	272					
Park azimuth	28							85	129	272					
Point azimuth	29							85	129	272					
Point Creek (U. S. L. S.) latitude	19						66		106	272				742	
Prentice azimuth	30							85	129	272					
Pulaski azimuth	31							85	129	272					
Quarry Bluff azimuth	32							85	129	272					
Rawleys Point (Two Rivers) (U. S. L. S.) latitude	20						66		106	272				741	
Rhinelander azimuth	33							85	129	272					
Robert azimuth	34							85	129	273					
Rock Island (U. S. L. S.) latitude	21						66		107	273				738	
Smook azimuth	35							85	129	273					
Somers (U. S. L. S.) latitude	22						63		107	273					
Somers (U. S. L. S.) azimuth	36							85	129	273					
South Sheboygan (U. S. L. S.) latitude	23						66		107	273				743	
Spring Green east base azimuth	37							85	129	273					
Valley Junction (U. S. L. S.) longitude.	6	Detroit, Mich	28	27		43			118	273				759	
Valley Junction (U. S. L. S.) latitude.	24						66		107	273				741	
Wabeno azimuth	38							85	129	273					
Way azimuth	39							85	129	273					
Yerkes Observatory longitude	7	St. Louis, Mo	257	19		39			118	274					
Yerkes Observatory latitude	25						63		107	274					

Station	Station on index sketch	Longitude: Signals exchanged with	Longitude: Difference	Longitude: Observed difference	Longitude: Adjustment (see also columns 12, 13, 14, 15)	Longitude: Adjusted difference and longitude	Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—: (12) Special Publication No. 4	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
WYOMING (Fig. 22)	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
Alkali latitude	1						63		107	274					
Alkali azimuth	1							85	129	274					
Cambria latitude	2						63		107	274					
Cambria azimuth	2							85	129	274					
Cheyenne (U. S. E.) latitude	3						68		107	274					F, 31–45
Coleman latitude	4						63		107	274					
Fort Fred Steele (U. S. E.) latitude	5						68		107	274					D, 85–92.
Green River (U. S. E.) latitude	6						68		107	274					C, 145–154.
Jireh College latitude	7						63		107	274					
Kirtley latitude	8						63		107	274					
Laramie U. S. E.) latitude	9						68		107	274					D, 94–100
Ragged azimuth	3							85	129	274					
Sheridan (U. S. G. S.) longitude	1	St. Louis, Mo	18	29		44			118	275					
Sheridan (U. S. G. S.) latitude	10						67		107	275					
Sherman longitude	2	Salt Lake City, Utah	82	12		35			118	275					
Sherman latitude	11						63		107	275					
Sundance latitude	12						63		107	275					
Twin azimuth	4							85	129	275					
Wheatland longitude	3	Omaha, Nebr	322	21		41			118	275					
Wheatland latitude	13						63		107	275					
Whitaker latitude	14						63		107	275					
Willow azimuth	5							85	129	275					
Wyoming-Colorado Boundary monument, mile post 44 latitude.	15						63		107	275					
Yellowstone Lake longitude	4	Helena, Mont	225	18		39			118	276					
Yellowstone Lake latitude	16						63		107	276					
CANADA															
Beechy Head azimuth (fig. 24)	1							85	129	276					
Columbia River east (U. S. & C.) latitude (fig. 24).	1						68		107	276					
Frederickton longitude		Calais, Me	25	10		34			118	278					
Gargantua (U. S. L. S.) latitude (fig. 19).	2						66		107	276				734	
Gargantua (U. S. L. S.) azimuth (fig. 19).	2							86	129	276					
Goderich (U. S. L. S.) longitude (fig. 16).	1	Detroit, Mich	2	26		43			118	276				754	
Goderich (U. S. L. S.) latitude (fig. 16).	3						66		107	276				742	
Halifax longitude		Bangor, Me	13	10	31	34			118	278					
		Cambridge, Mass	12	10	31	34									
Johnstown (U. S. L. S.) azimuth (fig. 16).	3							86	129	276					
Michipicoten (U. S. L. S.) latitude (fig. 19).	4						66		107	276				733	
Midway (U. S. & C.) latitude (fig. 24).	5						68		107	276					
Montreal longitude		Albany, Dudley Observatory (old site), N. Y.	246	19		39			118	277			245, 246–257		
		Cambridge, Mass	1, 148a	30		46, 37,							219, 246–257		
		Greenwich, England	223a			39							237, 246–257		
St. Ignace (U. S. L. S.), latitude (fig. 19):															
Post Nos. 1, 2, 3	6						66		107	277				623	
Post No. 4	7						66		107	277				623	
Post No. 5	8						66		107	277				623	
Post No. 6	9						66		107	277				623	
Red River (U. S. & C.) latitude [5]															
Silicia Creek (U. S. & C.) latitude (fig. 24).	10						68		107	277					
Tip Top (U. S. L. S.) latitude (fig 19).	11						66		107	277				733	
West Roseau (U. S. & C.) latitude [5]															

[5] See Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy, by John F. Hayford, 1910, p. 13.

Station	Station on index sketch	Longitude					Observed latitude	Observed azimuth	Geographic position and deflection of the vertical	Description of station	Additional details published in—				
		Signals exchanged with	Difference	Observed difference	Adjustment (see also columns 12, 13, 14, 15)	Adjusted difference and longitude					(12) Special Publication No. 4.	(13) Special Publication No. 7	(14) Report for 1897, App. No. 2	(15) Professional Papers No. 24, U.S.E.	Miscellaneous (see p. 293)
	No.		No.	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	Page	
ENGLAND															
Greenwich, Royal Observatory longitude.	----	Brest, France	83	12	----	35	----	----	118	277	----	----	209, 246-257	----	----
		Foilhommerum, Ireland	43	11	----	35	----	----	----	----	----	----	205, 246-257	----	----
		Montreal, Canada	223a	----	----	39	----	----	----	----	----	----	237, 246-257	----	----
		Paris, France	89	12	----	35	----	----	----	----	----	----	211, 246-257	----	----
FRANCE															
Brest longitude	----	Duxbury, Mass	66	12	----	35	----	----	118	277	----	----	207, 246-257	----	----
		Greenwich, England	83	12	----	35	----	----	----	----	----	----	209, 246-257	----	----
		Paris, France	84	12	----	35	----	----	----	----	----	----	209, 246-257	----	----
		St. Pierre, St. Pierre Island.	85	12	----	35	----	----	----	----	----	----	210, 246-257	----	----
Paris longitude	----	Brest, France	84	12	----	35	----	----	118	277	----	----	209, 246-257	----	----
		Greenwich, England	89	12	----	35	----	----	----	----	----	----	211, 246-257	----	----
GUAM ISLAND															
Guam longitude	----	Manila, Philippine Islands.	202	20	----	40	----	----	118	278	----	----	----	----	K
		Midway, Midway Island.	264	20	----	40	----	----	----	----	----	----	----	----	K
HAWAII															
Honolulu longitude	----	Midway, Midway Island.	265	20	----	40	----	----	118	278	----	----	----	----	K
		San Francisco, Presidio (new), Calif.	261	20	----	40	----	----	----	----	----	----	----	----	K
IRELAND															
Foilhommerum longitude	----	Greenwich, England	43	11	----	35	----	----	118	278	----	----	205, 246-257	----	----
		Hearts Content, Newfoundland.	42	11	----	35	----	----	----	----	----	----	205, 246-257	----	----
MEXICO															
Tacubaya longitude	----	El Paso, Tex	231	18	----	39	----	----	118	278	----	----	----	----	----
MIDWAY ISLAND															
Midway longitude	----	Guam, Guam Island	264	20	----	40	----	----	119	278	----	----	----	----	K
		Honolulu, Hawaii	265	20	----	40	----	----	----	----	----	----	----	----	K
NEWFOUNDLAND															
Hearts Content longitude	----	Calais, Me	44	11	----	35	----	----	119	278	----	----	206, 246-257	----	----
		Foilhommerum, Ireland	42	11	----	35	----	----	----	----	----	----	205, 246-257	----	----
PHILIPPINES															
Manila longitude	----	Guam, Guam Island	202	20	----	40	----	----	119	278	----	----	----	----	K
ST. PIERRE ISLAND															
St. Pierre longitude	----	Brest, France	85	12	----	35	----	----	119	278	----	----	210, 246-257	----	----
		Cambridge, Mass	88	12	----	35	----	----	----	----	----	----	210, 246-257	----	----
		Washington, U. S. Naval Observatory (old site), D. C.	87	25	----	----	----	----	----	----	----	----	----	----	----