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DANIEL C. ROPER, Secretary

COAST AND GEODETIC SURVEY

R. S. PATTON, Director

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TRIANGULATION IN UTAH

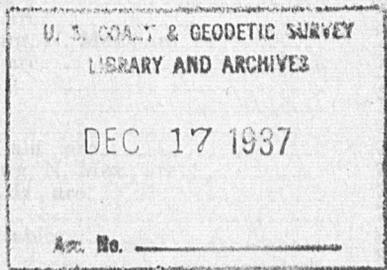
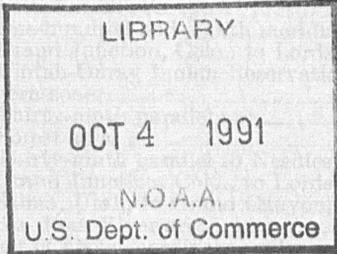
(1927 DATUM)

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# TRIANGULATION IN UTAH (1927 DATUM)

## GENERAL STATEMENT

This volume contains the results of all first- and second-order triangulation in Utah executed by the United States Coast and Geodetic Survey, the final data for which were available at the time of publication. Triangulation just over the boundary in adjoining States has been included also in order that all existing data required for surveys in Utah, even near the boundaries, might be available in one volume. The geographic positions of the triangulation stations contained herein are based on a new datum as a result of the readjustment of all the triangulation in the United States and supersede the positions in Utah which appeared in Special Publication No. 19.

Part of the first-order triangulation in Utah is a section of the transcontinental arc extending from the Atlantic to the Pacific along the thirty-ninth parallel. A quadrilateral was extended northward to Great Salt Lake where it had been decided to have a base line which later was measured in 1896. This was the first base line measured with the Duplex base apparatus designed by Assistant William Eimbeck. A large number of supplementary points were established in connection with the work on the transcontinental arc for the purpose of providing additional stations for this area as the lines of the main arc are unusually long. The field work on the transcontinental arc and supplementary points in this State was done at various times between 1884 and 1898.

The triangulation in the southwestern corner of the State is part of a first-order arc extending from the transcontinental arc to Needles, Calif., the field work for which was done in 1925.

Two triangulation stations near the State boundary in Idaho are included. These stations were established in 1897 on a first-order arc that it was proposed to extend from Great Salt Lake northward to the United States-Canada boundary. The plan was dropped, however, and the stations were later used for starting the Utah-Washington arc in 1915.

In 1919 a second-order scheme of triangulation was developed over the central part of the State to control surveys in the forest areas of that region. All of this work lies within the transcontinental arc with which it is rigidly connected through main scheme and supplementary stations.

This volume also includes a portion of what is called the one-hundred-and-eighth meridian arc, executed in 1931, which extends from the thirty-ninth parallel arc northward to the State boundary. The arc takes its name from its position farther north, as the part in Utah is located mostly west of the one-hundred-and-ninth meridian. There is also included the portion of the Grand Junction, Colo., to Lordsburg, N. Mex., arc which is close to and parallel with the eastern boundary of Utah. This work was done in 1934, and one of its important supplementary stations is the one called "Four Corners" (see

fig. 1), the corner common to the four States of Utah, Colorado, New Mexico, and Arizona.

In 1934 the Salina, Utah-Grand Canyon, Ariz., arc of first-order triangulation was extended southward from the thirty-ninth parallel arc to connect with triangulation used for the control of surveys of the Boulder Dam project.

In 1936 two arcs of first-order triangulation were executed to provide control for surveys executed by the Soil Conservation Service. These were the Uintah-Ouray Indian Reservation arc, and the San Juan River arc.

All told, there are reported in this volume the results obtained on parts or on all of seven arcs of first-order triangulation and on one arc of second-order triangulation. These arcs are listed by name in the Table of Contents.

This volume is the fourteenth of a series of publications, each of which contains the geographic positions on the new datum, and the descriptions and other data, for the available first-order (and, in some cases, the second-order) triangulation and traverse of a State, or occasionally of two States. The following volumes have already been published:

	Spec. Pub. no.
Triangulation in Colorado.....	160
First-Order Triangulation in Southeast Alaska.....	164
First- and Second-Order Triangulation in Oregon.....	175
First-Order Triangulation in Kansas.....	179
First-Order Triangulation and Traverse in Louisiana.....	183
First-Order Triangulation in Missouri.....	186
First-Order Triangulation and Traverse in Arkansas.....	187
Triangulation in Texas.....	189
Triangulation in Oklahoma.....	190
First- and Second-Order Triangulation and Traverse in North Carolina....	192
First- and Second-Order Triangulation in Tennessee.....	198
First- and Second-Order Triangulation in California.....	202
First- and Second-Order Triangulation and Traverse in Minnesota.....	203

### READJUSTMENT OF THE TRIANGULATION NET

The triangulation of the United States has been built up by continually adding new arcs to those already measured, and for many years in adjusting this triangulation the plan had to be followed of fitting the new arcs of triangulation to the old ones which had been previously adjusted. This method was the only one that could be followed until a comprehensive net had been built up and it led to no serious difficulty until the point was reached where the new arcs formed closed loops with the old arcs. It then developed that the last arc to close a loop received excessive corrections when adjusted to the previous triangulation, because the entire error of closure of the loop had to be absorbed by it.

It was realized that the only way to overcome this difficulty was to adjust the entire network at one time. It was impracticable, however, to readjust the network each time a new arc was added or an additional loop was closed as the time required to do so was too great and if this were done, the geographic positions of the triangulation stations would be in a continual state of change, a condition very disturbing to those using the data.

In 1926 the triangulation net west of the ninety-eighth meridian had become so extended that it could serve as a framework for all future

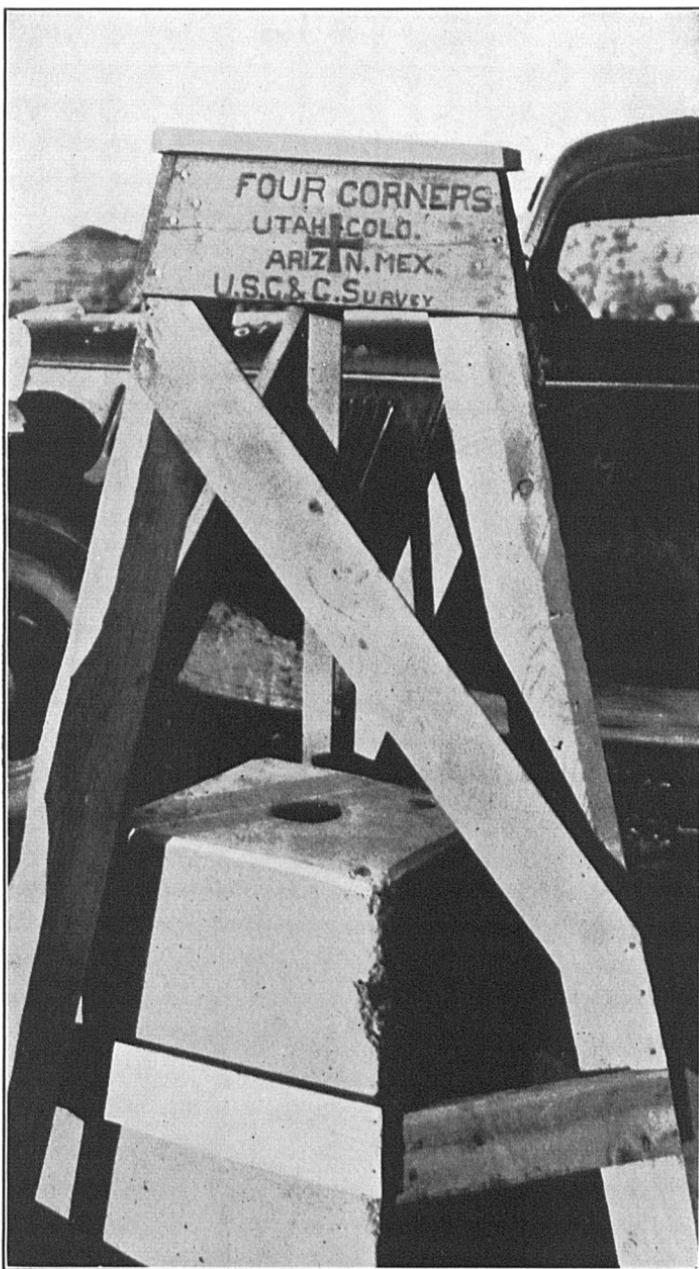


Figure 1.—Monument marking triangulation station Four Corners (G. L. O. Station 1), which is common to the four States: Utah, Colorado, Arizona, and New Mexico.

triangulation in that area and it was found desirable to adjust this portion of the United States net in one piece. In preparation for this adjustment a method was devised, in 1924, at the office of the Coast and Geodetic Survey,<sup>1</sup> by means of which a large network of triangulation could be adjusted within a reasonable time and at a comparatively small cost. This method was applied first to the triangulation west of the ninety-eighth meridian involving 12,500 miles of arcs in 16 closed loops. Later it was applied to the eastern half of the net involving 13,000 miles of arcs forming 26 loops. The adjusted net of the country is now of such extent and strength that all new arcs hereafter can be fitted to it without having to disturb the old work and without causing excessive corrections to the new work.

#### NORTH AMERICAN DATUM OF 1927

The original adjustment of the triangulation included in this publication was computed upon the Clarke spheroid of 1866, on what was called at that time the North American datum. In the readjustment of the triangulation in the western part of the United States the same spheroid was used as surface of reference, but only one station was held in position. The station, Meades Ranch, in Kansas, was assigned the same position that it had in the original United States standard datum, later called the North American datum. This position of Meades Ranch is as follows:

$$\begin{aligned}\text{Latitude} &= 39^{\circ}13'26''.686 \\ \text{Longitude} &= 98^{\circ}32'30''.506\end{aligned}$$

This position was held in the new datum because it had been found to be best in accord with the country as a whole in the extensive investigation that was carried out at the time of the adoption of the original datum. If any are interested in the procedure followed in the establishment of this former datum, an account of it can be found in any one of the following publications, which contain triangulation and traverse data based on the datum in use prior to 1927: Special Publications Nos. 11, 13, 16, 17, 19, 24, 30, 31, 43, 46, 54, 62, 70, 74, 76, 78, 79, 86, 88, 101, and 114.

The orientation in the new adjustment is controlled by the various Laplace azimuths distributed throughout the network of arcs. The position of Meades Ranch, together with the Laplace azimuths included in the arcs, serve to define the North American datum of 1927. The date is appended to the name of the new datum to distinguish it from the old North American datum. A station is said to be on this North American datum of 1927 when it is rigidly adjusted to the scheme of the readjusted triangulation.

#### GENERAL DESCRIPTION OF TABLES AND SKETCHES

The tables of geographic positions, on pages 20 to 55, also contain the distances between contiguous triangulation stations in meters and feet, the logarithms of the distances in meters, and the azimuths of the lines joining these stations. The distances are corrected for elevation above mean sea level, and the azimuths are referred to the true south. Anyone who wishes to obtain the actual distances between the triangulation stations should use the formula given on

<sup>1</sup> For a description of the method used see Special Publication No. 169.

page 18, by which the true distance at the mean elevation of the stations can be derived from the distance at sea level. There are also given on pages 59 to 79 of this publication tables of plane coordinates on the State system. Further reference to these are made on pages 5 and 18, and an explanation thereof immediately precedes the tables themselves. The descriptions of the stations, given on pages 99 to 154, are designed to enable the engineer to recover and identify the station mark after he has visited the general locality of the station. There will be times when the description, so far as witness and other marks are concerned, will have become out of date from changes by nature or by the work of man. Any engineer who may visit a station and find that the description does not truly represent the present conditions, or who finds the mark destroyed or mutilated, should report the facts to the Director of the Coast and Geodetic Survey, at Washington, D. C., in order that the files of this office may be kept up to date. The engineer should realize that the triangulation extended over the country by the Coast and Geodetic Survey is a public survey, made for the use of the people. The stations really belong to the States in which they are located, and the engineer who is so fortunate as to find one of these stations located near his work should help to perpetuate the monuments in order that they may be of continuous service and value to his locality. The Coast and Geodetic Survey officials will, from time to time, visit the stations established and will re-mark and re-describe them if necessary.

At most of the stations there are reference and witness marks that were established to assist in locating the station. The distance and azimuth from the station to each of these additional marks are usually given in the description of the station, and the measurements are supposed to be so carefully made, at least to the reference marks, that if the station mark becomes lost or destroyed the station can be relocated accurately enough for use in third-order and local surveys.

Near the back of this publication will be found a number of sketches which show graphically the approximate locations of the stations, especially with reference to State and county boundaries, and the lines over which the main-scheme observations were made. It is suggested that if one should wish to learn whether there are triangulation stations in the vicinity of his work he should first consult the sketches. He can obtain from them the names of the stations that may be of help to him; then he should turn to the index on page 155 of this volume, from which he can find the pages upon which the descriptions and geographic positions of the stations appear.

#### OTHER PUBLICATIONS OF VALUE TO THE ENGINEER

If an engineer wishes to compute geographic positions for the stations of any triangulation that he may execute, he should procure a copy of Coast and Geodetic Survey Special Publication No. 8 from the Superintendent of Documents, Washington, D. C. The cost of this publication is 25 cents. If he is interested in knowing the length in meters of the degrees, minutes, and seconds of latitude and longitude in the region in which he is working, he can obtain them from Special Publication No. 5, which can be purchased at a cost of 20 cents, from the Superintendent of Documents.

In the past when an engineer desired to use plane coordinates for his triangulation rather than spherical coordinates, he found the transformation easily made through the use of Special Publication No. 71, Relation Between Plane Rectangular Coordinates and Geographic Positions. This publication proved very useful to many engineers, particularly in cities, where intensive surveys of a high order of accuracy could most easily be made by triangulation, but best adapted to the general use of the various engineering bureaus through the medium of plane coordinates.

Recently, however, in order to make geodetic control data of greater use to engineers and surveyors, a plane coordinate system has been established in each of the 48 States. In this publication the data for each triangulation station will include not only its geographic position (latitude and longitude) but also its  $x$  and  $y$  coordinates on one of the zones of the plane rectangular system (see p. 56) established for this State. For stations located in the vicinity of boundary lines between two zones, which might be useful in controlling large surveys extending from either zone into the other, plane coordinates on both zones are given. The use of these plane coordinates will enable the engineer to extend his surveys over wide areas or coordinate old surveys with the national control survey without having to resort to the formulas of geodetic surveying. The engineer desiring to make the fullest use of these plane-coordinate systems will do well to secure from the Superintendent of Documents copies of the following Special Publications: No. 193, Manual of Plane-Coordinate Computation, cost 35 cents; and No. 194, Manual of Traverse Computation on the Lambert Grid, cost 20 cents.

The Coast and Geodetic Survey has issued a number of manuals on the various classes of its work. The ones that would be of value to an engineer in connection with triangulation, including base measurements, are Special Publication No. 120, Manual of First-Order Triangulation, cost 40 cents; Special Publication No. 145, Manual of Second- and Third-Order Triangulation and Traverse, cost 60 cents; and Special Publication No. 137, Manual of First-Order Traverse, cost 30 cents. If he is interested in the determination of azimuth to a high degree of accuracy, he should procure a copy of Special Publication No. 14, Determination of Time, Longitude, Latitude, and Azimuth, cost 35 cents. If he is interested only in the determination of approximate azimuths, he should secure a copy of Serial No. 166, Directions for Magnetic Measurements, cost 15 cents.

In computing his triangulation the engineer will find that Special Publication No. 138, Manual of Triangulation Computation and Adjustment, cost 50 cents, will be of great assistance to him.

The reader can secure from the Director of the United States Coast and Geodetic Survey, free of charge, several leaflets which describe geodetic surveying and which also show how triangulation can be used in connection with the boundary surveys of private and public property.

#### CLASSIFICATION OF TRIANGULATION

Triangulation is divided into different classes according to accuracy. Four classes of triangulation are now defined by the Federal Board of Surveys and Maps, viz, first, second, third, and fourth orders. The first three of these are, respectively, equal in accuracy to the classes

primary, secondary, and tertiary as formerly defined and used by the Coast and Geodetic Survey.

The ultimate criterion applied in classifying the different grades of triangulation is the actual error in the length of any line. This is indicated by the discrepancy between the measured length of a base line and its length as computed through the triangulation from the last preceding base. In first-order triangulation such discrepancies must not exceed 1 part in 25,000, in second-order triangulation 1 part in 10,000, and in third-order triangulation 1 part in 5,000. Before making the comparison between the computed and measured lengths the adjustment of the triangulation should be carried to the point where the side and angle equations have been satisfied. It is also necessary to take into consideration the maximum actual error in the measurement of the base lines.

To secure the accuracy indicated above, certain standards are adopted for the field work, the most important one of which relates to the closing errors of the triangles or the discrepancy between the sum of the measured angles in a triangle and  $180^\circ$  plus the spherical excess of the triangle. In first-order triangulation the average closing error of the triangles must not be greatly in excess of 1 second, in second-order it should not be more than 3 seconds, and in third-order not more than about 5 seconds. The shape of the figures in the triangulation scheme, the frequency of bases, the size and type of instrument, and the number and kind of observations are all selected with due regard to the accuracy desired.

Under certain conditions the proportionate error in the length of a line as specified above may be found to be exceeded in any class of triangulation. Where two points are fairly close together as compared with the size of the triangulation scheme, the distance between those points may be in error in excess of that indicated by the class of triangulation of the scheme. The accuracy of the computed length of any line can be estimated by computing the  $\Sigma R_1$  in accordance with the formula for the strength of figures as given in Coast and Geodetic Survey Special Publication No. 145. In any class of triangulation the subsidiary stations will be located with a less degree of accuracy than the main-scheme stations.

#### CHARACTERISTICS OF FIRST-ORDER TRIANGULATION

Except for a second-order scheme of triangulation established in the central part of Utah for the control of surveys of forest areas, the triangulation contained in this volume is of the first order. First-order triangulation is done with such accuracy that the average closing errors of the triangles is of the order of 1 second. In order that the angles may have this high degree of accuracy, large theodolites are used. The theodolite, as is well known, is similar in its appearance to the surveyor's transit. The main differences are in the excellence of the workmanship, the accuracy of graduation of the circle, in having micrometer microscopes for reading this circle, and in having a telescope with a high resolving power. Observations are made either on heliotropes, by which the light of the sun is reflected toward the observer, or on acetylene or electric signal lamps. The heliotrope, or lamp, and the theodolite must be centered directly over the station marks.

At certain intervals, depending upon the shape of the triangles, base lines are measured. A base is necessarily a side of one of the triangles. The ends of the base must be intervisible from the ground or from towers that may be erected over them. In the early years of the Coast and Geodetic Survey's existence the base lines were measured with metal bars, but near the beginning of the present century steel tape lines began to be used in the measurements. Since 1907 all of the bases of the survey have been measured with invar tapes. The probable error of a measured base is about 1 part in 1,000,000 of its length. This accuracy meets all the requirements of engineering and science.

The azimuths of the triangulation depend upon what are called Laplace azimuths, or azimuths determined by observations on Polaris, which have been corrected for the deflection of the vertical at each Laplace station. These deflections are due to the attraction of mountain or plateau masses that are comparatively near the place at which observations are made. The probable error of a Laplace azimuth is about  $\pm 0.3$  second.

If one is interested in the accuracy with which the triangulation of the Coast and Geodetic Survey is done and the reliability of the geographic positions which are given in this publication, he should refer to Special Publication No. 159, The Bowie Method of Triangulation Adjustment as Applied to the First-Order Net in the Western Part of the United States.

#### CHARACTERISTICS OF SECOND-ORDER TRIANGULATION

In second-order triangulation the same general principles apply as in first-order triangulation, but the details of the work will vary with the circumstances. The angles are nearly always determined with a smaller number of measures. The accuracy of second-order triangulation is represented by an average closing error of a triangle of not more than 3 seconds of arc.

Second-order triangulation has been used principally for three purposes: First, for the main scheme of an isolated region of moderate extent such as the Philippine Islands; second, to connect third-order with first-order triangulation when the latter lies at a considerable distance from the area requiring the detailed third-order control; and third, as the detailed control over areas of economic importance. The increasing demand for second-order horizontal control, under the last set of conditions, and the growing economic importance of the entire coastal region of the United States, led the Director of the Coast and Geodetic Survey to decide, early in 1928, to make the entire coastal main-scheme triangulation of first- or second-order accuracy.

#### SUPPLEMENTARY STATIONS

In addition to the stations which form the main network of triangles in Utah, a number of objects, such as mountain peaks, church spires, and schoolhouse cupolas, were observed from stations of the main scheme. The geographic positions and plane coordinates of these supplementary stations have been computed and are included in this publication. These stations are shown on the sketches and in the index, but only a few of them are given in the descriptions of stations, as in most cases the name of the object is all the description that is available. Ordinarily the name of the supplementary station is

sufficient for its accurate identification by the engineer who may wish to use it.

Usually a mountain peak is rather an indefinite object on which to point, and therefore, the geographic position obtained for it is somewhat uncertain. It should not be used as a basis for local surveys except as a last resort.

### USE OF HORIZONTAL CONTROL DATA

The plan or map for any extensive engineering project, whether or not map construction is the primary object, should have all of its parts properly correlated and should be on the same datum as adjacent surveys. Federal and State mapping organizations have long been aware of the necessity for having all surveys based upon a common datum, but local engineers and surveyors in this country have too often in the past been content, and in many cases compelled to use a local datum for their surveys. The future economic disadvantage of such a system is now becoming recognized, with the result that city and county surveys are being more generally placed upon a permanent basis by connecting them to stations on the North American datum of 1927.

One other factor must be taken into consideration by the engineer of today. As the States develop industrially they will undoubtedly follow the lead of one of the Eastern States, Massachusetts, which with splendid foresight has extended its triangulation control over the entire State for the purpose of defining property boundaries in terms of latitude and longitude. The advantage of such a system is well stated in the following extracts from the report on the Maryland oyster survey:

The difficulties of accurately locating and permanently defining the boundaries of a farmers' plantation on land, even with the aid of monuments, public roads, streams of water, and other points of reference, are often great, judging from the disputes frequently arising in connection with boundaries. \* \* \*

There is only one point on the earth's surface at the intersection of any one parallel of latitude and any one meridian of longitude, and therefore there can be no dispute as to the meaning of such a geographic definition of the location of a point, even though all the original triangulation station marks used in its determination, together with the chart on which its position was originally plotted, have been totally destroyed.

In the case of the destruction of an original triangulation station mark, or any other point defined by a geographic position, a competent geodetic engineer can reestablish its exact location by means of a new system of triangulation connecting with other distant triangulation marks which have not been destroyed.

Another Eastern State, New Jersey, early in the year 1935, through legislative enactment,<sup>2</sup> gave legal recognition to the use of its State plane-coordinate system for describing the boundaries of private properties. Similar action was taken by Pennsylvania in 1937, and other States are showing considerable interest in the action of these States with the evident intent of at least considering similar legislation for themselves.

There are a number of instances where corporations owning large tracts of land have attempted to make surveys of their boundaries and of subdivisions of property by means of traverse. This method can be used if certain precautions are taken, but most of these corporations have found it advisable to use the method of triangulation

<sup>2</sup>Chapter 116, Laws of 1935, State of New Jersey.

for the determination of relative positions of their boundary monuments and of other points which lie within those boundaries. If the triangulation in question is connected with the triangulation system of the Coast and Geodetic Survey, then true geographic positions can be obtained as well as the relative ones.

In a section of the country covered by adequate geodetic control the data are available to the engineer for any of the following operations, in addition to their possible future use as a basis for cadastral surveys:

**1. Extensive mapping.**—The topographer needs as initial data for beginning a topographic survey the distance and direction between two points and the geographic position of one of them in latitude and longitude. His local triangulation or traverse, based on this control, will prevent the accumulation of excessive errors as he carries on his mapping operations. In the event that the available first-order triangulation in that region has lines of too great length to join to conveniently, he can measure a base and azimuth at some place visible from a first- or second-order triangulation station and connect his base to the station by triangulation, thus obtaining proper geographic positions for his local surveys. On recent triangulation special azimuth marks have been set. (See p. 19.)

**2. Boundary lines.**—If it is desired to locate or to delimit accurately and permanently the boundaries of political subdivisions, such as States, counties, or cities, the methods indicated in the preceding paragraph may be followed. Whenever possible, a line of the adjusted triangulation or traverse should be used as a basis for local surveys rather than a point, since a line gives the three essentials of position, length, and direction.

**3. Local intensive surveys.**—The necessity for such surveys arises most frequently in connection with extensive improvements over a considerable area or as a basis for city planning, where the needs of a city are being anticipated for a number of years. Here the requirements are somewhat different from those in the two preceding operations, for it is often necessary to extend first- or second-order control in considerable detail over the entire area affected, third-order triangulation or traverse then being used to furnish additional points for the survey. Such a control survey should invariably be started from a line of adjusted triangulation or traverse.

While it may be noted in the preceding paragraphs that the azimuth and length of a line and the geographic positions of the ends of that line constitute the essential data for the complete utilization of old work as a basis for new work, there is always grave danger in depending upon this minimum of data. There may be failure to identify the true station mark, or the mark, though genuine, may have been tampered with or otherwise disturbed in position. This will, of course, introduce an error into the new work based on these stations. It is the present practice in this survey, unless unusual conditions render it unnecessary, to establish the integrity of the recovered points by using at least three old stations as a basis for new work, the third station serving as a check for the two stations on which the new work may actually depend.

The Coast and Geodetic Survey will be glad to give advice on any problem arising out of the use of its control points or on any proposed extension of triangulation or traverse from them.

## EXPLANATION OF TABLE FOR POLYCONIC MAP PROJECTION

The engineer or surveyor who makes use of the data in this publication may find it desirable to construct a map covering the territory he is surveying. He may wish to show on this map the meridians and parallels so as to be able to plot the positions of the triangulation stations included in the area and show the details of his survey in the correct geographic positions. To enable him to do this with the least possible difficulty, the following table, reprinted from Coast and Geodetic Survey Special Publication No. 5, has been inserted. This table may also be used to interpret in terms of degrees, minutes, and seconds of arc any relatively short distance measured along a meridian or parallel. The method of using the table is described below.

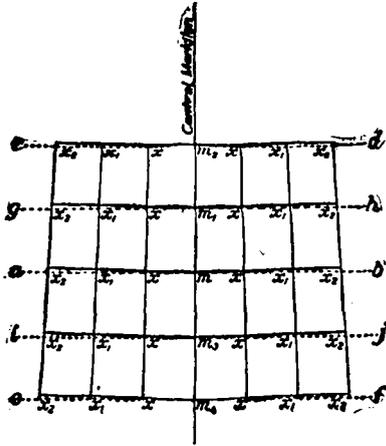


FIGURE 2.—Sketch showing construction of polyconic projection.

NOTE.—In this figure the angles made at the central meridian by the parallels are grossly exaggerated. In an actual projection the parallels appear practically as straight lines.

To make a projection for a large-scale map (1 to 20,000 and larger), first draw a straight line for a central meridian and a construction line  $ab$  perpendicular thereto, each to be as central to the sheet as the selected interval of latitude and longitude will permit. (See fig. 2 above.) On the central meridian lay off, on the desired scale, the distances  $mm_2$  and  $mm_4$ , using the length of 1 minute along the meridian for the latitude of  $m$ , as given in the table in the column headed "Arc of the meridian, 1'", and multiplying this length by the number of minutes for the interval between the central parallel and the extreme parallels. Through  $m_2$  and  $m_4$  draw straight lines,  $cd$  and  $ef$  parallel to the line  $ab$ . On the lines  $ef$ ,  $ab$ , and  $cd$  lay off to the scale of the map the distances  $m_4x_2$ ,  $mx_2$ , and  $m_2x_2$  on both sides of the central meridian, taking the values from the column headed "Arc of the parallel, 1'", corresponding to the latitude of  $m_4$ ,  $m$ , and  $m_2$ , respectively. The value of 1 minute as taken from the table must be multiplied by the number of minutes out from the central meridian. Draw straight lines through the points thus determined for the extreme meridians—that is, through the  $x_2$  points.

At the two points designated  $x_2$  on the line  $ab$  lay off along the meridians the value of  $Y$  as given in the table under "Y coordinate

of curvature," using as argument the interval in minutes between the central meridian and the extreme meridian. Draw straight lines from these points to the point  $m$  for the middle parallel, and from the points of intersection with the extreme meridians lay off distances along these meridians, above and below, equal to the distances  $mm_2$  and  $mm_4$  to locate points in the extreme parallels.

Subdivide each of the three meridians and three parallels already determined into parts corresponding with the projection interval and join the corresponding points of subdivision by straight lines to complete the projection.

The method outlined above may be used for all large-scale maps regardless of the number of meridians and parallels shown. For small-scale maps the method is somewhat more complicated, and it becomes necessary to make use of Special Publication No. 5, which may be obtained for 20 cents from the Superintendent of Documents, Washington, D. C.

*Polyconic map projection table*

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature, latitude 37°
	1"	1'	1"	1'		
° /	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	° /	<i>Meters</i>
37 00	24.720	1,483.6	30.828	1,849.58	0 1	0.1
1	.721	3.3	6	.59	2	0.5
2	.715	2.9	7	.59	3	1.2
3	.710	2.6	7	.60	4	2.1
4	.704	2.3	7	.61		
37 05	24.699	1,481.9	30.827	1,849.61	0 5	3.3
6	.684	1.6	7	.62	6	4.7
7	.688	1.3	7	.62	7	6.4
8	.683	1.0	7	.63	8	8.3
9	.677	0.6	7	.63	9	10.5
37 10	24.672	1,480.3	30.827	1,849.64	0 10	13.0
11	.667	30.0	7	.64	15	29.2
12	.661	79.7	7	.65	20	51.9
13	.656	9.3	8	.65	25	81.2
14	.650	9.0	8	.66	30	116.9
37 15	24.645	1,478.7	30.828	1,849.66	0 35	159.1
16	.639	8.4	8	.67	40	207.8
17	.634	8.1	8	.67	45	283.0
18	.629	7.7	8	.68	50	324.6
19	.623	7.4	8	.68	55	392.8
37 20	24.618	1,477.1	30.828	1,849.69	1 00	467.5
21	.612	6.8	8	.69	05	548.6
22	.607	6.4	8	.70	10	636.3
23	.601	6.1	8	.71	15	730.4
24	.596	5.8	9	.71	20	831.1
37 25	24.590	1,475.4	30.829	1,849.72	1 25	938.2
26	.585	5.1	9	.72	30	1,051.8
27	.580	4.8	9	.73	35	1,171.9
28	.574	4.4	9	.73	40	1,298.5
29	.569	4.1	9	.74	45	1,431.6
37 30	24.563	1,473.8	30.829	1,849.74	1 50	1,571.2
31	.558	3.5	9	.75	55	1,717.3
32	.552	3.1	9	.75	2 00	1,870
33	.547	2.8	9	.76	3 00	4,207
34	.541	2.5	9	.76	4 00	7,479
37 35	24.536	1,472.2	30.829	1,849.77		
36	.530	1.8	30	.77		
37	.525	1.5	0	.78		
38	.519	1.2	0	.78		
39	.514	0.8	0	.79		
37 40	24.509	1,470.5	30.830	1,849.80		
41	.503	70.2	0	.80		
42	.498	69.9	0	.81		
43	.492	9.5	0	.81		
44	.487	9.2	0	.82		
37 45	24.481	1,468.9	30.830	1,849.82		
46	.476	8.5	0	.83		
47	.470	8.2	1	.83		
48	.465	7.9	1	.84		
49	.459	7.5	1	.84		
37 50	24.454	1,467.2	30.831	1,849.85		
51	.448	6.9	1	.85		
52	.443	6.6	1	.86		
53	.437	6.2	1	.86		
54	.432	5.9	1	.87		
37 55	24.426	1,465.6	30.831	1,849.88		
56	.421	5.2	1	.88		
57	.415	4.9	1	.89		
58	.410	4.6	2	.89		
59	.404	4.2	2	.90		
38 00	24.399	1,463.9	30.832	1,849.90		

*Polyconic map projection table—Continued*

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature, latitude 38°
	1"	1'	1"	1'		
° /	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	° /	<i>Meters</i>
38 00	24.399	1,463.9	30.832	1,840.00	0 1	0.1
1	.393	3.6	2	.91	2	0.5
2	.387	3.2	2	.91	3	1.2
3	.382	2.9	2	.92	4	2.1
4	.376	2.6	2	.92		
38 05	24.371	1,462.3	30.832	1,849.93	0 5	3.3
6	.365	1.9	2	.93	6	4.7
7	.360	1.6	2	.94	7	6.4
8	.354	1.3	2	.94	8	8.4
9	.349	0.9	2	.95	9	10.6
38 10	24.343	1,460.6	30.833	1,849.95	0 10	13.1
11	.338	00.3	3	.96	15	29.5
12	.332	59.0	3	.97	20	52.4
13	.327	9.6	3	.97	25	81.9
14	.321	9.3	3	.98	30	118.0
38 15	24.315	1,458.9	30.833	1,849.98	0 35	160.6
16	.310	8.6	3	.99	40	209.8
17	.304	8.3	3	49.99	45	265.5
18	.299	7.9	3	50.00	60	327.7
19	.293	7.6	3	.00	55	396.5
38 20	24.288	1,457.3	30.833	1,850.01	1 00	471.9
21	.282	6.9	4	.01	05	553.8
22	.276	6.6	4	.02	10	642.3
23	.271	6.3	4	.02	15	737.3
24	.265	5.9	4	.03	20	838.9
38 25	24.260	1,455.6	30.834	1,850.03	1 25	947.1
26	.254	5.8	4	.04	30	1,061.8
27	.249	4.9	4	.05	35	1,183.0
28	.243	4.6	4	.05	40	1,310.8
29	.237	4.2	4	.06	45	1,445.2
38 30	24.232	1,453.9	30.834	1,850.06	1 50	1,586.1
31	.226	3.6	4	.07	55	1,733.5
32	.221	3.2	5	.07	2 00	1,888
33	.215	2.9	5	.08	3 00	4,247
34	.210	2.6	5	.08	4 00	7,549
38 35	24.204	1,452.2	30.835	1,850.09		
36	.198	1.9	5	.09		
37	.193	1.6	5	.10		
38	.187	1.2	5	.10		
39	.182	0.9	6	.11		
38 40	24.176	1,450.6	30.835	1,850.11		
41	.170	50.2	6	.12		
42	.165	49.9	6	.13		
43	.159	9.6	6	.13		
44	.154	9.2	6	.14		
38 45	24.148	1,448.9	30.836	1,850.14		
46	.142	8.5	6	.15		
47	.137	8.2	6	.15		
48	.131	7.9	6	.16		
49	.125	7.5	6	.16		
38 50	24.120	1,447.2	30.836	1,850.17		
51	.114	6.9	6	.17		
52	.109	6.5	6	.18		
53	.103	6.2	6	.18		
54	.097	5.8	6	.19		
38 55	24.092	1,445.5	30.837	1,850.20		
56	.086	5.2	7	.20		
57	.080	4.8	7	.21		
58	.075	4.5	7	.21		
59	.069	4.1	7	.22		
39 00	24.063	1,443.8	30.837	1,850.22		

*Polyconic map projection table—Continued*

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature, latitude 39°
	1"	1'	1"	1'		
° /	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	° /	<i>Meters</i>
39 00	24.063	1,443.8	30.837	1,850.22	0 1	0.1
1	.058	3.5	7	.23	2	0.5
2	.052	3.1	7	.23	3	1.2
3	.047	2.8	7	.24	4	2.1
4	.041	2.5	7	.24		
39 05	24.035	1,442.1	30.837	1,850.25	0 5	3.3
6	.030	1.8	8	.25	6	4.8
7	.024	1.4	8	.26	7	6.5
8	.018	1.1	8	.26	8	8.5
9	.013	0.8	8	.27	9	10.7
39 10	24.007	1,440.4	30.838	1,850.28	0 10	13.2
11	4.001	40.1	8	.28	15	29.7
12	3.996	39.7	8	.29	20	52.0
13	.990	9.4	8	.29	25	82.0
14	.984	9.1	8	.30	30	118.9
39 15	23.979	1,438.7	30.838	1,850.30	0 35	161.9
16	.973	8.4	8	.31	40	211.5
17	.967	8.0	9	.31	45	267.6
18	.962	7.7	9	.32	50	330.4
19	.956	7.4	9	.32	55	399.8
39 20	23.950	1,437.0	30.839	1,850.33	1 00	475.8
21	.944	6.7	9	.33	05	558.4
22	.939	6.3	9	.34	10	647.6
23	.933	6.0	9	.35	15	743.4
24	.927	5.6	9	.35	20	845.8
39 25	23.922	1,435.3	30.839	1,850.36	1 25	954.8
26	.916	5.0	9	.36	30	1,070.4
27	.910	4.6	39	.37	35	1,192.6
28	.905	4.3	40	.37	40	1,321.4
29	.899	3.9	0	.38	45	1,456.8
39 30	23.893	1,433.6	30.840	1,850.38	1 50	1,598.8
31	.888	3.3	0	.39	55	1,747.5
32	.882	2.9	0	.39	2 00	1,903
33	.876	2.6	0	.40	3 00	4,281
34	.870	2.2	0	.40	4 00	7,611
39 35	23.865	1,431.9	30.840	1,850.41		
36	.859	1.6	0	.42		
37	.853	1.2	0	.42		
38	.847	0.9	0	.43		
39	.842	0.5	1	.43		
39 40	23.836	1,430.2	30.841	1,850.44		
41	.830	29.8	1	.44		
42	.825	9.5	1	.45		
43	.819	9.1	1	.45		
44	.813	8.8	1	.46		
39 45	23.807	1,428.4	30.841	1,850.46		
46	.802	8.1	1	.47		
47	.796	7.8	1	.47		
48	.790	7.4	1	.48		
49	.784	7.1	1	.49		
39 50	23.779	1,426.7	30.842	1,850.49		
51	.773	6.4	2	.50		
52	.767	6.0	2	.50		
53	.761	5.7	2	.51		
54	.756	5.3	2	.51		
39 55	23.750	1,425.0	30.842	1,850.52		
56	.744	4.7	2	.52		
57	.738	4.3	2	.53		
58	.733	4.0	2	.53		
59	.727	3.6	2	.54		
40 00	23.721	1,423.3	30.842	1,850.54		

*Polyconic map projection table—Continued*

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature, latitude 40°
	1"	1'	1"	1'		
° /	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	<i>Meters</i>	° /	<i>Meters</i>
40 00	23. 721	1, 423. 3	30. 842	1, 850. 64		
1	. 715	2. 9	2	. 55	0 1	0. 1
2	. 710	2. 6	3	. 56	2	0. 5
3	. 704	2. 2	3	. 56	3	1. 2
4	. 698	1. 9	3	. 57	4	2. 1
40 05	23. 692	1, 421. 5	30. 843	1, 850. 57	0 5	3. 3
6	. 686	1. 2	3	. 58	6	4. 8
7	. 681	0. 8	3	. 58	7	6. 5
8	. 675	0. 5	3	. 59	8	8. 5
9	. 669	20. 1	3	. 59	9	10. 8
40 10	23. 663	1, 419. 8	30. 843	1, 850. 60	0 10	13. 3
11	. 658	9. 5	3	. 60	15	29. 9
12	. 652	9. 1	3	. 61	20	53. 2
13	. 646	8. 8	4	. 61	25	83. 2
14	. 640	8. 4	4	. 62	30	119. 8
40 15	23. 634	1, 418. 1	30. 844	1, 850. 63	0 35	163. 0
16	. 629	7. 7	4	. 63	40	212. 0
17	. 623	7. 4	4	. 64	45	269. 4
18	. 617	7. 0	4	. 64	50	332. 6
19	. 611	6. 7	4	. 65	55	402. 5
40 20	23. 605	1, 416. 3	30. 844	1, 850. 65	1 00	479. 0
21	. 600	6. 0	4	. 66	05	562. 2
22	. 594	5. 6	4	. 66	10	652. 0
23	. 588	5. 3	4	. 67	15	748. 5
24	. 582	4. 9	5	. 67	20	851. 6
40 25	23. 576	1, 414. 6	30. 845	1, 850. 68	1 25	961. 4
26	. 570	4. 2	5	. 68	30	1, 077. 8
27	. 565	3. 9	5	. 69	35	1, 200. 8
28	. 559	3. 5	5	. 70	40	1, 330. 5
29	. 553	3. 2	5	. 70	45	1, 466. 9
40 30	23. 547	1, 412. 8	30. 845	1, 850. 71	1 50	1, 609. 9
31	. 541	2. 6	5	. 71	55	1, 759. 6
32	. 536	2. 1	5	. 72	2 00	1, 916
33	. 530	1. 8	5	. 72	3 00	4, 311
34	. 524	1. 4	5	. 73	4 00	7, 663
40 35	23. 518	1, 411. 1	30. 846	1, 850. 73		
36	. 512	0. 7	6	. 74		
37	. 506	0. 4	6	. 74		
38	. 501	10. 0	6	. 75		
39	. 495	09. 7	6	. 76		
40 40	23. 489	1, 409. 3	30. 846	1, 850. 76		
41	. 483	9. 0	6	. 77		
42	. 477	8. 6	6	. 77		
43	. 471	8. 3	6	. 78		
44	. 465	7. 9	6	. 78		
40 45	23. 460	1, 407. 6	30. 846	1, 850. 79		
46	. 454	7. 2	7	. 79		
47	. 448	6. 9	7	. 80		
48	. 442	6. 5	7	. 80		
49	. 436	6. 2	7	. 81		
40 50	23. 430	1, 405. 8	30. 847	1, 850. 81		
51	. 424	5. 5	7	. 82		
52	. 419	5. 1	7	. 83		
53	. 413	4. 8	7	. 83		
54	. 407	4. 4	7	. 84		
40 55	23. 401	1, 404. 1	30. 847	1, 850. 84		
56	. 395	3. 7	7	. 85		
57	. 389	3. 3	8	. 85		
58	. 383	3. 0	8	. 86		
59	. 377	2. 6	8	. 86		
41 00	23. 372	1, 402. 3	30. 848	1, 850. 87		

*Polyconic map projection table—Continued*

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y coordinate of curvature	
	1"	1'	1"	1'		Lat. 41°	Lat. 42°
° /	Meters	Meters	Meters	Meters	° /	Meters	Meters
41 00	23.372	1,402.3	30.848	1,850.87	0 1	0.1	0.1
1	.366	1.9	8	.87	2	0.5	0.5
2	.360	1.6	8	.88	3	1.2	1.2
3	.354	1.2	8	.89	4	2.1	2.2
4	.348	0.9	8	.89			
41 05	23.342	1,400.5	30.848	1,850.90	0 5	3.3	3.4
6	.336	400.2	8	.90	6	4.8	4.8
7	.330	399.8	8	.91	7	6.6	6.6
8	.324	9.5	9	.91	8	8.6	8.6
9	.318	9.1	9	.92	9	10.8	10.9
41 10	23.313	1,398.8	30.849	1,850.92	0 10	13.4	13.4
11	.307	8.4	9	.93	15	30.1	30.2
12	.301	8.0	9	.93	20	53.5	53.8
13	.295	7.7	9	.94	25	83.6	84.0
14	.289	7.3	9	.95	30	120.4	120.9
41 15	23.283	1,397.0	30.849	1,850.95	0 35	163.9	164.6
16	.277	6.6	9	.96	40	214.1	215.0
17	.271	6.3	9	.96	45	270.9	272.1
18	.265	5.9	49	.97	50	334.5	336.0
19	.259	5.6	50	.97	55	404.7	406.5
41 20	23.253	1,395.2	30.850	1,850.98	1 00	481.7	483.8
21	.247	4.8	0	.98	05	565.3	567.8
22	.241	4.5	0	.99	10	655.6	658.5
23	.236	4.1	0	50.99	15	752.6	755.9
24	.230	3.8	0	51.00	20	856.3	860.1
41 25	23.224	1,393.4	30.850	1,851.01	1 25	966.7	971.0
26	.218	3.1	0	.01	30	1,083.8	1,088.5
27	.212	2.7	0	.02	35	1,207.6	1,212.8
28	.206	2.4	0	.02	40	1,338.0	1,343.8
29	.200	2.0	0	.03	45	1,475.1	1,481.6
41 30	23.194	1,391.6	30.851	1,851.03	1 50	1,019.0	1,026.1
31	.188	1.3	1	.04	55	1,769.5	1,777.2
32	.182	0.9	1	.04	2 00	1,927	1,936
33	.176	0.6	1	.05	3 00	4,335	4,354
34	.170	90.2	1	.05	4 00	7,706	7,739
41 35	23.164	1,389.9	30.851	1,851.06			
36	.158	9.5	1	.07			
37	.152	9.1	1	.07			
38	.146	8.8	1	.08			
39	.140	8.4	1	.08			
41 40	23.134	1,388.1	30.851	1,851.09			
41	.128	7.7	2	.09			
42	.122	7.3	2	.10			
43	.117	7.0	2	.10			
44	.111	6.6	2	.11			
41 45	23.105	1,386.3	30.852	1,851.11			
46	.099	5.9	2	.12			
47	.093	5.6	2	.12			
48	.087	5.2	2	.13			
49	.081	4.8	2	.14			
41 50	23.075	1,384.5	30.852	1,851.14			
51	.069	4.1	2	.15			
52	.063	3.8	3	.15			
53	.057	3.4	3	.16			
54	.051	3.0	3	.16			
41 55	23.045	1,382.7	30.853	1,851.17			
56	.039	2.3	3	.17			
57	.033	2.0	3	.18			
58	.027	1.6	3	.18			
59	.021	1.2	3	.19			
42 00	23.015	1,380.9	30.853	1,851.20			

CONVERSION TABLE

In earlier triangulation publications of this Bureau complete tables have been printed for the conversion of feet to meters and meters to feet. As these tables require eight pages, it seemed advisable in the interests of economy to substitute for them the condensed table shown below. This table can be used readily for converting a rather large number of one unit to the corresponding number in the other unit by simply taking the conversion value for each digit of the first number, moving the decimal point if necessary, and adding the values together. For example, to convert 24.6 feet to meters we take from the table the value in meters corresponding to 2 feet and move the decimal point one number to the right. We then take the value for 4 feet as given in the table, and next the value for 6 feet, and move the decimal point one number to the left. This gives, by rounding off the third decimal place,  $6.096 + 1.219 + 0.183 = 7.498$  meters.

Meters	Feet	Feet	Meters
1	3.280833	1	0.3048006
2	6.561667	2	0.6096012
3	9.842500	3	0.9144018
4	13.123333	4	1.2192024
5	16.404167	5	1.5240030
6	19.685000	6	1.8288037
7	22.965833	7	2.1336043
8	26.246667	8	2.4384049
9	29.527500	9	2.7432055
10	32.808333	10	3.0480061

EXPLANATION OF TABLES OF GEOGRAPHIC POSITIONS

In the tables of geographic positions the latitude and longitude of each point are given on the North American datum of 1927, and there are also given for all except the intersection points, the length and azimuth of each line observed over, whether in one or both directions. Along with the latitude and longitude of each point the lengths and azimuths are given of lines from that point to other points of the scheme. No lengths and azimuths are repeated, and for a given line the length and azimuth will be found opposite the position of one or the other of the two stations involved.

To aid in the use of the tables, a column of the logarithms of the lengths in meters is given. It must be remembered that it is the logarithm which is derived first from the computation, the lengths given in the table being then derived from the corresponding logarithms. A final column gives these lengths reduced to feet, the reduction being made from the lengths in meters.

The rule followed in recent publications of this office has been to give the latitudes and longitudes of the stations to thousandths of seconds for all points, the positions of which are fixed by fully adjusted triangulation. Points, the positions of which are given to hundredths of seconds only, are marked by footnotes as being without check (not occupied and observed from two stations only) or checked by vertical angles only.

In the columns giving azimuths, distances, and logarithms of distances the accuracy is indicated to a certain extent by the number of decimal places given, it being understood that in each case some of

the final figures are doubtful. In some cases there is very little doubt of the correctness of the second figure from the right, while in a few cases some doubt may exist as to the correctness of even the third figure from the right.

It will be noted that in the following tables of geographic positions and of plane coordinates that some of the stations have two names. In the case of mountain peaks the first name is the one given the station when its geographic position was determined. This name may now be wrong, either because the observer did not identify the name correctly, or because the name of the geographic feature has since been changed. The second name is now believed to be the correct one. There are also a number of stations established by other organizations to which the observer gave names of his own devising at the time he was using them but for which the true names given at the time of their establishment have been later determined. The true name of such a station is given after the record name, usually in parentheses. The record name is retained in order that the station may be readily identified should it ever become necessary to look it up in the old field records.

The establishment of a plane-coordinate system for each of the 48 States has made possible the presentation of geodetic data in such form that it may be utilized easily by the engineer or surveyor, whether he be interested in a survey of a large area or of one of very limited extent. Using plane coordinates on a State-wide system he may conduct his surveys and make his computations according to the methods and formulas of plane surveying, yet secure the accuracy which results from full coordination with an accurate control survey. In this publication, commencing on page 59, will be found tables of plane coordinates of the triangulation stations for which the geographic positions are also given. Immediately preceding these tables of plane coordinates will be found an explanation thereof.

The tables may be conveniently consulted by using as finders the sketches and the index at the end of this publication. The second column of the index gives the page on which will be found the geographic position of the station, and the third column gives the page number of the corresponding plane coordinates. In the fourth column of the index will be found a reference to the page on which the elevation is given, in the fifth column the page on which the description is given, and finally in the sixth column the figure number of the sketch on which the station appears.

#### EXPLANATION OF LENGTHS

The lengths as given in the tables are all reduced to mean sea level. If the actual length of a line on the ground reduced only to the horizontal is desired—that is, its length in its actual elevation on the surface of the earth—it may be obtained by adding to the sea-level length as given in meters the following correction,

$$\text{Cor.} = \frac{Sh_m}{6,370,000},$$

in which  $S$  is the length of the line in meters and  $h_m$  is the mean elevation of the two ends of the line in meters. The correction for the length in feet can also be found by the same formula if  $S$  is taken in

feet, but  $h_m$  must still be kept in meters, since the denominator is the approximate length of the radius of the earth in meters.

#### AZIMUTH AND BACK AZIMUTH

The azimuth of a line of triangulation is its true direction reckoned clockwise from true south. The cardinal points of the compass on this system are as follows: South is  $0^\circ$  (or  $360^\circ$ ), west  $90^\circ$ , north  $180^\circ$ , and east  $270^\circ$ .

Because of the convergence of the meridians, the azimuth and the back azimuth of a line do not differ by exactly  $180^\circ$ , the amount of the divergence varying with the latitude and the difference of longitude of the two ends of the line. To illustrate from the tables on page 20, the azimuth from Wheeler Peak to Tushar is  $290^\circ 13' 17'' .44$  while the back azimuth, or the azimuth from Tushar to Wheeler Peak, is  $111^\circ 24' 37'' .66$ .

The azimuths of the triangulation lines offer a very convenient and accurate means of testing the deflection of the magnetic needle on a surveyor's transit, and even the azimuth over such short distances as those between a station mark and its reference mark may be used for this purpose with fair accuracy, provided the distance is greater than 100 feet. On all recent triangulation, a special azimuth mark has been set for each station at a distance usually not less than one-fourth mile. The azimuth of the line from the station to this mark has been accurately determined and may be used as the starting azimuth for traverse lines and other local surveys.

GEOGRAPHIC POSITIONS

Thirty-ninth parallel arc

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
	°	'	"	°	'	"	°	'	"		Logarithm (meters)	Meters	Feet
<i>Principal points</i>													
Treasury Mountain (Colo.), 1893.....	39	00	51.430										
	107	05	54.435										
Uncompahgre (Colo.), 1895.....	38	04	17.953	196	42	57.81	16	56	32.15	Treasury Mountain.....	5.0388911	100,317.86	358,653.7
	107	27	41.309										
Mount Waas, 1893.....	38	32	20.856	253	25	12.13	74	45	11.93	Treasury Mountain.....	5.2540969	192,352.08	631,075.1
	109	13	37.750	288	01	21.49	109	07	01.77	Uncompahgre.....	5.2119820	162,922.85	534,522.7
Tavaputs (Colo.), 1891.....	39	32	23.278	238	55	07.42	110	07	33.27	Treasury Mountain.....	5.2419586	174,565.58	572,720.6
	109	00	18.715	320	04	00.66	141	02	03.79	Uncompahgre.....	5.3243760	211,045.44	692,404.9
				9	53	03.60	189	44	40.30	Mount Waas.....	5.0520720	112,738.44	369,876.0
Mesa (Colo.), 1893.....	38	54	00.938	66	35	36.54	245	56	15.80	Mount Waas.....	4.9982445	99,596.59	326,759.8
	108	10	43.738	135	06	47.74	314	35	26.62	Tavaputs.....	5.0028889	100,667.41	330,273.0
				299	30	37				Reference mark no. 2.....			
Patmos Head, 1890.....	39	30	07.840	267	27	38.50	88	17	41.33	Tavaputs.....	5.0522550	112,785.95	370,031.9
	110	18	57.354	318	14	42.17	138	55	50.08	Mount Waas.....	5.1539658	142,549.54	467,681.3
Mount Ellen, 1891.....	38	07	16.462	195	35	58.78	15	54	42.38	Patmos Head.....	5.2021633	159,280.77	522,573.7
	110	48	49.923	251	01	21.57	72	00	24.37	Mount Waas.....	5.1652075	146,287.60	479,945.2
				270	02	15.20	92	06	22.69	Uncompahgre.....	5.4685033	294,105.61	964,911.5
Wasatch, 1890.....	39	06	53.617	245	58	10.81	66	41	24.31	Patmos Head.....	5.0297577	107,092.17	351,351.6
	111	27	11.209	333	01	05.30	153	25	01.65	Mount Ellen.....	5.0918563	123,554.43	405,361.5
Mount Nebo, 1887.....	39	48	38.316	284	55	37.62	105	51	08.32	Patmos Head.....	5.1107303	129,041.76	423,364.5
	111	45	56.235	340	42	12.12	160	54	07.17	Wasatch.....	4.9127097	81,791.79	268,345.2
Tushar, 1885.....	38	25	09.551	199	41	08.58	20	05	36.08	Mount Nebo.....	5.2155166	164,254.24	538,890.8
	112	24	42.168	226	52	35.33	47	28	36.24	Wasatch.....	5.0553447	113,591.20	372,873.8
				282	49	00.79	103	48	23.72	Mount Ellen.....	5.1574220	143,688.51	471,418.0
Wheeler Peak (Nev.), 1882.....	38	59	09.017	246	32	40.10	68	09	41.58	Mount Nebo.....	5.3761505	237,766.39	780,071.9
	114	18	47.019	290	13	17.44	111	24	37.66	Tushar.....	5.2478407	176,945.98	580,530.3
Ibepah, 1889.....	39	49	41.587	269	55	00.59	91	17	45.02	Mount Nebo.....	5.2656977	184,373.15	604,897.6
	113	55	08.136	319	43	00.67	140	40	04.82	Tushar.....	5.3087603	203,591.82	667,950.8
				20	04	31.13	199	49	30.36	Wheeler Peak.....	4.9977890	99,492.19	326,417.3

Pioche (Nev.), 1883.....	37	59	10.102	168	26	32.59	348	16	45.65	Wheeler Peak.....	5.0542277	113,299.43	371,716.5
	114	03	03.921	250	58	53.68	71	59	43.76	Tushar.....	5.1802123	151,430.14	496,817.0
Diamond Peak (Nev.), 1881.....	39	35	05.984	259	58	43.81	81	11	31.22	Ibepah.....	5.2186626	165,448.40	542,808.6
	115	49	04.051	296	39	02.58	117	36	12.72	Wheeler Peak.....	5.1639749	145,872.99	478,585.0
White Pine (Nev.), 1881.....	38	19	09.861	169	62	30.33	348	50	33.46	Diamond Peak.....	5.1558018	143,153.43	469,662.5
	115	30	03.828	234	03	08.10	54	47	39.49	Wheeler Peak.....	5.1043178	127,150.41	417,159.3
				285	46	45.72	106	40	30.50	Pioche.....	5.1217750	132,365.55	434,269.3
Deseret, 1887.....	40	27	34.448	57	57	39.03	237	07	36.98	Ibepah.....	5.1160158	130,621.84	428,548.5
	112	37	31.880	314	14	09.05	134	47	24.53	Mount Nebo.....	5.0118839	102,774.15	337,184.9
Pilot Peak (Nev.), 1887.....	41	01	16.304	5	10	59.31	185	01	51.88	Wheeler Peak.....	5.3558186	226,891.68	744,393.8
	114	04	35.565	296	29	40.93	117	26	30.22	Deseret.....	5.1383532	137,515.98	451,167.0
				303	40	13.72	125	10	08.13	Mount Nebo.....	5.3761536	237,768.09	780,071.9
				354	10	58.07	174	17	06.04	Ibepah.....	5.1243178	133,142.82	436,819.4
Ogden Peak, 1884.....	41	11	59.906	37	36	30.42	217	07	18.55	Deseret.....	5.0147269	103,449.14	339,399.4
	111	52	52.490	49	15	09.47	227	55	43.35	Ibepah.....	5.3622245	230,263.17	755,455.1
				84	34	37.79	263	08	01.04	Pilot Peak.....	5.2682467	185,458.47	608,458.3
				356	19	38.38	176	24	08.77	Mount Nebo.....	5.1891693	154,585.69	507,169.9
Antelope, 1892.....	40	57	43.512	31	59	08.07	211	43	04.73	Deseret.....	4.8175336	65,695.20	215,535.0
	112	12	54.937	93	00	36.60	271	47	21.11	Pilot Peak.....	5.1952301	156,758.13	514,297.3
				226	37	30.67	46	50	40.83	Ogden Peak.....	4.5859750	38,545.62	126,461.8
Waddoup, 1892.....	40	54	25.154	51	45	49.79	231	16	54.48	Deseret.....	4.9022773	79,850.44	261,976.0
	111	53	09.898	102	33	14.32	282	20	17.89	Antelope.....	4.4531766	28,390.73	93,145.3
				180	42	51.23	0	43	02.66	Ogden Peak.....	4.5124130	32,539.66	106,757.2
Promontory, 1892.....	41	17	52.813	10	39	14.28	190	31	07.86	Deseret.....	4.9764423	94,720.13	310,761.0
	112	25	08.673	78	05	09.23	256	59	41.90	Pilot Peak.....	5.1537291	142,471.87	467,426.5
				283	23	57.91	103	45	14.50	Ogden Peak.....	4.6662997	46,376.68	152,154.2
				313	56	48.79	134	17	50.22	Waddoup.....	4.7949987	62,373.30	204,636.4
				335	17	17.93	155	25	20.56	Antelope.....	4.6132470	41,043.75	134,657.7
Salt Lake southeast base, 1896.....	41	02	17.702	63	05	21.20	242	57	34.73	Antelope.....	4.2705925	18,646.29	61,175.4
	112	01	03.917	212	30	24.85	32	35	46.02	Ogden Peak.....	4.3285299	21,307.37	69,905.9
				322	42	37.95	142	47	48.76	Waddoup.....	4.2627327	18,311.87	60,078.2
Salt Lake northwest base, 1896.....	41	06	37.570	28	06	04.10	208	01	57.20	Antelope.....	4.2711507	18,670.27	61,254.0
	112	06	38.872	128	57	21.62	308	45	10.54	Promontory.....	4.5219322	33,204.21	108,937.5
				242	37	41.20	62	46	45.04	Ogden Peak.....	4.3361173	21,682.90	71,138.0
				315	40	53.85	135	44	33.93	Salt Lake southeast base.....	4.0491667	11,198.68	36,741.0
Oxford (Idaho), 1897.....	42	16	10.842	50	36	11.56	229	17	15.58	Pilot Peak.....	5.3333462	215,449.85	706,885.0
	112	05	49.460	351	20	01.73	171	28	38.96	Ogden Peak.....	5.0797507	120,157.45	394,216.6
Cache (Idaho), 1897.....	42	11	08.430	15	09	33.27	194	52	58.16	Pilot Peak.....	5.1268016	133,906.48	439,324.8
	113	39	36.911	265	20	22.18	86	23	24.40	Oxford.....	5.1118894	129,386.64	424,496.0
				305	52	39.36	127	03	39.52	Ogden Peak.....	5.2652067	184,166.10	604,218.3

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Supplementary points</i>													
Chiquita (Colo.), 1895.....	38 54 37.696	108 39 06.163	246 02 42.9	271 28 03.5	66 17 48.2	91 43 52.7	Grand Mesa.....	4.578306	37,870.9	124,248			
Divide (Colo.), 1891.....	39 34 19.203	108 58 38.521	33 47 40.2	44 36 54.7	213 46 36.4	224 35 46.6	Tavaputs Summit.....	3.633626	4,301.6	14,113			
Flat Top (Colo.), 1891.....	39 32 34.093	108 50 23.237	88 42 32.4	105 22 29.2	268 36 13.3	285 17 13.9	Tavaputs Divide.....	4.153003	14,223.4	46,665			
East Peak (Colo.), 1891.....	39 31 44.772	109 01 09.967	88 52 36.2	225 51 41.3	268 03 06.3	45 52 13.9	Patmos Head.....	5.047403	111,532.9	365,921			
Spur (Colo.), 1891.....	39 32 45.611	109 00 44.770	317 54 19.7	17 46 58.4	137 54 36.3	197 46 42.4	Tavaputs East Peak.....	2.967617	928.1	3,045			
Summit (Colo.), 1891.....	39 32 55.318	109 00 25.407	350 48 47.4	57 04 39.1	170 48 51.7	237 04 26.8	Tavaputs Spur.....	3.000416	1,001.0	3,284			
Tavaputs south base (Colo.), 1891.....	39 32 25.313	109 00 30.504	151 26 45.3	282 34 07.3	331 26 36.2	102 34 14.8	Spur.....	2.852889	712.7	2,338			
Tavaputs north base (Colo.), 1891.....	39 32 32.316	109 00 22.747	340 56 38.9	40 37 14.3	160 56 41.5	220 37 09.4	Tavaputs south base.....	2.469654	294.9	968			
Mount Peale, 1893.....	38 26 18.493	109 13 42.657	180 36 33.8	240 22 31.4	0 36 36.9	61 01 52.6	Mount Waas.....	4.048203	11,173.9	36,660			
Middle La Salle Peak, 1893.....	38 27 47.674	109 13 59.783	75 08 21.1	183 37 29.2	254 09 35.0	3 37 42.9	Mount Ellen.....	5.156526	143,392.3	470,446			
La Salle, northwest peak, cairn, 1893.....	38 32 47.422	109 13 58.101	328 57 53.2	358 12 39.9	148 58 05.9	178 12 49.5	Mount Waas.....	2.980453	956.0	3,136			
La Salle, north peak, cairn, 1893.....	38 33 01.600	109 13 40.891	356 32 04.0	43 37 51.8	176 32 06.0	223 37 41.1	Mount Peale.....	4.079117	11,998.2	39,364			
C. V. South, cairn, 1893.....	38 31 38.021	109 13 58.902	201 11 56.0	357 42 36.1	21 12 09.2	177 42 46.2	Mount Waas.....	3.099896	1,258.6	4,129			
							Mount Peale.....	2.781019	604.0	1,982			
								3.151272	1,416.7	4,648			
								3.993890	9,860.3	32,350			
C. V. North, cairn 1893.....	38 32 04.111	109 14 04.320	231 15 25.8	357 10 39.3	51 15 42.4	177 10 52.8	Mount Waas.....	2.916474	825.0	2,707			
Colorado-Utah, north boundary flag, 1893.....	38 33 57.395	109 03 33.658	78 32 58.6	81 55 57.8	258 26 42.1	261 49 28.6	Mount Peale.....	4.028158	10,669.8	35,006			
Colorado-Utah, north boundary stone, 1893 <sup>1</sup> .....	38 33 56.41	109 03 33.66	180		0		Colorado-Utah, north boundary flag.....	4.173987	14,927.5	48,925			
Colorado-Utah, middle boundary monument, 1893 <sup>1</sup> .....	38 30 43.62	109 03 33.76	101 38 00	106 11 18	281 31 43	286 05 00	La Salle, northwest peak, cairn.....	4.183920	15,272.8	50,108			
Colorado-Utah, south boundary, 1893.....	38 27 46.155	109 03 33.522	120 06 07.5	123 30 52.3	299 59 51.4	303 24 34.2	Colorado-Utah, north boundary flag.....	1.484015	30.48	100.0			
Moab (Warner's ranch), 1893.....	38 33 43.647	109 32 07.082	275 19 57.6	297 03 26.0	95 31 29.0	117 14 53.5	Mount Waas.....	4.174195	14,934.6	48,998			
Moab ditch mark, 1893 <sup>1</sup> .....	38 33 44.66	109 32 06.96	5 21 00		185 21 00		La Salle, north peak, cairn.....	4.184936	15,308.6	50,225			
Mount Waas azimuth mark, cairn, 1893.....	38 26 22.184	109 15 32.972	119 33 21.3	104 09 39.1	299 23 02.4	14 10 50.8	Mount Waas.....	4.228271	16,915.0	55,495			
Thompsons Springs, west tank, 1893.....	38 58 17.832	109 42 54.532	318 23 05.6	323 15 00.8	138 41 25.4	143 33 05.9	La Salle, north peak, cairn.....	4.246504	17,640.2	57,875			
Thompsons Springs, east tank, 1893 <sup>1</sup> .....	38 58 16.69	109 42 48.61	103 55 27		283 55 24		Mount Waas.....	4.431098	26,983.5	88,528			
Valley Knob, 1890.....	38 59 05.057	110 04 17.941	159 55 05.4	303 42 42.0	339 45 49.1	124 14 25.4	Mount Peale.....	4.478233	30,076.9	98,677			
Hartman, 1898.....	39 01 49.230	110 09 54.340	301 59 43.3		122 03 15.0		Moab (Warner's ranch).....	1.496750	31.387	102.98			
Mica, 1898.....	38 59 05.372	110 10 04.183	182 40 57.3	270 02 11.0			Moab.....	4.441992	27,668.9	90,777			
Reservoir, 1898.....	38 59 29.362	110 09 58.651	181 22 38.5	275 11 33.0			Mount Waas.....	4.057152	11,406.5	37,423			
Wash, 1898.....	39 00 10.099	110 11 27.006	216 05 38.9	300 34 04.0			Mount Waas.....	4.806624	64,065.5	210,188			
Green River east base, 1898.....	38 59 36.921	110 10 14.739	120 28 31.6	156 51 26.4			Middle La Salle Peak.....	4.846915	70,293.5	230,621			
			301 02 59.2	345 21 50.2			Thompsons Springs, west tank.....	2.166957	146.878	481.88			
							Patmos Head.....	4.786707	61,193.7	200,766			
							Mount Waas.....	4.947012	88,514.0	290,400			
							Valley Knob.....	3.979864	9,546.9	31,322			
							Hartman.....	3.704018	5,058.5	16,596			
							Valley Knob.....	3.920831	8,333.6	27,341			
							Hartman.....	3.634918	4,314.4	14,155			
							Valley Knob.....	3.915623	8,234.2	27,015			
							Mica.....	2.876024	751.7	2,466			
							Hartman.....	3.577892	3,783.5	12,413			
							Reservoir.....	3.392619	2,469.6	8,102			
							Mica.....	3.450366	2,820.8	9,255			
							Wash.....	3.304849	2,017.7	6,620			
							Hartman.....	3.613783	4,109.4	13,482			
							Reservoir.....	2.655055	451.9	1,483			
							Mica.....	3.002384	1,005.5	3,299			

<sup>1</sup> No check on this position.

Station	Latitude and longitude			Azimuth	Back azimuth	To station	Distance						
	°	'	"				Logarithm (meters)	Meters	Feet				
<i>Supplementary points—Continued</i>													
Green River west base, 1898	38	59	35.596	151	20	28.0	331	20	12.8	Wash	3.083697	1,212.5	3,978
	110	11	02.839	267	58	25.6	87	58	55.9	Green River east base	3.063808	1,158.26	3,800.1
				277	05	16.0	97	05	56.4	Reservoir	3.192186	1,556.6	5,107
				303	25	41.8	123	26	18.7	Mica	3.228293	1,691.6	5,550
Green River north meridian, 1898	38	59	49.971	7	44	53.7	187	44	51.4	Reservoir	2.907099	641.4	2,104
	110	09	55.059	9	04	20.5	189	04	14.7	Mica	3.143860	1,392.7	4,569
				105	40	43.1	285	39	45.2	Wash	3.361345	2,298.0	7,539
				180	16	09.6	0	16	10.0	Hartman	3.565572	3,677.7	12,066
Green River south meridian, 1898 <sup>1</sup>	38	59	30.02	76	46	03	256	46	01	Reservoir	1.948533	88.8	291
	110	09	55.06	180	00	00	0	00	00	Green River north meridian	2.788994	615.2	2,018
Green River longitude, 1898 <sup>1</sup>	38	59	29.62	180	00	00	0	00	00	Green River south meridian	1.093422	12.40	40.7
	110	09	55.06										
Green River latitude, 1898 <sup>1</sup>	38	59	29.62	270	00	00	90	00	00	Green River longitude	0.11394	1.30	4.2
	110	09	55.11										
Green River, schoolhouse, 1898 <sup>1</sup>	38	59	38.44	29	24	02	209	23	47	Mica	3.06836	1,170.5	3,840
	110	09	40.31	110	49	38	290	48	31	Wash	3.43884	2,746.9	9,012
Green River, hotel, 1898 <sup>1</sup>	38	59	28.22	22	39	31	202	39	23	Mica	2.88274	763.4	2,505
	110	09	51.97	119	27	40	299	26	40	Wash	3.41939	2,626.6	8,617
Cliff, 1898	39	03	50.932	316	39	53	136	41	26	Hartman	3.712538	5,158.7	16,925
	110	12	21.523	338	42	59	158	44	19	Green River east base	3.924574	8,405.7	27,578
				339	25	23	159	25	50	Mica	3.873369	9,405.2	30,857
				349	05	46	169	06	21	Wash	3.841045	6,935.0	22,733
Mount Bruin, summit, 1887	39	38	40.736	350	21	24.2	170	22	35.8	Patmos Head	4.205312	16,044.0	52,638
	110	20	49.840	58	40	08.0	237	53	01.9	Wasatch	5.049135	111,978.6	367,383
				99	04	13.7	278	09	49.9	Mount Nebo	5.088893	122,996.6	403,531
Mount Bartles, summit, 1887	39	42	05.349	344	12	29.7	164	15	16.7	Patmos Head	4.361004	22,993.4	75,438
	110	23	19.255	54	57	01.4	234	16	28.7	Wasatch	5.050872	112,453.2	368,940
				96	18	14.5	275	25	24.4	Mount Nebo	5.074165	118,621.9	389,179
San Rafael Knob, 1890	38	48	47.108	123	00	30.2	302	37	53.3	Wasatch	4.791099	61,815.7	202,807
	110	51	13.485	211	06	57.6	31	27	20.2	Patmos Head	4.951904	89,516.7	283,689
				357	23	34.1	177	25	03.4	Mount Ellen	4.885789	76,875.7	252,216
Indian Head, summit, 1884	39	52	34.733	308	58	39.1	129	21	25.7	Patmos Head	4.818020	65,768.8	215,776
	110	54	37.283	84	35	08.9	264	02	16.2	Mount Nebo	4.866669	73,564.6	241,353
				151	04	54.9	330	27	03.1	Ogden Peak	5.226422	168,431.0	552,594
Scipio, 1884	39	23	33.581	219	04	03.29	39	20	54.81	Mount Nebo	4.7773551	59,890.11	196,489.5
	112	12	23.046	295	08	03.14	115	36	39.09	Wasatch	4.8571156	71,964.05	236,102.1
				9	25	26.46	189	17	42.24	Tushar	5.0394528	109,509.75	359,283.2
				76	43	52.27	255	23	59.73	Wheeler Peak	5.2730581	187,524.53	615,236.7
				108	44	45.16	287	39	14.31	Ibepah	5.1898090	154,813.56	507,917.5
				163	18	20.17	343	02	11.77	Deseret	5.0925789	123,759.60	406,034.6
Sanpete, 1884	39	22	27.289	39	50	34.0	219	12	34.9	Tushar	5.138062	137,430.2	450,886
	111	24	12.705	91	56	51.1	271	26	17.1	Scipio	4.840136	69,204.8	227,049
				147	24	56.5	327	11	05.7	Mount Nebo	4.760238	57,575.5	188,896
				261	01	46.1	81	43	13.3	Patmos Head	4.976366	94,703.5	310,706
				8	28	18.7	188	26	25.8	Wasatch	4.464033	29,109.4	95,503
Mooseneah, 1890	39	02	11.165	46	55	06.1	226	23	46.1	Tushar	4.999158	99,806.3	327,448
	111	34	37.240	126	14	08.7	305	50	16.2	Scipio	4.827510	67,221.8	220,544
				169	21	35.4	349	14	24.2	Mount Nebo	4.941883	87,474.8	286,990
				201	43	30.9	21	50	05.7	Sanpete	4.606230	40,385.9	132,499
				230	52	16.1	50	56	57.3	Wasatch	4.140311	13,813.7	45,320
				326	33	11.6	147	01	44.9	Mount Ellen	5.084290	121,419.9	398,358
West Sanpete, 1884	39	22	26.365	269	01	56.9	89	02	42.0	Sanpete	3.231791	1,705.3	5,595
	111	25	23.935	5	07	11.8	185	06	03.9	Wasatch	4.460585	28,879.2	94,748
				19	33	22.0	199	27	32.2	Mooseneah	4.599409	39,756.6	130,435
Mount Alice, 1890	38	40	05.627	67	54	18.1	247	25	27.7	Tushar	4.861560	72,704.3	238,531
	111	38	25.224	148	48	58.0	328	27	34.6	Scipio	4.973966	94,181.6	308,994
				198	04	48.1	18	11	51.3	Wasatch	4.717484	52,177.6	171,186
				309	48	15.1	130	19	03.0	Mount Ellen	4.974683	94,337.2	309,505
Salt Creek, cairn, 1884	39	39	53.856	52	59	30.4	232	41	47.3	Scipio	4.699431	50,053.1	164,216
	111	44	32.758	139	47	14.5	319	13	08.3	Deseret	5.064533	116,020.0	380,642
				173	00	05.8	352	59	12.4	Mount Nebo	4.212097	16,296.6	53,466
				337	42	19.0	157	53	19.9	Wasatch	4.819277	65,959.4	216,402
Cedar, 1884	39	37	29.884	41	14	25.3	221	04	24.9	Scipio	4.534732	34,255.6	112,387
	111	56	39.379	216	33	30.5	36	40	21.4	Mount Nebo	4.408654	25,683.5	84,263
				255	33	40.3	75	41	23.9	Salt Creek	4.252491	17,885.1	58,678
Levan, 1884	39	31	06.793	67	47	48.2	247	32	43.7	Scipio	4.565711	36,788.4	120,697
	111	48	39.700	135	56	31.6	315	51	26.1	Cedar	4.216221	16,452.1	53,977
				186	50	12.8	6	51	57.1	Mount Nebo	4.514054	32,602.6	107,161
Monroe, 1885	38	37	32.323	56	34	31.8	236	19	43.7	Tushar	4.617452	41,443.1	135,968
	112	00	56.345	169	04	43.4	348	57	31.1	Scipio	4.938206	86,737.3	284,571
				219	43	59.1	40	00	29.2	Mooseneah	4.773904	59,416.1	194,934
				221	46	33.8	42	07	44.7	Wasatch	4.863494	73,028.8	239,695
				261	39	02.1	81	53	05.9	Mount Alice	4.518695	33,013.8	108,313

<sup>1</sup> No check on this position.

Station	Latitude and longitude			Azimuth	Back azimuth	To station	Distance						
	°	'	"				Logarithm (meters)	Meters	Feet				
<i>Supplementary points—Continued</i>													
Gunnison astronomic, 1890.....	39	09	30.270	302	41	00.0	122	50	12.3	Mooseneah.....	4.398352	25,023.7	82,099
	111	49	12.944	16	03	18.8	195	55	57.3	Monroe.....	4.789046	61,524.2	201,851
				234	56	06.3	55	11	10.8	West Sanpete.....	4.621072	41,790.0	137,106
Nephi Bench, 1887.....	39	42	15.654	45	09	29.9	225	05	32.9	Cedar.....	4.096605	12,491.2	40,982
	111	50	28.023	208	42	28.7	28	45	22.5	Mount Nebo.....	4.129007	13,458.8	44,156
				297	17	15.9	117	21	02.8	Salt Creek.....	3.979033	9,528.7	31,262
South Juab Base, 1884.....	39	32	13.415	57	20	04.1	237	09	01.6	Scipio.....	4.471706	29,628.3	97,206
	111	55	00.749	166	26	58.1	346	25	55.3	Cedar.....	4.001726	10,039.8	32,939
				203	05	10.9	23	10	58.5	Mount Nebo.....	4.518925	33,031.2	108,370
Lone Tree, cairn, 1884.....	38	59	38.056	20	27	58.6	200	17	45.3	Tushar.....	4.832782	68,042.8	223,237
	112	08	21.447	172	33	34.4	352	31	01.7	Scipio.....	4.649790	44,646.8	146,479
				199	25	28.6	19	39	42.5	Mount Nebo.....	4.983257	96,218.2	315,676
				257	02	30.8	77	28	27.2	Wasatch.....	4.784593	60,896.6	199,792
				345	14	31.6	165	19	10.6	Monroe.....	4.626006	42,267.4	138,672
Delano, cairn, 1885.....	38	22	09.225	74	24	45.3	253	22	26.0	Pioche.....	5.185427	153,259.4	502,819
	112	22	14.292	147	10	27.8	327	08	56.0	Tushar.....	3.820701	6,617.6	21,711
				187	05	53.5	7	12	04.8	Scipio.....	5.058815	114,502.5	375,664
South Scipio, cairn, 1884.....	39	17	41.407	212	45	22.7	33	01	50.6	Mount Nebo.....	4.833788	68,200.6	223,755
	112	11	47.563	287	02	41.4	107	30	53.2	Wasatch.....	4.827702	67,251.5	220,641
				10	56	43.6	190	48	37.6	Tushar.....	4.995502	98,969.6	324,703
Beaver, 1885.....	38	24	06.443	112	12	40.1	291	02	09.4	Wheeler Peak.....	5.245308	175,917.1	577,155
	112	25	59.936	224	06	36.7	44	07	25.1	Tushar.....	3.433038	2,710.4	8,892
				303	24	14.6	123	26	34.7	Delano.....	3.817007	6,561.6	21,528
West Beaver, monument, 1885.....	38	24	06.859	226	58	38.9	46	59	32.0	Tushar.....	3.452336	2,833.6	9,297
	112	26	07.563	273	57	50.8	93	57	55.5	Beaver.....	2.268368	67,251.5	220,641
				302	37	32.8	122	39	57.6	Delano.....	3.827011	6,723.7	22,059
				8	40	07.1	188	38	52.6	Birch Creek.....	4.287629	19,392.3	63,223
Birch Creek, cairn, 1885.....	38	13	45.088	119	44	37.0	299	31	44.8	Milford Needle.....	4.541875	34,823.7	114,251
	112	28	07.733	189	11	37.7	9	12	56.9	Beaver.....	4.287989	19,408.4	63,676
				193	17	37.5	13	19	45.0	Tushar.....	4.336199	21,687.0	71,151
			208	53	25.8	28	57	04.8	Delano.....	4.249417	17,758.9	58,264	
Cervera, 1898.....	39	18	25.106	247	54	09.8	68	04	33.0	Scipio.....	4.404544	25,383.1	83,278
	112	28	45.875										
Camara, 1898.....	39	22	06.380	264	22	31.4	84	34	48.8	Scipio.....	4.446317	27,945.8	91,686
	112	31	45.264	327	47	26.0	147	49	19.7	Cervera.....	3.906528	8,063.6	26,455
Manterola, 1898.....	39	20	00.506	223	12	16.2	43	13	52.8	Camara.....	3.726454	5,326.6	17,476
	112	34	17.600	258	05	24.3	78	19	18.1	Scipio.....	4.507163	32,148.7	105,475
				290	17	13.2	110	20	43.4	Cervera.....	3.928062	8,473.5	27,800
Montijo, 1898.....	39	17	49.821	150	33	08.8	330	32	08.6	Manterola.....	3.665435	4,628.4	15,185
	112	32	42.591	189	50	23.2	9	50	59.5	Camara.....	3.904727	8,030.2	26,346
				249	56	27.1	70	09	20.3	Scipio.....	4.492309	31,067.7	101,928
				259	07	08.7	79	09	38.6	Cervera.....	3.761579	5,775.4	18,948
Sagasta, 1898.....	39	21	21.571	0	09	13.2	180	09	12.8	Cervera.....	3.735759	5,442.0	17,854
	112	28	45.266	41	03	39.0	221	01	08.6	Montijo.....	3.937404	8,657.7	28,404
Augusti, 1898.....	39	17	46.945	174	22	57.9	354	22	47.2	Manterola.....	3.616866	4,138.7	13,678
	112	34	00.685	267	16	46.3	87	17	35.8	Montijo.....	3.272639	1,873.4	6,146
Blanco, 1898.....	39	19	06.083	229	35	11.6	49	36	03.8	Manterola.....	3.413164	2,589.2	8,495
	112	35	39.911	298	57	08.6	118	59	01.0	Montijo.....	3.686272	4,855.9	15,931
				315	44	31.8	135	45	34.7	Augusti.....	3.532378	3,407.0	11,178
Canovas, 1898.....	39	17	54.363	189	25	19.1	9	25	28.8	Blanco.....	3.350637	2,242.0	7,356
	112	35	55.233	211	00	28.2	31	01	30.1	Manterola.....	3.656967	4,539.1	14,892
				274	45	14.6	94	46	27.2	Augusti.....	3.440021	2,754.4	9,037
Oasis northeast base, 1898.....	39	18	42.493	247	56	14.2	67	57	01.7	Blanco.....	3.287210	1,937.4	6,356
	112	36	54.863	292	18	03.9	112	19	54.3	Augusti.....	3.654295	4,511.2	14,800
				316	05	11.4	136	05	49.2	Canovas.....	3.313902	2,060.2	6,759
Oasis southwest base, 1898.....	39	17	55.398	209	31	23.7	29	31	45.4	Oasis northeast base.....	3.222483	1,669.10	5,476.0
	112	37	29.195	230	12	41.1	50	13	50.3	Blanco.....	3.532361	3,406.9	11,177
				270	48	13.8	90	49	13.3	Canovas.....	3.352519	2,251.7	7,387
Oasis north meridian, 1898.....	39	18	15.757	234	46	41.7	54	47	12.6	Oasis northeast base.....	3.155249	1,429.7	4,691
	112	37	43.615	242	20	56.4	62	22	14.8	Blanco.....	3.524452	3,345.4	10,976
				284	14	41.3	104	15	50.0	Canovas.....	3.428046	2,679.5	8,791
				331	10	23.5	151	10	32.7	Oasis southwest base.....	2.855304	716.6	2,361
Oasis south meridian, 1898.....	39	17	37.362	180	00	01.7	0	00	01.7	Oasis north meridian.....	3.073370	1,184.0	3,885
	112	37	43.615	210	10	38.0	30	11	08.9	Oasis northeast base.....	3.369147	2,323.5	7,623
				211	51	03.2	31	51	12.4	Oasis southwest base.....	2.816115	654.8	2,148
			227	16	41.2	47	17	59.6	Blanco.....	3.605701	4,033.7	13,234	
Milford Needle, 1883.....	38	23	03.581	205	03	34.6	25	26	29.9	Scipio.....	5.092581	123,760.2	406,037
	112	48	53.512	263	34	51.2	83	49	52.7	Tushar.....	4.549372	35,430.1	116,240
				68	11	02.5	247	25	11.2	Pioche.....	5.068108	116,979.0	383,789

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
	°	'	"	°	'	"	°	'	"		Logarithm (meters)	Meters	Feet
<i>Supplementary points—Continued</i>													
Oasis astronomic, 1898 <sup>1</sup> .....	39	17	37.19	180	00	01.7	0	00	01.7	Oasis south meridian.....	0.71767	5.22	17.1
	112	37	43.62										
Oasis, schoolhouse tower, 1898.....	39	17	18.032	177	34	51	357	34	50	Oasis southwest base.....	3.061955	1,153.3	3,784
	112	37	27.163	196	32	46	16	33	06	Oasis northeast base.....	3.434121	2,717.2	8,915
Beaver, meeting house, 1885 <sup>1</sup> .....	38	16	26.50	231	40	29	51	48	08	Beaver.....	4.359855	22,901.0	75,134
	112	38	20.34	288	25	22	108	31	41	Birch Creek.....	4.196041	15,705.1	51,526
Beaver, flagstaff (U. S. Engineers Astronomic station 1872-1885), 1885.....	38	16	24.850	128	58	00.7	308	51	31.9	Milford Needle.....	4.291646	19,572.5	64,214
	112	38	26.508	231	48	18.2	51	56	01.3	Beaver.....	4.362575	23,050.2	75,624
				288	04	31.1	108	10	54.2	Birch Creek.....	4.199518	15,851.4	51,940
Frisco Mount, tree, 1884.....	38	31	13.728	120	23	34.4	299	45	01.6	Wheeler Peak.....	5.013220	103,090.8	338,224
	113	17	12.338	223	42	22.4	44	23	07.9	Scipio.....	5.129365	134,699.2	441,926
				278	05	33.3	98	38	13.1	Tushar.....	4.887546	77,187.3	253,239
Antelope Mountain or Swasey Peak, 1884.....	39	23	17.612	133	29	41.8	313	06	36.5	Ibepah.....	4.852633	71,225.1	233,678
	113	18	55.382	206	09	05.5	26	35	39.3	Deseret.....	5.123097	132,769.1	435,593
				269	21	10.1	90	03	23.7	Scipio.....	4.980186	95,540.2	313,451
Knotch Peak or Sawtooth Mountain, 1884.....	39	08	35.771	77	42	00.7	257	07	48.7	Wheeler Peak.....	4.904235	80,211.2	263,160
	113	24	30.815	150	09	34.8	329	50	06.5	Ibepah.....	4.943547	87,810.6	288,092
				312	32	29.4	133	09	57.2	Tushar.....	5.072463	118,158.0	387,657
Indian Peak, 1881.....	38	16	01.496	26	27	04.3	206	20	32.0	Pioche.....	4.541746	34,813.4	114,217
	113	52	28.467	154	33	41.8	334	17	16.3	Wheeler Peak.....	4.946710	88,452.5	290,198
				262	01	10.2	82	55	37.4	Tushar.....	5.110586	128,998.9	423,224
Ibepah azimuth mark, 1889.....	39	51	13.860	237	55	21.3	58	44	52.7	Deseret.....	5.107596	128,113.8	420,320
	113	54	19.282	22	12	27.4	202	11	56.1	Ibepah.....	2.487670	3,073.8	10,085
				139	58	52.7	319	53	27.8	Middle boundary.....	4.271409	18,681.4	61,291
Red Chief, cairn, 1889.....	39	47	59.868	204	06	51.8	24	07	29.6	Ibepah.....	3.536209	3,437.2	11,277
	113	56	07.189	236	18	47.3	57	09	26.5	Deseret.....	5.125538	133,517.4	438,048
Red Squaw, cairn, 1889.....	39	48	01.886	209	20	18.0	29	21	04.5	Ibepah.....	3.547475	3,527.6	11,573
	113	56	20.817	236	24	35.6	57	15	23.7	Deseret.....	5.126304	133,753.1	438,822
Bench, 1889.....	39	52	32.796	176	52	44.6	356	49	32.1	Pilot Peak.....	5.105105	127,381.1	417,916
	113	59	38.757	309	21	16.5	129	24	08.9	Ibepah.....	3.920268	8,322.8	27,306
				330	35	25.4	150	37	32.2	Red Squaw.....	3.981801	9,589.6	31,462
Mount Moriah, cairn (Nev.), 1883.....	39	16	23.655	264	57	15.0	86	12	59.6	Scipio.....	5.236094	172,224.1	565,039
	114	11	52.734	300	52	25.3	121	59	39.1	Tushar.....	5.259470	181,748.2	596,286
				17	21	29.7	197	17	08.2	Wheeler Peak.....	4.524027	33,421.6	109,651
Shell Creek, north peak (Nev.), 1881.....	39	24	47.940	100	41	26.4	279	54	55.1	Diamond Peak.....	5.027614	106,564.9	349,622
	114	35	55.941	231	30	38.4	51	56	39.3	Ibepah.....	4.871388	74,368.3	245,990
				332	25	25.9	152	36	16.2	Wheeler Peak.....	4.728318	53,495.6	175,510
Shell Creek, south peak (Nev.), 1881.....	39	20	11.171	105	07	38.7	284	21	10.2	Diamond Peak.....	5.035244	108,453.6	355,818
	114	35	56.776	226	43	40.2	47	09	40.4	Ibepah.....	4.902652	79,974.6	262,383
				327	29	09.4	147	39	59.7	Wheeler Peak.....	4.663799	46,110.4	151,281
Butte, 1883.....	37	56	41.324	148	31	08.9	328	29	58.1	Pioche.....	3.730724	5,379.3	17,649
	114	01	08.807	167	34	26.4	347	23	28.1	Wheeler Peak.....	5.073243	118,370.4	388,354
				248	59	59.4	69	59	36.7	Tushar.....	5.177130	150,359.2	493,303
East Ridge (Nev.), 1883.....	37	59	05.497	356	53	10.1	176	53	16.2	Butte.....	3.648521	4,451.6	14,605
	114	01	18.711	93	10	26.2	273	09	21.5	Pioche.....	3.410169	2,571.4	8,436
Road Summit (Nev.), 1883.....	37	57	58.546	164	23	29.7	344	23	14.2	Pioche.....	3.359964	2,290.7	7,515
	114	02	38.665	223	23	02.4	43	23	51.6	East Ridge.....	3.453408	2,840.6	9,320
				317	20	06.3	137	21	01.6	Butte.....	3.510199	3,237.4	10,621
Pine Hill (Nev.), 1883.....	37	58	12.540	337	23	48.5	157	24	18.0	Butte.....	3.483760	3,046.2	9,994
	114	01	56.758	67	08	03.3	247	07	37.5	Road Summit.....	3.045390	1,110.2	3,642
				137	16	47.2	317	16	05.9	Pioche.....	3.383078	2,415.9	7,926
				209	37	27.2	29	37	50.6	East Ridge.....	3.273775	1,878.3	6,162
North boundary signal, 1883.....	38	00	50.899	325	46	08.5	145	47	04.2	East Ridge.....	3.594416	3,930.2	12,894
	114	02	49.307	342	18	41.9	162	19	43.7	Butte.....	3.907209	8,076.2	26,497
				6	32	46.7	186	32	37.7	Pioche.....	3.495285	3,128.1	10,283
Canyon Peak (Nev.), 1883.....	38	00	33.758	206	55	27.9	26	55	34.7	North boundary signal.....	2.772840	592.7	1,945
	114	03	00.309	317	39	32.9	137	40	35.4	East Ridge.....	3.565976	3,681.1	12,077
				1	57	25.5	181	57	23.3	Pioche.....	3.411752	2,580.8	8,467
Boundary stake no. 1, 1883 <sup>1</sup> .....	38	00	47.09	242	07	40	62	07	46	North boundary signal.....	2.400097	251.2	824
	114	02	58.41	6	25	34	186	25	33	Canyon Peak.....	2.616580	413.6	1,357
Boundary stake no. 2, 1883 <sup>1</sup> .....	37	58	47.88	306	00	30	126	01	08	Pine Hill.....	3.267939	1,853.2	6,080
	114	02	58.18	342	36	47	162	36	59	Road Summit.....	3.202475	1,594.0	5,230
White Rock (Nev.), 1881.....	38	08	46.214	100	56	21.7	280	12	41.0	White Pine.....	5.020232	104,768.8	343,729
	114	19	29.258	180	37	29.8	0	37	56.1	Wheeler Peak.....	4.969476	93,212.9	305,816
				306	23	57.9	126	34	05.4	Pioche.....	4.475288	29,873.6	98,010

<sup>1</sup> No check on this position.

151730°—37'—3

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Supplementary points—Continued</i>													
Pioche Peak, monument (Nev.), 1881.....	37	56	00.752	210	11	29.6	30	17	17.3	White Rock.....	4.436448	27,317.9	89,625
	114	28	53.446	234	59	58.0	55	22	16.2	Indian Peak.....	4.811878	64,845.2	212,746
				261	05	39.2	81	21	32.3	Pioche.....	4.582910	38,274.5	125,572
White cairn (Nev.), 1883.....	37	55	18.354	114	39	10.5	294	37	58.8	Pioche Peak, monument.....	3.496240	3,135.0	10,285
	114	26	56.772	203	37	22.0	23	41	57.8	White Rock.....	4.434471	27,193.9	89,219
				258	20	00.4	78	34	41.7	Pioche.....	4.552711	35,703.5	117,137
Highland Peak, summit (Nev.), 1881.....	37	53	37.533	120	32	41.6	299	58	30.4	White Pine.....	4.971980	93,751.9	307,584
	114	34	40.035	190	42	44.6	10	52	37.2	Wheeler Peak.....	5.091340	123,407.0	404,878
				257	21	03.7	77	40	29.6	Pioche.....	4.675978	47,421.8	155,583
Snake Creek, 1883.....	38	58	00.985	94	11	53.3	273	59	07.0	Wheeler Peak.....	4.468370	29,401.5	96,461
	113	58	28.706	150	28	21.6	330	19	54.4	Mount Moriah.....	4.592249	39,106.5	128,302
				248	02	44.8	68	24	08.9	Knotch Peak or Sawtooth Mountain.....	4.722354	52,766.0	173,116
Wheeler Peak reference mark (Nev.), 1882.....	39	01	12.843	281	00	41.5	101	13	48.4	Snake Creek.....	4.486766	30,673.7	100,635
	114	19	19.355	348	28	47.1	168	29	07.4	Wheeler Peak.....	3.590717	3,896.9	12,785
Nevada-Utah boundary monument, 1883.....	39	09	45.066	343	42	21.1	163	45	07.2	Snake Creek.....	4.354453	22,617.9	74,206
	114	02	52.298	49	33	53.6	229	23	51.8	Wheeler Peak.....	4.479857	30,189.6	99,047
				56	25	39.4	236	15	17.0	Wheeler Peak reference mark.....	4.454835	28,499.4	93,502
Cedar Spur (Nev.), 1883.....	38	56	39.289	108	22	18.2	288	16	14.0	Wheeler Peak.....	4.166970	14,688.2	48,190
	114	09	07.850	200	24	22.4	20	28	19.0	Nevada-Utah boundary monument.....	4.412616	25,859.3	84,840
				260	38	50.9	80	45	32.7	Snake Creek.....	4.192971	15,594.5	51,163
Transit Venus station (Nev.) 1883.....	39	00	40.665	215	07	09.9	35	12	20.2	Nevada-Utah boundary monument.....	4.312499	20,535.2	67,373
	114	11	04.356	285	05	01.7	105	12	57.2	Snake Creek.....	4.275108	18,841.2	61,815
				339	20	41.8	159	21	55.2	Cedar Spur.....	3.900590	7,954.1	26,096
Mount Grafton, summit (Nev.), 1881.....	38	41	32.119	58	14	28.6	237	46	06.4	White Pine.....	4.892713	78,111.1	256,269
	114	44	29.795	228	39	03.3	48	55	10.9	Wheeler Peak.....	4.694283	49,463.3	162,281
				322	10	48.9	142	36	31.0	Pioche.....	4.995343	98,933.4	324,584
Ward, small cairn (Nev.), 1881.....	39	06	01.035	30	26	18.2	210	04	29.4	White Pine.....	5.001532	100,353.4	329,243
	114	55	11.029	125	05	08.1	304	30	58.5	Diamond Peak.....	4.974442	94,294.9	309,333
				83	24	27.4	103	47	23.1	Wheeler Peak.....	4.732698	54,037.8	177,289

Ward, north summit (Nev.), 1881.....	39	08	28.917	28	09	03.8	207	48	08.4	White Pine.....	5.014172	103,317.0	338,966
	114	56	37.292	123	27	09.8	302	53	54.0	Diamond Peak.....	4.954263	90,004.2	295,289
				287	21	17.3	107	45	08.0	Wheeler Peak.....	4.757756	57,247.4	187,819
Mount Irish (Nev.), 1881.....	37	38	41.093	173	18	16.7	353	14	34.0	White Pine.....	4.877382	75,401.8	247,381
	115	24	01.949	212	14	20.0	32	54	47.5	Wheeler Peak.....	5.247104	176,646.1	579,546
				251	54	01.9	72	43	40.6	Pioche.....	5.095932	124,718.8	409,182
Duckwater cairn (Nev.), 1881.....	38	54	35.354	5	53	28.3	185	50	34.5	White Pine.....	4.818784	65,894.6	216,166
	115	25	25.459	155	42	53.2	335	27	55.7	Diamond Peak.....	4.915474	82,314.1	270,059
				264	38	32.2	85	20	25.8	Wheeler Peak.....	4.985227	96,655.6	317,111
White Pine azimuth mark (Nev.), 1883.....	38	18	42.966	210	48	46.2	30	48	58.8	White Pine.....	2.985770	967.8	3,175
	115	30	24.234	233	52	40.6	54	37	24.5	Wheeler Peak.....	5.107347	123,040.4	420,079
				285	22	19.7	106	16	16.8	Pioche.....	5.122609	132,620.0	435,104
White Pine, south summit (Nev.), 1889.....	38	17	36.92										
	115	31	18.38										
Mount Hamilton (Nev.), 1880.....	39	13	57.114	358	03	20.3	178	04	49.0	White Pine.....	5.006135	101,422.7	332,751
	115	32	25.480	148	40	58.8	328	30	24.9	Diamond Peak.....	4.661313	45,847.2	150,417
South boundary flag, 1889.....	39	53	46.187	299	46	39.3	119	48	26.0	Bench.....	3.658556	4,555.7	14,946
	114	02	25.149	305	57	02.0	126	01	42.1	Ibepah.....	4.108485	12,837.6	42,118
				320	45	51.8	140	49	45.3	Red Squaw.....	4.136824	13,703.3	44,958
Middle boundary, 1889.....	39	58	57.430	327	35	29.5	147	40	23.0	Ibepah.....	4.307427	20,296.8	66,590
	114	02	45.573	335	38	11.4	155	42	18.2	Red Squaw.....	4.346131	22,188.7	72,797
North boundary flag, 1889.....	40	00	18.451	324	26	53.3	144	32	17.2	Ibepah azimuth.....	4.314561	20,632.9	67,693
	114	02	43.954	331	05	53.7	151	10	46.2	Ibepah.....	4.350787	22,427.8	73,582
				338	07	58.6	158	12	04.4	Red Squaw.....	4.388677	24,472.4	80,290
South Peak, middle tree, 1889.....	40	02	19.401	6	21	38.2	186	20	27.9	Ibepah.....	4.371379	23,516.8	77,155
	113	53	18.580	26	32	33.3	206	28	29.2	Bench.....	4.305733	20,217.8	66,331
				39	22	58.9	219	17	07.9	South boundary flag.....	4.311006	20,464.7	67,141
North Peak, tree, east prong, 1889.....	40	02	48.726	5	00	43.6	184	59	46.1	Ibepah.....	4.386854	24,369.9	79,954
	113	53	38.605	24	15	31.1	204	11	39.8	Bench.....	4.318717	20,831.3	68,344
				36	47	50.6	216	42	12.4	South boundary flag.....	4.318810	20,883.8	68,516
Ibepah, telegraph office, flag, 1889.....	40	03	24.271	283	18	45.9	103	22	34.8	South Peak, middle tree.....	3.937948	8,668.6	28,440
	113	59	14.307	342	42	01.3	162	45	10.8	Ibepah azimuth.....	4.372754	23,591.4	77,399
				347	00	09.0	167	02	47.1	Ibepah.....	4.415610	26,038.1	85,427
Ibepah, post office, eccentric, 1889.....	40	03	31.284	347	44	47.3	167	47	17.3	Ibepah.....	4.418037	26,184.1	85,906
	113	59	01.825	54	01	29.8	234	01	21.7	Ibepah telegraph office, flag.....	2.569053	368.2	1,208
Ibepah, post office, southeast corner, 1889.....	40	03	31.646	318	41	31.5	138	41	31.8	Ibepah post office eccentric.....	1.171524	14.84	48.7
	113	59	02.239	51	43	03.2	231	42	55.4	Ibepah telegraph office, flag.....	2.564775	367.1	1,204

Station	Latitude and longitude			Azimuth	Back azimuth	To station	Distance			
	°	'	"				Logarithm (meters)	Meters	Feet	
<i>Supplementary points—Continued</i>										
Ibepah, telegraph office, chimney, 1889.....	40 03 23.715	113 59 17.410	237 42 22.3	57 42 32.3	237 42 22.3	76 29 42.5	Ibepah post office eccentric.....	2.640432	437.0	1,434
			256 29 40.6	76 29 42.5			Ibepah telegraph office, flag.....	1.865998	73.45	241.0
Devine's granary, 1889.....	40 03 32.320	113 59 01.737	347 45 56.9	167 48 26.9	167 48 26.9	183 46 12.3	Ibepah.....	4.418548	26,214.9	86,007
			3 46 12.3	183 46 12.3			Ibepah post office eccentric.....	1.505570	32.03	105.1
Strawberry North, summit, 1887.....	40 02 49.992	110 59 01.634	316 23 22.0	136 49 00.3	136 49 00.3	248 17 36.8	Patmos Head.....	4.920555	83,282.7	273,237
			108 40 41.7	287 37 02.6			Mount Nebo.....	4.856190	71,810.8	235,599
							Deseret.....	5.167282	146,988.0	482,243
Spanish Fork, cairn, 1887.....	40 05 16.745	111 31 37.006	102 28 36.0	122 28 36.0	122 28 36.0	213 26 34.7	Patmos Head.....	5.087881	122,428.1	401,666
			114 10 45.8	293 28 09.2			Mount Nebo.....	4.567452	36,936.2	121,182
							Deseret.....	5.009203	102,141.7	335,110
Granite Peak, 1884.....	40 07 41.358	113 16 12.747	59 12 16.4	238 47 15.9	238 47 15.9	325 11 21.0	Ibepah.....	4.810584	64,652.3	212,113
			145 42 49.1	56 20 04.1			Pilot Peak.....	5.060617	120,397.4	395,004
			235 55 03.1				Deseret.....	4.819697	66,023.3	216,611
Springville Peak, monument, 1884.....	40 14 38.691	111 33 22.225	307 26 04.7	128 13 47.1	128 13 47.1	175 59 58.8	Patmos Head.....	5.128221	134,344.8	440,763
			20 26 08.0	200 18 02.9			Wasatch.....	5.099376	125,711.8	412,439
							Mount Nebo.....	4.710697	51,368.5	168,531
Herriman, 1884.....	40 25 32.365	112 11 52.597	331 30 17.4	151 47 00.2	151 47 00.2	275 47 15.2	Mount Nebo.....	4.889852	77,598.3	254,587
			96 03 53.8	17 22 00.6			Deseret.....	4.561955	36,471.6	119,657
			197 09 35.4				Ogden Peak.....	4.954449	90,042.8	295,415
Deseret magnetic, 1887.....	40 27 25.863	112 36 54.681	180 14 04.9	0 14 06.7	0 14 06.7	64 33 05.1	Onaqui.....	4.208327	16,155.7	53,004
			213 13 19.8	33 20 37.5			Lake Shore bench.....	4.460186	28,852.7	94,661
			244 16 22.2				Oquirrh.....	4.604812	40,254.3	132,088
Hill flag, 1887.....	40 27 35.994	112 36 29.893	61 51 08.8	241 50 52.7	241 50 52.7	358 07 42.3	Deseret magnetic.....	2.821106	662.4	2,173
			178 07 56.6	32 42 02.3			Onaqui.....	4.200072	15,851.6	52,006
			212 35 00.7				Lake Shore bench.....	4.451373	28,273.1	92,759
Flag in flat, 1887 <sup>1</sup> .....	40 27 49.19	112 36 38.29	334 05 16	154 05 21	154 05 21	208 13 56	Hill flag.....	2.655551	452.4	1,484
			28 14 07				Deseret magnetic.....	2.912007	816.6	2,679
Draper, 1887.....	40 30 51.099	111 47 09.936	85 24 04.6	264 51 22.5	264 51 22.5	323 46 22.3	Deseret.....	4.853881	71,430.0	234,350
			144 03 10.5	353 57 16.8			Antelope.....	4.789201	61,546.2	201,923
			174 01 00.9				Ogden Peak.....	4.854097	76,576.8	251,236
Lone Peak, needle, 1884.....	40 31 37.116	111 45 19.150	0 38 07.6	180 37 43.7	180 37 43.7	263 55 27.1	Mount Nebo.....	4.900605	79,543.6	260,969
			84 29 21.4	351 52 24.1			Deseret.....	4.870128	74,152.9	243,283
			171 57 20.7				Ogden Peak.....	4.877869	75,486.4	247,658
Grantsville, flagstaff, 1887.....	40 36 06.606	112 28 22.601	266 46 50.5	86 58 01.3	86 58 01.3	219 14 45.0	Oquirrh.....	4.384972	24,264.5	79,608
			39 20 41.9	270 23 59.0			Deseret.....	4.309912	20,413.2	66,972
			90 29 30.4				Onaqui.....	4.078236	11,973.9	39,284
Onaqui, 1887.....	40 36 09.626	112 36 51.866	222 43 31.4	43 12 19.6	43 12 19.6	140 51 47.6	Ogden Peak.....	4.957333	90,642.7	297,384
			3 23 43.0	183 23 17.0			Mount Nebo.....	5.056235	113,824.3	373,439
							Deseret.....	4.201907	15,918.7	52,227
Oquirrh, 1887.....	40 36 49.506	112 11 12.021	65 25 04.5	245 07 57.7	245 07 57.7	356 25 16.0	Deseret.....	4.612079	40,933.5	134,296
			176 26 23.2	21 40 07.7			Antelope.....	4.588352	38,757.2	127,156
			201 28 07.7				Ogden Peak.....	4.845109	70,001.8	229,664
Lake Shore, bench, 1887.....	40 40 27.826	112 25 41.604	288 09 46.6	108 19 13.0	108 19 13.0	214 56 36.9	Oquirrh.....	4.332714	21,513.6	70,583
			35 04 18.8	243 06 54.6			Deseret.....	4.464259	29,124.5	95,553
			63 14 11.1				Onaqui.....	4.246732	17,649.5	57,905
City Creek, 1893.....	40 48 26.209	111 52 48.665	121 26 21.9	301 13 12.4	301 13 12.4	359 52 55.9	Antelope.....	4.519334	33,062.4	108,472
			179 52 58.4	175 00 27.6			Ogden Peak.....	4.639582	43,609.6	143,076
			354 56 00.8				Mount Nebo.....	5.045686	11,092.8	364,477
Salt Lake City, G. L. O. standard meridian, 1869.....	40 46 10.52	111 53 27.35								
Salt Lake City Temple, east spire, 1893.....	40 46 13.753	111 53 27.054	127 59 13.7	307 46 29.6	307 46 29.6	12 25 36.8	Antelope.....	4.539726	34,651.8	113,687
			192 25 11.7				City Creek.....	3.621569	4,183.8	13,726
Salt Lake City Temple, west spire, 1893.....	40 46 13.756	111 53 29.005	128 01 59.7	307 49 16.8	307 49 16.8	322 40 59.1	Antelope.....	4.539273	34,615.7	113,568
			143 01 46.4	13 02 14.6			Promontory.....	4.866236	73,491.3	241,113
			193 01 48.3				City Creek.....	3.622607	4,193.8	13,759
Salt Lake City, azimuth, 1893.....	40 46 10.728	111 53 26.730	150 15 18.7	330 15 17.2	330 15 17.2	12 03 28.6	Salt Lake City Temple, west spire.....	2.031706	107.6	353
			192 03 03.7				City Creek.....	3.630772	4,273.4	14,020
Salt Lake City, longitude, 1869.....	40 46 11.54	111 53 26.69								
Salt Lake City, latitude, 1869.....	40 46 11.54	111 53 26.63								
South Antelope no. 1, cairn, 1892.....	40 52 54.681	112 11 32.976	38 07 27.7	217 50 31.8	217 50 31.8	347 50 42.0	Deseret.....	4.774476	59,494.4	195,191
			167 51 35.7	40 19 21.4			Antelope.....	3.959697	9,113.7	29,901
			220 12 29.0				Salt Lake southeast base.....	4.357187	22,760.8	74,674
South Antelope no. 2, 1892 <sup>1</sup> .....	40 52 29.68	112 11 14.90	38 54 41	218 37 33	218 37 33	346 23 49	Deseret.....	4.771988	59,154.5	194,076
			166 24 54				Antelope.....	3.998258	9,960.0	32,677

<sup>1</sup>No check on this position.

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Supplementary points—Continued</i>													
West Peninsula Peak, 1889.....	40 50 02.667	113 54 30.507	0 27 32.6	145 47 23.9	187 06 30.5	180 27 08.2	325 40 47.5	7 08 38.0	Ibepah.....	5.048025	111,692.8	366,445	
									Pilot Peak.....	4.400433	25,143.9	82,493	
									Butte.....	4.563541	36,605.1	120,095	
East Peninsula Peak, 1889.....	40 54 23.954	113 49 34.297	3 47 35.8	121 11 41.9	175 11 38.9	183 43 59.5	301 01 51.0	355 10 32.0	Ibepah.....	5.079210	120,008.0	393,726	
									Pilot Peak.....	4.391227	24,616.5	80,763	
									Butte.....	4.452744	28,362.5	93,053	
White boundary stake, 1892.....	40 56 06.859	114 02 29.227	162 49 04.8	279 51 33.3	315 01 26.5	342 47 41.9	100 00 00.9	135 06 39.8	Pilot Peak.....	3.999660	9,992.2	32,783	
									East Peninsula Peak.....	4.265022	18,408.7	60,396	
									West Peninsula Peak.....	4.200552	15,869.1	52,064	
Black boundary stake, 1892.....	40 55 24.353	114 02 29.361	164 48 22.7	180 08 15.1	311 27 59.9	344 46 59.9	0 08 15.2	131 33 13.3	Pilot Peak.....	4.051180	11,250.7	36,912	
									White boundary stake.....	3.117679	1,311.2	4,302	
									West Peninsula Peak.....	4.175297	14,972.6	49,123	
Camp stake, 1892.....	40 59 22.653	113 58 53.398	305 07 02.2	340 22 19.8	113 42 20.6	125 13 08.7	160 25 12.0	293 38 36.1	East Peninsula Peak.....	4.204048	15,997.3	52,494	
									West Peninsula Peak.....	4.263329	18,337.0	60,161	
									Pilot Peak.....	3.941069	8,731.1	28,645	
Flag, 1892.....	40 59 00.564	113 59 12.253	119 01 23.3	212 53 43.1	302 12 22.7	298 57 51.2	32 53 55.5	122 18 41.5	Pilot Peak.....	3.936447	8,638.7	28,342	
									Camp stake.....	2.909297	811.5	2,662	
									East Peninsula Peak.....	4.203755	15,986.6	52,449	
									West Peninsula Peak.....	4.251758	17,854.9	58,579	
Nevada-Utah boundary stake, 1892 <sup>1</sup> .....	41 01 15.91	114 02 27.74	304 52 28	85 56 52.4	71 37 57	124 54 48	251 28 08	132 26 23	Camp stake.....	3.785834	6,107.1	20,036	
									Flag.....	3.791620	6,189.0	20,305	
Pilot Peak azimuth mark (Nev.), 1892.....	41 02 29.490	114 04 14.029	257 50 37.4	12 33 52.7		78 55 51.3	192 33 38.5		Promontory.....	5.150723	141,489.1	464,202	
									Pilot Peak.....	3.364176	2,313.0	7,589	
Willow Springs, 1892.....	40 59 22.555	113 58 53.126	113 42 26.0	127 35 29.7	209 12 07.7	293 38 41.3	307 31 59.1	29 17 07.9	Pilot Peak.....	3.941419	8,738.1	28,668	
									Pilot Peak azimuth mark.....	3.975854	9,459.2	31,034	
									Butte.....	4.339133	21,834.0	71,634	
Bountiful Peak or Francis Peak, cairn, 1892.....	40 57 51.952	111 49 02.045	50 53 05.2	89 41 07.1	126 26 24.0	230 21 27.1	209 25 27.7	306 02 38.7	Deseret.....	4.946275	88,363.9	289,907	
									Antelope.....	4.525155	33,508.5	109,936	
									Promontory.....	4.790990	62,659.9	205,577	
Lake Park, pavilion, flag, 1892 <sup>1</sup> .....	40 58 38.91	111 56 20.31	330 20 32	85 53 17		150 22 36	265 42 25		Waddoup.....	3.954543	9,006.2	29,548	
									Antelope.....	4.367716	23,319.3	76,507	
Farmington, courthouse, spire, 1892 <sup>1</sup> .....	40 58 48.80	111 53 10.61	359 52 59	85 56 53		179 52 59	265 43 56		Waddoup.....	3.910246	8,132.9	26,683	
									Antelope.....	4.443494	27,764.8	91,092	
Francis Peak, 1896 <sup>1</sup> .....	41 01 51.76	111 50 19.49	16 08 48	111 10 32		196 06 56	290 59 49		Waddoup.....	4.156594	14,341.5	47,052	
									Salt Lake northwest base.....	4.389274	24,506.1	80,400	
Kaysville, R. G. W. depot, chimney, 1892 <sup>1</sup> .....	41 01 30.36	111 57 57.54	332 49 31	71 37 57		152 52 40	251 28 08		Waddoup.....	4.168513	14,740.5	48,361	
									Antelope.....	4.344629	21,112.1	69,265	
Kaysville, meeting house, spire, 1892 <sup>1</sup> .....	41 02 10.52	111 57 28.18	337 09 40	69 15 53		157 12 29	249 05 45		Waddoup.....	4.192396	15,573.8	51,095	
									Antelope.....	4.364985	23,173.1	76,027	
Fremont Island, cairn, 1888.....	41 10 27.050	112 20 32.902	154 59 30.5	265 36 52.4	335 32 32.5	334 56 28.7	85 55 05.8	155 37 33.4	Promontory.....	4.181189	15,177.1	49,794	
									Ogden Peak.....	4.588857	38,802.3	127,304	
									Antelope.....	4.412747	25,867.1	84,866	
Desert Peak, cairn, 1892.....	41 11 09.919	113 22 02.453	284 01 47.3	321 57 23.3	73 08 50.8	104 47 12.4	142 26 29.2	252 40 52.3	Antelope.....	4.999865	99,068.9	327,981	
									Deseret.....	5.009047	102,105.0	334,989	
									Pilot Peak.....	4.794677	62,327.1	204,485	
Ogden, longitude, 1873.....	41 13 11.693	111 59 37.406	190 04 28.5	283 10 27.5		10 05 48.8	103 14 54.3		North Ogden Peak.....	4.208702	16,169.7	53,050	
									Ogden Peak.....	3.986318	9,689.9	31,791	
Weber bench, 1891.....	41 12 12.047	111 59 32.417	176 23 09.8	188 41 02.0	272 15 54.3	356 23 06.5	8 42 19.0	92 20 17.8	Ogden longitude.....	3.265688	1,843.7	6,049	
									North Ogden Peak.....	4.254459	17,966.3	58,944	
									Ogden Peak.....	3.969690	9,325.9	30,597	
Ogden, azimuth, 1891.....	41 13 11.547	111 59 37.377	103 49 12.2	190 04 09.4	283 08 56.7	283 32 22.4	10 05 29.7	103 13 23.5	Promontory.....	4.564536	36,689.0	120,370	
									North Ogden Peak.....	4.208819	16,174.1	53,065	
									Ogden Peak.....	3.986240	9,688.1	31,785	
Sandy, 1891.....	41 13 02.128	112 00 01.944	242 41 37.0	280 49 14.7	335 59 44.8	62 41 53.2	100 53 57.7	156 00 04.3	Ogden longitude.....	2.808394	643.3	2,111	
									Ogden Peak.....	4.068078	10,187.7	33,424	
									Weber bench.....	3.223188	1,691.2	5,549	
Ogden City Hall, 1891.....	41 13 12.298	111 58 13.214	286 36 39.3	44 47 53.6	89 27 46.5	106 40 10.6	224 47 01.4	269 26 51.0	Ogden Peak.....	3.892014	7,798.6	25,586	
									Weber bench.....	3.418139	2,619.0	8,593	
									Ogden longitude.....	3.292528	1,961.2	6,434	
Ogden Union Depot, 1891.....	41 13 15.009	111 58 44.135	285 45 33.4	30 04 47.1	85 17 31.1	105 49 25.1	210 04 15.3	265 16 56.0	Ogden Peak.....	3.930113	8,513.6	27,932	
									Weber bench.....	3.351121	2,244.5	7,364	
									Ogden longitude.....	3.095201	1,245.1	4,085	
Ogden, railroad crossing, U. P. and U. C., 1891.....	41 13 19.057	111 58 55.684	286 03 49.6	76 35 00.9		106 07 48.9	256 34 33.4		Ogden Peak.....	3.944805	8,806.5	28,893	
									Ogden azimuth.....	2.999302	998.4	3,276	

<sup>1</sup> No check on this position.

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Supplementary points—Continued</i>													
Ogden Methodist Church, 1891 <sup>1</sup> .....	41 13 22.88	111 58 04.79	83 03 33	80 55 10	223 02 35	260 54 09	Weber bench.....	3.475712	2,990.3	9,811			
							Ogden longitude.....	3.339393	2,184.7	7,168			
Ogden, courthouse, flagstaff, 1888.....	41 13 23.236	111 58 06.144	289 21 12.1	42 28 18.5	109 24 38.7	222 27 21.6	Ogden Peak.....	3.889082	7,746.1	25,414			
			80 29 56.1	260 28 55.9	260 28 55.9		Weber bench.....	3.473774	2,977.0	9,767			
							Ogden longitude.....	3.333528	2,155.4	7,072			
Ogden Reform School, 1891 <sup>1</sup> .....	41 13 56.24	111 57 23.29	43 06 53	66 16 07	223 05 28	246 14 39	Weber bench.....	3.643666	4,402.2	14,443			
							Ogden longitude.....	3.533102	3,412.7	11,196			
Grassy, cairn, 1892.....	41 15 53.002	114 00 54.159	261 56 30.3	306 53 40.9	103 07 30.9	127 48 13.8	Antelope.....	5.189931	154,857.0	508,060			
			10 49 44.7	190 47 19.0	190 47 19.0		Deseret.....	5.168415	147,372.0	483,503			
							Pilot Peak.....	4.439859	27,533.3	90,332			
Butte, 1892.....	41 09 40.135	113 51 16.217	50 16 32.5	130 33 40.2	230 07 47.1	310 27 19.4	Pilot Peak.....	4.385285	24,282.0	79,665			
							Grassy, cairn.....	4.248176	17,708.3	58,098			
Cliff, flag, 1891.....	41 16 45.819	111 55 15.767	339 15 59.3	35 18 28.2	159 17 33.8	215 15 39.0	Ogden Peak.....	3.974517	9,430.1	30,939			
			42 42 23.9	222 39 31.4	222 39 31.4		Weber bench.....	4.014784	10,346.3	33,944			
							Ogden longitude.....	3.953554	8,985.7	29,481			
North Ogden public school, 1891 <sup>1</sup> .....	41 18 24.78	111 57 37.61	13 05 47	16 06 56	193 04 31	196 05 37	Weber bench.....	4.072073	11,805.2	38,731			
							Ogden longitude.....	4.002300	10,053.1	32,983			
South Promontory, cairn, 1892.....	41 18 26.345	112 26 46.939	283 54 20.6	293 41 34.4	104 16 42.1	113 42 39.3	Ogden Peak.....	4.688732	48,835.1	160,220			
			333 03 32.9	153 12 40.3	153 12 40.3		Promontory.....	3.397360	2,496.7	8,191			
							Antelope.....	4.632896	42,943.4	140,890			
Tecoma, railroad signboard, eccentric (Nev.), 1892.....	41 19 12.708	114 04 51.520	318 06 12.6	359 21 24.6	138 08 49.3	179 21 35.1	Grassy, cairn.....	3.917714	8,274.0	27,146			
							Pilot Peak.....	4.521240	33,207.8	108,949			
Nevada-Utah boundary monument, 1892 <sup>1</sup> .....	41 20 30.38	114 02 22.86	346 26 00	55 17 07	166 26 58	235 15 29	Grassy, cairn.....	3.944600	8,802.4	28,879			
							Tecoma, railroad signboard, eccentric.....	3.623890	4,206.2	13,800			
North Ogden Peak, 1891.....	41 21 47.743	111 57 35.710	340 00 00.6	25 46 21.7	160 03 07.5	205 36 16.8	Ogden Peak.....	4.285445	19,295.0	63,304			
			79 28 26.5	259 10 14.9	259 10 14.9		Antelope.....	4.694070	49,439.0	162,201			
							Promontory.....	4.592352	39,115.8	128,332			
Middle Promontory, cairn, 1892.....	41 23 54.139	112 29 06.472	293 20 23.9	333 35 55.3	113 44 18.7	153 38 32.4	Ogden Peak.....	4.741700	55,169.6	181,002			
			6 31 01.4	186 25 30.3	186 25 30.3		Promontory.....	4.094905	12,442.4	40,821			
							Deseret.....	5.020872	104,923.3	344,236			
North Promontory, cairn, 1892.....	41 29 25.151	112 30 26.935	301 23 34.8	337 14 03.8	121 48 24.0	157 25 37.1	Ogden Peak.....	4.789146	61,538.4	201,897			
			340 52 34.4	160 56 04.8	160 56 04.8		Antelope.....	4.803287	63,575.1	208,579			
							Promontory.....	4.354150	22,602.2	74,154			
Box Elder Peak or Willards Peak, cairn, 1888 <sup>1</sup> .....	41 38 08.65	112 00 49.41	347 03 56	42 12 37	167 09 12	221 56 31	Ogden Peak.....	4.695894	49,647.1	162,884			
							Promontory.....	4.703580	50,533.6	165,792			

Forest Area

Principal points	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
South Tent, 1919.....	39 23 31.879	111 21 24.708	90 18 38.40	143 03 08.12	269 46 17.47	322 47 30.10	Scipio.....	4.8644273	73,185.88	240,110.7			
							Mount Nebo.....	4.7651648	58,232.41	191,050.8			
Indianola, 1919.....	39 49 40.286	111 23 41.199	356 08 12.56	86 40 26.81	176 09 39.58	266 26 11.89	South Tent.....	4.6855594	48,479.64	159,053.6			
							Mount Nebo.....	4.5025550	31,809.36	104,361.2			
Wasatch 2, 1919.....	39 06 53.651	111 27 11.207	47 28 34.95	115 36 36.35	226 52 34.04	295 08 00.40	Tushar.....	5.0553476	113,591.96	372,676.3			
			160 54 06.19	340 42 11.14	340 42 11.14		Scipio.....	4.8571132	71,963.65	236,100.7			
			195 04 23.25	15 08 02.50	15 08 02.50		Mount Nebo.....	4.9127047	81,790.85	268,342.1			
							South Tent.....	4.5035888	31,885.18	104,610.0			
Mount Catherine, 1919.....	38 59 38.294	112 08 20.470	172 31 43.29	257 02 34.45	352 29 10.00	77 28 30.24	Scipio.....	4.6497500	44,642.65	146,465.1			
							Wasatch 2.....	4.7844200	60,872.34	199,712.0			
Musinia, 1919.....	39 02 11.078	111 34 37.411	84 38 52.43	126 14 22.75	264 17 38.84	305 50 30.33	Mount Catherine.....	4.6892992	48,898.91	160,429.2			
			230 52 11.89	50 56 53.14	50 56 53.14		Scipio.....	4.8274989	67,220.06	220,537.8			
							Wasatch 2.....	4.1404866	13,819.32	45,338.9			
Black Cap, 1919.....	38 57 19.112	111 49 12.488	98 55 42.27	145 36 50.42	278 43 40.21	325 22 12.02	Mount Catherine.....	4.446246	27,965.63	91,750.6			
			246 46 30.19	66 55 40.85	66 55 40.85		Scipio.....	4.7702657	58,920.41	193,308.0			
							Musinia.....	4.3598837	22,902.54	75,139.4			
Monroe 2, 1919.....	38 37 31.357	112 00 53.773	56 39 27.41	169 02 33.27	236 24 37.77	348 55 19.40	Tushar.....	4.6178240	41,478.59	136,084.3			
			221 43 26.50	42 04 35.79	42 04 35.79		Scipio.....	4.9384109	86,778.26	284,705.0			
							Wasatch 2.....	4.8633840	73,010.28	239,534.6			
Mount Marvine, 1919.....	38 40 05.633	111 38 25.258	67 54 16.77	81 49 02.92	247 25 26.42	261 35 00.75	Tushar.....	4.8615564	72,703.68	238,528.7			
			198 04 50.27	18 11 53.47	18 11 53.47		Monroe 2.....	4.5179323	32,955.83	108,122.6			
							Wasatch 2.....	4.7174930	52,178.67	171,189.5			
Thousand Lake Mountain, 1919.....	38 25 01.139	111 28 42.514	90 28 20.47	116 28 37.10	269 53 32.76	296 08 34.30	Tushar.....	4.9111735	81,502.98	267,397.7			
							Monroe 2.....	4.7175946	52,190.88	171,229.6			
							Mount Marvine.....	4.4949477	31,287.03	102,549.1			

<sup>1</sup>No check on this position.

Forest Area—Continued

Station <sup>1</sup>	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Supplementary points</i>													
Mount Baldy, 1919 <sup>2</sup>	39 45 36.39	109 12 43	289 05 29	Mount Nebo	4.233053	17,102.2	56,109						
	111 34 37.29	244 12 49	64 19 49	Indianola	4.238740	17,327.7	56,849						
C. H. 7, 1919 <sup>1</sup>	39 44 28.42	10 13 15	190 10 09	South Tent	4.595205	39,373.6	129,178						
	111 16 32.75	133 22 13	313 17 39	Indianola	4.146628	14,016.1	45,984						
U. S. Forest Service no. 21, 1919	39 20 44.928	106 10 50.2	286 02 53.2	Scipio	4.272745	18,738.9	61,479						
	111 59 50.990	201 02 05.5	21 10 57.4	Mount Nebo	4.742878	55,319.5	181,494						
U. S. Forest Service no. 1, 1919	39 32 29.712	3 13 29.4	183 13 04.6	Scipio	4.219065	16,560.2	54,331						
	112 11 44.116	321 49 13.8	141 56 46.8	U. S. Forest Service no. 21	4.441321	27,626.2	90,637						
U. B. Dam Gatehouse, 1919 <sup>1</sup>	39 22 19.98	98 43 35	278 37 01	Scipio	4.177695	15,055.5	49,395						
	112 02 01.18	313 13 45	133 15 08	U. S. Forest Service no. 21	3.631310	4,278.7	14,038						
C. H. 2 (Horseshoe), 1919 <sup>1</sup>	39 22 26.34	5 07 14	185 06 06	Wasatch 2	4.460557	28,877.3	94,742						
	111 25 23.93	250 32 02	70 34 34	South Tent	3.783308	6,071.7	19,920						
C. H. 1, 1919 <sup>1</sup>	39 17 27.69	225 00 48	45 05 46	South Tent	4.201352	15,898.3	52,160						
	111 29 14.60	351 22 44	171 24 02	Wasatch 2	4.296129	19,775.6	64,880						
U. S. Forest Service no. 6, 1919	38 51 55.180	209 09 56.3	29 13 24.4	Mount Catherine	4.213755	16,358.9	53,671						
	112 13 51.744	254 12 52.9	74 28 22.1	Black Cap	4.568369	37,014.3	121,438						
		324 44 08.6	144 52 15.5	Monroe 2	4.513160	32,595.7	106,941						
Red Pyramid (Beehive) (U. S. F. S.), 1919	38 56 09.091	59 35 28.4	239 29 41.4	U. S. Forest Service no. 6	4.188831	15,446.5	50,677						
	112 04 39.187	140 28 07.6	320 25 48.4	Mount Catherine	3.922546	8,366.5	27,449						
		249 37 18.0	70 00 53.4	Wasatch 2	4.760514	57,612.1	189,016						
		264 23 34.0	84 33 16.6	Black Cap	4.350654	22,420.9	73,559						
U. S. Forest Service no. 5, 1919	39 03 35.207	1 19 05.3	181 19 00.9	Mount Catherine	3.863780	7,307.7	23,975						
	112 08 13.485	20 41 58.5	200 38 25.9	U. S. Forest Service no. 6	4.363080	23,071.7	75,694						
		292 48 06.2	113 00 04.5	Black Cap	4.474255	29,802.7	97,778						
U. S. Forest Service no. 3, 1919	39 16 25.679	202 53 39.1	22 56 06.7	Scipio	4.156142	14,326.6	47,003						
	112 16 15.953	333 58 08.3	154 03 12.9	U. S. Forest Service no. 5	4.422138	26,432.5	86,721						
		339 46 26.4	159 51 26.5	Mount Catherine	4.519803	33,098.1	108,589						
U. S. Forest Service no. 2, 1919	39 15 15.777	23 47 50.1	203 43 39.8	U. S. Forest Service no. 5	4.373007	23,605.2	77,445						
	112 01 37.336	95 55 14.0	275 45 57.9	U. S. Forest Service no. 3	4.325799	21,173.8	69,468						
		134 50 32.4	314 43 43.2	Scipio	4.338302	21,792.2	71,497						
		155 34 16.9	335 27 51.8	U. S. Forest Service no. 1	4.544511	35,035.7	114,946						
		331 36 29.1	151 44 18.9	Black Cap	4.576551	37,718.2	123,747						
U. S. Forest Service no. M 11, 1919	39 17 07.276	229 48 42.7	49 54 56.7	Scipio	4.266733	18,481.3	60,634						
	112 22 13.036	278 29 33.7	98 33 19.8	U. S. Forest Service no. 3	3.937234	8,654.3	28,393						
		328 12 21.8	148 21 07.3	Mount Catherine	4.580115	38,029.0	124,767						
U. S. Forest Service no. M 9, 1919	39 08 38.162	125 33 30.4	305 23 49.9	U. S. Forest Service no. M 11	4.432184	27,051.0	88,750						
	112 06 54.810	137 00 33.1	316 54 38.4	U. S. Forest Service no. 3	4.285042	19,726.1	64,718						
		211 49 28.0	31 52 48.7	U. S. Forest Service no. 2	4.159432	14,435.5	47,360						
		309 14 56.8	129 26 06.1	Black Cap	4.518922	33,031.0	108,369						
U. S. Forest Service no. M 10, 1919	39 18 20.290	20 51 17.0	200 50 41.4	U. S. Forest Service no. 3	3.577733	3,782.1	12,408						
	112 15 19.783	203 38 19.6	23 40 11.6	Scipio	4.023160	10,547.8	34,606						
		343 44 16.2	163 48 40.9	Mount Catherine	4.550727	36,035.2	118,225						
Flagstaff (U. S. F. S.), 1919 <sup>2</sup>	39 04 13.08	80 47 53	260 37 50	Musinia	4.367666	23,316.6	76,498						
	111 18 40.43	112 00 46	291 55 24	Wasatch 2	4.121763	13,236.2	43,426						
Stevens 20, 1919	39 03 36.952	59 09 54.6	239 04 32.4	Mount Catherine	4.156534	14,339.5	47,046						
	111 59 48.843	89 47 24.6	269 42 06.6	U. S. Forest Service no. 5	4.083979	12,133.3	39,807						
		173 07 01.8	353 05 53.4	U. S. Forest Service no. 2	4.326602	21,707.1	71,217						
		307 12 52.2	127 19 32.8	Black Cap	4.284213	19,240.4	63,125						
U. S. Forest Service no. 20, 1919	39 03 15.04	61 14 23	241 09 04	Mount Catherine	4.142148	13,872.3	45,513						
	111 59 55.14	93 00 50	272 55 36	U. S. Forest Service no. 5	4.079122	11,998.4	39,365						
Monroe Peak (U. S. Forest Service no. 13), 1919	38 32 09.976	66 26 37.5	246 13 58.1	Tushar	4.509211	32,300.6	105,973						
	112 04 21.627	159 23 41.2	339 17 44.7	U. S. Forest Service no. 6	4.591695	39,056.6	128,138						
		206 53 54.7	26 56 04.3	Monroe 2	4.045857	11,113.7	36,462						
		284 07 16.8	104 29 27.8	Thousand Lake Mountain	4.728443	53,511.0	175,561						
U. S. Forest Service no. M 8, 1919	38 30 16.719	44 16 26.2	224 12 29.6	Tushar	4.121244	13,220.4	43,374						
	112 18 21.728	242 03 53.2	62 14 46.5	Monroe 2	4.457780	28,093.3	94,138						
		260 11 25.9	80 20 09.1	Monroe Peak (U. S. Forest Service no. 13)	4.314899	20,649.0	67,746						
Mount Terrill (U. S. F. S.), 1919	38 42 44.009	189 27 53.9	9 30 30.4	Musinia	4.562141	36,487.2	119,708						
	111 38 46.883	335 53 19.6	155 59 36.4	Thousand Lake Mountain	4.554988	35,891.2	117,753						
		353 53 22.4	173 53 35.9	Mount Marvine	3.691211	4,911.5	16,114						
Mount Hilgard (U. S. F. S.), 1919	38 41 02.956	78 14 18.0	258 10 39.1	Mount Marvine	3.936977	8,649.2	28,377						
	111 32 35.001	175 41 40.0	355 40 23.1	Musinia	4.593457	39,215.4	128,659						
		249 13 53.7	169 16 18.7	Thousand Lake Mountain	4.479818	30,186.9	99,038						

<sup>1</sup> No check on this position.  
<sup>2</sup> Checked by vertical angles only.

Forest Area—Continued

Station	Latitude and longitude			Azimuth	Back azimuth			To station	Distance		
									Logarithm (meters)	Meters	Feet
<i>Supplementary points—Continued</i>											
U. S. Forest Service no. 8, 1919.....	38 40 38.830	112 18 16.579	0 22 21.4 197 01 11.1 233 36 18.1 252 49 16.9 307 45 44.8	180 22 18.2 17 03 56.9 53 54 31.4 103 00 08.2 127 54 25.8	U. S. Forest Service no. M 8..... U. S. Forest Service no. 6..... Black Cap..... Monroe 2..... Monroe Peak (U. S. Forest Service no. 13).	4.282918 4.338729 4.717434 4.412802 4.407900	19,183.1 21,813.7 52,171.6 25,870.3 25,580.0	62,937 71,567 171,166 84,876 83,924			
U. S. Forest Service no. M 3, 1919.....	38 43 38.568	112 26 15.345	295 33 22.1 335 05 40.7 356 13 05.1	115 38 21.5 155 10 36.3 176 14 03.3	U. S. Forest Service no. 8..... U. S. Forest Service no. M 8..... Tushar.....	4.106157 4.435382 4.534920	12,827.9 27,251.0 34,270.5	42,086 89,406 112,436			
U. S. Forest Service no. 9, 1919.....	38 38 52.444	112 32 02.555	223 32 07.8 260 35 59.2 273 00 15.3 287 00 48.1 308 36 02.7 337 09 39.3	43 35 44.8 80 44 35.2 93 19 42.1 107 18 04.1 128 44 34.5 157 14 13.7	U. S. Forest Service no. M 3..... U. S. Forest Service no. 8..... Monroe 2..... Monroe Peak (U. S. Forest Service no. 13). U. S. Forest Service no. M 8..... Tushar.....	4.085514 4.306157 4.655787 4.623955 4.405676 4.439716	12,176.3 20,237.5 45,267.6 42,068.3 25,449.3 27,524.3	39,948 66,396 148,515 138,019 83,495 90,303			
Marys Nipple (U. S. F. S.), 1919.....	38 40 57.483	112 24 36.515	70 21 52.6 154 19 54.4 298 51 10.3	250 17 14.0 334 18 52.6 119 03 48.4	U. S. Forest Service no. 9..... U. S. Forest Service no. M 3..... Monroe Peak (U. S. Forest Service no. 13).	4.058890 3.741259 4.526271	11,452.2 5,511.4 33,594.7	37,573 18,082 110,219			
U. S. Forest Service no. 15 (north end of Fish Lake), 1919. <sup>1</sup>	38 37 29.97	111 42 39.85	232 02 13 318 37 41	52 04 52 138 46 22	Mount Marvine..... Thousand Lake Mountain.....	3.892474 4.487622	7,806.8 30,734.2	25,613 100,834			
U. S. Forest Service no. M 2, 1919.....	38 33 13.850	112 31 49.423	178 15 27.9 202 43 32.5 235 01 30.6 285 31 41.9	358 15 19.7 22 47 01.1 55 09 57.9 105 40 05.0	U. S. Forest Service no. 9..... U. S. Forest Service no. M 3..... U. S. Forest Service no. 8..... U. S. Forest Service no. M 8.....	4.018922 4.319913 4.373828 4.307757	10,445.3 20,889.0 23,978.8 20,312.2	34,269 68,533 78,670 66,641			
U. S. Forest Service no. 10, 1919.....	38 32 02.326	112 12 58.725	53 19 19.4 67 25 59.8 154 15 04.3 268 52 34.9	233 12 01.7 247 22 38.6 334 11 45.9 88 57 57.0	Tushar..... U. S. Forest Service no. M 8..... U. S. Forest Service no. 8..... Monroe Peak (U. S. Forest Service no. 13).	4.327922 3.928162 4.247632 4.097827	21,277.6 8,475.4 17,636.1 12,526.4	69,808 27,806 58,025 41,097			
U. S. Forest Service no. M 7, 1919.....	38 44 19.322	112 12 16.223	2 35 36.9 18 49 33.5 52 02 46.2 86 31 30.0 170 41 46.0 332 55 09.0	182 35 10.4 198 45 45.3 231 59 00.8 266 22 44.9 350 40 46.1 153 00 05.3	U. S. Forest Service no. 10..... U. S. Forest Service no. M 8..... U. S. Forest Service no. 8..... U. S. Forest Service no. M 3..... U. S. Forest Service no. 6..... Monroe Peak (U. S. Forest Service no. 13).	4.356953 4.438462 4.043245 4.307641 4.153648 4.402250	22,748.5 27,444.9 11,047.0 20,306.8 14,244.5 25,249.3	74,634 90,042 36,243 66,523 46,734 82,839			
Elsinore sugar factory, west gable, flagpole, 1919.....	38 40 50.510	112 07 22.425	26 34 36.7 39 17 13.2 344 44 20.2	206 31 06.9 219 10 21.9 164 46 13.0	U. S. Forest Service no. 10..... U. S. Forest Service no. M 8..... Monroe Peak (U. S. Forest Service no. 13).	4.260217 4.401902 4.221051	18,206.1 25,229.1 16,636.1	59,731 82,772 54,580			
Marysvale Peak (U. S. F. S.), 1919.....	38 28 42.712	112 06 16.108	76 19 34.7 99 25 22.1 122 17 02.6 141 45 39.7	256 08 07.0 279 17 50.5 302 12 52.0 321 38 10.4	Tushar..... U. S. Forest Service no. M 8..... U. S. Forest Service no. 10..... U. S. Forest Service no. 8.....	4.441136 4.250969 4.062009 4.449286	27,614.4 17,822.5 11,534.8 28,137.5	90,598 58,473 37,844 92,314			
Flat, 1919 <sup>1</sup> .....	38 30 41.26	112 01 15.71	63 21 50 182 24 09	243 18 43 2 24 23	Marysvale Peak (U. S. F. S.)..... Monroe 2.....	3.910945 4.102308	3,146.0 12,656.3	26,726 41,823			
U. S. Forest Service no. M 1, 1919 <sup>2</sup> .....	38 36 28.00	112 22 11.05	301 43 54 334 06 22	121 53 49 154 08 45	Marysvale Peak (U. S. F. S.)..... U. S. Forest Service no. M 8.....	4.434807 4.104612	27,214.9 12,723.7	89,288 41,744			
Mahuston Peak (U. S. Forest Service no. 12), 1919.....	38 15 14.137	112 05 10.008	122 55 07.6 159 56 33.8 176 19 22.8	302 43 00.5 339 51 42.7 356 18 41.7	Tushar..... U. S. Forest Service no. 10..... Marysvale Peak (U. S. F. S.).....	4.529667 4.519853 4.397643	33,874.0 33,101.9 24,982.9	111,135 108,602 81,965			
City Creek Peak (U. S. Forest Service no. M 4), 1919.....	38 18 42.097	112 20 17.578	222 52 05.1 227 43 19.4 286 07 30.2	43 01 59.2 47 52 02.0 106 17 12.5	Monroe Peak (U. S. Forest Service no. 13). Marysvale Peak (U. S. F. S.)..... Mahuston Peak (U. S. Forest Service no. 12).	4.531899 4.440389 4.361182	34,032.9 27,567.0 22,971.1	111,656 90,443 75,364			
Circleville Mountain (U. S. Forest Service no. 11), 1919.....	38 11 57.078	112 23 50.420	177 03 32.3 219 27 29.3 257 20 06.5	357 03 00.2 39 38 23.2 77 31 39.8	Tushar..... Marysvale Peak (U. S. F. S.)..... Mahuston Peak (U. S. Forest Service no. 12).	4.388580 4.604362 4.445933	24,467.0 40,212.6 27,921.1	80,272 131,931 91,604			
Delano Peak (U. S. Forest Service no. M 5), 1919.....	38 22 09.178	112 22 14.280	147 10 44.8 216 19 33.9 242 20 59.9 297 07 36.2	327 09 12.9 36 25 19.4 62 30 55.3 117 18 11.2	Tushar..... U. S. Forest Service no. 10..... Marysvale Peak (U. S. F. S.)..... Mahuston Peak (U. S. Forest Service no. 12).	3.820792 4.356310 4.418625 4.446883	6,619.0 22,714.9 26,219.5 27,982.3	21,716 74,524 86,022 91,805			

<sup>1</sup> No check on this position.  
<sup>2</sup> Checked by vertical angles only.

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Principal points</i>													
Brian, 1925.....	37 40 52.495	107 51 18.07	287 06 22.84	Pioche.....	5.0517350	112,650.99	369,589.1						
	112 49 49.901	204 02 18.79	24 17 48.10	Tushar.....	4.9532372	89,791.92	294,592.3						
Burger, 1925.....	37 19 31.849	146 37 59.97	326 17 48.84	Pioche.....	4.9442937	87,961.71	288,587.7						
	113 30 01.481	217 56 29.55	38 36 35.73	Tushar.....	5.1893237	154,640.68	507,350.3						
		236 06 42.12	56 31 10.32	Brian.....	4.8523838	71,185.05	233,546.3						
Hayford (Nev.), 1925.....	36 39 27.945	214 17 15.85	34 59 03.66	Pioche.....	5.2532698	179,171.86	587,833.0						
	115 11 59.863	243 23 44.93	64 25 06.58	Burger.....	5.2265195	168,468.80	552,718.0						
Virgin (Nev.), 1925.....	36 36 51.196	93 06 20.73	272 26 24.66	Hayford.....	4.9994309	99,869.05	327,653.7						
	114 05 04.609	181 06 29.71	1 07 42.85	Pioche.....	5.1826583	152,285.40	499,623.0						
		213 12 42.31	33 33 47.15	Burger.....	4.9755965	94,535.85	310,156.4						
Mormon (Nev.), 1925.....	36 50 55.411	72 16 51.73	251 50 32.70	Hayford.....	4.8376093	68,803.30	225,732.2						
	114 28 01.004	307 11 30.80	127 25 13.98	Virgin.....	4.6328280	42,936.63	140,867.9						
Moapa (Nev.), 1925.....	36 40 18.023	88 27 16.13	268 06 38.26	Hayford.....	4.7118446	51,504.43	168,977.4						
	114 37 26.860	215 29 34.86	35 35 13.50	Mormon.....	4.3828396	24,145.69	79,218.0						
		277 21 58.50	97 41 17.69	Virgin.....	4.6872359	48,667.15	159,668.8						
<i>Supplementary points</i>													
Lund, 1925.....	38 00 30.360	242 40 56.93	63 18 52.83	Tushar.....	5.0019561	100,451.43	329,564.4						
	113 26 01.217	304 11 18.27	124 33 30.44	Brian.....	4.8083474	64,320.21	211,023.9						
Lund, B. M. Q 8, 1925 <sup>1</sup> .....	38 00 24.48	155 59 35	335 59 33	Lund.....	2.2979202	198.573	651.48						
	113 25 57.90												
Lund U. S. B. M., 1925 <sup>1</sup> .....	38 00 27.62	136 19 41	316 19 39	Lund.....	2.0666055	116.575	382.46						
	113 25 57.92												
Hawkins, 1925.....	37 28 31.318	167 44 20.98	347 39 11.99	Pioche.....	4.7635990	58,022.84	190,363.3						
	113 54 38.997	215 15 41.98	35 33 13.45	Lund.....	4.8608751	72,589.72	238,154.8						
		256 12 18.93	76 51 50.72	Brian.....	4.9917833	98,125.82	321,934.5						
Eight Mile Monument (Utah, Ariz.), 1925.....	37 00 00.711	20 35 59.79	200 29 31.78	Virgin.....	4.6603141	45,741.89	150,071.5						
	113 54 16.984	71 37 12.07	251 16 56.11	Mormon.....	4.7229658	52,840.37	173,360.4						
Initial (Ariz.), 1925.....	36 59 52.357	268 47 57.79	88 53 07.96	Eight Mile Monument.....	4.1054016	12,746.81	41,820.2						
	114 02 52.397	4 24 46.84	184 23 27.63	Virgin.....	4.6304357	42,700.77	140,094.1						
Initial (initial monument) (Utah, Nev., Ariz.), 1925 <sup>1</sup> .....	37 00 00.78	334 58 21	154 58 24	Initial.....	2.4574125	286.69	940.58						
	114 02 57.30												
Mount Bangs (Ariz.), 1925.....	36 47 34.195	46 11 28.22	226 03 11.90	Virgin.....	4.4563008	28,595.70	93,817.7						
	113 51 14.194	96 39 13.26	276 17 10.68	Mormon.....	4.7407102	55,044.03	180,590.3						
		207 54 11.92	28 06 58.91	Burger.....	4.8258004	66,957.68	219,677.0						
Moapa, B. M. I 1 (Nev.), 1925 <sup>1</sup> .....	36 40 19.12	8 44 18	188 44 18	Moapa.....	1.5351042	34.285	112.48						
	114 37 26.65												
Moapa, railroad water tank (Nev.), 1925 <sup>1</sup> .....	36 40 22.41	60 36 53	240 36 48	Moapa.....	2.440262	275.6	904						
	114 37 17.19	215 12 51	35 18 24	Mormon.....	4.378333	23,896.4	78,400						

One-hundred-and-eighth meridian arc

<i>Principal points</i>											
Kinney (Wyo.), 1931.....	41 06 58.421	66 38 35		J. W. Tucker, oil well no. 1.							
	108 32 24.145										
Brown (U. S. G. S.) (Wyo.), 1931.....	41 06 20.453	268 38 25.32	89 06 23.94	Kinney.....	4.7750798	59,577.16	195,462.7				
	109 14 57.081	40 27 23		Cairn, about 1 mile distant.							
Middle (Colo.), 1931.....	40 58 38.208	119 14 53.03	299 02 54.26	Brown (U. S. G. S.).....	4.4665068	29,275.67	96,048.6				
	108 56 42.402	245 29 34.69	65 45 32.30	Kinney.....	4.5727565	37,390.09	122,670.7				
		264 12 17		First steel derrick north of Wilson Lease, well no. 1.							
Zenobia (Colo.), 1931.....	40 36 26.096	150 04 16.03	329 49 21.58	Brown (U. S. G. S.).....	4.8058223	63,947.31	209,800.5				
	108 52 09.789	171 11 01.63	351 08 03.52	Middle.....	4.6189398	41,585.30	136,434.4				
		206 03 23.06	26 16 18.76	Kinney.....	4.7991639	62,974.38	206,608.4				
		120 24 38		Low sharp peak, 1 mile distant.							
		210 28 29		Base of sharp bluff, east edge of Irish Canyon.							
Lena (U. S. G. S.), 1931.....	40 47 12.668	201 23 18.15	21 29 47.77	Brown (U. S. G. S.).....	4.5802208	38,039.15	124,800.1				
	109 24 51.590	241 42 47.44	62 01 13.03	Middle.....	4.6517408	44,847.76	147,138.0				
		293 14 07.07	113 35 26.29	Zenobia.....	4.7006350	50,192.06	164,671.8				
		325 01 38		Cairn, north end of ridge.							
		86 42 40		North gable, red-top house in valley.							
Blue, 1931.....	40 22 29.649	147 12 52.80	326 59 14.29	Lena (U. S. G. S.).....	4.7362503	54,481.66	178,745.2				
	109 03 53.359	212 38 44.85	32 46 21.70	Zenobia.....	4.4866093	30,662.62	100,568.9				
		212 36 49		Zenobia, center of peak.							
		68 22 50		Pinnacle on south slope of mountain, about 2 miles distant.							

<sup>1</sup> No check on this position.

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Principal points—Continued</i>													
Little, 1931.....	40 31 15.408	219 39 13.72	39 50 34.69	Lena (U. S. G. S.).....	4.5843802	38,404.33	125,998.2						
	109 42 16.839	262 00 48.66	82 33 24.16	Zenobia.....	4.8536140	71,386.16	234,206.1						
Rabbit (Colo.), 1931.....	39 53 17.196	2 32 52.96	182 32 06.91	Blue.....	4.7532225	50,652.95	185,968.9						
	108 59 06.649	139 09 01.23	318 41 09.18	Vernal, Tabernacle Dome.									
		286 25 33.05	106 50 27.46	Small butte, pole in cairn.									
		297 47 52		Tavaputs.....	4.5878228	38,709.96	127,000.9						
		321 03 00		Little.....	4.9695116	93,220.53	305,841.0						
Cone, 1931.....	40 06 04.831	193 30 56.44	13 36 04.29	Blue.....	4.7362027	54,475.69	178,725.7						
	109 50 12.679	244 56 16.52	65 26 11.89	Sharpest peak on far ridge.									
		267 45 22.74	108 18 13.36	Little.....	4.6805895	47,928.02	157,243.8						
		13 53 15		Blue.....	4.8596233	72,380.78	237,469.3						
Book (Colo.), 1931.....	39 35 24.086	130 09 43.94	309 39 14.62	Rabbit.....	4.8836115	76,491.21	250,954.9						
	109 02 37.638	188 36 45.96	8 39 00.85	Cairn on small square butte (on range with gap).									
		329 14 50.15	149 16 18.64	Azimuth mark.									
Range, 1931.....	39 35 20.609	17 03 29.42	197 02 10.56	Cone.....	4.9468855	88,488.22	290,315.1						
	110 16 53.484	213 38 41.72	33 55 47.39	Rabbit.....	4.5247192	33,474.89	109,825.5						
		252 57 01.87	73 46 45.40	Tavaputs.....	3.8120911	6,487.70	21,285.1						
		269 32 52.17	90 20 11.87	Patmos Head.....	4.0038510	10,089.07	33,109.6						
		272 26 52.36	93 15 39.05	Cone.....	4.8352900	68,436.84	224,529.9						
		321 36 29.49	142 16 21.66	Rabbit.....	5.0643706	115,976.66	380,500.1						
Grand (Colo.), 1931.....	39 02 53.863	56 35 54.46	235 59 14.84	Book.....	5.0266438	106,327.06	348,841.4						
	108 15 06.946	130 15 28.42	309 46 51.03	Tavaputs.....	5.0406726	109,817.77	360,293.8						
		338 53 34.59	158 56 20.14	Mount Waas.....	5.1703468	148,029.01	485,658.5						
				Azimuth mark.									
<i>Supplementary points</i>	41 00 03.526	84 50 01.2	264 36 41.7	Mt. Waas.....	5.0079574	101,849.15	334,150.1						
	108 36 23.459	203 33 54.2	23 36 31.4	Tavaputs.....	4.9286739	84,854.31	278,392.8						
				Mesa.....	4.2458304	17,612.88	57,784.9						
G. L. O. Station 29 eccentric (Wyo.), 1931.....	41 00 03.526	84 50 01.2	264 36 41.7	Middle.....	4.456586	28,614.5	93,879						
G. L. O. Station 29, Wyo.; G. L. O. Station 2, Colo.; Wyo.-Colo. boundary milepost 239, (Wyo.-Colo.), 1931. <sup>1</sup>	108 36 23.459	203 33 54.2	23 36 31.4	Kinney.....	4.145057	13,965.5	45,818						
	41 00 00.23	123 52 48	303 52 44	G. L. O. Station 29, eccentric.....	2.261144	182,450	598.59						
	108 36 16.98												

101730°-57'

W. W. Wilson Lease, well no. 1, 1931 <sup>1</sup> .....	41 00 03.45	84 50 10	264 36 51	Middle.....	4.456423	28,603.8	93,844
	108 36 23.91	203 36 03	23 38 41	Kinney.....	4.145254	13,971.9	45,839
Ucolwy; G. L. O. Station 1, Utah; G. L. O. Station 1, Colo.; G. L. O. Station 28, Wyo., (Utah-Colo.-Wyo.), 1931.	41 00 02.616	124 48 57.9	304 41 05.4	Brown (U. S. G. S.).....	4.310654	20,448.2	67,087
	109 02 57.633	173 20 24.8	353 17 44.9	Quaking Asp (U. S. G. S.).....	4.686376	48,570.9	159,353
G. L. O. Station 3 (Colo.), 1931.....	40 35 41.941	95 00 16.6	274 53 00.8	Zenobia.....	4.198751	15,803.4	51,848
	108 41 00.143	152 35 33.1	332 25 17.6	Middle.....	4.679953	47,857.8	157,013
G. L. O. Station 2, 1931.....	40 25 59.018	273 38 44.7	94 21 04.2	Blue.....	4.966660	92,610.4	303,839
	110 09 11.198	323 45 18.0	143 57 33.9	Cone.....	4.659071	45,611.1	149,642
Utah-Colorado boundary milepost 224; G. L. O. Station 4, Utah; G. L. O. Station 4, Colo. (Utah-Colo.), 1931.	40 13 25.071	120 55 13.6	300 28 47.5	Little.....	4.810551	64,647.4	212,097
	109 03 00.837	175 46 52.0	355 46 18.0	Blue.....	4.226412	16,842.7	55,258
		351 30 16.7	171 32 47.4	Rabbit.....	4.575942	37,665.3	123,574
G. L. O. Station 5, eccentric, (Colo.), 1931.....	40 00 22.686	126 54 05.4	306 19 01.5	Little.....	4.981463	95,821.5	314,374
	108 48 01.691	151 16 23.0	331 06 08.9	Blue.....	4.669417	46,710.8	153,250
G. L. O. Station 5 (Colo.), 1931 <sup>1</sup> .....	40 00 21.20	203 37 29	23 37 29	G. L. O. Station 5, eccentric.....	1.698640	49.962	163.92
	108 48 02.54						
G. L. O. Station 6, 1931.....	39 00 57.614	204 26 00.6	24 37 41.6	Tavaputs.....	4.805640	63,920.5	209,713
	109 18 45.917	351 58 27.9	172 01 40.9	Mount Waas.....	4.728010	53,457.7	175,386

Grand Junction, Colo., to Lordsburg, N. Mex., arc

<i>Principal points</i>										
Spruce (U. S. G. S.) (Colo.), 1934.....	38 26 03.486	100 39 13.84	280 12 10.43	Mount Waas.....	4.8681010	64,283.72	210,904.2			
	108 30 09.193	197 39 02.14	17 48 26.78	Grand.....	4.8546503	71,556.70	234,765.6			
		208 28 38.21	28 40 46.39	Mesa.....	4.7701209	58,900.76	193,243.6			
Summit (Colo.), 1934.....	38 00 23.016	161 01 06.98	340 52 26.55	Mount Waas.....	4.7962997	62,560.43	205,250.3			
	108 59 37.569	222 00 51.30	42 19 05.38	Spruce (U. S. G. S.).....	4.8067281	64,080.82	210,238.5			
		193 04 26		Azimuth mark.						
Lone Cone (Colo.), 1934.....	37 53 16.795	101 40 00.63	281 12 45.39	Summit.....	4.8212155	66,254.52	217,370.0			
	108 15 17.902	130 37 34.75	310 01 29.68	Mount Waas.....	5.0476777	111,680.59	366,405.4			
		160 23 14.43	340 14 03.71	Spruce (U. S. G. S.).....	4.8080855	64,403.36	211,296.7			
Ute (Colo.), 1934.....	37 17 02.714	166 42 13.60	346 34 19.17	Summit.....	4.9159128	82,397.26	270,331.7			
	108 46 40.828	214 25 02.65	34 44 11.17	Lone Cone.....	4.9106460	81,404.06	267,073.2			
		4 27 32		Shiprock, highest point.						
Madden (Colo.), 1934.....	37 22 56.641	79 50 04.19	259 25 35.29	Ute.....	4.7825925	60,616.73	198,873.4			
	108 06 18.722	166 47 20.78	346 41 51.54	Lone Cone.....	4.7608076	57,651.11	189,143.7			

<sup>1</sup> No check on this position.

Grand Junction, Colo., to Lordsburg, N. Mex., arc—Continued

Station	Latitude and longitude	Azimuth	Back azimuth	To station	Distance		
					Logarithm (meters)	Meters	Feet
<i>Supplementary points</i>							
Utah-Colorado boundary milepost 70 (Utah-Colo.), 1934.	38 00 25.908	164 43 31.0	344 36 38.4	Mount Wass.....	4.786913	61,222.8	260,862
	109 02 31.790	224 44 24.8	45 04 26.7	Spruce (U. S. G. S.).....	4.825660	66,936.0	219,606
		271 11 12.6	91 12 59.9	Summit.....	3.628520	4,261.3	13,948
G. L. O. Station 12 (Colo.), 1934.....	37 45 54.298	183 35 54.4	3 36 36.8	Summit.....	4.428727	26,836.6	88,046
	109 00 46.610	258 12 49.4	78 40 42.8	Lone Cone.....	4.833230	68,113.0	223,467
		338 40 12.8	158 48 48.0	Ute.....	4.758609	57,280.8	187,929
Four Corners (G. L. O. Station 1), eccentric, 1934.....	37 00 05.244	217 01 25.4	37 11 05.8	Ute.....	4.594703	39,328.1	129,029
	109 02 42.158	242 50 55.6	63 25 00.9	Madden.....	4.971024	93,545.7	306,908
Four Corners (G. L. O. Station 1) (Utah-Colo.-Ariz.-N. Mex.), 1934. <sup>1</sup>	36 59 56.30	170 15 51	350 15 50	Four Corners (G. L. O. Station 1) eccentric.	2.446845	279.798	917.97
	109 02 40.24						

Salina, Utah to Grand Canyon, Arizona, arc

<i>Principal points</i>							
Tantlus, 1934.....	38 08 14.450	133 13 01.12	312 48 15.63	Monroe 2.....	4.8998991	79,414.37	260,545.3
	111 21 01.273	156 49 43.10	336 38 54.59	Mt. Marvine.....	4.8071492	64,142.99	210,442.5
		175 19 04.23	355 15 13.30	Wasatch 2.....	5.0369599	108,882.96	357,226.8
Bowns Point, 1934.....	38 03 04.227	182 40 26.06	2 40 37.38	Mt. Ellen.....	4.6727728	47,073.10	154,439.0
	111 21 19.615	260 32 14.70	80 52 17.36	Reference mark no. 3.			
		49 56 28					
Pockets, 1934.....	37 42 16.457	140 02 41.74	319 49 08.81	Tantlus.....	3.9811517	9,575.28	31,414.9
	110 59 15.584	146 31 50.06	326 18 27.62	Mt. Marvine.....	4.6825604	48,146.02	157,959.1
		198 14 01.72	18 20 26.17	Wasatch 2.....	4.7012997	50,268.94	164,924.0
Collet, 1934.....	37 29 14.632	196 48 48.41	16 56 43.56	Tantlus.....	4.7608548	57,657.37	189,164.2
	111 34 15.378	223 13 53.04	43 41 43.70	Mt. Ellen.....	4.6875901	48,706.85	159,799.1
		244 44 47.28	65 06 08.35	Reference mark no. 3.			
Steep, 1934.....	38 00 48.558	17 59 28.05	197 51 35.69	Bowns Pt.....	4.8155140	65,300.40	214,535.0
	111 21 23.830	181 24 26.85	1 24 29.45	Mt. Ellen.....	4.9864333	96,924.44	317,992.9
		316 26 47.74	136 40 22.92	Pockets.....	4.7548069	56,871.79	186,586.9
Navajo Mountain, 1934.....	37 02 03.323	129 07 58.72	308 42 28.52	Reference mark no. 3.			
	110 52 07.994	171 59 10.13	351 54 50.60	Collet.....	4.9033458	80,047.13	262,621.3
		207 59 08		Pockets.....	4.8758320	75,133.22	246,499.6
Keam (Ariz.), 1934.....	36 46 42.822	171 04 45.96	350 59 42.53	Collet.....	4.9011162	79,637.24	261,276.5
	111 25 52.734	240 19 03.46	60 39 19.34	Navajo Mt.....	4.7604165	57,599.21	188,973.4
		176 05 46		Reference mark no. 3.			
Cedar Mountain, 1934.....	37 00 23.313	191 36 58.52	11 41 28.86	Collet.....	4.7363641	54,495.94	178,792.1
	111 41 42.026	267 21 00.04	87 50 50.72	Navajo Mt.....	4.8667649	73,580.86	241,406.5
		317 01 05.37	137 10 35.25	Keam.....	4.5381739	34,528.20	113,281.3
Paria (Ariz.), 1934.....	36 50 52.469	175 26 45.30	355 26 11.24	Cedar Mt.....	4.2468113	17,652.71	57,915.6
	111 40 45.335	289 06 17.25	109 15 12.11	Keam.....	4.3696704	23,424.50	76,851.9
		239 09 08		Reference mark no. 3.			
Brown (Ariz.), 1934.....	37 00 05.659	355 37 36.13	175 38 21.95	Keam.....	4.3948050	24,820.18	81,430.9
	111 27 09.058	49 54 06.74	229 45 56.35	Paria.....	4.4222266	26,437.88	86,738.3
		91 31 02.22	271 22 16.81	Cedar Mt.....	4.3342684	21,590.78	70,835.8
<i>Supplementary points</i>							
Tantlus (U. S. F. S.), 1934 <sup>1</sup> .....	38 08 14.038	174 48 47	354 48 47	Tantlus.....	1.106191	12.770	41.90
	111 21 01.226						
Bowns Point (U. S. F. S.), 1934 <sup>1</sup> .....	38 03 04.284	323 55	143 55	Bowns Pt.....	0.338456	2.180	7.15
	111 21 19.668						
Boundary monument no. 130, (Utah-Ariz.), 1934 <sup>1</sup> .....	37 00 04.750	165 38 08.7	345 38 05.1	Cedar Mt.....	2.771367	590.70	1,938.0
	111 41 36.099						
Boundary monument no. 140, (Utah-Ariz.), 1934.....	37 00 05.666	16 07 58.7	196 07 55.7	Wahweap.....	2.655173	452.0	1,483
	111 30 44.917	91 58 21.8	271 51 46.3	Cedar Mt.....	4.211014	16,256.0	53,333
		269 59 02.4	90 01 12.3	Brown.....	3.727316	5,337.2	17,510
G. L. O. boundary mark, (Utah-Ariz.), 1934 <sup>1</sup> .....	37 00 05.771	78 15 46	258 15 46	Brown.....	1.229989	16.982	55.72
	111 27 08.386						
Boundary monument no. 143, (Utah-Ariz.), 1934 <sup>1</sup> .....	37 00 05.761	270 19 14	90 19 27	Brown.....	2.745543	556.6	1,826
	111 27 31.569						
Wahweap, 1934.....	36 59 51.579	93 31 36.9	273 25 04.4	Cedar Mt.....	4.208209	16,151.4	52,990
	111 30 49.997	265 26 19.7	85 28 32.6	Brown.....	3.738795	5,480.2	17,960
		343 07 55.2	163 10 53.6	Keam.....	4.404900	25,403.9	83,346
Paria (U. S. G. S.), cairn, (Ariz.) 1934 <sup>1</sup> .....	36 50 52.067	157 38	337 38	Paria.....	1.127105	13.40	44.0
	111 40 45.129						

<sup>1</sup>No check on this position.

Utah-Ouray Indian Reservation arc

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Principal points</i>													
Altonah, 1936	40 29 22.656	110 17 38.220	265 49 32.46	317 49 08.67	346 38 29	86 12 30.35	138 06 52.90	Little	4.6995738	50,069.56	164,269.9		
								Cone	4.7637734	58,046.15	190,439.7		
								Azimuth mark					
Roosevelt (U. S. G. S.), 1936	40 16 34.657	109 55 45.540	127 32 08.10	214 59 48.54	337 54 20.48	307 17 57.61	157 57 56.27	Altonah	4.5909059	38,985.75	127,905.7		
								Little	4.5210365	33,192.24	108,898.2		
								Cone	4.3214147	20,961.13	68,770.0		
								Azimuth mark					
Antelope (U. S. G. S.), 1936	40 01 05.770	110 12 44.102	172 27 40.89	217 33 29.38	253 48 49.78	352 24 30.84	74 03 19.54	Altonah	4.7226167	52,797.90	173,221.1		
								Little	4.8485878	70,564.75	231,511.2		
								Cone	4.5228481	33,330.98	109,353.4		
								Azimuth mark					
Farm Creek Pass, 1936	40 27 29.331	110 38 08.527	263 00 42.40	323 26 38.28	344 09 52	83 14 01.00	143 43 03.02	Altonah	4.4652577	29,191.58	95,772.7		
								Antelope (U. S. G. S.)	4.7831677	60,697.07	199,137.0		
								Azimuth mark					
Cottonwood, 1936	40 01 35.615	110 29 01.800	164 57 26.23	197 22 48.03	272 11 10.57	344 51 33.03	92 21 39.32	Farm Creek Pass	4.6957811	49,634.21	162,841.6		
								Altonah	4.7315543	53,895.72	176,822.9		
								Antelope (U. S. G. S.)	4.3655405	23,202.81	76,124.6		
								Azimuth mark					
Red, 1936	40 24 29.504	111 00 27.632	250 54 44.90	313 22 14.97	39 53 33	80 09 13.39	133 42 32.64	Farm Creek Pass	4.5057889	32,047.11	105,141.2		
								Cottonwood	4.7889816	61,515.09	201,820.8		
								Azimuth mark					
Strawberry, 1936	40 03 03.190	110 57 39.735	174 18 06.33	211 21 53.59	273 38 26.49	354 16 17.94	93 56 51.65	Red	4.6006753	39,872.67	130,815.6		
								Farm Creek Pass	4.7244368	53,019.65	173,948.6		
								Cottonwood	4.6108492	40,817.76	133,916.3		
								Azimuth mark					
Buck, 1936	39 45 25.729	109 32 23.786	73 53 26.38	146 30 17.86	341 25 18	253 25 02.01	326 18 51.79	Range	4.8215745	66,309.31	217,549.8		
								Cone	4.6015960	45,877.11	150,515.2		
								Azimuth mark					
Maud, 1936	39 50 33.607	110 00 34.442	39 43 05.66	207 08 08.27	283 07 57.93	219 32 40.07	103 26 00.14	Range	4.5630121	36,560.50	119,948.9		
								Cone	4.5080599	32,289.40	105,936.1		
								Buck	4.6162305	41,326.68	135,585.9		
								Azimuth mark					
Black Knoll, 1936	39 28 42.317	109 41 32.403	103 49 04.49	146 09 12.14	202 52 25.33	283 26 34.34	22 58 15.16	Range	4.7170283	52,122.87	171,006.4		
								Maud	4.6879794	48,750.54	159,942.4		
								Buck	4.5262225	33,598.70	110,231.7		
								Azimuth mark					
Black Hill, 1936	39 26 55.830	110 08 06.123	141 04 01.65	193 47 48.01	236 00 01.22	320 58 26.07	56 22 46.90	Range	4.3015845	20,025.55	65,700.5		
								Maud	4.6355183	45,031.70	147,741.5		
								Buck	4.7889783	61,514.61	201,819.2		
								Azimuth mark					
Toad, 1936	39 22 22.180	109 50 37.982	108 41 34.91	122 39 30.96	211 22 33.72	288 30 29.47	31 34 10.68	Black Hill	4.4225484	26,457.48	86,802.6		
								Range	4.6498773	44,655.74	145,508.0		
								Buck	4.6992166	50,028.40	164,134.8		
								Black Knoll	4.2440794	17,542.01	57,552.4		
								Azimuth mark					
Hill, 1936	39 16 28.838	109 51 08.734	128 32 02.52	133 30 29.31	183 51 52.86	308 21 17.28	3 52 12.35	Black Hill	4.4927413	31,098.63	102,029.4		
								Range	4.7060749	50,824.71	166,747.4		
								Toad	4.0382826	10,921.51	35,831.7		
								Azimuth mark					
Flat Rock, 1936	39 21 56.414	109 43 06.710	48 51 37.22	94 14 47.97	190 12 25.74	228 46 31.78	10 13 25.63	Hill	4.1858834	15,342.05	50,334.7		
								Toad	4.0346970	10,831.71	35,537.0		
								Black Knoll	4.1044664	12,719.39	41,730.2		
								Azimuth mark					
Wilcox, 1936	39 15 17.678	109 45 27.546	105 02 53.00	150 25 34.88	192 45 37.16	284 59 17.06	15 21 24.05	Hill	3.9278198	8,468.76	27,784.6		
								Toad	4.1777130	15,056.12	49,396.6		
								Black Knoll	4.4055976	25,444.71	83,479.9		
								Flat Rock	4.1055453	12,751.03	41,834.0		
								Azimuth mark					
Ice Cave Peak, 1936	40 36 26.432	109 54 37.356	298 46 30.6	2 30 33.0	68 12 35.7	118 54 32.2	182 29 48.8	Little	4.298580	19,887.5	65,248		
								Roosevelt (U. S. G. S.)	4.565791	36,795.2	120,719		
								Altonah	4.544351	35,022.8	114,904		
								Azimuth mark					
La Point, 1936	40 27 22.221	109 45 15.420	36 43 05.1	141 48 59.3	183 22 53	216 36 17.0	321 42 54.1	Roosevelt (U. S. G. S.)	4.396188	24,899.4	81,691		
								Ice Cave Peak	4.329817	21,370.6	70,113		
								Azimuth mark					
Canal, 1936	40 19 00.612	109 44 35.770	74 10 28.0	156 20 03.9	176 32 40.2	254 03 14.9	356 32 14.5	Roosevelt (U. S. G. S.)	4.216083	16,446.9	53,960		
								Ice Cave Peak	4.546970	35,234.7	115,599		
								La Point	4.190335	15,500.1	50,863		
								Azimuth mark					
Spur (U. S. G. S.), 1936	40 30 06.169	110 29 47.918	274 24 01.1	335 38 49.1	67 44 18.2	94 31 55.0	155 49 50.8	Altonah	4.230431	17,235.8	56,548		
								Antelope (U. S. G. S.)	4.769972	58,880.6	193,177		
								Farm Creek Pass	4.105350	12,745.3	41,815		
								Azimuth mark					

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Principal points—Continued</i>													
Dry Gulch, 1936.....	40	35	58.502	327	06	09.3	147	16	46.3	Roosevelt (U. S. G. S.).....	4.630547	42,711.7	140,130
	110	12	07.464	32	32	42.9	212	29	07.9	Altonah.....	4.160761	14,479.7	47,505
				66	33	36.8	246	22	07.4	Spur (U. S. G. S.).....	4.434824	27,216.0	89,291
Blue Bench, 1936.....	40	12	56.754	344	32	06.7	164	34	51.5	Antelope (U. S. G. S.).....	4.356984	22,750.1	74,639
	110	16	59.901	39	11	56.3	219	04	11.0	Cottonwood.....	4.432717	27,084.3	88,859
				132	03	45.6	311	50	04.4	Farm Creek Pass U. S. G. S. bench mark no. M-93, 1934.	4.604898	40,262.2	132,094
Cedar Rim, 1936.....	40	09	36.601	58	30	05.7	238	21	08.7	Strawberry.....	4.365015	23,174.7	76,032
	110	43	46.101	139	25	32.8	319	14	45.2	Red.....	4.559994	36,307.3	119,118
Hanna, 1936.....	40	28	29.502	279	09	01.9	99	14	17.8	Farm Creek Pass.....	4.065036	11,615.4	38,108
	110	46	15.230	354	13	57.4	174	15	33.9	Cedar Rim.....	4.545558	35,120.3	115,224
				69	50	54.1	249	41	41.2	Red.....	4.330609	21,409.6	70,241
Water, 1936.....	40	12	52.211	169	02	29.8	349	00	35.5	Red.....	4.340603	21,908.0	71,876
	110	57	31.010	287	06	22.6	107	15	14.9	Cedar Rim.....	4.310174	20,425.6	67,013
				37	09	54				Azimuth mark.			
Minnie, 1936.....	40	01	05.303	132	51	11.2	312	49	24.8	Strawberry.....	3.728153	5,347.5	17,544
	110	54	54.347	225	03	03.3	45	10	13.6	Cedar Rim.....	4.349184	22,345.2	73,311
Grey, 1936.....	39	59	36.269	97	35	31.2	277	26	06.9	Minnie.....	4.322222	21,000.1	68,898
	110	40	16.581	104	33	35.0	284	22	24.2	Strawberry.....	4.407336	25,546.8	83,815
				165	00	34.8	344	58	19.9	Cedar Rim.....	4.282620	19,169.9	62,893
Wolf, 1936.....	40	29	41.502	277	10	37.9	97	25	15.0	Farm Creek Pass.....	4.506356	32,089.0	105,279
	111	00	39.763	358	17	51.0	178	17	58.8	Red.....	3.983527	9,627.8	31,587
				27	26	03				U. S. Geological Survey bench mark.			
Loota, 1936.....	40	10	35.698	67	02	26.0	246	53	30.9	Cone.....	4.329434	21,351.8	70,052
	109	36	22.641	112	02	18.6	291	49	47.6	Roosevelt (U. S. G. S.).....	4.471870	29,639.4	97,242
				167	42	02.1	347	38	12.8	Little.....	4.592632	39,141.0	128,415
			120	36	49				Azimuth mark.				

U. S. COAST AND GEODETIC SURVEY

Two Water, 1936.....	39	59	01.475	70	11	58.4	249	52	33.4	Maud.....	4.661624	45,880.1	150,525
	109	30	18.802	114	52	22.6	294	39	34.5	Cone.....	4.493728	31,169.4	102,262
				158	06	08.7	338	02	14.5	Loota.....	4.363274	23,062.0	75,728
Bench, 1936.....	40	00	20.044	224	54	11.0	44	58	59.1	Cone.....	4.176787	15,024.0	49,291
	109	57	40.437	273	24	50.3	93	42	25.4	Two Water.....	4.591285	39,019.8	126,017
				12	53	04.4	192	51	12.7	Maud.....	4.268411	18,552.9	60,869
Edge, 1936.....	39	51	54.346	85	54	59.4	265	39	47.5	Maud.....	4.530433	33,918.2	111,280
	109	36	51.454	144	08	20.7	323	59	45.9	Cone.....	4.510484	32,395.4	106,284
				215	15	23.4	35	19	35.4	Two Water.....	4.207892	16,139.6	52,951
Taylor, 1936.....	39	36	08.159	41	49	41.8	221	42	56.3	Black Hill.....	4.358686	22,839.5	74,933
	109	57	29.103	87	04	54.0	266	52	31.8	Range.....	4.444378	27,821.3	91,277
				170	37	33.0	350	35	34.6	Maud.....	4.432228	27,053.8	88,759
Taylor azimuth, 1936 <sup>1</sup> .....	39	37	30.25	349	11	15	169	11	28	Taylor.....	3.411198	2,577.5	8,456
	109	57	49.37	81	46	04	261	33	54	Range.....	4.440686	27,585.8	90,504
Big Horn, 1936.....	39	14	16.629	179	46	16.1	359	46	13.6	Black Hill.....	4.369459	23,413.1	76,814
	110	08	02.212	260	23	10.6	80	33	51.9	Hill.....	4.391628	24,639.3	80,837
				143	20	26				Azimuth mark.			
Wood, 1936.....	39	38	57.586	42	28	46.2	222	21	03.6	Black Knoll.....	4.409061	25,701.7	84,323
	109	29	26.189	160	32	59.8	340	31	06.4	Buck.....	4.103679	12,606.4	41,655
				344	56	42				Azimuth mark.			
Winter, 1936.....	39	29	09.070	52	10	03.5	232	02	28.3	Flat Rock.....	4.336919	21,723.0	71,270
	109	31	10.017	86	52	48.9	266	46	13.2	Black Knoll.....	4.173113	14,897.5	48,876
				176	39	48.2	356	39	01.1	Buck.....	4.479602	30,171.9	98,989
Moon, 1936.....	39	21	51.652	90	37	55.5	270	31	30.1	Wood.....	4.262886	18,318.3	60,099
	109	32	59.138	187	45	59.7	7	47	05.8	Azimuth mark.			
				109	27	25							
Carbon and Emery Counties, boundary marker, 1936.....	39	21	51.652	90	37	55.5	270	31	30.1	Flat Rock.....	4.162732	14,545.6	47,722
	109	32	59.138	135	56	05.3	315	50	39.3	Black Knoll.....	4.246469	17,638.8	57,870
				190	56	27.2	10	57	36.5	Winter.....	4.137982	13,739.9	45,078
Greyhead Peak, cairn, 1936 <sup>1</sup> .....	39	28	09.452	291	30	42.5	111	42	40.1	Toad.....	4.463558	29,077.6	95,399
	110	09	28.134	309	17	23.2	129	29	00.6	Hill.....	4.532112	34,049.6	111,711
				319	10	52.2	139	11	44.4	Black Hill.....	3.477102	2,999.9	9,842
Water.....	39	57	41.28	142	21	44	322	11	53	Water.....	4.550455	35,818.5	116,530
	110	42	13.76	218	05	12	38	06	28	Grey.....	3.653833	4,506.4	14,785

<sup>1</sup> No check on this position.

TRIANGULATION IN UTAH

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Supplementary points</i>													
Myton water tank, base, 1936 <sup>1</sup> .....	40 11 40.84	97 27 10	277 18 56	Blue Bench	4.260499	18,217.9	59,770						
	110 04 15.98	233 02 47	53 08 16		Roosevelt (U. S. G. S.).....	4.178704	15,080.5	49,509					
Cone-shaped mountain peak, 1936 <sup>1</sup> .....	39 24 17.96	174 08 22	354 07 26	Range	4.312677	20,543.6	67,400						
	110 15 25.58	245 06 28	65 11 07		Black Hill.....	4.063881	11,583.8	38,005					
Altonah (U. S. G. S.), 1936 <sup>1</sup> .....	40 29 22.653	91 47	271 47	Altonah.....	0.491782	3.103	10.15						
	110 17 38.088												
T. 3 S., R. 4. W., sec's 13 and 24, quarter corner, 1936 <sup>1</sup> ..	40 12 50.19	188 04 29	8 04 30	Blue Bench.....	2.310621	204.466	670.82						
	110 17 01.12												

*San Juan River arc*

<i>Principal points</i>												
Monitor, 1936.....	37 13 01.975	60 44 24.46	240 29 42.77	Navajo Mountain.....	4.6168272	41,383.50	135,772.4					
	110 27 47.199	139 31 44.61	310 12 36.04		Pockets.....	4.8529034	71,269.44	233,823.2				
North Woodenshoe (U. S. G. S.), 1936.....	37 42 19.240	39 30 36.14	219 12 16.50	Monitor.....	4.8454955	70,064.10	229,868.6					
	109 57 39.274	47 28 34.51	226 55 30.48	Navajo Mountain.....	5.0398751	109,616.29	359,632.8					
		90 15 34.93	269 37 54.25	Pockets.....	4.9568604	90,544.15	297,060.3					
		322 39 41		Azimuth mark.....								
Lee, 1936.....	37 14 47.029	85 51 21.18	265 33 41.85	Monitor.....	4.6362946	43,280.73	141,996.9					
	109 58 36.366	181 34 21.91	1 34 56.64	North Woodenshoe (U. S. G. S.).....	4.7071881	50,955.15	167,175.4					
Bears Ears (U. S. G. S.), 1936.....	37 37 36.626	14 21 50.47	194 17 23.83	Lee.....	4.6392691	43,578.18	142,972.7					
	109 51 17.721	50 00 22.29	229 38 11.78	Monitor.....	4.8479627	70,463.26	231,178.2					
		133 00 29.91	312 56 36.76	North Woodenshoe (U. S. G. S.).....	4.1065780	12,781.39	41,933.6					
		183 41 49		Azimuth mark.....								
Bluff, 1936.....	37 19 23.770	78 57 53.36	258 40 12.10	Lee.....	4.6433560	43,990.20	144,324.5					
	109 29 24.483	136 20 49.69	316 07 30.68	Bears Ears (U. S. G. S.).....	4.6688635	46,651.27	153,055.0					
		273 43 26.98	94 09 20.67	Ute.....	4.8013045	63,285.54	207,629.3					
		125 06 53		Azimuth mark.....								

Abajo Peak (U. S. G. S.), 1936.....	37 50 22.316	245 37 26.74	65 54 42.17	Summit.....	4.6544031	45,123.53	148,042.8
	109 27 42.295	315 22 14.63	135 47 15.21	Ute.....	4.9360712	86,312.00	283,175.3
Horsehead, 1936.....		2 30 51.54	182 29 49.22	Bluff.....	4.7585547	57,352.81	188,165.0
		55 51 41.24	235 37 15.01	Bears Ears (U. S. G. S.).....	4.6225720	41,934.55	137,580.3
		71 26 39.24	251 08 18.53	North Woodenshoe (U. S. G. S.).....	4.6668181	46,432.08	152,335.9
		58 58 21		Azimuth mark.....			
		31 59 46.06	211 47 35.62	Bluff.....	4.7459239	55,708.81	182,771.3
		110 31 57.96	290 20 45.87	Abajo Peak (U. S. G. S.).....	4.4568986	28,635.09	93,947.0
60-Mile, 1936.....		206 41 32.83	26 47 33.86	Summit.....	4.5042832	31,936.20	104,777.3
		326 54 11.37	147 08 02.52	Ute.....	4.7893567	61,568.24	201,995.1
		267 42 38		Azimuth mark.....			
		178 17 28.5	358 16 48.2	Pockets.....	4.735312	54,364.1	178,360
Hall, 1936.....	37 29 20.720	310 28 49.1	130 43 16.9	Monitor.....	4.666179	46,363.8	152,112
	110 51 37.532	17 37 19.7	197 33 21.9	60-Mile.....	4.504012	31,916.3	104,712
Grey Mesa, 1936.....	37 14 28.487	81 31 29.0	261 23 32.2	60-Mile.....	4.293295	19,646.9	64,458
	110 45 01.277	160 30 51.1	340 26 50.6	Hall.....	4.465133	29,183.2	95,745
		275 53 08.7	96 03 34.3	Monitor.....	4.408762	25,630.8	84,090
		219 25 24		Azimuth mark.....			
40-Mile, 1936.....	37 23 58.372	228 53 42.6	48 58 24.7	Hall.....	4.179766	15,127.5	49,631
	110 59 21.518	355 02 23.6	175 03 07.3	60-Mile.....	4.313094	20,563.4	67,465
Bullfrog, 1936.....		106 03 28		Azimuth mark.....			
	37 30 10.593	321 01 22.8	141 11 53.6	Monitor.....	4.610023	40,740.2	133,662
	110 45 06.553	359 44 36.5	179 44 39.7	Grey Mesa.....	4.463054	29,043.8	95,288
		80 56 15.8	260 52 17.8	Hall.....	3.987957	9,726.5	31,911
North Gulch, 1936.....		147 24 35		Azimuth mark.....			
	37 27 37.401	46 47 26.8	226 36 50.6	Grey Mesa.....	4.549787	35,463.9	116,351
	110 27 32.573	59 05 22.2	238 46 48.1	60-Mile.....	4.722525	52,786.8	173,185
		95 14 54.6	275 00 15.5	Hall.....	4.552028	35,647.4	116,953
North Gulch azimuth, 1936.....		100 25 29.8	280 14 48.4	Bullfrog.....	4.420329	26,322.6	86,360
	37 28 00.418	288 08 32.2	108 09 25.8	North Gulch.....	3.357549	2,278.0	7,474
	110 29 00.655	94 21 41.1	274 07 55.5	Hall.....	4.524147	33,430.8	109,681
		99 40 49.4	279 31 01.6	Bullfrog.....	4.381428	24,067.3	78,961
Red House, 1936.....	37 27 44.598	220 50 01.9	40 59 42.8	North Woodenshoe (U. S. G. S.).....	4.552453	35,682.3	117,068
	110 13 31.743	240 45 17.2	60 58 50.1	Bears Ears (U. S. G. S.).....	4.573928	37,491.1	123,002
		37 48 30.4	217 39 51.5	Monitor.....	4.536636	34,406.1	112,881
		93 12 48.2	272 49 37.4	Hall.....	4.750065	56,242.5	184,522
		291 02 44		Azimuth mark.....			
		57 58 23.5	237 50 56.2	Monitor.....	4.332085	21,482.5	70,481
Grand, 1936.....	37 19 12.169	190 17 42.0	10 18 52.9	Red House.....	4.205648	16,056.4	52,678
	110 15 28.507	201 48 46		Azimuth mark.....			

<sup>1</sup> No check on this position.

Station	Latitude and longitude			Azimuth			Back azimuth			To station	Distance		
											Logarithm (meters)	Meters	Feet
<i>Supplementary points—Continued</i>													
Bridges, 1936.....	37 32 50.151	66 07 29.3	245 58 43.6	Red House.....			4.365615	23,206.8	76,138				
	109 59 08.242	187 04 50.4	7 05 44.7	North Woodenshoe (U. S. G. S.)..			4.247482	17,680.0	58,005				
Horn, 1936.....	37 19 57.765 110 05 23.617	232 32 31.6	52 37 18.6	Bears Ears (U. S. G. S.).....			4.162417	14,535.1	47,687				
		304 37 15		Azimuth mark.									
		68 56 42.6	248 43 08.8	Monitor.....			4.550186	35,496.5	116,458				
		195 22 31.6	15 27 14.4	North Woodenshoe (U. S. G. S.)..			4.632454	42,899.7	140,747				
Monocline, 1936.....	37 15 24.918 109 42 48.482	212 24 45.9	32 33 20.6	Bears Ears (U. S. G. S.).....			4.587691	38,698.2	126,962				
		230 16 56		Azimuth mark.									
		87 13 01.9	267 03 28.2	Lee.....			4.369014	23,389.1	76,736				
		163 05 08.6	342 59 59.0	Bears Ears (U. S. G. S.).....			4.632669	42,920.9	140,816				
Horse, 1936.....	37 52 20.014 109 46 40.566	249 32 12.2	69 40 19.3	Bluff.....			4.324869	21,128.5	69,319				
		49 29 03		Azimuth mark.									
		277 19 58.0	97 31 36.5	Abajo Peak (U. S. G. S.).....			4.448118	28,062.0	92,067				
		14 00 46.4	193 57 56.8	Bears Ears (U. S. G. S.).....			4.448206	28,067.6	92,085				
Notch, 1936.....	37 45 06.758 109 45 43.901	41 05 05.7	220 58 22.1	North Woodenshoe (U. S. G. S.)..			4.390103	24,552.9	80,554				
		337 11 05		Azimuth mark.									
		30 32 30.7	210 29 06.6	Bears Ears (U. S. G. S.).....			4.207054	16,108.5	52,849				
		73 38 04.1	253 30 46.3	North Woodenshoe (U. S. G. S.)..			4.261586	18,263.6	59,920				
Twin, 1936.....	37 51 24.983 109 29 39.179	174 04 50.6	354 04 15.8	Horse.....			4.128054	13,429.3	44,059				
		249 43 20.2	69 54 23.1	Abajo Peak (U. S. G. S.).....			4.450162	28,194.3	92,501				
		359 40 46		Azimuth mark.									
		304 03 10.7	124 04 22.4	Abajo Peak (U. S. G. S.).....			3.537760	3,449.5	11,317				
Bridger Jack, 1936.....	37 57 52.181 109 39 52.155	83 58 29.3	273 48 02.3	Horse.....			4.398350	25,023.6	82,098				
		292 40 04		Azimuth mark.									
		308 30 39.8	128 36 56.5	Twin.....			4.282170	19,150.1	62,828				
		44 16 57.2	224 12 46.2	Horse.....			4.155235	14,296.7	46,905				
Hart, 1936.....	38 00 00.388 109 24 28.266	14 54 28.0	194 52 28.8	Abajo Peak (U. S. G. S.).....			4.265795	18,441.4	60,503				
		25 34 04.0	205 30 52.9	Twin.....			4.245785	17,611.0	57,779				
		80 08 12.1	259 58 43.6	Bridger Jack.....			4.359659	22,890.7	75,101				
Bridger Jack azimuth mark, 1936 <sup>1</sup> .....	37 57 45.02 109 39 27.29	259 09 15	79 18 29	Hart.....			4.348962	22,333.8	73,273				
		309 08 58	129 14 59	Twin.....			4.268081	18,538.8	60,823				
Blanding, 1936.....	37 38 33.579 109 29 02.720	87 02 33.9	266 48 58.7	Bears Ears (U. S. G. S.).....			4.515608	32,779.9	107,545				
		134 37 36.1	314 26 48.4	Horse.....			4.560242	36,328.0	119,186				
		185 08 33.4	5 09 22.6	Abajo Peak (U. S. G. S.).....			4.341220	21,939.2	71,979				
		1 03 35		Azimuth mark.									
Recapture, 1936.....	37 26 06.978 109 28 00.495	9 26 43.2	189 25 52.2	Bluff.....			4.100399	12,600.8	41,341				
		121 54 24.2	301 40 13.0	Bears Ears (U. S. G. S.).....			4.605954	40,360.3	132,415				
		176 12 29.2	356 11 51.3	Blanding.....			4.363006	23,067.8	75,682				
		26 56 37		Bench mark D-23.									
Montezuma, 1936.....	37 23 09.738 109 15 46.522	117 13 38.2	296 52 00.6	Bears Ears (U. S. G. S.).....			4.769173	58,772.3	192,822				
		145 35 46.2	325 27 41.4	Blanding.....			4.538414	34,547.3	113,344				
		160 49 56.4	340 42 39.6	Abajo Peak (U. S. G. S.).....			4.726772	53,305.5	174,886				
		284 36 12.9	104 53 51.6	Ute.....			4.647760	44,438.9	145,796				
Lone square peak at south end of 50-mile range, 1936 <sup>1</sup> .....	37 08 18.01 110 58 51.79	134 42 37		Azimuth mark.									
		232 09 54	52 28 53	North Gulch.....			4.766985	58,477.0	191,853				
Iron, 1936.....	37 59 57.257 109 13 36.273	240 47 18	60 55 40	Grey Mesa.....			4.370195	23,452.8	76,945				
		267 42 20.2	87 50 56.6	Summit.....			4.311282	20,477.7	67,184				
		333 20 39.7	153 37 06.3	Ute.....			4.947947	88,704.8	291,026				
		49 26 55.2	229 18 15.3	Abajo Peak (U. S. G. S.).....			4.434975	27,225.4	89,322				
Ismay (Colo.), 1936.....	37 21 36.508 109 02 38.524	179 48 51		Azimuth mark.									
		145 23 35.72	325 08 18.20	Abajo Peak (U. S. G. S.).....			4.811891	64,742.45	212,409.2				
		289 36 52.19	109 46 32.84	Ute.....			4.3987201	25,044.95	82,168.3				
	82 22 50			Azimuth mark.									

<sup>1</sup> No check on this position.

## EXPLANATION OF TABLES OF PLANE COORDINATES

In order to meet the various demands imposed upon it by engineering and surveying operations, a plane-coordinate system must satisfy the conditions which naturally accompany the requirements for accurate computations and exact results. The preservation of angles is one important factor to be considered; another factor of utmost importance is the elimination of variations of scale. Since variations of scale are inevitable, it becomes of utmost importance to select a projection which will give definite scale values in certain directions, so that such scale values may be tabulated, and through their use, when utmost accuracy is desired, the distortions of scale may be eliminated which result from the projection of spheroidal coordinates onto a plane.

These various requirements pointed very definitely to the adoption of one of the conformal projections. After due consideration, it was decided to employ the Lambert conformal projection with two standard parallels in States with greatest extent in an east-west direction and the transverse Mercator projection where the greatest extent was in a north-south direction. Such a rule, however, could be applied only in those States which were of such limited extent in one of these directions that the entire State could be included in a single zone. It therefore became necessary to divide the larger States into a number of zones, using the projection in each which would satisfy the requirements of accuracy indicated by limiting scale error, and at the same time keep to a minimum the number of zones required.

For these reasons the Lambert conformal projection with three zones was adopted for Utah (see fig. 3). It will be noticed that the junction lines between adjacent zones follow the county boundary lines, so that all stations in any county will be included in the same zone. Since, however, some surveys will extend across these artificial boundaries, the coordinates of stations which lie within what may be termed the borderland of two contiguous zones are given on both zones. With these data the engineer will not have to go from one zone of coordinates to the other in extending a survey a short distance beyond a boundary. Care must always be taken, however, to use in direct combination only coordinates which are given on the same zone. Where it is necessary to go from one zone to another, suitable directions for so doing will be found in Special Publication No. 193.

The geodetic positions in this publication have been reduced to plane coordinates which are given in the following tables. These coordinates are based upon the Lambert conformal projection. Coordinate tables for the State have been computed by this Bureau as a basis for computing the coordinates. The purpose in view in supplying these coordinates has been to provide for computations of surveys by the usual methods of plane surveying in which the convergence of the meridians is not considered. A State-wide application can now be made of principles ordinarily confined in common practice to very restricted areas.

In the table, the  $x$  and  $y$  coordinates are given in feet to two decimal places. This is one place farther than geodetic positions justify, but it was thought desirable to accept the positions as if they were correct to three decimal places, and carry two decimal places in the coordinates for use in adjusting traverses between fixed points.

The plane coordinates are in all essential features merely the plane representation of the spheroidal coordinates given in the tables of geodetic positions. For definite instructions regarding the use of such coordinates, reference should be made to the following special publications of this Bureau: No. 193, Manual of Plane-Coordinate

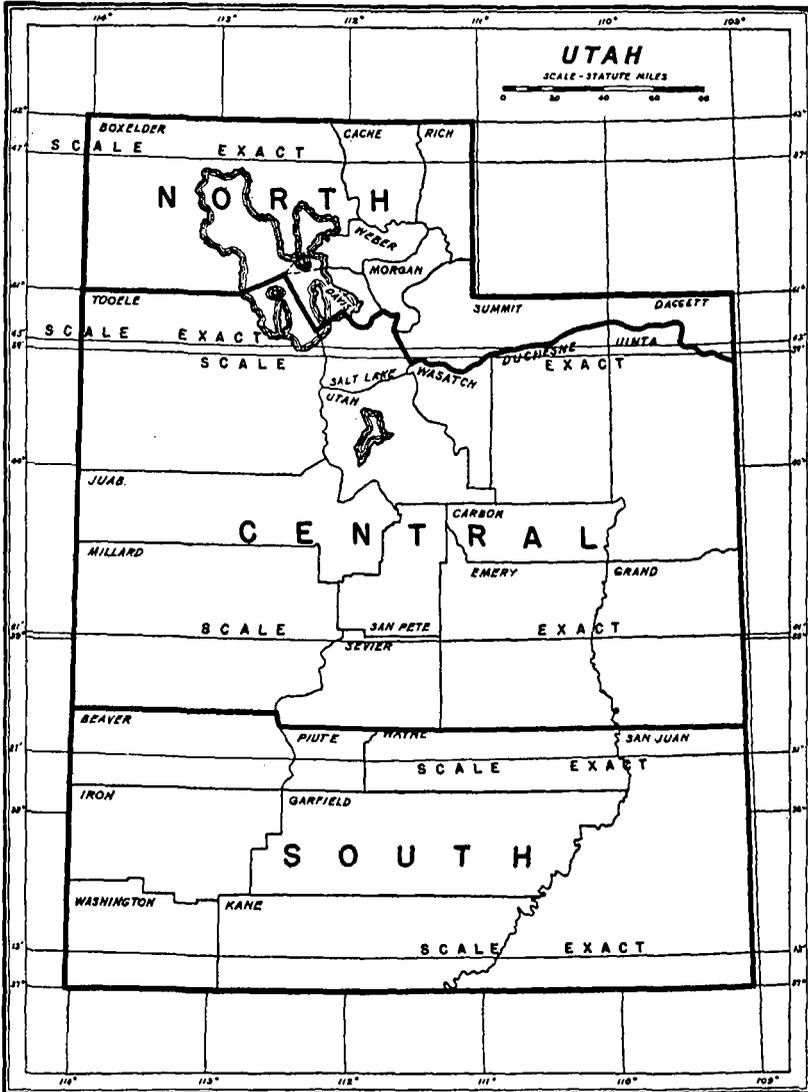


FIG. 3—Map of Utah with grid system outline.

Computation; No. 194, Manual of Traverse Computation on the Lambert Grid; and No. 195, Manual of Traverse Computation on the Transverse Mercator Grid.

A few stations, for which geodetic positions are given in this publication, lie so far outside the State that plane coordinates were not computed for them on the grid of this State. If it becomes necessary

to use any of these as control for local surveys, their coordinates should be obtained from the Coast and Geodetic Survey on the grid of the State in which they lie. Computations of traverses tied to them would then have to be made by passing from one grid to the other. The method of accomplishing this is given in Special Publication No. 193. It is not thought that this necessity will arise very often, but when it does occur the method of handling it is not complicated and the necessary computations can easily be made.

#### EXPLANATION OF PLANE LENGTHS

These tables of plane coordinates do not give lengths of lines, but any such length can be computed from the differences of coordinates just as is done in ordinary plane surveying. The resulting length is affected by the distortion due to the reduction of the actual curved surface of the earth to a plane. It must be corrected for the scale of the grid at that point to reduce it to the sea-level length listed in the geographic-position tables. Should it be desired to obtain the actual ground-level length, a further correction must be applied as described on page 18 for lines of triangulation.

#### EXPLANATION OF PLANE OR GRID AZIMUTHS

The plane or grid azimuths given in the tables of plane-coordinate positions are based upon the central meridian of the proper system, and they, therefore, differ from the geodetic azimuths which appear in the lists of geographic positions and the descriptions. The back azimuth differs from the forward azimuth by exactly  $180^\circ$ , hence it is necessary to list the azimuth of each line in only one direction.

Many of the azimuths listed are to special azimuth marks located at comparatively short distances from the stations. These marks have been placed at such positions as to be visible from the ground at the stations and thus are readily available as starting azimuths for local surveys such as traverses. Since 1927 it has been the custom to set these azimuth marks at most of the first-order stations established by this Bureau.

The plane azimuth from a triangulation station to an azimuth mark or other triangulation station may be computed in two ways; first, by means of the formula

$$\text{geodetic azimuth} - \text{grid azimuth} = +\theta - \frac{x_2 - x_1}{2\rho_0^2 \sin 1''} \left( y_1 - y_0 + \frac{y_2 - y_1}{3} \right),$$

in which  $\theta$  is the mapping angle obtained from Table II of the plane-coordinate projection tables (pp. 81 to 96),  $x_1$ ,  $x_2$ ,  $y_1$ , and  $y_2$  are the coordinates of the stations, and  $\frac{1}{2\rho_0^2 \sin 1''}$  and  $y_0$  are obtained from the table of constants (p. 81) for the zone in which the stations are located; and second, by means of the usual plane-surveying methods using the formula

$$\text{tangent grid azimuth} = \frac{\Delta x}{\Delta y},$$

in which  $\Delta x$  and  $\Delta y$  are the respective differences of the  $x$  and  $y$  coordinates of the two stations.

Since the second term of the first formula is negligible for distances up to approximately 1 mile, the mapping angle,  $\theta$ , may be applied

directly to the geodetic azimuth to obtain the grid azimuth. The first formula, using only the  $\theta$  angle, will give more consistent results for azimuths over short distances than will the second formula. This is due to the fact that there are not enough significant figures in the differences of the  $x$  and  $y$  coordinates to make the second formula sufficiently exact.

Inconsistencies between plane azimuths, as computed from the two formulas, may also arise when the coordinates of the azimuth mark are derived from a "no check" (p. 17) geodetic position. This results from discarding the third decimal place of the seconds of latitude and longitude and thus using only hundredths of seconds for computing the plane-coordinate position.

Since these inconsistencies diminish as the distance between the station and the azimuth mark increases, the second formula has been used to compute the plane azimuths of such lines as are of sufficient length to make the differences negligible. In other words when the distance between the station and the azimuth mark is such that both formulas give practically the same result, and when the coordinates of both station and azimuth mark are known, the second (or tangent) formula has been used.

The first formula has been used to compute the plane azimuths to all azimuth marks whose coordinates were not known, and also to stations whose coordinates were derived from "no check" geodetic positions and to other azimuth marks whose coordinates were known but which did not give consistent results when computed by means of the second formula.

In the tables of plane-coordinate positions the plane azimuths between stations for which coordinates were available but which were computed by means of the first formula are marked by footnote (\*).

PLANE COORDINATES

NORTHERN ZONE

*Thirty-ninth parallel arc*

Station	$x$ coordinate; $y$ coordinate	Plane azimuth	Mark
<i>Principal points</i>			
Deseret, 1887.....	<i>Feet</i> 1,686,778.73 48,010.84	° ' "	
Pilot Peak (Nev.), 1887.....	1,289,124.91 201,146.85	194 15 33.6	Pilot Peak, azimuth mark.
Ogden Peak, 1884.....	1,895,083.69 315,972.69		
Antelope, 1892.....	1,802,454.05 229,884.94		
Waddoup, 1892.....	1,893,278.71 209,234.65		
Promontory, 1802.....	1,747,459.03 352,794.60		
Salt Lake southeast base, 1806.....	1,857,167.18 257,240.33		
Salt Lake northwest base, 1806.....	1,831,684.67 283,712.04		

## Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Principal points—Continued</i>			
	<i>Feet</i>	° ' "	
Oxford (Idaho), 1897.....	1, 838, 369. 34 706, 091. 12		
Cache (Idaho), 1897.....	1, 414, 502. 47 682, 198. 07		
<i>Supplementary points</i>			
Herriman, 1884.....	1, 805, 666. 90 34, 416. 68		
Deseret magnetic, 1887.....	1, 089, 043. 02 47, 114. 01		
Hill, flag, 1887.....	1, 691, 572. 24 48, 114. 69		
Flag in flat, 1887 <sup>1</sup> .....	1, 690, 940. 24 49, 468. 33		
Draper, 1887.....	1, 020, 446. 60 60, 023. 76		
Lone Peak, needle, 1884.....	1, 929, 017. 60 70, 054. 09		
Grantsville, flagstaff, 1887.....	1, 729, 817. 89 90, 335. 21		
Onaqui, 1887.....	1, 090, 540. 38 100, 112. 63		
Oquirrh, 1887.....	1, 809, 346. 63 102, 917. 47		
Lake Shore bench, 1887.....	1, 742, 518. 71 125, 633. 70		
City Creek, 1893.....	1, 804, 750. 13 172, 901. 85	13 17 17. 8	Salt Lake City Temple, west spire.
Salt Lake City, G. L. O. standard meridian, 1869.	1, 891, 713. 49 159, 183. 23		
Salt Lake City Temple, east spire, 1893.	1, 891, 737. 74 159, 510. 31		
Salt Lake City Temple, west spire, 1893.	1, 891, 587. 63 159, 511. 20	330 30 46*	Salt Lake City, azimuth.
Salt Lake City, azimuth, 1893.....	1, 891, 761. 20 159, 204. 07		
Salt Lake City, longitude, 1869.....	1, 891, 704. 74 159, 286. 23		
Salt Lake City, latitude, 1869.....	1, 891, 769. 37 159, 286. 21		
South Antelope no. 1, cairn, 1892.....	1, 808, 508. 92 200, 604. 53		
South Antelope no. 2, 1892 <sup>1</sup> .....	1, 809, 877. 33 198, 063. 42		
West Peninsula Peak, 1889.....	1, 333, 594. 69 191, 669. 16		
East Peninsula Peak, 1889.....	1, 357, 063. 30 217, 482. 24		
White boundary stake, 1892.....	1, 297, 888. 82 229, 558. 37		
Black boundary stake, 1892.....	1, 297, 752. 75 225, 258. 79		

<sup>1</sup> No check on this position.\* This azimuth has been computed by means of the  $\theta$  correction. See page 58.

Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
	<i>Feet</i>	° ' "	
Camp stake, 1892.....	1, 315, 012. 74 248, 886. 49	34 32 06*	Flag.
Flag, 1892.....	1, 313, 503. 43 246, 693. 27		
Nevada-Utah boundary stake, 1892 <sup>1</sup> .....	1, 298, 917. 38 260, 818. 53		
Pilot Peak, azimuth mark (Nev.), 1892.....	1, 290, 994. 01 268, 501. 42		
Willow Springs, 1892.....	1, 315, 033. 32 248, 875. 98		
Bountiful Peak or Francis Peak, cairn, 1892.....	1, 912, 380. 05 230, 080. 00		
Lake Park, pavilion, flag, 1892 <sup>1</sup> .....	1, 878, 788. 06 234, 984. 51		
Farmington, courthouse, spire, 1892 <sup>1</sup> .....	1, 893, 342. 65 235, 916. 31		
Francis Peak, 1896 <sup>1</sup> .....	1, 906, 539. 37 254, 377. 55		
Kaysville, R. G. W. depot, chimney, 1892. <sup>1</sup>	1, 871, 423. 50 252, 374. 38		
Kaysville, meeting house, spire, 1892 <sup>1</sup> .....	1, 873, 695. 22 256, 426. 69		
Fremont Island, cairn, 1888.....	1, 768, 069. 72 307, 469. 29		
Desert Peak, cairn, 1892.....	1, 486, 049. 31 316, 206. 00		
Ogden, longitude, 1873.....	1, 864, 172. 53 323, 393. 68	269 46 21. 2	Ogden, City Hall.
Weber bench, 1891.....	1, 864, 519. 59 317, 355. 08	225 06 29. 6	Ogden, City Hall.
Ogden, azimuth, 1891.....	1, 864, 174. 67 323, 378. 90	256 54 05*	Ogden, railroad crossing, U. P. and U. C.
Sandy, 1891.....	1, 862, 291. 81 322, 436. 39		
Ogden City Hall, 1891.....	1, 870, 606. 68 323, 419. 22	89 46 21. 2	Ogden, longitude.
Ogden Union Depot, 1891.....	1, 868, 245. 26 323, 706. 49	85 36 28*	Ogden, longitude.
Ogden, railroad crossing, U. P. and U. C., 1891.	1, 867, 304. 99 324, 121. 05		
Ogden Methodist church, 1891 <sup>1</sup> .....	1, 871, 256. 19 324, 486. 70		
Ogden, courthouse, flagstaff, 1888.....	1, 871, 152. 91 324, 523. 28		
Ogden Reform School, 1891 <sup>1</sup> .....	1, 874, 445. 12 327, 846. 02		
Grassy, cairn, 1892.....	1, 308, 656. 21 349, 338. 79		
Butte, 1892.....	1, 351, 752. 29 310, 379. 77		
Cliff, flag, 1891.....	1, 884, 271. 55 344, 959. 15		

<sup>1</sup> No check on this position.

\* This azimuth has been computed by means of the  $\theta$  correction. See page 58.

## Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
	<i>Feet</i>	° ' "	
North Ogden, public school, 1891 <sup>1</sup> .....	1,873,495.03 355,029.54		
South Promontory, cairn, 1892.....	1,739,994.84 356,167.40		
Tecoma, railroad signboard, eccentric (Nev), 1892. <sup>1</sup>	1,291,137.66 370,073.24		
Nevada-Utah boundary monument, 1892. <sup>1</sup>	1,302,705.67 377,596.56		
North Ogden Peak, 1891.....	1,873,748.75 375,570.02		
Middle Promontory, cairn, 1892.....	1,729,723.88 389,560.40		
North Promontory, cairn, 1892.....	1,723,980.49 423,130.42		
Box Elder Peak or Willards Peak, cairn, 1888. <sup>1</sup>	1,859,585.82 474,930.73		

## One-hundred-and-eighth meridian arc

<i>Principal points</i>			
Kinney (Wyo.), 1931.....	2,815,442.47 299,120.25	64 41 29 21 41 35*	J. W. Tucker, oil well no. 1. W. W. Wilson Lease, well no. 1.
Brown (U. S. G. S.) (Wyo.), 1931.....	2,620,228.38 289,421.25	38 58 20	Cairn, about 1 mile distant.
Middle (Colo.), 1931.....	2,705,371.81 244,977.64	262 55 45* 262 31 12	W. W. Wilson Lease, well no. 1. First steel derrick north of Wilson Lease, well no. 1.
Zenobia (Colo.), 1931.....	2,730,353.00 110,850.85	118, 40 34 208 44 25	Low sharp peak, 1 mile dis- tant. Base of sharp bluff, east edge of Irish Canyon.
Lena (U. S. G. S.), 1931.....	2,577,519.23 172,160.19	323 39 07 85 20 09	Cairn, north end of ridge. North gable, red-top house in valley.
Blue, 1931.....	2,678,479.59 24,652.35	211 00 29 66 46 30	Zenobia, center of peak. Pinnacle on south slope of mountain, about 2 miles distant.
Little, 1931.....	2,499,136.28 73,609.29	296 36 51 319 51 59	Tabernacle Dome, Vernal. Small butte, pole in cairn.
<i>Supplementary points</i>			
G. L. O. Station 29 eccentric, (Wyo.) 1931.	2,798,533.63 256,537.75	301 58 16*	G. L. O. Station 29, Wyo.
G. L. O. Station 29, Wyo.; G. L. O. Station 2, Colo.; Wyo.-Colo. bound- ary milepost 239 (Wyo.-Colo.), 1931. <sup>1</sup>	2,799,041.24 256,220.92		
W. W. Wilson Lease, well no. 1, 1931 <sup>1</sup> .	2,798,499.33 256,528.91		
Ucolwy; G. L. O. Station 1, Utah; G. L. O. Station 1, Colo.; G. L. O. Station 28, Wyo. (Utah-Colo.-Wyo.). 1931	2,676,361.95 252,687.66		
G. L. O. Station 3 (Colo.), 1931.....	2,782,124.14 108,003.31		
G. L. O. Station 2, 1931.....	2,374,970.64 39,239.66		

<sup>1</sup> No check on this position.\*This azimuth has been computed by means of the  $\theta$  correction. See page 58.

## CENTRAL ZONE

*Thirty-ninth parallel arc*

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Principal points</i>			
	<i>Feet</i>	° ' "	
Treasury Mountain (Colo.), 1893.....	3, 250, 225. 69 278, 794. 84		
Mount Waas, 1893.....	2, 050, 173. 44 83, 221. 05	147 30 44*	La Sallo, northwest peak, cairn.
Tavaputs (Colo.), 1891.....	2, 703, 485. 06 449, 238. 27	136 18 43*	Spur (Colo.).
Mesa (Colo.), 1893.....	2, 945, 062. 81 224, 044. 26	297 22 58. 1	Reference mark no. 2.
Patmos Head, 1890.....	2, 334, 099. 27 427, 935. 05		
Wasatch, 1890.....	2, 013, 303. 89 284, 673. 07		
Mount Nebo, 1887.....	1, 925, 383. 43 538, 185. 28		
Tushar, 1885.....	1, 738, 725. 82 32, 652. 72		
Wheeler Peak (Nev.), 1882.....	1, 200, 454. 79 250, 239. 54	170 17 14. 5	Wheeler Peak, reference mark (Nev.).
Ibepah, 1889.....	1, 320, 744. 80 553, 001. 44	203 44 54. 3	Ibepah, azimuth mark.
Diamond Peak (Nev.), 1881.....	783, 575. 66 485, 254. 38		
Deseret, 1887.....	1, 686, 807. 46 776, 421. 63		
Pilot Peak (Nev.), 1887.....	1, 289, 013. 32 989, 313. 64	104 12 39. 8	Pilot Peak, azimuth mark (Nev.).
Antelope, 1892.....	1, 802, 429. 58 956, 324. 32		
Waddoup, 1892.....	1, 893, 268. 09 937, 688. 13		
Salt Lake southeast base, 1890.....	1, 857, 144. 84 985, 700. 59		
Salt Lake northwest base, 1890.....	1, 831, 653. 05 1, 012, 166. 12		
<i>Supplementary points</i>			
Chiquita (Colo.), 1895.....	2, 810, 428. 33 223, 120. 24		
Divide (Colo.), 1891.....	2, 711, 000. 85 401, 182. 08		
Flat Top (Colo.), 1891.....	2, 750, 082. 38 451, 076. 04		
East Peak (Colo.), 1891.....	2, 699, 580. 26 445, 232. 39		
Spur (Colo.), 1891.....	2, 701, 382. 52 451, 440. 02		
Summit (Colo.), 1891.....	2, 702, 871. 29 452, 463. 93		
Tavaputs south base (Colo.), 1891.....	2, 702, 556. 76 449, 418. 33		
Tavaputs north base (Colo.), 1891.....	2, 703, 144. 44 450, 143. 49		

\*This azimuth has been computed by means of the  $\theta$  correction. See page 58.

## Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
	<i>Feet</i>	° ' "	
Mount Peale, 1893.....	2,650,714.69 46,559.83		
Middle La Salle Peak, 1893.....	2,649,123.43 55,545.74		
La Salle, northwest peak, cairn, 1893....	2,648,488.53 85,887.66		
La Salle, north peak, cairn, 1893.....	2,649,819.19 87,338.39		
C. V. South, cairn, 1893.....	2,648,602.85 78,846.40		
C. V. North, cairn, 1893.....	2,648,105.50 81,474.39		
Colorado-Utah, north boundary flag, 1893.	2,697,897.46 94,260.45		
Colorado-Utah, north boundary stone, 1893. <sup>1</sup>	2,697,900.02 94,160.82		
Colorado-Utah, middle boundary mon- ument, 1893. <sup>1</sup>	2,698,424.28 74,051.07		
Colorado-Utah, south boundary, 1893..	2,698,933.09 56,703.03		
Moab (Warner's ranch), 1893.....	2,561,855.60 89,508.15		
Moab, ditch mark, 1893 <sup>1</sup> .....	2,561,803.05 89,610.82		
Mount Waas, azimuth mark, cairn, 1893.	2,641,928.74 46,711.74		
Thompsons Springs, west tank, 1893....	2,507,454.83 237,550.25		
Thompsons Springs, east tank, 1893 <sup>1</sup> ..	2,507,924.77 237,444.07		
Valley Knob, 1890.....	2,406,030.29 240,506.86		
Hartman, 1898.....	2,379,221.63 256,704.31		
Mica, 1898.....	2,378,691.75 240,110.81	201 48 11*	Green River, hotel.
Reservoir, 1898.....	2,379,092.35 242,550.16		
Wash, 1898.....	2,372,056.42 240,568.08	289 58 13.4	Green River, schoolhouse.
Green River east base, 1898.....	2,377,810.84 243,295.93		
Green River west base, 1898.....	2,374,015.45 243,105.74		
Green River north meridian, 1898.....	2,379,344.83 244,639.21	359 08 42*	Green River south meridian.
Green River south meridian, 1898 <sup>1</sup> .....	2,379,374.87 242,620.95		
Green River longitude, 1898 <sup>1</sup> .....	2,379,375.48 242,580.49		
Green River latitude, 1898 <sup>1</sup> .....	2,379,371.54 242,580.43		

<sup>1</sup> No check on this position.\* This azimuth has been computed by means of the  $\theta$  correction. See page 58.

Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
	<i>Feet</i>	° ' "	
Green River, schoolhouse, 1898 <sup>1</sup> .....	2, 380, 528. 03 243, 490. 13		
Green River, hotel, 1898 <sup>1</sup> .....	2, 379, 621. 54 242, 442. 60		
Cliff, 1898.....	2, 367, 429. 79 268, 845. 09		
Mount Bruin, summit, 1837.....	2, 324, 614. 51 479, 706. 93		
Mount Bartles, summit, 1837.....	2, 312, 671. 06 500, 258. 77		
San Rafael Knob, 1890.....	2, 184, 165. 57 175, 410. 63		
Indian Head, summit, 1884.....	2, 165, 480. 44 562, 539. 62		
Sciplo, 1884.....	1, 800, 361. 41 386, 624. 93		
Sanpete, 1884.....	2, 027, 271. 46 379, 144. 48		
Mooseneah, 1890.....	1, 978, 123. 70 256, 103. 03		
West Sanpete, 1884.....	2, 021, 678. 19 379, 045. 57		
Mount Alice, 1890.....	1, 967, 705. 99 127, 788. 31		
Salt Creek, cairn, 1884.....	1, 931, 753. 43 485, 105. 21		
Cedar, 1884.....	1, 874, 862. 27 470, 757. 45		
Levan, 1884.....	1, 912, 258. 08 431, 841. 12		
Monroe, 1885.....	1, 852, 658. 75 106, 898. 64		
Gunnison astronomic, 1890.....	1, 909, 183. 37 300, 680. 88		
Nephi Bench, 1887.....	1, 904, 027. 81 499, 541. 01		
South Juab Base, 1884.....	1, 882, 429. 93 438, 702. 80		
Lone Tree, cairn.....	1, 818, 289. 47 241, 252. 73		
Delano, cairn, 1885.....	1, 760, 319. 38 14, 290. 57		
South Sciplo, cairn, 1884.....	1, 802, 869. 46 350, 974. 48		
Beaver, 1885.....	1, 732, 468. 75 26, 331. 55		
West Beaver, monument, 1885.....	1, 731, 861. 92 23, 379. 99		
Cervera, 1898.....	1, 722, 866. 62 355, 145. 27		
Camara, 1898.....	1, 709, 024. 86 378, 688. 55		
Manterola, 1898.....	1, 696, 909. 88 366, 095. 19		

<sup>1</sup> No check on this position.

## Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
	<i>Feet</i>	°     "	
Montijo, 1898.....	1,704,219.80 352,786.29		
Sagasta, 1898.....	1,723,109.93 373,996.76		
Augusti, 1898.....	1,698,077.65 352,567.82		
Blanco, 1898.....	1,690,375.69 360,667.90		
Canovas, 1898.....	1,689,082.52 353,427.25		
Oasis northeast base, 1898.....	1,684,456.01 358,354.23		
Oasis southwest base, 1898.....	1,681,697.95 353,023.76		
Oasis north meridian, 1898.....	1,680,590.47 355,697.61		
Oasis south meridian, 1898.....	1,681,033.00 351,807.27		
Oasis astronomic, 1898 <sup>1</sup> .....	1,680,540.84 351,796.08		
Oasis, schoolhouse, tower, 1898.....	1,681,810.17 349,841.72		
Milford Needle, 1883.....	1,623,012.50 21,346.23		
Frisco Mount, tree, 1884.....	1,488,720.42 73,275.46		
Antelope Mountain or Swasey Peak, 1884.....	1,486,945.28 389,427.73		
Knotch Peak or Sawtooth Mountain, 1884.....	1,458,712.73 300,779.82		
Ibepah, azimuth mark, 1889.....	1,324,805.70 662,891.09		
Red Chief, cairn, 1889.....	1,315,859.54 543,498.79		
Red Squaw, cairn, 1889.....	1,314,801.92 543,731.87		
Bench, 1889.....	1,300,124.13 571,556.68		
Mount Moriah, cairn (Nev.), 1883.....	1,236,310.10 353,859.53		
Shell Creek, north peak (Nev.), 1881....	1,124,643.77 408,524.88		
Shell Creek, south peak (Nev.), 1881....	1,123,608.28 380,543.02		
Snake Creek, 1883.....	1,296,426.03 240,516.01		
Wheeler Peak, reference mark (Nev.), 1882.....	1,198,297.65 262,841.40		
Nevada-Utah boundary monument, 1883.....	1,277,642.96 312,304.29		
Cedar Spur (Nev.), 1883.....	1,245,718.24 233,700.93		
Transit Venus station (Nev.), 1883.....	1,237,249.83 258,384.95		

<sup>1</sup> No check on this position.

Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
Mount Grafton, summit (Nev.), 1881..	<i>Feet</i> 1, 074, 825. 35 147, 502. 39	° ' "	
Ward, small cairn (Nev.), 1881.....	1, 029, 693. 44 297, 901. 07		
Ward, north summit (Nev.), 1881.....	1, 023, 473. 76 313, 112. 19		
Duckwater, cairn (Nev.), 1881.....	883, 730. 86 234, 466. 67		
Mount Hamilton (Nev.), 1880.....	855, 868. 46 353, 361. 16		
South boundary flag, 1889.....	1, 287, 368. 53 579, 344. 15		
Middle boundary, 1889.....	1, 286, 673. 68 610, 867. 48		
North boundary flag, 1889.....	1, 287, 032. 92 619, 058. 19		
South Peak, middle tree, 1889.....	1, 331, 335. 68 630, 078. 24		
North Peak, tree, east prong, 1889.....	1, 329, 858. 24 633, 085. 01		
Ibepah, telegraph office, flag, 1889.....	1, 303, 855. 25 637, 393. 43		
Ibepah, post office eccentric, 1889.....	1, 304, 852. 08 638, 075. 58		
Ibepah, post office, southeast corner, 1889.	1, 304, 820. 92 638, 113. 07	57 21 55. 8	Ibepah, telegraph office, chimney.
Ibepah, telegraph office chimney, 1889.	1, 303, 619. 50 637, 343. 71		
Devine's granary, 1889.....	1, 304, 861. 83 638, 180. 10		
Strawberry North, summit, 1887.....	2, 144, 513. 43 624, 661. 96		
Spanish Fork, cairn, 1887.....	1, 992, 460. 88 639, 094. 64		
Granite Peak, 1884.....	1, 505, 044. 60 658, 623. 74		
Springville Peak, monument, 1884.....	1, 984, 319. 25 696, 059. 11		
Herriman, 1884.....	1, 805, 687. 73 762, 855. 35		
Deseret magnetic, 1887.....	1, 689, 671. 79 775, 510. 94		
Hill, flag, 1887.....	1, 691, 600. 47 776, 518. 22		
Flag in flat, 1887 <sup>1</sup> .....	1, 690, 968. 03 777, 861. 51		
Draper, 1887.....	1, 920, 452. 15 794, 478. 12		
Lone Peak, needle, 1884.....	1, 929, 022. 06 799, 108. 90		
Grantsville, flagstaff, 1887.....	1, 729, 826. 26 827, 748. 66		

<sup>1</sup> No check on this position.

## Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
	<i>Feet</i>	° ' "	
Onaqui, 1887.....	1,690,549.74 828,512.52		
Oquirrh, 1887.....	1,809,351.87 831,352.35		
Lake Shore, bench, 1887.....	1,742,518.87 854,050.58		
City Creek, 1893.....	1,894,744.17 901,352.69	13 16 51.5	Salt Lake City Temple, west spire.
Salt Lake City, G.L.O. standard meridian, 1869.	1,891,709.14 887,633.02		
Salt Lake City Temple, east spire, 1893.	1,891,733.34 887,960.12		
Salt Lake City Temple, west spire, 1893.	1,891,583.22 887,961.08	330 30 20*	Salt Lake City azimuth.
Salt Lake City azimuth, 1893.....	1,891,756.93 887,653.86		
Salt Lake City longitude, 1869.....	1,891,760.38 887,736.03		
Salt Lake City latitude, 1869.....	1,891,764.99 887,736.01		
South Antelope no. 1, cairn, 1892.....	1,808,491.86 929,042.19		
South Antelope no. 2, 1892 <sup>1</sup> .....	1,809,860.97 926,501.19		
West Peninsula Peak, 1889.....	1,333,544.87 919,864.75		
East Peninsula Peak, 1889.....	1,356,995.19 945,698.21		
White boundary stake, 1892.....	1,297,804.87 957,728.40		
Black boundary stake, 1892.....	1,297,672.36 953,428.25		
Camp stake, 1892.....	1,314,014.99 977,073.00	34 29 18*	Flag.
Flag, 1892.....	1,313,407.28 974,878.25		
Nevada-Utah boundary stake, 1892 <sup>1</sup> ..	1,298,807.51 988,993.48		
Pilot Peak azimuth mark (Nev.), 1892.	1,290,876.50 996,070.89		
Willow Springs, 1892.....	1,314,935.57 977,062.51		
Bountiful Peak or Francis Peak, cairn, 1892.	1,912,375.16 958,543.99		
Lake Park, pavillon, flag, 1892 <sup>1</sup> .....	1,878,772.29 963,438.97		
Farmington, courthouse, spire, 1892 <sup>1</sup> ..	1,893,328.66 964,372.86		
Francis Peak, 1896 <sup>1</sup> .....	1,906,525.05 982,838.30		
Kaysville, R. G. W. depot, chimney, 1892. <sup>1</sup>	1,871,404.12 990,830.19		

<sup>1</sup> No check on this position.\*This azimuth has been computed by means of the  $\theta$  correction. See page 58.

Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
Kaysville, meeting house, spire, 1892 <sup>1</sup> ..	<i>Feet</i> 1, 873, 878. 57 984, 883. 46	" " "	
Butte, 1892.....	1, 351, 612. 11 1, 038, 605. 95		

Forest Area

<i>Principal points</i>			
South Tent, 1919.....	2, 040, 453. 02 385, 606. 75		
Indianola, 1919.....	2, 029, 551. 12 544, 361. 71		
Wasatch 2, 1919.....	2, 013, 304. 04 284, 676. 51		
Mount Catherine, 1919.....	1, 818, 366. 78 241, 276. 26		
Musinia, 1919.....	1, 978, 110. 19 256, 094. 24		
Black Cap, 1919.....	1, 908, 954. 53 226, 709. 07		
Monroe 2, 1919.....	1, 852, 862. 34 106, 799. 72		
Mount Marvine, 1919.....	1, 959, 920. 96 122, 016. 69		
Thousand Lake Mountain, 1919.....	2, 006, 168. 51 30, 470. 72		
<i>Supplementary points</i>			
Mount Baldy, 1919 <sup>2</sup> .....	1, 978, 346. 72 519, 677. 48		
C. H. 7, 1919 <sup>1</sup> .....	2, 063, 054. 45 512, 870. 39		
U. S. Forest Service no. 21, 1919.....	1, 859, 304. 97 369, 165. 12	133 34 15*	U. B. Dam, gatehouse.
U. S. Forest Service no. 1, 1919.....	1, 803, 839. 83 440, 840. 38		
U. B. Dam, gatehouse, 1919 <sup>1</sup> .....	1, 849, 135. 11 378, 840. 37		
C. H. 2 (Horseshoe), 1919 <sup>1</sup> .....	2, 021, 678. 59 379, 043. 05		
C. H. 1, 1919 <sup>1</sup> .....	2, 003, 869. 38 348, 819. 39		
U. S. Forest Service no. 6, 1919.....	1, 791, 828. 69 194, 623. 88		
Red Pyramid (Beehive) (U. S. F. S.), 1919.	1, 835, 701. 21 219, 992. 42		
U. S. Forest Service no. 5, 1919.....	1, 819, 088. 99 265, 240. 53		
U. S. Forest Service no. 3, 1919.....	1, 781, 704. 57 343, 486. 43		
U. S. Forest Service no. 2, 1919.....	1, 850, 754. 62 335, 913. 15		

<sup>1</sup> No check on this position.

<sup>2</sup> Checked by vertical angles only.

\* This azimuth has been computed by means of the  $\theta$  correction. See page 58.

## Forest Area—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points—Continued</i>			
	<i>Feet</i>	° ' "	
U. S. Forest Service no. M 11, 1919.....	1,753,866.06 347,952.27		
U. S. Forest Service no. M 9, 1919.....	1,825,505.62 295,846.60		
U. S. Forest Service no. M 10, 1919.....	1,780,219.50 355,043.57		
Flagstaff (U. S. F. S.), 1919 <sup>1</sup> .....	2,053,597.08 268,484.46		
Stevens 20, 1919.....	1,858,895.86 265,164.74		
U. S. Forest Service no. 20, 1919 <sup>2</sup> .....	1,858,386.80 262,950.67		
Monroe Peak (U. S. Forest Service no. 13), 1919.	1,836,156.58 74,384.15		
U. S. Forest Service no. M 8, 1919.....	1,769,289.62 63,439.97		
Mount Terrill (U. S. F. S.), 1919.....	1,958,231.80 138,043.19		
Mount Hilgard (U. S. F. S.), 1919.....	1,987,707.50 127,787.90		
U. S. Forest Service no. 8, 1919.....	1,770,265.20 126,377.29		
U. S. Forest Service no. M 3, 1919.....	1,732,485.00 144,931.15	334 54 54.0	Marys Nipple (U. S. F. S.).
U. S. Forest Service no. 9, 1919.....	1,704,633.16 116,287.63		
Marys Nipple (U. S. F. S.), 1919.....	1,740,151.73 128,553.28		
U. S. Forest Service no. 15 (north end of Fish Lake), 1919. <sup>1</sup>	1,939,688.57 106,307.01		
U. S. Forest Service no. M 2, 1919.....	1,705,280.44 82,019.92		
U. S. Forest Service no. 10, 1919.....	1,795,055.89 73,906.27		
U. S. Forest Service no. M 7, 1919.....	1,799,020.99 148,443.81		
Elsinore sugar factory, west gable, flagpole, 1919.	1,822,155.02 127,144.98		
Marysvale Peak (U. S. F. S.), 1919.....	1,826,916.85 53,473.70		
Flat, 1919 <sup>1</sup> .....	1,850,879.46 65,317.79		
U. S. Forest Service no. M 1, 1919 <sup>2</sup> .....	1,751,422.52 101,174.60		
Delano Peak (U. S. Forest Service no. M 5), 1919.	1,750,320.28 14,285.80		

<sup>1</sup> No check on this position.<sup>2</sup> Checked by vertical angles only.

One-hundred-and-eighth meridian arc.

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Principal points</i>			
	<i>Feet</i>	° ' "	
Kinney (Wyo.), 1931.....	2,815,606.18 1,027,198.56	64 44 49 21 44 55*	J. W. Tucker, oil well 1. W. W. Wilson Lease, well no. 1.
Brown (U. S. G. S.) (Wyo.) 1931.....	2,620,347.22 1,017,664.45	39 00 52	Cairn, about 1 mile distant.
Middle (Colo.), 1931.....	2,705,469.05 973,146.70	262 58 40* 262 34 05	W. W. Wilson Lease, well no. 1. First steel derrick north of Wilson Lease, well no. 1.
Zenobia (Colo.), 1931.....	2,730,337.48 838,992.15	118 43 32 208 47 22	Low sharp peak, 1 mile dis- tant. Base of sharp bluff, east edge of Irish Canyon.
Lena (U. S. G. S.), 1931.....	2,577,549.79 900,420.15	323 41 28 85 22 30	Cairn, north end of ridge. North gable, red-top house in valley.
Blue, 1931.....	2,678,396.69 752,843.59	211 03 13 66 49 14	Zenobia, center of peak. Pinnacle on south slope of mountain about 2 miles distant.
Little, 1931.....	2,499,104.86 801,820.05	296 38 52 319 54 00	Tabernacle Dome, Vernal. Small butte, pole in cairn.
Rabbit (Colo.), 1931.....	2,705,562.51 576,209.94	61 20 33	Sharpest peak on far ridge.
Cone, 1931.....	2,465,205.47 648,284.11	12 49 20	Cairn on small square butte, on range with gap.
Book (Colo.), 1931.....	2,692,104.59 467,222.90	105 24 58	Azimuth mark.
Range, 1931.....	2,343,376.35 469,706.52	247 07 27	Azimuth mark.
Grand (Colo.), 1931.....	2,922,309.70 277,161.68		
<i>Supplementary points</i>			
G. L. O. Station 29 eccentric (Wyo.), 1931.	2,798,653.72 984,625.29	302 01 31*	G. L. O. Station 29, Wyo..
G. L. O. Station 29, Wyo.; G. L. O. Station 2, Colo.; Wyo.-Colo. bound- ary milepost 239 (Wyo.-Colo.), 1931. <sup>1</sup>	2,799,161.09 984,307.93		
W. W. Wilson Lease, well no. 1, 1931. <sup>1</sup>	2,798,619.40 984,616.48		
Uoolwy; G. L. O. Station 1, Utah; G. L. O. Station 1, Colo.; G. L. O. Sta- tion 28, Wyo. (Utah-Colo.-Wyo.) 1931.	2,676,461.58 960,881.66		
G. L. O. Station 3 (Colo.), 1931.....	2,782,104.38 836,098.49		
G. L. O. Station 2, 1931.....	2,374,932.27 767,617.28		
Utah-Colorado boundary milepost 224, G. L. O. Station 4, Utah; G. L. O. Station 4, Colo. (Utah-Colo.), 1931.	2,683,969.08 697,870.92		
G. L. O. Station 5, eccentric (Colo), 1931.....	2,756,070.93 620,751.05		
G. L. O. station 5 (Colo.), 1931. <sup>1</sup> .....	2,756,009.43 620,598.77		
G. L. O. station 6, 1931.....	2,621,444.01 256,251.08		

<sup>1</sup> No check on this position.

\* This azimuth has been computed by means of the  $\theta$  correction. See, page 58.

## U. S. COAST AND GEODETIC SURVEY

*Grand Junction, Colo., to Lordsburg, N. Mex., arc*

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Principal points</i>			
Spruce (U. S. G. S.) (Colo.), 1934.....	<i>Feet</i> 2, 858, 664. 20 51, 167. 40	° ' "	

*Uintah-Ouray Indian Reservation arc*

<i>Principal points</i>			
Altonah, 1936.....	2, 335, 451. 59 787, 662. 61	345 52 08*	Azimuth mark.
Roosevelt (U. S. G. S.), 1936.....	2, 438, 226. 40 711, 534. 98	324 21 54*	Azimuth mark.
Antelope (U. S. G. S.), 1936.....	2, 360, 645. 98 616, 296. 00	247 11 53*	Azimuth mark.
Farm Creek Pass, 1936.....	2, 240, 510. 82 775, 095. 29	343 36 39*	Azimuth mark.
Cottonwood, 1936.....	2, 284, 556. 15 618, 335. 92	62 29 39*	Azimuth mark.
Red, 1936.....	2, 137, 102. 21 756, 113. 57	39 34 37*	Azimuth mark.
Strawberry, 1936.....	2, 150, 874. 07 626, 034. 88	77 25 43*	Azimuth mark.
Buck, 1936.....	2, 550, 991. 59 524, 626. 96	340 09 58*	Azimuth mark.
Maud, 1936.....	2, 418, 470. 13 553, 225. 76	126 39 33*	Azimuth mark.
Black Knoll, 1936.....	2, 510, 209. 88 422, 227. 59	251 08 50*	Azimuth mark.
Black Hill, 1936.....	2, 385, 434. 43 409, 239. 35	276 08 28*	Azimuth mark.
Toad, 1936.....	2, 468, 152. 47 382, 947. 10	123 37 25*	Azimuth mark.
Hill, 1936.....	2, 466, 396. 48 347, 160. 73	296 48 30*	Azimuth mark.
Flat Rock, 1936.....	2, 503, 634. 87 381, 021. 78	40 38 38*	Azimuth mark.
Wilcox, 1936.....	2, 493, 362. 22 340, 471. 21	167 06 33*	Azimuth mark.
Ice Cave Peak, 1936.....	2, 441, 366. 95 832, 207. 63	342 08 41*	Azimuth mark.
Lapoint, 1936.....	2, 485, 776. 59 777, 954. 49	182 15 47*	Azimuth mark.
Canal, 1936.....	2, 489, 837. 86 727, 286. 41	344 30 16*	Azimuth mark.
Spur (U. S. G. S.), 1936.....	2, 279, 027. 40 791, 369. 27	305 33 28*	Azimuth mark.
Dry Gulch, 1936.....	2, 360, 423. 24 828, 074. 11		
Blue Bench, 1936.....	2, 339, 769. 01 687, 949. 47	270 42 27*	Bench mark no. M-93, 1934, U. S. G. S.
Cedar Rim, 1936.....	2, 215, 362. 77 666, 313. 86		
Hanna, 1936.....	2, 202, 840. 91 780, 848. 88	192 08 00*	Azimuth mark.

\*This azimuth has been computed by means of the  $\theta$  correction. See page 58.

*Uintah-Ouray Indian Reservation arc—Continued*

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Principal points—Continued</i>			
Water, 1936.....	<i>Feet</i> 2, 151, 191. 78 686, 636. 39	36 40 06*	Azimuth mark.
Minnie, 1936.....	2, 163, 812. 39 614, 188. 15		
Grey, 1936.....	2, 232, 181. 29 605, 719. 79	191 01 22*	Azimuth mark.
Wolf, 1936.....	2, 135, 991. 24 787, 079. 79	27 07 15*	Azimuth mark.
Leota, 1936.....	2, 529, 108. 86 676, 967. 27	119 24 02*	Azimuth mark.
Two Water, 1936.....	2, 558, 908. 97 607, 356. 41	70 20 05*	Azimuth mark.
Bench, 1936.....	2, 431, 019. 08 612, 780. 93	207 19 42*	Azimuth mark.
Edge, 1936.....	2, 529, 264. 75 563, 487. 30	306 25 20*	Azimuth mark.
Taylor, 1936.....	2, 434, 433. 05 465, 923. 02	168 12 12*	Taylor azimuth.
Taylor azimuth, 1936 <sup>1</sup> .....	2, 432, 704. 39 474, 199. 95		
Big Horn, 1936.....	2, 386, 914. 22 332, 444. 08	142 27 56*	Azimuth mark.
Wood, 1936.....	2, 565, 739. 27 485, 674. 77	343 39 28*	Azimuth mark.
Winter, 1936.....	2, 558, 938. 78 425, 966. 88	108 11 18*	Azimuth mark.
Moon, 1936.....	2, 551, 350. 70 381, 535. 44	162 12 21*	Azimuth inark.
Carbon and Emery Counties, bound- ary marker, 1936.	2, 378, 890. 39 410, 589. 58	318 19 17*	Black Hill.
Greyhead Peak, cairn, 1936 <sup>1</sup> .....	2, 223, 165. 76 594, 003. 00		
<i>Supplementary points</i>			
Myton, water tank, base, 1936 <sup>1</sup> .....	2, 399, 145. 23 681, 145. 51		
Cone-shaped mountain peak, 1936 <sup>1</sup> .....	2, 351, 188. 59 392, 766. 51		
Altonah (U. S. G. S.), 1936 <sup>1</sup> .....	2, 335, 461. 79 787, 602. 44		
T. 3 S., R. 4 W., secs. 13 and 24, quarter corner, 1936. <sup>1</sup>	2, 339, 683. 79 687, 284. 17	187 17 44*	Blue Bench.

SOUTHERN ZONE

*Thirty-ninth parallel arc*

<i>Principal points</i>			
Uncompahgre (Colo.), 1895.....	3, 162, 248. 75 536, 676. 15		
Mount Waas, 1893.....	2, 650, 105. 35 689, 716. 62	147 34 33*	La Salle, northwest peak, cairn.
Mount Ellen, 1891.....	2, 197, 389. 47 530, 356. 70		

<sup>1</sup> No check on this position.

\*This azimuth has been computed by means of the  $\theta$  correction. See page 58.

## Thirty-ninth parallel arc—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Principal points—Continued</i>			
	<i>Feet</i>	° ' "	
Tushar, 1885.....	1, 738, 774. 56 639, 456. 01		
Ploche (Nev.), 1889.....	1, 284, 834. 53 490, 465. 08		
White Pine (Nev.), 1881.....	852, 384. 74 626, 360. 92	33 16 04*	White Pine, azimuth mark.
<i>Supplementary points</i>			
Mount Peale, 1893.....	2, 650, 605. 89 653, 059. 54		
Middle La Salle Peak, 1893.....	2, 649, 024. 91 662, 045. 68		
La Salle, northwest peak, cairn 1893....	2, 648, 423. 57 662, 364. 18		
La Salle, north peak, cairn, 1893.....	2, 649, 755. 70 663, 831. 20		
C. V. South, cairn, 1893.....	2, 648, 530. 12 685, 343. 63		
C. V. North, cairn, 1893.....	2, 648, 635. 72 687, 971. 85		
Colorado-Utah, north boundary flag, 1893.	2, 697, 836. 95 700, 689. 49		
Colorado-Utah, north boundary stone, 1893. <sup>1</sup>	2, 697, 839. 39 700, 689. 87		
Colorado-Utah, middle boundary monument, 1893. <sup>1</sup>	2, 698, 340. 42 681, 092. 34		
Colorado-Utah, south boundary, 1893....	2, 698, 827. 85 663, 145. 72		
Moab (Warner's ranch), 1893.....	2, 561, 803. 47 696, 093. 52		
Moab, ditch mark, 1893 <sup>1</sup> .....	2, 561, 811. 01 696, 106. 18		
Mount Waas, azimuth mark, cairn, 1893.	2, 641, 821. 75 653, 221. 07		
San Rafael Knob, 1890.....	2, 184, 176. 06 782, 234. 34		
Mount Alice, 1890.....	1, 987, 706. 29 734, 040. 06		
Monroe, 1885.....	1, 852, 667. 56 713, 732. 00		
Delano, cairn, 1885.....	1, 750, 373. 74 621, 103. 23		
Beaver, 1885.....	1, 732, 521. 56 633, 133. 86		
West Beaver, monument, 1885.....	1, 731, 914. 81 633, 182. 01		
Birch Creek, cairn, 1885.....	1, 721, 697. 05 570, 385. 30		
Milford Needle, 1883.....	1, 623, 090. 39 628, 089. 68		

<sup>1</sup> No check on this position.\*This azimuth has been computed by means of the  $\theta$  correction. See page 58.

*Thirty-ninth parallel arc*—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points</i> —Continued			
	<i>Feet</i>	° ' "	
Beaver, meeting house, 1885 <sup>1</sup> .....	1, 673, 015. 29 587, 262. 86		
Beaver, flagstaff (U. S. Engineers astronomic station 1872-1885), 1885.	1, 672, 521. 42 587, 101. 96		
<i>Frisco Mount, tree</i> , 1884.....	1, 488, 781. 68 679, 908. 84		
Indian Peak, 1881.....	1, 318, 288. 25 591, 397. 80		
Butte, 1883.....	1, 273, 641. 74 476, 172. 05		
East Ridge (Nev.), 1883.....	1, 273, 241. 89 489, 771. 03		
Road Summit (Nev.), 1883.....	1, 266, 658. 86 483, 174. 87		
Pine Hill (Nev.), 1883.....	1, 270, 051. 90 484, 498. 76		
North boundary signal, 1883.....	1, 266, 281. 72 500, 624. 97		
Canyon Peak (Nev.), 1883.....	1, 265, 354. 31 498, 915. 80		
Boundary stake no. 1, 1883 <sup>1</sup> .....	1, 265, 542. 99 500, 259. 69		
Boundary stake no. 2, 1883 <sup>1</sup> .....	1, 265, 232. 70 488, 205. 65		
White Rock (Nev.) 1881.....	1, 187, 741. 92 550, 970. 97		
White cairn (Nev.), 1883.....	1, 149, 432. 31 470, 408. 78		
Ploche Peak, monument (Nev.), 1881..	1, 140, 224. 77 474, 991. 46		
Highland Peak, summit (Nev.), 1881..	1, 111, 995. 32 461, 412. 51		
Mount Grafton, summit (Nev.), 1881..	1, 074, 825. 57 753, 624. 02		
Mount Irish (Nev.), 1881.....	870, 956. 37 379, 677. 60		
White Pine, azimuth mark (Nev.), 1883.	850, 643. 11 623, 696. 31		
White Pine, south summit (Nev.), 1880.	846, 044. 30 617, 212. 66		

*Forest Area*

<i>Principal points</i>			
Monroe 2, 1919.....	1, 852, 871. 16 713, 634. 05		
Mount Marvine, 1919.....	1, 959, 922. 30 728, 867. 37		
Thousand Lake Mountain, 1919.....	2, 096, 167. 35 637, 332. 94		

<sup>1</sup> No check on this position.

## Forest Area—Continued

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points</i>			
	<i>Feet</i>	° ' "	
Monroe Peak (U. S. Forest Service no. 13), 1919.	1,838, 175. 44 081, 216. 91		
U. S. Forest Service no. M 8, 1919. ....	1,769, 320. 55 670, 251. 67		
Mount Terrill (U. S. F. S.), 1919. ....	1,958, 232. 07 744, 893. 42		
Mount Hilgard (U. S. F. S.) 1919. ....	1,987, 707. 79 734, 639. 66		
U. S. Forest Service no. 8, 1919. ....	1,770, 271. 40 733, 184. 23		
U. S. Forest Service no. M 3, 1919. ....	1,732, 483. 80 751, 721. 82	334 53 21.3	Marys Nipple (U. S. F. S.)
U. S. Forest Service no. 9, 1919. ....	1,704, 646. 33 723, 065. 67		
Marys Nipple (U. S. F. S.), 1919. ....	1,740, 157. 80 735, 347. 68		
U. S. Forest Service no. 15 (north end of Fish Lake), 1919. <sup>1</sup>	1,939, 692. 23 713, 156. 71		
U. S. Forest Service no. M 2, 1919. ....	1,705, 310. 77 688, 800. 70		
U. S. Forest Service no. 10, 1919. ....	1,795, 079. 71 680, 726. 19		
U. S. Forest Service no. M 7, 1919. ....	1,799, 018. 82 755, 281. 11		
Elsinore sugar factory, west gable, flag pole, 1919.	1,822, 159. 54 733, 966. 92		
Marysvale Peak (U. S. F. S.), 1919. ....	1,826, 942. 94 680, 306. 60		
Flat, 1919 <sup>1</sup> .....	1,860, 898. 93 672, 155. 60		
U. S. Forest Service no. M 1, 1919 <sup>2</sup> .....	1,751, 439. 92 707, 975. 01		
Mabuston Peak (U. S. Forest Service no. 12), 1919.	1,831, 086. 89 578, 479. 00		
City Creek Peak (U. S. Forest Service no. M 4), 1919.	1,759, 481. 20 600, 066. 18		
Circleville Mountain (U. S. Forest Service no. 11), 1919. ....	1,742, 123. 79 559, 255. 15		
Delano Peak (U. S. Forest Service no. M 5), 1919.	1,750, 374. 04 621, 098. 46		

## Thirty-ninth parallel to Needles, Calif., arc

Principal points	x coordinate; y coordinate	Plane azimuth	Mark
Brian, 1925. ....	1,614, 058. 16 372, 167. 55		
Burger, 1925. ....	1,418, 354. 55 246, 113. 25		
Mormon (Nev.), 1925. ....	1,131, 894. 31 80, 002. 68		
Moapa (Nev.), 1925. ....	1,083, 707. 36 17, 128. 91	242 31 39*	Moapa, railroad water tank.

<sup>1</sup> No check on this position.<sup>2</sup> Checked by vertical angles only.\* This azimuth has been computed by means of the  $\theta$  correction. See page 53.

*Thirty-ninth parallel to Needles, Calif., arc—Continued*

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points</i>			
	<i>Feet</i>	° ' "	
Lund, 1925.....	1,442,898.64 494,314.89	317 30 44* 337 10 38*	Lund U. S. B. M. Lund, B. M. Q 8.
Lund, B. M. Q 8, 1925 <sup>1</sup> .....	1,443,161.75 493,714.74		
Lund U. S. B. M., 1925 <sup>1</sup> .....	1,443,156.71 494,032.31		
Hawkins, 1925.....	1,300,449.96 303,471.87		
Eight Mile Monument (Utah-Ariz.), 1925.....	1,297,775.44 130,472.04		
Initial (Ariz.), 1925.....	1,256,953.95 130,734.51	156 32 04*	Initial (initial monument).
Initial (initial monument) (Utah, Nev., Ariz.), 1925.....	1,256,679.65 131,696.96		
Mount Bangs (Ariz.), 1925.....	1,310,699.21 54,614.84		
Moapa, B. M. I 1 (Nev.), 1925 <sup>1</sup> .....	1,083,788.17 17,239.23		
Moapa, railroad water tank (Nev.), 1925. <sup>1</sup>	1,084,609.65 17,646.08		

*Grand Junction, Colo., to Lordsburg, N. Mex., arc*

<i>Principal points</i>			
Spruce (U. S. G. S.) (Colo), 1934.....	2,858,524.41 667,309.70		
Summit (Colo.), 1934.....	2,722,043.81 497,488.09	191 32 18*	Azimuth mark.
Lone Cone (Colo.), 1934.....	2,936,310.66 460,947.38		
Ute (Colo.), 1934.....	2,791,841.97 236,333.46	2 47 28*	Shiprock, highest point.
Madden (Colo.), 1934.....	2,986,188.52 278,606.96		
<i>Supplementary points</i>			
Utah-Colorado boundary milepost 70 (Utah, Colo.), 1934.	2,708,096.88 467,410.40		
G. L. O. Station 12 (Colo.), 1934.....	2,718,866.52 409,603.47		
Four Corners (G. L. O. Station 1) ec- centric, 1934.	2,710,879.77 131,311.64	348 45 35*	Four Corners (G. L. O. Sta- tion 1).
Four Corners (G. L. O. Station 1) (Utah-Colo.-Ariz.-N. Mex.), 1934 <sup>1</sup> ...	2,717,059.06 130,411.34		

<sup>1</sup> No check on this position.

\* This azimuth has been computed by means of the  $\theta$  correction. See page 68.

## U. S. COAST AND GEODETIC SURVEY

*Salina, Utah, to Grand Canyon, Arizona, arc*

Station	z coordinate; y coordinate	Plane azimuth	Mark
<i>Principal points</i>			
Tantlus, 1934.....	<i>Feet</i> 2,043,041.88 535,532.64	° ' " 49 50 58*	Reference mark no. 3.
Bowns Point, 1934.....	2,041,624.94 504,150.75		
Pockets, 1934.....	2,148,223.30 378,316.88	292 09 04*	Reference mark no. 3.
Collet, 1934.....	1,979,416.90 298,842.80		
Steep, 1934.....	2,041,308.84 490,427.30	207 53 52*	Reference mark no. 3.
Navajo Mountain, 1934.....	2,184,232.48 134,465.55		
Keam (Ariz.), 1934.....	2,020,118.84 40,750.33	176 03 15*	Reference mark no. 3.
Cedar Mountain, 1934.....	1,943,052.61 123,788.18	345 45 15*	Boundary monument no. 130.
Paria (Ariz.), 1934.....	1,947,540.63 66,043.15	239 15 43*	Reference mark no. 3.
Brown (Ariz.), 1934.....	2,013,867.50 121,946.79	90 17 42*	Boundary monument no. 143.
<i>Supplementary points</i>			
Tantlus (U. S. F. S.), 1934 <sup>1</sup> .....	2,043,045.70 535,490.97		
Bowns Point (U. S. F. S.), 1934 <sup>1</sup> .....	2,041,620.70 504,156.50		
Boundary monument no. 130 (Utah-Ariz.), 1934 <sup>1</sup> .....	1,943,529.51 121,909.71		
Boundary monument no. 140 (Utah-Ariz.), 1934.....	1,996,356.15 121,944.21		
G. L. O. boundary mark (Utah-Ariz.), 1934. <sup>1</sup>	2,013,922.00 121,958.14		
Boundary monument no. 143 (Utah-Ariz.), 1934. <sup>1</sup>	2,012,041.31 121,956.23		
Wahweap (Ariz.), 1934.....	1,995,943.84 120,519.50	196 08 26*	Boundary monument no. 140.
Paria (U. S. G. S.), cairn (Ariz.), 1934 <sup>1</sup> .....	1,947,557.29 66,002.46		

*San Juan River arc*

Station	z coordinate; y coordinate	Plane azimuth	Mark
<i>Principal points</i>			
Monitor, 1936.....	<i>Feet</i> 2,301,942.96 202,134.04	° ' " 40 03 42*	Azimuth mark.
North Woodenshoe (U. S. G. S.), 1936.....	2,445,248.32 381,856.09	321 43 07*	Azimuth mark.
Lee, 1936.....	2,443,382.68 214,696.34	274 20 11*	Azimuth mark.
Bears Ears (U. S. G. S.), 1936.....	2,476,409.38 353,798.05	182 41 20*	Azimuth mark.
Bluff, 1936.....	2,584,411.59 245,355.27	123 53 00*	Azimuth mark.
Abajo Peak (U. S. G. S.), 1936.....	2,588,567.18 433,467.06	57 43 25*	Azimuth mark.

<sup>1</sup> No check on this position.\* This azimuth has been computed by means of the  $\theta$  correction. See page 58.

*San Juan River arc—Continued*

Station	x coordinate; y coordinate	Plane azimuth	Mark
<i>Supplementary points</i>			
	<i>Feet</i>	° ' "	
Horsehead, 1936.....	2, 677, 339. 60 402, 731. 61	266 16 30*	Azimuth mark.
60-Mile, 1936.....	2, 154, 553. 09 200, 074. 75	356 52 28*	Azimuth mark.
Hall, 1936.....	2, 185, 569. 93 300, 085. 32		
Grey Mesa, 1936.....	2, 218, 229. 29 210, 084. 60	218 57 51*	Azimuth mark.
40-mile, 1936.....	2, 148, 352. 94 267, 253. 27	105 44 41*	Azimuth mark.
Bullfrog, 1936.....	2, 217, 040. 33 305, 363. 18	146 57 05*	Azimuth mark.
North Gulch, 1936.....	2, 302, 140. 42 290, 082. 57	107 31 10*	North Gulch azimuth.
North Gulch azimuth, 1936.....	2, 295, 013. 70 292, 932. 27		
Red House, 1936.....	2, 869, 919. 52 292, 249. 69	290 15 53*	Azimuth mark.
Grand, 1936.....	2, 361, 194. 55 240, 300. 26	201 03 07*	Azimuth mark.
Bridges, 1936.....	2, 439, 031. 62 324, 187. 77	303 41 34*	Azimuth mark.
Horn, 1936.....	2, 409, 082. 80 245, 604. 20	229 25 00*	Azimuth mark.
Monocline, 1936.....	2, 519, 942. 59 219, 884. 01	48 23 23*	Azimuth mark.
Horse, 1936.....	2, 497, 056. 98 443, 534. 08	336 07 47*	Azimuth mark.
Notch, 1936.....	2, 502, 414. 04 399, 803. 80	358 36 53*	Azimuth mark.
Twin, 1936.....	2, 579, 057. 25 439, 001. 41	291 26 20*	Azimuth mark.
Bridger Jack, 1936.....	2, 529, 139. 00 477, 748. 35		
Hart, 1936.....	2, 602, 819. 99 492, 264. 72		
Bridger Jack azimuth mark, 1936 <sup>1</sup> .....	2, 531, 144. 14 477, 063. 32		
Blanding, 1936.....	2, 583, 662. 38 361, 659. 19	359 49 29*	Azimuth mark.
Recapture, 1936.....	2, 590, 307. 64 280, 272. 92	25 41 52*	Bench mark D-23.
Montezuma, 1936.....	2, 649, 919. 54 209, 703. 37	133 20 23*	Azimuth mark.
Lone square peak at south end of 50- mile range, 1936. <sup>1</sup>	2, 151, 279. 53 172, 159. 58		
Iron, 1936.....	2, 655, 001. 55 493, 168. 13	178 25 17*	Azimuth mark.
Ismay (Colo.), 1936.....	2, 713, 744. 98 261, 872. 96	80 52 33*	Azimuth mark.

<sup>1</sup> No check on this position.

\* This azimuth has been computed by means of the  $\epsilon$  correction. See page 58.

## EXPLANATION OF PLANE-COORDINATE PROJECTION TABLES

The State tables of plane coordinates are intended primarily for use in the reduction of geodetic positions to grid coordinates, and they were computed with that end in view. However, they serve another purpose, as they are needed in the computation of surveys on the grid coordinate system. The zone projection constants are frequently needed in the solution of special problems, while the scale factors are necessary if computations are to produce exact results through the elimination of variations in scale.

There are several ways in which the table of scales can be used on the Lambert grids. The factors are listed for every minute of latitude and the most rigid method of using them is to determine the mean latitude of each line of a survey and interpolate for this value. But in general we do not have the latitudes of the stations of a survey and hence we have no means of computing the latitude of the middle of a given line. If United States Geological Survey quadrangle maps for the region are available, a traverse can be plotted on them approximately by angles and distances, and then the latitudes of the middle points of the various lines can be scaled from the maps. This has been found to be very satisfactory in a general way. Unfortunately, these maps are not always available and for many sections of the country no such maps have yet been made.

With most traverses of ordinary length, it is sufficiently accurate to determine the mean latitude of the whole traverse. If the traverse runs from one geodetic control point to another, the latitudes of the control points will be known and from these a mean latitude of the whole traverse can be found. The scale factor for this mean latitude can then be adopted for the whole traverse. By noting how much change there is in the scale factor as given for the two control stations, one can judge whether this method will be satisfactory. Except where exact results are sought, this method will be satisfactory, unless the traverse is a very long one and covers a great distance in a north-south direction.

A third method of approximation can be employed in the following manner: If the computations of the grid coordinates for the control stations are available, a mean of the  $y''$  values for these control stations can be subtracted from the  $y$  coordinates of the various traverse stations to determine approximate  $y'$  values for those stations. A mean of these for the ends of each line of the traverse will give a mean approximate  $y'$  value for each line with which interpolation can be made in the  $y'$  table for a scale factor for the various lines. This method is not very acceptable for two reasons. In general the computations of the grid coordinates of the control stations will not be available, since only the coordinates of the same are given; and in the second place, a preliminary computation of the  $y$  coordinates for the various stations of the traverse would have to be made. Either a plotting of the traverse on a map or the adoption of a mean scale factor would seem to be the best solution of the question.

The scale factors are tabulated in two forms: First, as a correction to the final places of the logarithm of the length; and, second, as a ratio for direct multiplication. The logarithmic corrections are given in units of the seventh decimal place of logarithms, with tenths for the eighth place. These corrections are given the signs that must be used in applying them to the measured lengths reduced to sea level; that is,

they must be added algebraically with the sign as given to the logarithms of those lengths. The ratio form is used as a factor for multiplying the measured lengths. If one wishes to go from the grid length to the geodetic length, the logarithmic correction must be subtracted algebraically and the factor used as a divisor. This correction of a grid length gives a geodetic or sea-level length; a further correction for elevation must be applied to secure the ground-level length. In the computation of the traverse the measured length should be reduced to sea level before the grid factor is applied.

Reference should be made to Special Publication No. 193, Manual of Plane-Coordinate Computation, and to Special Publication No. 194, Manual of Traverse Computation on the Lambert Grid. These publications give full accounts of the use of the State tables and of the use of coordinates in computations.

**PLANE-COORDINATE PROJECTION TABLES**

**TABLE OF CONSTANTS**

Constant	Zone		
	Northern	Central	Southern
Standard parallel (south).....	40°43'	39°01'	37°13'
Standard parallel (north).....	41°47'	40°39'	38°21'
Central meridian.....	111°30'	111°30'	111°30'
<i>l</i> .....	0. 6593554910	0. 6405785926	0. 6126873424
log <i>l</i> .....	9. 8191196273-10	9. 8005724200-10	9. 7872389083-10
log <i>K</i> .....	7. 6037244351	7. 6069600206	7. 6204530156
<i>y</i> <sub>0</sub> .....feet..	334, 237. 64	546, 937. 67	400, 857. 53
log $\frac{1}{2 \rho_0^2 \sin 1''}$	0. 3724197-10	0. 3725936-10	0. 3727696-10

$$\text{Geodetic azimuth} - \text{grid azimuth} = +\theta - \frac{x_2 - x_1}{2 \rho_0^2 \sin 1''} \left( y_1 - y_0 + \frac{y_2 - y_1}{3} \right)$$

**NORTHERN ZONE**

*Table I*

Latitude	<i>R</i>	<i>y'</i> ( <i>y</i> value on the central meridian)	Tabular difference of <i>R</i> for 1 second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
	<i>Feet</i>	<i>Feet</i>	<i>Feet</i>		
40 20	24 229 110. 29	0. 00	101. 20300	+364. 5	1. 000 0839
21	24 223 038. 11	6 072. 18	300	344. 6	793
22	24 216 965. 93	12 144. 36	283	325. 2	749
23	24 210 893. 76	18 216. 53	267	306. 1	705
24	24 204 821. 60	24 288. 69	250	287. 3	662
25	24 198 749. 45	30 360. 84	233	269. 0	619
40 26	24 192 677. 31	36 432. 98	101. 20217	+250. 9	1. 000 0578
27	24 186 605. 18	42 505. 11	217	233. 3	537
28	24 180 533. 05	48 577. 24	217	216. 0	497
29	24 174 460. 92	54 649. 37	200	199. 0	458
30	24 168 388. 80	60 721. 49	183	182. 5	420
40 31	24 162 316. 69	66 793. 60	101. 20183	+166. 3	1. 000 0383
32	24 156 244. 58	72 865. 71	167	150. 4	346
33	24 150 172. 48	78 937. 81	167	134. 9	311
34	24 144 100. 38	85 009. 91	150	119. 8	276
35	24 138 028. 20	91 082. 00	167	105. 0	242

Table I—Continued

Latitude	<i>R</i>	<i>v'</i> ( <i>v</i> value on the central meridian)	Tabular difference of <i>R</i> for 1 second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
° ' "	Feet	Feet	Feet		
40 36	24 131 956.19	97 154.10	101.20150	+90.6	1.000 0209
37	24 125 844.10	103 266.19	150	76.6	176
38	24 119 812.01	109 298.28	150	62.9	145
39	24 113 739.92	115 370.37	150	49.6	114
40	24 107 667.83	121 442.46	150	36.7	084
40 41	24 101 595.74	127 514.55	101.20150	+24.1	1.000 0055
42	24 095 523.05	133 586.64	150	+11.8	027
43	24 089 451.56	139 658.73	150	0.0	1.000 0000
44	24 083 379.47	145 730.82	167	-11.5	0.999 9974
45	24 077 307.37	151 802.92	150	-22.6	948
40 46	24 071 235.28	157 875.01	101.20167	-33.4	0.999 9923
47	24 065 163.18	163 947.11	167	43.8	899
48	24 059 091.08	170 019.21	183	53.9	876
49	24 053 018.97	176 091.32	183	63.6	854
50	24 046 946.86	182 163.43	200	72.9	832
40 51	24 040 874.74	188 235.55	101.20200	-81.8	0.999 9812
52	24 034 802.62	194 307.67	217	90.4	792
53	24 028 730.49	200 379.80	217	98.7	773
54	24 022 658.36	206 451.93	233	106.5	755
55	24 016 586.22	212 524.07	250	114.0	738
40 56	24 010 514.07	218 596.22	101.20267	-121.2	0.999 9721
57	24 004 441.91	224 668.38	283	127.9	706
58	23 998 369.74	230 740.55	283	134.3	691
59	23 992 297.57	236 812.72	300	140.4	677
41 00	23 986 225.39	242 884.90	317	146.1	664
41 01	23 980 153.20	248 957.09	101.20350	-151.4	0.999 9651
02	23 974 080.99	255 029.30	367	156.3	640
03	23 968 008.77	261 101.52	383	160.9	630
04	23 961 936.54	267 173.75	400	165.1	620
05	23 955 864.30	273 245.99	417	169.0	611
41 06	23 949 792.05	279 318.24	101.20433	-172.5	0.999 9603
07	23 943 719.79	285 390.50	467	175.6	596
08	23 937 647.51	291 462.78	500	178.4	589
09	23 931 575.21	297 535.08	517	180.7	584
10	23 925 502.90	303 607.39	533	182.8	579
41 11	23 919 430.58	309 679.71	101.20507	-184.4	0.999 9575
12	23 913 358.24	315 752.05	600	185.7	572
13	23 907 285.88	321 824.41	617	186.7	570
14	23 901 213.51	327 896.78	650	187.2	569
15	23 895 141.12	333 969.17	667	187.4	568
41 16	23 889 068.72	340 041.57	101.20717	-187.3	0.999 9509
17	23 882 996.29	346 114.00	750	186.7	570
18	23 876 923.84	352 186.45	767	185.8	572
19	23 870 851.38	358 258.91	800	184.6	575
20	23 864 778.90	364 331.39	850	182.9	579
41 21	23 858 706.39	370 403.90	101.20867	-180.0	0.999 9583
22	23 852 633.87	376 476.42	917	178.6	589
23	23 846 561.32	382 548.97	950	175.8	595
24	23 840 488.75	388 621.54	20983	172.7	602
25	23 834 416.16	394 694.13	21017	169.3	610
41 26	23 828 343.55	400 766.74	101.21067	-165.4	0.999 9619
27	23 822 270.91	406 839.38	100	161.2	620
28	23 816 198.25	412 912.04	150	156.7	630
29	23 810 125.56	418 984.73	183	151.7	651
30	23 804 052.95	425 057.44	217	146.4	663
41 31	23 797 980.12	431 130.17	101.21283	-140.8	0.999 9676
32	23 791 907.35	437 202.94	317	134.7	690
33	23 785 834.56	443 275.73	350	128.3	705
34	23 779 761.75	449 348.54	417	121.6	720
35	23 773 688.90	455 421.39	450	114.4	737

Table I—Continued

Latitude	<i>R</i>	<i>y'</i> ( <i>y</i> value on the central meridian)	Tabular difference of <i>R</i> for 1 second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
41 36	<i>Feet</i> 23 767 616. 03	<i>Feet</i> 461 494. 26	<i>Feet</i> 101. 21500	-106. 9	0. 999 9754
37	23 761 643. 13	467 567. 16	550	99. 0	772
38	23 755 470. 20	473 640. 09	790	90. 8	791
39	23 749 397. 24	479 713. 05	650	82. 2	811
40	23 743 324. 25	485 786. 04	700	73. 2	831
41 41	23 737 251. 23	491 859. 06	101. 21750	-63. 8	0. 999 9853
42	23 731 178. 18	497 932. 11	800	54. 1	875
43	23 725 105. 10	504 005. 19	867	44. 0	899
44	23 719 031. 98	510 078. 31	900	33. 6	923
45	23 712 958. 84	516 151. 45	1983	22. 8	948
41 46	23 706 885. 05	522 224. 64	101. 22017	-11. 6	0. 999 9973
47	23 700 812. 44	528 297. 85	083	0. 0	1. 000 0000
48	23 694 739. 19	534 371. 10	133	+11. 9	027
49	23 688 665. 91	540 444. 38	200	24. 2	056
50	23 682 592. 69	546 517. 70	267	36. 9	085
41 51	23 676 519. 23	552 591. 06	101. 22317	+49. 9	1. 000 0115
52	23 670 445. 84	558 664. 45	383	63. 4	146
53	23 664 372. 41	564 737. 88	433	77. 1	178
54	23 658 298. 96	570 811. 34	617	91. 3	210
55	23 652 225. 44	576 884. 86	567	105. 8	244
41 56	23 646 151. 90	582 958. 39	101. 22633	+120. 7	1. 000 0278
57	23 640 078. 32	589 031. 97	700	136. 9	313
58	23 634 004. 70	595 105. 59	767	151. 6	349
59	23 627 931. 04	601 179. 25	850	167. 6	386
60	23 621 857. 33	607 252. 96	900	184. 0	424
42 01	23 615 783. 69	613 326. 70	101. 22967	+200. 7	1. 000 0462
02	23 609 709. 81	619 400. 48	3050	217. 8	502
03	23 603 635. 98	625 474. 31	117	235. 3	542
04	23 597 562. 11	631 548. 18	183	253. 1	583
05	23 591 488. 20	637 622. 09	267	271. 3	625
42 06	23 585 414. 24	643 696. 05	101. 23333	+289. 9	1. 000 0668
07	23 579 340. 24	649 770. 05	400	308. 9	711
08	23 573 266. 20	655 844. 09	483	328. 2	756
09	23 567 192. 11	661 918. 18	567	348. 0	801
10	23 561 117. 97	667 992. 32	667	368. 0	847
42 11	23 555 043. 77	674 066. 62	101. 23750	+388. 5	1. 000 0895
12	23 548 969. 52	680 140. 77	817	409. 3	942
13	23 542 895. 23	686 215. 06	883	430. 6	991
14	23 536 820. 90	692 289. 39	3950	452. 1	1041
15	23 530 746. 53	698 363. 76	4033	474. 0	091
42 16	23 524 672. 11	704 438. 18	101. 24100	+496. 3	1. 000 1143
17	23 518 597. 65	710 512. 64	183	519. 0	195
18	23 512 523. 14	716 587. 15	250	542. 0	248
19	23 506 448. 59	722 661. 70	333	565. 4	302
42 20	23 500 373. 99	728 736. 30		589. 2	357

Table II

[1" of longitude = 0".65935549 of  $\theta$ ]

Longitude		$\theta$	Longitude		$\theta$	Longitude		$\theta$
°	'	°	°	'	°	°	'	°
108	30	+1 58	109	36	+1 15	110	41	+0 32
	31	58		37	14		42	31
	32	57		38	13		43	30
	33	56		39	13		44	30
	34	56		40	12		45	29
	35	55						29
108	36	+1 54	109	41	+1 11	110	46	+0 29
	37	54		42	11		47	28
	38	54		43	10		48	27
	39	52		44	09		49	27
	40	52		45	09		50	26
108	41	+1 51	109	46	+1 08	110	51	+0 25
	42	50		47	07		52	25
	43	50		48	07		53	24
	44	49		49	06		54	23
	45	48		50	05		55	23
108	46	+1 48	109	51	+1 05	110	56	+0 22
	47	47		52	04		57	21
	48	46		53	03		58	21
	49	46		54	03		59	20
	50	45		55	02	111	00	19
108	51	+1 44	109	56	+1 01	111	01	+0 19
	52	44		57	01		02	18
	53	43		58	00		03	17
	54	42		59	1 00		04	17
	55	42	110	00	0 59		05	16
108	56	+1 41	110	01	+0 58	111	06	+0 15
	57	40		02	58		07	15
	58	40		03	57		08	14
	59	39		04	56		09	13
	00	38		05	56		10	13
109	01	+1 38	110	06	+0 55	111	11	+0 12
	02	37		07	54		12	11
	03	36		08	54		13	11
	04	36		09	53		14	10
	05	35		10	52		15	09
109	06	+1 34	110	11	+0 52	111	16	+0 09
	07	34		12	51		17	08
	08	33		13	50		18	07
	09	32		14	50		19	07
	10	32		15	49		20	06
109	11	+1 31	110	16	+0 48	111	21	+0 05
	12	30		17	48		22	05
	13	30		18	47		23	04
	14	29		19	46		24	03
	15	29		20	46		25	03
109	16	+1 28	110	21	+0 45	111	26	+0 02
	17	27		22	44		27	01
	18	27		23	44		28	01
	19	26		24	43		29	00
	20	25		25	42		30	00
109	21	+1 25	110	26	+0 42	111	31	-0 00
	22	24		27	41		32	01
	23	23		28	40		33	01
	24	23		29	40		34	02
	25	22		30	39		35	03
109	26	+1 21	110	31	+0 38	111	36	-0 03
	27	21		32	38		37	04
	28	20		33	37		38	05
	29	19		34	36		39	05
	30	19		35	36		40	06
109	31	+1 18	110	36	+0 35	111	41	-0 07
	32	17		37	34		42	07
	33	17		38	34		43	08
	34	16		39	33		44	09
	35	15		40	32		45	09

Table II—Continued

[1" of longitude=0".65935549 of  $\theta$ ]

Longitude			$\theta$			Longitude			$\theta$			Longitude			$\theta$		
°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"
111	46		-0	10	32.9813	112	41		-0	46	48.8544	113	36		-1	23	04.7275
	47			11	12.5426		42			47	28.4157		37			23	44.2888
	48			11	52.1039		43			48	07.9771		38			24	23.8502
	49			12	31.6553		44			48	47.5384		39			25	03.4115
	50			13	11.2266		45			49	27.0997		40			25	42.9728
111	51		-0	13	50.7879	112	46		-0	50	06.6610	113	41		-1	26	22.5342
	52			14	30.3492		47			50	46.2224		42			27	02.0955
	53			15	09.9106		48			51	25.7837		43			27	41.6568
	54			15	49.4719		49			52	05.3450		44			28	21.2181
	55			16	29.0332		50			52	44.9064		45			29	00.7795
111	56		-0	17	08.5946	112	51		-0	53	24.4677	113	46		-1	29	40.3408
	57			17	48.1659		52			54	04.0200		47			30	19.9021
	58			18	27.7172		53			54	43.5903		48			30	59.4635
	59			19	07.2785		54			55	23.1517		49			31	39.0248
112	00			19	46.8399		55			56	02.7130		50			32	18.5861
112	01		-0	20	26.4012	112	56		-0	56	42.2743	113	51		-1	32	68.1475
	02			21	05.9625		57			57	21.8367		52			33	37.7088
	03			21	45.6239		58			58	01.3970		53			34	17.2701
	04			22	25.0852		59			58	40.9583		54			34	50.8314
	05			23	04.6465	113	00			59	20.5197		55			35	36.3028
112	06		-0	23	44.2079	113	01		-1	00	00.0810	113	56		-1	36	15.9541
	07			24	23.7692		02			00	39.6423		57			36	55.5154
	08			25	03.3305		03			01	19.2036		58			37	35.0768
	09			25	42.8918		04			01	58.7650		59			38	14.6381
	10			26	22.4532		05			02	38.3263	114	00			38	54.1994
112	11		-0	27	02.0145	113	06		-1	03	17.8876	114	01		-1	39	33.7607
	12			27	41.5758		07			03	57.4490		02			40	13.3221
	13			28	21.1372		08			04	37.0103		03			40	52.8834
	14			29	00.6985		09			05	16.5716		04			41	32.4447
	15			29	40.2598		10			05	56.1329		05			42	12.0061
112	16		-0	30	19.8212	113	11		-1	06	35.0943	114	06		-1	42	51.5674
	17			30	59.3825		12			07	15.2556		07			43	31.1267
	18			31	38.9438		13			07	54.8169		08			44	10.6901
	19			32	18.5051		14			08	34.3783		09			44	50.2514
	20			32	58.0665		15			09	13.9398		10			45	29.8127
112	21		-0	33	37.6278	113	16		-1	09	53.5009	114	11		-1	46	09.3740
	22			34	17.1891		17			10	33.0623		12			46	48.9354
	23			34	56.7505		18			11	12.6236		13			47	28.4967
	24			35	36.3118		19			11	52.1849		14			48	08.0580
	25			36	15.8781		20			12	31.7462		15			48	47.6194
112	26		-0	36	55.4344	113	21		-1	13	11.3076	114	16		-1	49	27.1807
	27			37	34.9958		22			13	50.8689		17			50	00.7420
	28			38	14.5571		23			14	80.4302		18			50	46.3033
	29			38	54.1184		24			15	09.9916		19			51	25.8647
	30			39	33.6798		25			15	49.5529		20			52	05.4260
112	31		-0	40	13.2411	113	26		-1	16	29.1142	114	21		-1	52	44.0873
	32			40	52.8024		27			17	08.6755		22			53	24.5487
	33			41	32.3639		28			17	48.2369		23			54	04.1100
	34			42	11.9251		29			18	27.7982		24			54	43.0713
	35			42	51.4864		30			19	07.3595		25			55	23.2327
112	36		-0	43	31.0477	113	31		-1	19	46.9209	114	26		-1	56	02.7940
	37			44	10.6091		32			20	26.4822		27			56	42.3553
	38			44	50.1704		33			21	06.0435		28			57	21.9166
	39			45	29.7317		34			21	45.6049		29			58	01.4780
	40			46	09.2631		35			22	25.1662	114	30			58	41.0393

## U. S. COAST AND GEODETIC SURVEY

## CENTRAL ZONE

Table I

Latitude	R	$\nu'$ ( $\nu$ value on the central meridian)	Tabular difference of R for 1 second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
	<i>Feet</i>	<i>Feet</i>	<i>Feet</i>		
38 20	25 664 114.42	0.00	101.18333	+1 035.0	1.000 2383
21	25 658 043.42	6 071.00	283	002.6	309
22	25 651 972.45	12 141.97	233	970.5	235
23	25 645 901.51	18 212.91	200	938.8	162
24	25 639 830.59	24 283.83	167	907.4	089
25	25 633 759.69	30 354.73	100	876.4	2018
38 26	25 627 688.83	36 425.59	101.18067	+845.8	1.000 1948
27	25 621 617.99	42 496.43	8033	815.5	878
28	25 615 547.17	48 567.25	7983	785.6	809
29	25 609 476.38	54 638.04	950	756.0	741
30	25 603 405.61	60 708.81	917	726.8	674
38 31	25 597 334.86	66 779.56	101.17867	+698.0	1.000 1607
32	25 591 264.14	72 850.28	850	669.5	542
33	25 585 193.43	78 920.99	800	641.4	477
34	25 579 122.75	84 991.67	767	613.6	413
35	25 573 052.09	91 062.33	733	586.2	350
38 36	25 566 981.45	97 132.97	101.17700	+559.2	1.000 1288
37	25 560 910.83	103 203.59	650	532.5	226
38	25 554 840.24	109 274.18	633	506.1	165
39	25 548 769.66	115 344.76	617	480.2	106
40	25 542 699.09	121 415.33	567	454.6	1047
38 41	25 536 628.55	127 486.87	101.17550	+429.3	1.000 0988
42	25 530 558.02	133 556.40	517	404.4	931
43	25 524 487.51	139 626.91	483	379.9	875
44	25 518 417.02	145 697.40	467	355.7	819
45	25 512 346.54	151 767.88	433	331.9	764
38 46	25 506 276.08	157 838.34	101.17400	+308.5	1.000 0710
47	25 500 205.64	163 908.78	400	285.4	657
48	25 494 135.20	169 979.22	367	262.6	605
49	25 488 064.78	176 049.64	333	240.3	553
50	25 481 994.38	182 120.04	317	218.3	503
38 51	25 475 923.99	188 190.43	101.17300	+196.6	1.000 0453
52	25 469 853.61	194 260.81	283	175.3	404
53	25 463 783.24	200 331.18	250	154.4	356
54	25 457 712.89	206 401.53	250	133.8	308
55	25 451 642.54	212 471.88	217	113.6	262
38 56	25 445 572.21	218 542.21	101.17217	+93.7	1.000 0216
57	25 439 501.88	224 612.54	183	74.3	171
58	25 433 431.57	230 682.85	183	55.1	127
59	25 427 361.26	236 753.16	167	36.4	084
39 00	25 421 290.96	242 823.46	150	+18.0	041
39 01	25 415 220.67	248 893.75	101.17133	0.0	1.000 0000
02	25 409 150.39	254 964.03	133	-17.7	0.999 9959
03	25 403 080.11	261 034.31	117	35.0	919
04	25 397 009.84	267 104.58	100	52.0	880
05	25 390 939.58	273 174.84	100	68.6	842
39 06	25 384 869.32	279 245.10	101.17083	-84.8	0.999 9805
07	25 378 799.07	285 315.35	083	100.7	768
08	25 372 728.82	291 385.60	083	116.2	732
09	25 366 658.57	297 455.85	067	131.4	697
10	25 360 588.33	303 526.09	067	146.2	663
39 11	25 354 518.09	309 596.33	101.17050	-100.6	0.999 9630
12	25 348 447.86	315 666.56	067	174.6	598
13	25 342 377.62	321 736.80	050	188.3	566
14	25 336 307.39	327 807.03	067	201.7	536
15	25 330 237.15	333 877.27	050	214.6	506
39 16	25 324 166.92	339 947.50	101.17050	-227.2	0.999 9477
17	25 318 096.69	346 017.73	050	239.5	449
18	25 312 026.46	352 087.96	067	251.4	421
19	25 305 956.22	358 158.20	067	262.9	395
20	25 299 885.98	364 228.44	067	274.1	369

Table I—Continued

Latitude	R	$\gamma'$ ( $\gamma$ value on the central meridian)	Tabular difference of R for 1 second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
39 21	25 293 815. 74	370 268. 68	101. 17067	-284. 9	0. 999 9344
22	25 287 745. 50	376 368. 92	067	295. 3	320
23	25 281 075. 26	382 439. 10	083	305. 3	297
24	25 275 005. 01	388 509. 41	100	315. 1	274
25	25 269 534. 75	394 579. 67	083	324. 4	253
39 26	25 263 464. 50	400 649. 92	101. 17117	-333. 4	0. 999 9232
27	25 257 394. 23	406 720. 19	117	342. 0	213
28	25 251 323. 96	412 790. 46	117	350. 2	194
29	25 245 253. 69	418 860. 73	133	358. 1	175
30	25 239 183. 41	424 931. 01	150	365. 6	158
39 31	25 233 113. 12	431 001. 30	101. 17167	-372. 8	0. 999 9142
32	25 227 042. 82	437 071. 60	183	379. 6	126
33	25 220 972. 51	443 141. 91	200	386. 0	111
34	25 214 902. 19	449 212. 23	200	392. 1	097
35	25 208 831. 87	455 282. 55	217	397. 8	084
39 36	25 202 761. 54	461 352. 88	101. 17250	-403. 1	0. 999 9072
37	25 196 691. 19	467 423. 23	267	408. 1	060
38	25 190 620. 83	473 493. 59	267	412. 7	050
39	25 184 550. 47	479 563. 95	300	416. 9	040
40	25 178 480. 09	485 634. 33	317	420. 8	031
39 41	25 172 409. 70	491 704. 72	101. 17350	-424. 3	0. 999 9023
42	25 166 339. 29	497 775. 13	367	427. 4	016
43	25 160 268. 87	503 845. 55	383	430. 2	009
44	25 154 198. 44	509 915. 98	417	432. 6	9004
45	25 148 127. 99	515 986. 43	433	434. 7	8999
39 46	25 142 057. 53	522 056. 89	101. 17467	-436. 4	0. 999 8995
47	25 135 987. 05	528 127. 37	483	437. 7	992
48	25 129 916. 56	534 197. 86	517	438. 0	990
49	25 123 846. 05	540 268. 37	550	439. 2	989
50	25 117 775. 52	546 338. 90	583	439. 4	988
39 51	25 111 704. 97	552 409. 45	101. 17600	-439. 3	0. 999 8988
52	25 105 634. 41	558 480. 01	633	438. 8	990
53	25 099 563. 83	564 550. 59	667	437. 9	992
54	25 093 493. 23	570 621. 19	700	436. 6	995
55	25 087 422. 61	576 691. 81	750	435. 0	8998
39 56	25 081 351. 96	582 762. 46	101. 17767	-433. 0	0. 999 9003
57	25 075 281. 30	588 833. 12	800	430. 7	008
58	25 069 210. 62	594 903. 80	850	428. 0	014
59	25 063 139. 91	600 974. 51	867	424. 9	022
40 00	25 057 069. 19	607 045. 23	917	421. 5	029
40 01	25 050 998. 44	613 115. 98	101. 17967	-417. 7	0. 999 9038
02	25 044 927. 06	619 186. 76	7983	413. 5	049
03	25 038 856. 87	625 257. 55	8033	408. 9	058
04	25 032 786. 05	631 328. 37	083	404. 0	070
05	25 026 715. 20	637 399. 22	117	398. 7	082
40 06	25 020 644. 33	643 470. 09	101. 18167	-393. 1	0. 999 9095
07	25 014 573. 43	649 540. 99	200	387. 1	109
08	25 008 502. 61	655 611. 91	250	380. 7	123
09	25 002 431. 56	661 682. 80	300	373. 9	139
10	24 996 360. 58	667 753. 84	350	366. 8	155
40 11	24 990 289. 57	673 824. 85	101. 18383	-359. 3	0. 999 9173
12	24 984 218. 54	679 895. 88	450	351. 5	191
13	24 978 147. 47	685 966. 95	483	343. 3	210
14	24 972 076. 38	692 038. 04	533	334. 7	229
15	24 966 005. 26	698 109. 10	600	325. 7	250
40 16	24 959 934. 10	704 180. 32	101. 18633	-316. 4	0. 999 9271
17	24 953 862. 92	710 251. 50	700	306. 7	294
18	24 947 791. 70	716 322. 72	750	296. 6	317
19	24 941 720. 45	722 393. 97	800	286. 2	341
20	24 935 649. 17	728 465. 25	850	275. 4	366
40 21	24 929 577. 86	734 536. 50	101. 18917	-294. 2	0. 999 9392
22	24 923 506. 61	740 607. 91	8967	252. 7	418
23	24 917 435. 13	746 679. 29	9633	240. 8	446
24	24 911 363. 71	752 750. 71	083	228. 5	474
25	24 905 292. 26	758 822. 16	133	215. 8	503

Table I—Continued

Latitude	<i>R</i>	<i>y'</i> ( <i>y</i> value on the central meridian)	Tabular difference of <i>R</i> for 1 second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
40 26	24 899 220.78	764 893.64	101.19217	-202.8	0.999 9533
27	24 893 140.25	770 965.17	267	189.4	504
28	24 887 077.69	777 036.73	333	175.7	595
29	24 881 006.09	783 108.33	383	161.6	628
30	24 874 934.46	789 179.96	450	147.1	661
40 31	24 868 862.79	795 251.63	101.19533	-132.2	0.999 9696
32	24 862 791.07	801 323.35	583	117.0	731
33	24 856 719.32	807 395.10	650	101.4	767
34	24 850 647.53	813 466.89	717	85.4	803
35	24 844 575.70	819 538.72	783	69.1	841
40 36	24 838 503.83	825 610.59	101.19867	-52.4	0.999 9879
37	24 832 431.91	831 682.51	19917	35.3	919
38	24 826 359.96	837 754.43	26000	-17.8	0.999 9959
39	24 820 287.96	843 826.46	967	0.0	1.000 0000
40	24 814 215.92	849 898.50	150	+18.2	042
40 41	24 808 143.83	855 970.59	101.20200	+36.8	1.000 0085
42	24 802 071.71	862 042.71	300	55.7	128
43	24 795 999.53	868 114.89	367	75.0	173
44	24 789 927.31	874 187.11	433	94.7	218
45	24 783 855.05	880 259.37	517	114.7	264
40 46	24 777 782.74	886 331.68	101.20600	+135.1	1.000 0311
47	24 771 710.38	892 404.04	667	155.9	359
48	24 765 637.98	898 476.44	750	177.1	408
49	24 759 565.53	904 548.89	833	198.6	457
50	24 753 493.03	910 621.39	917	220.6	508
40 51	24 747 420.48	916 693.94	101.21000	+242.8	1.000 0559
52	24 741 347.88	922 766.54	967	265.6	611
53	24 735 275.24	928 839.18	167	288.5	664
54	24 729 202.54	934 911.88	250	311.8	718
55	24 723 129.79	940 984.63	333	335.6	773
40 56	24 717 056.99	947 057.43	101.21417	+359.7	1.000 0828
57	24 710 984.14	953 130.28	500	384.3	825
58	24 704 911.24	959 203.18	600	409.1	0942
59	24 698 838.28	965 276.14	683	434.4	1000
41 00	24 692 765.27	971 349.15	767	460.0	059
41 01	24 686 692.21	977 422.21	101.21867	+486.0	1.000 1119
02	24 680 619.09	983 495.33	1950	512.4	180
03	24 674 545.92	989 568.50	2050	539.1	241
04	24 668 472.69	995 641.73	150	566.2	304
05	24 662 399.40	1 001 715.02	217	593.7	367
41 06	24 656 326.07	1 007 788.35	101.22333	+621.6	1.000 1431
07	24 650 252.67	1 013 861.75	433	649.8	498
08	24 644 179.21	1 019 935.21	517	678.4	562
09	24 638 105.70	1 026 008.72	617	707.4	629
10	24 632 032.13	1 032 082.29		736.7	696



Table II—Continued

[1" of longitude=C".65935549 of  $\theta$ ]

Longitude			$\theta$			Longitude			$\theta$			Longitude			$\theta$			
°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	
110	21		+0	44	11.9954	111	26		+0	02	33.7389	112	31		-0	39	04.5177	
	22			43	33.6007		27			01	55.3041		32			39	42.9524	
	23			42	55.1259		28			01	16.8094		33			40	21.3871	
	24			42	16.0912		29			00	38.4347		34			40	59.8218	
	25			41	38.2565		30			0	00.0000		35			41	38.2565	
110	26		+0	40	59.8218	111	31		-0	00	38.4347	112	36		-0	42	16.0912	
	27			40	21.3871		32			01	16.8094		37			42	55.1259	
	28			39	42.9524		33			01	55.3041		38			43	33.6007	
	29			39	04.5177		34			02	33.7389		39			44	11.9954	
	30			38	26.0829		35			03	12.1736		40			44	50.4301	
110	31		+0	37	47.6482	111	36		-0	03	50.6063	112	41		-0	45	28.8048	
	32			37	09.2135		37			04	29.0430		42			40	07.2995	
	33			36	20.7788		38			05	07.4777		43			46	45.7342	
	34			35	52.3441		39			05	45.9124		44			47	24.1090	
	35			35	13.9094		40			06	24.3472		45			48	02.6037	
110	36		+0	34	35.4746	111	41		-0	07	02.7819	112	46		-0	48	41.0384	
	37			33	57.0399		42			07	41.2166		47			49	19.4731	
	38			33	18.6052		43			08	19.6613		48			49	57.9078	
	39			32	40.1705		44			08	58.0890		49			50	36.3425	
	40			32	01.7358		45			09	36.5207		50			51	14.7772	
110	41		+0	31	23.3011	111	46		-0	10	14.9554	112	51		-0	51	53.2120	
	42			30	44.8663		47			10	53.3902		52			52	31.6467	
	43			30	06.4316		48			11	31.8249		53			53	10.0814	
	44			29	27.9969		49			12	10.2596		54			53	48.5161	
	45			28	49.5622		50			12	48.6943		55			54	26.9508	
110	46		+0	28	11.1275	111	51		-0	13	27.1290	112	56		-0	55	05.3855	
	47			27	32.6928		52			14	05.5637		57			55	43.8203	
	48			26	54.2581		53			14	43.9985		58			56	22.2550	
	49			26	15.8233		54			15	22.4332		59			57	00.6897	
	50			25	37.3886		55			16	00.8679		113	00		57	39.1244	
110	51		+0	24	58.9539	111	56		-0	16	39.3026	113	01		-0	58	17.5591	
	52			24	20.5192		57			17	17.7373		02			58	55.9938	
	53			23	42.0845		58			17	56.1720		03			-0	59	34.4286
	54			23	03.6498		59			18	34.6068		04			-1	00	12.8633
	55			22	25.2150	112	00			19	13.0415		05			00	51.2980	
110	56		+0	21	46.7803	112	01		-0	19	51.4762	113	06		-1	01	29.7327	
	57			21	08.3456		02			20	29.9109		07			02	08.1674	
	58			20	29.9109		03			21	08.3456		08			02	46.6021	
	59			19	51.4762		04			21	46.7803		09			03	25.0368	
	00			19	13.0415		05			22	25.2150		10			04	03.4716	
111	01		+0	18	34.6068	112	06		-0	23	03.6498	113	11		-1	04	41.9063	
	02			17	56.1720		07			23	42.0845		12			05	20.3410	
	03			17	17.7373		08			24	20.5192		13			05	58.7757	
	04			16	39.3026		09			24	55.9539		14			06	37.2104	
	05			16	00.8679		10			25	37.3886		15			07	15.6451	
111	06		+0	15	22.4332	112	11		-0	26	15.8233	113	16		-1	07	54.0799	
	07			14	43.9985		12			26	54.2581		17			08	32.5146	
	08			14	05.5637		13			27	32.6928		18			09	10.9493	
	09			13	27.1290		14			28	11.1275		19			09	49.3849	
	10			12	48.6943		15			28	49.5622		20			10	27.8187	
111	11		+0	12	10.2596	112	16		-0	29	27.9969	113	21		-1	11	00.2534	
	12			11	31.8249		17			30	06.4316		22			11	44.6881	
	13			10	53.3902		18			30	44.8663		23			12	23.1229	
	14			10	14.9554		19			31	23.3011		24			13	01.5576	
	15			09	36.5207		20			32	01.7358		25			13	39.9923	
111	16		+0	08	58.0890	112	21		-0	32	40.1705	113	26		-1	14	18.4270	
	17			08	19.6513		22			33	18.6052		27			14	56.8617	
	18			07	41.2166		23			33	57.0399		28			15	35.2964	
	19			07	02.7819		24			34	35.4746		29			16	13.7312	
	20			06	24.3472		25			35	13.9094		30			16	52.1659	
111	21		+0	05	45.9124	112	26		-0	35	52.3441	113	31		-1	17	30.6006	
	22			05	07.4777		27			36	30.7788		32			18	09.0353	
	23			04	29.0430		28			37	09.2135		33			18	47.4700	
	24			03	50.6083		29			37	47.6482		34			19	25.9047	
	25			03	12.1736		30			38	26.0829		35			20	04.3394	



U. S. COAST AND GEODETIC SURVEY

SOUTHERN ZONE

Table I

Latitude	R	y' (y value on the central meridian)	Tabular difference of R for 1 second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
° ' "	Feet	Feet	Feet		
36 40	27 432 812.88	0.00	101.14450	+608.6	1.000 1397
41	27 428 744.21	6 068.67	433	582.4	341
42	27 420 675.65	12 137.33	400	558.6	286
43	27 414 606.91	18 205.97	367	535.2	232
44	27 408 538.29	24 274.59	350	512.1	179
45	27 402 469.68	30 343.20	317	489.4	127
36 46	27 398 401.09	36 411.79	101.14300	+467.0	1.000 1075
47	27 390 332.51	42 480.37	283	445.0	1025
48	27 384 263.94	48 548.94	267	423.4	0976
49	27 378 195.38	54 617.50	233	402.1	926
50	27 372 126.84	60 686.04	217	381.2	878
36 51	27 366 058.31	66 754.57	101.14200	+380.6	1.000 0830
52	27 359 989.79	72 823.09	183	340.4	784
53	27 353 921.28	78 891.60	167	320.6	738
54	27 347 852.78	84 960.10	160	301.1	693
55	27 341 784.29	91 028.59	133	282.0	649
36 56	27 335 715.81	97 097.07	101.14117	+263.3	1.000 0606
57	27 329 647.34	103 165.54	100	244.9	564
58	27 323 578.88	109 234.00	100	226.9	522
59	27 317 510.42	115 302.46	083	209.2	482
37 00	27 311 441.97	121 370.91	067	191.9	442
37 01	27 305 373.53	127 439.35	101.14067	+175.0	1.000 0403
02	27 299 305.09	133 507.79	060	168.4	365
03	27 293 236.66	139 576.22	033	142.2	327
04	27 287 168.24	145 644.64	033	126.3	291
05	27 281 099.82	151 713.06	033	110.8	255
37 06	27 275 031.40	157 781.48	101.14017	+95.7	1.000 0220
07	27 268 962.99	163 849.89	017	80.9	186
08	27 262 894.58	169 918.30	017	60.5	153
09	27 256 826.17	175 986.71	000	52.5	121
10	27 250 757.77	182 055.11	000	38.8	089
37 11	27 244 689.37	188 123.51	101.14017	+25.5	1.000 0059
12	27 238 620.96	194 191.92	000	+12.5	029
13	27 232 552.56	200 260.32	000	0.0	1.000 0000
14	27 226 484.16	206 328.72	000	-12.3	0.999 9972
15	27 220 415.76	212 397.12	000	-24.1	945
37 16	27 214 347.36	218 465.52	101.14017	-35.6	0.999 9918
17	27 208 278.95	224 533.93	000	46.8	892
18	27 202 210.55	230 602.33	017	57.6	867
19	27 196 142.14	236 670.74	033	68.0	843
20	27 190 073.72	242 739.16	017	78.0	820
37 21	27 184 005.31	248 807.57	101.14033	-87.7	0.999 9798
22	27 177 936.89	254 875.99	033	97.0	777
23	27 171 868.47	260 944.41	067	106.0	756
24	27 165 800.03	267 012.85	050	114.0	736
25	27 159 731.60	273 081.28	067	122.8	717
37 26	27 153 663.16	279 149.72	101.14083	-130.0	0.999 9699
27	27 147 594.71	285 218.17	083	139.1	682
28	27 141 526.26	291 286.62	117	145.3	665
29	27 135 457.79	297 355.09	117	152.0	650
30	27 129 389.32	303 423.56	117	158.4	635
37 31	27 123 320.85	309 492.03	101.14150	-164.5	0.999 9621
32	27 117 252.36	315 560.52	167	170.2	608
33	27 111 183.86	321 629.02	183	175.5	596
34	27 105 115.35	327 697.53	200	180.4	585
35	27 099 046.83	333 766.05	217	185.0	574
37 36	27 092 978.30	339 834.58	101.14233	-189.2	0.999 9564
37	27 086 909.76	345 903.12	250	193.1	555
38	27 080 841.21	351 971.67	283	196.6	547
39	27 074 772.64	358 040.24	300	199.7	540
40	27 068 704.06	364 108.82	333	202.5	534

Table I—Continued

Latitude	R	<i>r'</i> ( <i>y</i> value on the central meridian)	Tabular difference of <i>R</i> for 1 second of latitude	Scale correction expressed in units of the seventh place of logarithms	Scale correction expressed as a ratio
° ' "	Feet	Feet	Feet		
37 41	27 062 635.46	370 177.42	101.14350	-204.9	0.999 9528
42	27 056 566.85	376 246.03	367	206.9	524
43	27 050 498.23	382 314.65	400	208.5	520
44	27 044 429.60	388 383.29	417	209.9	517
45	27 038 360.94	394 451.94	450	210.8	515
37 46	27 032 292.27	400 520.61	101.14483	-211.3	0.999 9513
47	27 026 223.68	406 589.30	600	211.5	513
48	27 020 154.88	412 658.00	550	211.4	513
49	27 014 086.15	418 726.73	567	210.8	515
50	27 008 017.41	424 795.47	600	209.9	517
37 51	27 001 948.65	430 864.23	101.14633	-208.7	0.999 9519
52	26 995 879.87	436 933.01	367	207.0	523
53	26 989 811.07	443 001.81	700	205.0	528
54	26 983 742.26	449 070.63	733	202.7	533
55	26 977 673.41	455 139.47	767	199.9	540
37 56	26 971 604.55	461 208.33	101.14800	-196.8	0.999 9547
57	26 965 535.67	467 277.21	350	193.4	555
58	26 959 466.70	473 346.12	383	189.0	563
59	26 953 397.83	479 415.05	933	185.4	573
38 00	26 947 328.87	485 484.01	4950	180.8	584
38 01	26 941 259.90	491 552.98	101.15000	-175.9	0.999 9595
02	26 935 190.90	497 621.98	050	170.6	607
03	26 929 121.87	503 691.01	100	164.9	620
04	26 923 052.81	509 760.07	133	158.9	634
05	26 916 983.73	515 829.15	167	152.5	649
38 06	26 910 914.63	521 898.25	101.15217	-145.7	0.999 9665
07	26 904 845.50	527 967.38	267	138.0	681
08	26 898 776.34	534 036.54	317	131.1	698
09	26 892 707.15	540 105.73	367	123.2	716
10	26 886 637.93	546 174.95	417	116.0	735
38 11	26 880 568.68	552 244.20	101.15450	-106.4	0.999 9755
12	26 874 499.41	558 313.47	517	97.4	776
13	26 868 430.10	564 382.78	567	88.0	797
14	26 862 360.76	570 452.12	617	78.3	820
15	26 856 291.39	576 521.49	667	68.2	843
38 16	26 850 221.90	582 590.89	101.15717	-57.8	0.999 9867
17	26 844 152.60	588 660.32	767	47.0	892
18	26 838 083.10	594 729.78	833	36.8	918
19	26 832 013.60	600 799.28	900	24.2	944
20	26 825 944.00	606 868.82	5960	-12.3	0.999 9972
38 21	26 819 874.49	612 938.39	101.16000	0.0	1.000 0000
22	26 813 804.89	619 007.99	067	+12.6	0.999 9929
23	26 807 735.25	625 077.63	117	25.7	0.999 9959
24	26 801 665.58	631 147.30	183	39.1	0.999 9990
25	26 795 595.87	637 217.01	250	52.8	0.999 9992
38 26	26 789 526.12	643 286.76	101.16300	+67.0	1.000 0154
27	26 783 456.34	649 356.54	367	81.5	188
28	26 777 386.62	655 426.36	433	96.3	222
29	26 771 316.66	661 496.22	517	111.6	257
30	26 765 246.75	667 566.13	607	127.2	293
38 31	26 759 176.81	673 636.07	101.16633	+143.2	1.000 0330
32	26 753 106.83	679 706.05	700	159.5	367
33	26 747 036.81	685 776.07	767	176.2	406
34	26 740 966.75	691 846.13	850	193.3	445
35	26 734 896.64	697 916.24	900	210.8	485
38 36	26 728 826.50	703 986.38	101.16983	+228.0	1.000 0526
37	26 722 756.31	710 056.57	7050	246.8	568
38	26 716 686.08	716 126.80	117	265.4	611
39	26 710 615.81	722 197.07	200	284.4	655
40	26 704 545.49	728 267.39	283	303.7	699
38 41	26 698 475.12	734 337.76	101.17350	+323.3	1.000 0744
42	26 692 404.71	740 408.17	417	343.4	791
43	26 686 334.26	746 478.62	517	363.8	838
44	26 680 263.75	752 549.13	583	384.0	880
45	26 674 193.20	758 619.68	650	405.8	934
38 46	26 668 122.61	764 690.27	101.17750	+427.3	1.000 0984
47	26 662 051.96	770 760.92	817	449.2	1034
48	26 655 981.27	776 831.61	900	471.5	086
49	26 649 910.53	782 902.35	983	494.2	138
50	26 643 839.74	788 973.14		517.2	191

Table II

[1'' of longitude=0''.61268734 of  $\theta$ ]

Longitude			$\theta$			Longitude			$\theta$			Longitude			$\theta$		
°	'	''	°	'	''	°	'	''	°	'	''	°	'	''	°	'	''
107	25		+2	30	06.5039	108	31		+1	49	40.2620	109	36		+1	09	50.7814
26				20	29.7427	32				40	03.6008	37				09	14.0202
27				28	52.0814	33				48	26.7396	38				08	37.2589
28				28	16.2202	34				47	49.9783	39				08	00.4977
29				27	39.4590	35				47	13.2171	40				07	23.7365
30				27	02.6977												
107	31		+2	26	25.9365	108	36		+1	46	36.4558	109	41		+1	08	46.9752
32				25	49.1752	37				45	59.6946	42				06	10.2140
33				25	12.4140	38				45	22.9334	43				05	33.4627
34				24	35.6528	39				44	46.1721	44				04	56.6915
35				23	58.8915	40				44	09.4109	45				04	19.9303
107	36		+2	23	22.1303	108	41		+1	43	32.6497	109	46		+1	03	43.1690
37				22	45.3690	42				42	55.8884	47				03	06.4078
38				22	08.6078	43				42	19.1272	48				02	29.6465
39				21	31.8466	44				41	42.3659	49				01	52.8853
40				20	55.0853	45				41	05.6047	50				01	16.1241
107	41		+2	20	18.3241	108	46		+1	40	28.8434	109	51		+1	00	39.3628
42				19	41.5628	47				39	52.0822	52			+1	00	02.6016
43				19	04.8016	48				39	15.3210	53			+0	59	25.8403
44				18	28.0404	49				38	38.5597	54				58	49.0791
45				17	51.2791	50				38	01.7085	55				58	12.3170
107	46		+2	17	14.5179	108	51		+1	37	25.0372	109	56		+0	57	35.5567
47				16	37.7566	52				36	48.2760	57				56	56.7854
48				16	00.9954	53				36	11.5148	58				56	22.0341
49				15	24.2342	54				35	34.7535	59				55	45.2729
50				14	47.4720	55				34	57.9923	110	00			55	08.5116
107	51		+2	14	10.7117	108	56		+1	34	21.2310	110	01		+0	54	31.7604
52				13	33.9504	57				33	44.4698	02				53	54.9892
53				12	57.1892	58				33	07.7086	03				53	18.2279
54				12	20.4270	59				32	30.9473	04				52	41.4667
55				11	43.0667	109	00			31	54.1861	05				52	04.7054
107	56		+2	11	06.9055	109	01		+1	31	17.4248	110	06		+0	51	27.9442
57				10	30.1442	02				30	40.6636	07				50	51.1830
58				09	53.3830	03				30	03.9024	08				50	14.4217
59				09	16.6217	04				29	27.1411	09				49	37.6605
108	00			08	39.8605	05				28	50.3799	10				49	00.8992
108	01		+2	08	03.0993	109	06		+1	28	13.6186	110	11		+0	48	24.1380
02				07	26.3380	07				27	36.8574	12				47	47.3768
03				06	49.5768	08				27	00.9962	13				47	10.6155
04				06	12.8155	09				26	23.3349	14				46	33.8543
05				05	36.0543	10				25	46.5737	15				45	57.0930
108	06		+2	04	59.2931	109	11		+1	25	09.8124	110	16		+0	45	20.3318
07				04	22.5318	12				24	33.0512	17				44	43.5706
08				03	45.7706	13				23	56.2900	18				44	06.8093
09				03	09.0093	14				23	19.5287	19				43	30.0481
10				02	32.2481	15			+1	22	42.7675	20				42	53.2868
108	11		+2	01	55.4869	109	16		+1	22	06.0662	110	21		+0	42	16.5256
12				01	18.7250	17				21	29.2450	22				41	39.7644
13				00	41.9644	18				20	52.4838	23				41	03.0031
14				00	05.2031	19				20	15.7225	24				40	26.2419
15			+1	59	28.4419	20				19	38.9613	25				39	49.4806
108	16		+1	58	51.5807	109	21		+1	19	02.2000	110	26		+0	39	12.7194
17				58	14.9194	22				18	25.4388	27				38	35.9582
18				57	38.1582	23				17	48.6776	28				37	59.1989
19				57	01.3969	24				17	11.9163	29				37	22.4357
20				56	24.6357	25				16	35.1551	30				36	45.6744
108	21		+1	55	47.8745	109	26		+1	15	58.3938	110	31		+0	36	08.9132
22				55	11.1132	27				15	21.6260	32				35	32.1520
23				54	34.3520	28				14	44.8713	33				34	55.3907
24				53	57.5907	29				14	08.1101	34				34	18.6295
25				53	20.8295	30				13	31.3489	35				33	41.8682
108	27		+1	52	44.0683	109	31		+1	12	54.5870	110	36		+0	33	06.1070
27				52	07.3070	32				12	17.8264	37				32	28.3458
28				51	30.5458	33				11	41.0651	38				31	51.5845
29				50	53.7845	34				11	04.3039	39				31	14.8233
30				50	17.0233	35				10	27.5427	40				30	38.0620

Table II—Continued

[1" of longitude=0".61288734 of  $\theta$ ]

Longitude		$\theta$	Longitude		$\theta$	Longitude		$\theta$	
°	'	°	'	°	'	°	'	°	'
110	41	+0	30	01.3008	111	46	-0	00	48.1700
	42		29	24.5395		47		10	24.9411
	43		28	47.7783		48		11	01.7023
	44		28	11.0171		49		11	38.4836
	45		27	34.2558		50		12	15.2248
110	46	+0	26	57.4946	111	51	-0	12	51.9801
	47		26	20.7334		52		13	28.7473
	48		25	43.9721		53		14	05.5085
	49		25	07.2109		54		14	42.2698
	50		24	30.4496		55		15	10.0310
110	51	+0	23	53.8884	111	56	-0	15	55.7923
	52		23	16.9271		57		16	32.5535
	53		22	40.1659		58		17	00.3147
	54		22	03.4047		59		17	46.0700
	55		21	28.0434		00		18	22.8372
110	56	+0	20	49.8822	112	01	-0	18	50.5085
	57		20	13.1210		02		18	36.3587
	58		19	36.3597		03		20	13.1210
	59		18	59.5985		04		20	49.8822
	00		18	22.8372		05		21	26.0434
111	01	+0	17	46.0760	112	06	-0	22	03.4047
	02		17	09.3147		07		22	40.1659
	03		16	32.5535		08		23	16.9271
	04		15	55.7923		09		23	53.8884
	05		15	19.0310		10		24	30.4496
111	06	+0	14	42.2698	112	11	-0	25	07.2109
	07		14	05.5085		12		25	43.9721
	08		13	28.7473		13		26	20.7334
	09		12	51.9861		14		26	57.4946
	10		12	15.2248		15		27	34.2558
111	11	+0	11	38.4636	112	16	-0	28	11.0171
	12		11	01.7023		17		28	47.7783
	13		10	24.9411		18		29	24.5395
	14		09	48.1799		19		30	01.3008
	15		09	11.4186		20		30	38.0620
111	16	+0	08	34.6574	112	21	-0	31	14.8233
	17		07	57.8961		22		31	51.5845
	18		07	21.1349		23		32	28.3458
	19		06	44.3737		24		33	05.1070
	20		06	07.6124		25		33	41.8692
111	21	+0	05	30.8512	112	26	-0	34	18.0295
	22		04	54.0899		27		34	55.3007
	23		04	17.3287		28		35	32.1520
	24		03	40.5674		29		36	08.9132
	25		03	03.8062		30		36	45.6744
111	26	+0	02	27.0450	112	31	-0	37	22.4357
	27		01	50.2837		32		37	59.1969
	28		01	13.5225		33		38	35.9582
	29		00	36.7612		34		39	12.7194
	30		0	00.0000		35		39	49.4806
111	31	-0	00	36.7612	112	36	-0	40	26.2419
	32		01	13.5225		37		41	03.0031
	33		01	50.2837		38		41	39.7644
	34		02	27.0450		39		42	16.5256
	35		03	03.8062		40		42	53.2868
111	36	-0	03	40.5674	112	41	-0	43	30.0481
	37		04	17.3287		42		44	06.8003
	38		04	54.0899		43		44	43.5706
	39		05	30.8512		44		45	20.3318
	40		06	07.6124		45		45	57.0930
111	41	-0	06	44.3737	112	46	-0	46	33.8543
	42		07	21.1349		47		47	10.6155
	43		07	57.8961		48		47	47.3708
	44		08	34.6574		49		48	24.1380
	45		09	11.4186		50		49	00.8992
112	51	-0	49	37.0605	112	51	-0	12	51.9801
	52		50	14.4217		52		13	28.7473
	53		50	51.1830		53		14	05.5085
	54		51	27.9442		54		14	42.2698
	55		52	04.7054		55		15	10.0310
112	56	-0	52	41.4667	112	56	-0	52	41.4667
	57		53	18.2279		57		53	18.2279
	58		53	54.9892		58		53	54.9892
	59		54	31.7504		59		54	31.7504
	00		55	08.5116		00		55	08.5116
113	01	-0	55	45.2729	113	01	-0	55	45.2729
	02		56	22.0341		02		56	22.0341
	03		56	58.7954		03		56	58.7954
	04		57	35.5507		04		57	35.5507
	05		58	12.3179		05		58	12.3179
113	06	-0	58	49.0701	113	06	-0	58	49.0701
	07		59	25.8403		07		59	25.8403
	08		00	02.6016		08		00	02.6016
	09		00	39.3628		09		00	39.3628
	10		01	16.1241		10		01	16.1241
113	11	-1	01	52.8853	113	11	-1	01	52.8853
	12		02	29.6405		12		02	29.6405
	13		03	06.4078		13		03	06.4078
	14		03	43.1690		14		03	43.1690
	15		04	19.9303		15		04	19.9303
113	16	-1	04	56.6915	113	16	-1	04	56.6915
	17		05	33.4527		17		05	33.4527
	18		06	10.2140		18		06	10.2140
	19		00	46.9752		19		00	46.9752
	20		07	23.7365		20		07	23.7365
113	21	-1	08	00.4977	113	21	-1	08	00.4977
	22		08	37.2589		22		08	37.2589
	23		09	14.0202		23		09	14.0202
	24		09	50.7814		24		09	50.7814
	25		10	27.5427		25		10	27.5427
113	26	-1	11	04.3039	113	26	-1	11	04.3039
	27		11	41.0651		27		11	41.0651
	28		12	17.8264		28		12	17.8264
	29		12	54.5876		29		12	54.5876
	30		13	31.3489		30		13	31.3489
113	31	-1	14	08.1101	113	31	-1	14	08.1101
	32		14	44.8713		32		14	44.8713
	33		15	21.6320		33		15	21.6320
	34		15	58.3038		34		15	58.3038
	35		16	35.1551		35		16	35.1551
113	36	-1	17	11.9163	113	36	-1	17	11.9163
	37		17	48.6776		37		17	48.6776
	38		18	25.4388		38		18	25.4388
	39		19	02.2000		39		19	02.2000
	40		19	38.9613		40		19	38.9613
113	41	-1	20	15.7225	113	41	-1	20	15.7225
	42		20	52.4838		42		20	52.4838
	43		21	29.2450		43		21	29.2450
	44		22	06.0062		44		22	06.0062
	45		22	42.7675		45		22	42.7675
113	46	-1	23	19.5287	113	46	-1	23	19.5287
	47		23	56.2900		47		23	56.2900
	48		24	33.0512		48		24	33.0512
	49		25	09.8124		49		25	09.8124
	50		25	46.5737		50		25	46.5737
113	51	-1	26	23.3349	113	51	-1	26	23.3349
	52		27	00.0962		52		27	00.0962
	53		27	36.8574		53		27	36.8574
	54		28	13.6186		54		28	13.6186
	55		28	60.3799		55		28	60.3799

Table II—Continued

[1" of longitude=0".61268734 of  $\theta$ ]

Longitude			$\theta$			Longitude			$\theta$			Longitude			$\theta$		
o	'	''	o	'	''	o	'	''	o	'	''	o	'	''	o	'	''
113	56		-1	29	27.1411	114	29		-1	49	40.2620	115	03		-2	10	30.1442
	57			30	03.9024		30			50	17.0233		04			11	06.9055
	58			30	40.6636								05			11	43.6807
	59			31	17.4248	114	31		-1	50	53.7845	115	06		-2	12	20.4279
114	00			31	54.1861		32			51	30.5458		07			12	57.1892
	01		-1	32	30.9473		33			52	07.3070		08			13	33.9504
	02			33	07.7086		34			52	44.0883		09			14	10.7117
	03			33	44.4698		35			53	20.8295		10			14	47.4729
	04			34	21.2310	114	36		-1	53	57.5907	115	11		-2	15	24.2342
	05			34	57.9923		37			54	34.3520		12			16	00.9954
	06		-1	35	34.7535		38			55	11.1132		13			16	37.7568
	07			36	11.5148		39			55	47.8745		14			17	14.5179
	08			36	48.2760		40			56	24.6357		15			17	51.2791
	09			37	25.0372	114	41		-1	57	01.3069	115	16		-2	18	28.0404
	10			38	01.7985		42			57	38.1582		17			19	04.8016
	11		-1	38	38.5507		43			58	14.9194		18			19	41.5628
	12			39	15.3210		44			58	51.6807		19			20	18.3241
	13			39	52.0822		45			59	28.4419		20			20	55.0853
	14			40	28.8434	114	46		-2	00	05.2031	115	21		-2	21	31.8466
	15			41	05.0947		47			00	41.9944		22			22	08.6078
	16		-1	41	42.3659		48			01	18.7256		23			22	45.3690
	17			42	19.1272		49			01	55.4869		24			23	22.1303
	18			42	55.8884		50			02	32.2481		25			23	58.8915
	19			43	32.0497	114	51		-2	03	09.0093	115	26		-2	24	35.6528
	20			44	09.4109		52			03	45.7706		27			25	12.4140
	21		-1	44	46.1721		53			04	22.5318		28			25	49.1752
	22			45	22.9334		54			04	59.2931		29			26	25.9365
	23			45	59.6940		55			05	36.0543		30			27	02.6977
	24			46	36.4558	114	56		-2	06	12.8155	115	31		-2	27	39.4590
	25			47	13.2171		57			06	49.5768		32			28	16.2202
	26		-1	47	49.9783		58			07	26.3380		33			28	52.9814
	27			48	26.7396		59			08	03.0093		34			29	29.7427
114	28			49	03.5008	115	00			08	39.8605	115	35		-2	30	06.5039
						115	01		-2	09	16.6217						
							02			09	53.3830						

## ELEVATIONS

The elevations given in the tables are referred to mean sea level. The stations are divided into three classes: First, those fixed directly by first-order leveling, as determined by the 1929 adjustment of the first-order level net, and subject to a probable error of  $\pm 0.1$  meter; second, the stations in the main scheme fixed by reciprocal measures of vertical angles, and subject to probable errors varying from  $\pm 0.1$  to  $\pm 1.5$  meters, the accuracy of each elevation depending mainly upon remoteness of that station from a station whose elevation is given in class 1; and third, the intersection stations, the elevations of which are fixed by nonreciprocal measures of vertical angles, and subject to a probable error which may amount to as much as  $\pm 3$  meters.

The elevations of classes 2 and 3 have not been computed on the 1929 adjusted level net. The values given in this publication for class 3 have been rounded off to even meters.

TABLES OF ELEVATIONS

Thirty-ninth parallel arc

Station	Point to which elevation refers	Elevation	
<i>Class 1</i>			
Ogden longitude.....	Top of east pier.....	<i>Meters</i> 1,332.074	<i>Feet</i> 4,370.31
Salt Lake northwest base.....	Station mark.....	1,289.488	4,230.60
Salt Lake southeast base.....	do.....	1,283.953	4,212.44
<i>Class 2</i>			
Treasury Mountain (Colo.).....	Station mark.....	4,097.1	13,442
Uncompahgre (Colo.).....	do.....	4,354.5	14,286
Mount Wans.....	do.....	3,752.3	12,311
Tavaputs (Colo.).....	do.....	2,677.8	8,785
Mesa (Colo.).....	do.....	3,046.0	9,993
Patmos Head.....	do.....	2,990.5	9,841
Mount Ellen.....	do.....	3,490.9	11,473
Wasatch.....	do.....	3,303.3	11,133
Mount Nebo.....	do.....	3,618.2	11,871
Tushar.....	do.....	3,697.8	12,132
Wheeler Peak (Nev.).....	do.....	3,076.7	10,047
Ibepah.....	do.....	3,684.3	12,088
Ploche (Nev.).....	do.....	2,675.8	8,779
Diamond Peak (Nev.).....	do.....	3,238.9	10,626
White Pine (Nev.).....	do.....	3,434.6	11,268
Deseret.....	do.....	3,362.2	11,031
Pilot Peak (Nev.).....	do.....	3,262.5	10,704
Ogden Peak.....	do.....	2,918.4	9,575
Antelope.....	do.....	2,010.3	6,595
Waddoup.....	do.....	1,302.4	4,273
Promontory.....	do.....	2,008.5	6,590
Oxford (Idaho).....	do.....	2,828.8	9,281
Cache (Idaho).....	do.....	3,151.7	10,340
Chiquita (Colo.).....	do.....	2,603.7	8,542
Scipio.....	do.....	2,062.4	6,779
City Creek.....	do.....	1,876.4	6,156
<i>Class 3</i>			
San Rafael Knob <sup>1</sup> .....	Ground at station.....	2,418	7,933
Sanpete.....	do.....	3,377	11,079
Mooseneh.....	do.....	3,348	10,984
Mount Alice.....	do.....	3,636	11,931
Salt Creek, cairn.....	do.....	3,045	9,990
Monroe <sup>1</sup> .....	do.....	3,418	11,214
Lone Tree, cairn.....	Tangent to summit.....	3,068	10,066
Dolano, cairn <sup>1</sup> .....	Ground at station.....	3,707	12,162
South Scipio, cairn <sup>1</sup> .....	do.....	2,814	9,232
Beaver.....	Top of signal.....	3,679	12,070
Frisco Mount, tree.....	Top of peak.....	2,947	9,669
Antelope Mountain or Swasey Peak.....	do.....	2,950	9,678
Knotch Peak or Sawtooth Mountain.....	do.....	2,943	9,655
Indian Peak.....	do.....	2,982	9,783
Mount Moriah, cairn (Nev.).....	do.....	3,673	12,050
White Rock (Nev.).....	Stone monument.....	2,714	8,904
Ploche Peak, monument (Nev.) <sup>1</sup> .....	Signal.....	2,220	7,303
Highland Peak, summit (Nev.) <sup>1</sup> .....	Top of peak.....	2,844	9,331
Mount Grafton, summit (Nev.).....	do.....	3,348	10,984
Ward, small cairn (Nev.).....	do.....	3,331	10,928
Duckwater, cairn (Nev.).....	do.....	3,503	11,493
Mount Hamilton (Nev.).....	do.....	3,274	10,741
Granite Peak <sup>1</sup> .....	do.....	2,981	9,780
Springville Peak, monument.....	do.....	3,369	11,053
Horriman.....	Ground at station.....	3,226	10,584
Draper.....	Top of peak.....	2,840	9,318
Lone Peak, needle.....	Ground at station.....	3,430	11,253
Onaqui.....	do.....	2,787	9,144
Oquirrh.....	do.....	2,854	9,363
Salt Lake City Temple, east spire.....	Center of figure Gabriel.....	1,385	4,544

<sup>1</sup> No check on this elevation.

## Thirty-ninth parallel arc—Continued

Station	Point to which elevation refers	Elevation	
		Meters	Feet
<i>Class 3—Continued</i>			
Bountiful Peak or Francis Peak, cairn.....	Base of cairn.....	2,890	9,482
Francis Peak.....	Top of peak.....	2,824	9,295
Fremont Island, cairn.....	do.....	1,622	4,993
Desert Peak, cairn.....	do.....	2,129	6,985
South Promontory, cairn.....	Base of peak.....	2,167	7,077
North Ogden Peak.....	Ground at station.....	2,962	9,718

## Forest Area

<i>Class 2</i>			
Monroe 2.....	Top of ground.....	3,418.5	11,216
Mount Marvine.....	do.....	3,535.4	11,599
Thousand Lake Mountain.....	do.....	3,442.7	11,295
<i>Class 3</i>			
South Tent.....	do.....	3,439	11,283
Indianola.....	do.....	2,670	8,780
Wasatch 2.....	do.....	3,393	11,132
Mount Catherine.....	do.....	3,073	10,082
Musinia.....	do.....	3,349	10,988
Black Cap.....	do.....	2,012	6,601
Mount Baldy.....	Top of tripod.....	2,756	9,042
U. S. Forest Service no. 21.....	Top of ground.....	1,873	6,145
U. S. Forest Service no. 1.....	do.....	2,061	6,762
U. S. Forest Service no. 8.....	do.....	2,840	9,318
U. S. Forest Service no. M 3.....	do.....	2,518	8,261
U. S. Forest Service no. 9.....	do.....	2,502	8,209
Marys Nipple (U. S. Forest Service).....	do.....	2,582	8,471
U. S. Forest Service no. M 2.....	do.....	2,751	9,026
U. S. Forest Service no. 10.....	do.....	2,288	7,507
U. S. Forest Service no. M 7.....	do.....	2,609	8,232
Marysvale Peak (U. S. F. S.).....	Top of ground.....	3,280	10,761
Flat.....	Top of pole.....	3,036	9,961
U. S. Forest Service no. M 1.....	Top of ground.....	2,440	8,005
Mahuston Peak (U. S. Forest Service no. 12).....	do.....	2,962	9,783
City Creek Peak (U. S. Forest Service no. M 4).....	do.....	3,402	11,161
Circleville Mountain (U. S. Forest Service no. 11).....	do.....	3,437	11,276
Delano Peak (U. S. Forest Service no. M 5).....	do.....	3,709	12,169
C. H. 2 (Horseshoe).....	do.....	3,348	10,984
U. S. Forest Service no. 6.....	do.....	3,117	10,226
Red Pyramid (Beehive) (U. S. F. S.).....	do.....	2,753	9,032
U. S. Forest Service no. 5.....	do.....	3,051	10,010
U. S. Forest Service no. 3.....	do.....	2,627	8,619
U. S. Forest Service no. 2.....	do.....	2,391	7,844
U. S. Forest Service no. M 11.....	do.....	1,654	5,426
U. S. Forest Service no. M 9.....	do.....	2,748	9,016
U. S. Forest Service no. M 10.....	do.....	2,086	6,812
Flagstaff (U. S. F. S.).....	do.....	3,113	10,213
Stevens 20.....	do.....	2,573	8,442
U. S. Forest Service no. 20.....	do.....	2,544	8,346
Monroe Peak (U. S. Forest Service no. 13).....	do.....	3,422	11,227
U. S. Forest Service no. M 8.....	do.....	2,792	9,160
U. S. Forest Service no. 8.....	do.....	2,840	9,318
Mount Terrill (U. S. F. S.).....	do.....	3,514	11,529

*Thirty-ninth parallel to Needles, Calif., arc.*

Station	Point to which elevation refers	Elevation	
		Meters	Feet
<i>Class 1</i>			
Lund, B. M. Q 8	Top of station mark	1,549.714	5,084.35
Lund U. S. B. M.	do.	1,548.690	5,080.99
<i>Class 2</i>			
Lund	Top of ground	1,548.7	5,081
Brian	do.	3,443.9	11,299
Burger	do.	3,147.0	10,325
Hayford (Nev.)	do.	3,023.7	9,920
Mormon (Nev.)	do.	1,593.4	5,228
Moapa (Nev.)	do.	507.6	1,665
Virgin (Nev.)	do.	2,457.9	8,064

*One-hundred-and-eighth meridian arc.*

<i>Class 2</i>			
Kinney (Wyo.)	Top of mark	2,485.0	8,153
Brown (U. S. G. S.) (Wyo.)	do.	2,732.2	8,964
Middle (Colo.)	do.	2,913.7	9,559
Zenobia (Colo.)	do.	2,748.6	9,018
Lena (U. S. G. S.)	do.	2,977.3	9,768
Blue	do.	2,552.1	8,373
Little	do.	2,600.2	8,531
Rabbit (Colo.)	do.	2,319.7	7,611
Cone	do.	1,622.4	5,323
Book (Colo.)	do.	2,576.7	8,454
Range	do.	2,990.8	9,812
Ucolwy; G. L. O. Station 1, Utah; G. L. O. Station 1, Colo.; G. L. O. Station 28, Wyo. (Utah-Colo.-Wyo.)	do.	2,505.2	8,416
G. L. O. Station 3 (Colo.)	do.	2,119.5	6,954
G. L. O. Station 2	do.	2,025.6	6,646
Utah-Colorado boundary milepost 224, G. L. O. Station 4, Utah; G. L. O. Sta- tion 4 Colo. (Utah-Colo.)	do.	1,701.2	5,581
G. L. O. Station 5, eccentric (Colo.)	do.	1,868.1	6,129
G. L. O. Station 6	do.	1,358.5	4,457
G. L. O. Station 5 (Colo.)	do.	1,961.5	6,435
<i>Class 3</i>			
G. L. O. Station 29, eccentric (Wyo.)	do.	2,195	7,201

**DESCRIPTIONS OF TRIANGULATION STATIONS**

The following descriptions of stations may be conveniently consulted by reference to the illustrations at the end of this publication or to the index. All azimuths given in the descriptions are reckoned continuously from true south around by west to 360°, south being 0°, west 90°, 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 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 chief of party by whom the station was established, the date of the establishment of the station, and the date when the station was last recovered.

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, United States Coast and Geodetic Survey, Washington, D. C.

#### MARKING OF STATIONS

The standard disk station and reference marks referred to in the following descriptions and notes consist of a disk and shank of brass cast in one piece, as shown in figure 4. The disk of the station mark is 90 millimeters in diameter, with a hole at the center surrounded by a 20-millimeter equilateral triangle, and has the following inscribed legend: "U. S. Coast and Geodetic Survey Triangulation Station. For information write to the Superintendent, Washington, D. C. \$250 fine or imprisonment for disturbing this mark." On the marks made since March 1921 the word "Director" replaces the word "Superintendent" in the inscription. The shank is 25 millimeters in diameter and 80 millimeters long, with a slit at the lower end into which a wedge is inserted, so that when it is driven into a drill hole in the rock it will bulge at the bottom and hold the mark firmly in place. The marks used between about 1915 and 1920 have grooves cut around the shank instead of the slit.

The standard disk reference mark, shown in figure 4, is the same size and shape as the newer type of station mark, described above, but instead of a triangle it has an arrow at the center of the disk, which, when the mark is properly set, points to the station. The legend is the same as for the station mark except that the words "reference mark" take the place of the words "triangulation station."

The standard disk azimuth mark, referred to on page 19, is not shown in figure 4. It is the same as the reference mark described above except that the words "azimuth mark" take the place of the words "reference mark" in the inscribed legend.

The standard notes on the marking of stations which are given below serve as a guide to the field observer in selecting the best type of mark for each particular station. They are also useful to the observer in writing his descriptions, as he need not describe the marking used at a station but simply give the numbers of the standard notes which describe the station, underground, reference, and witness marks. The notes are made as general as possible in order that it might not be necessary in the field to describe small and unimportant details.

For the convenience of the reader a brief description of the marking is given in each of the following descriptions of stations. In addition, the number of the note describing the mark in detail is also given.

#### STANDARD NOTES ON THE MARKING OF STATIONS

##### *Surface marks*

*Note 1.*—A standard disk triangulation station mark 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 disk triangulation station mark 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.

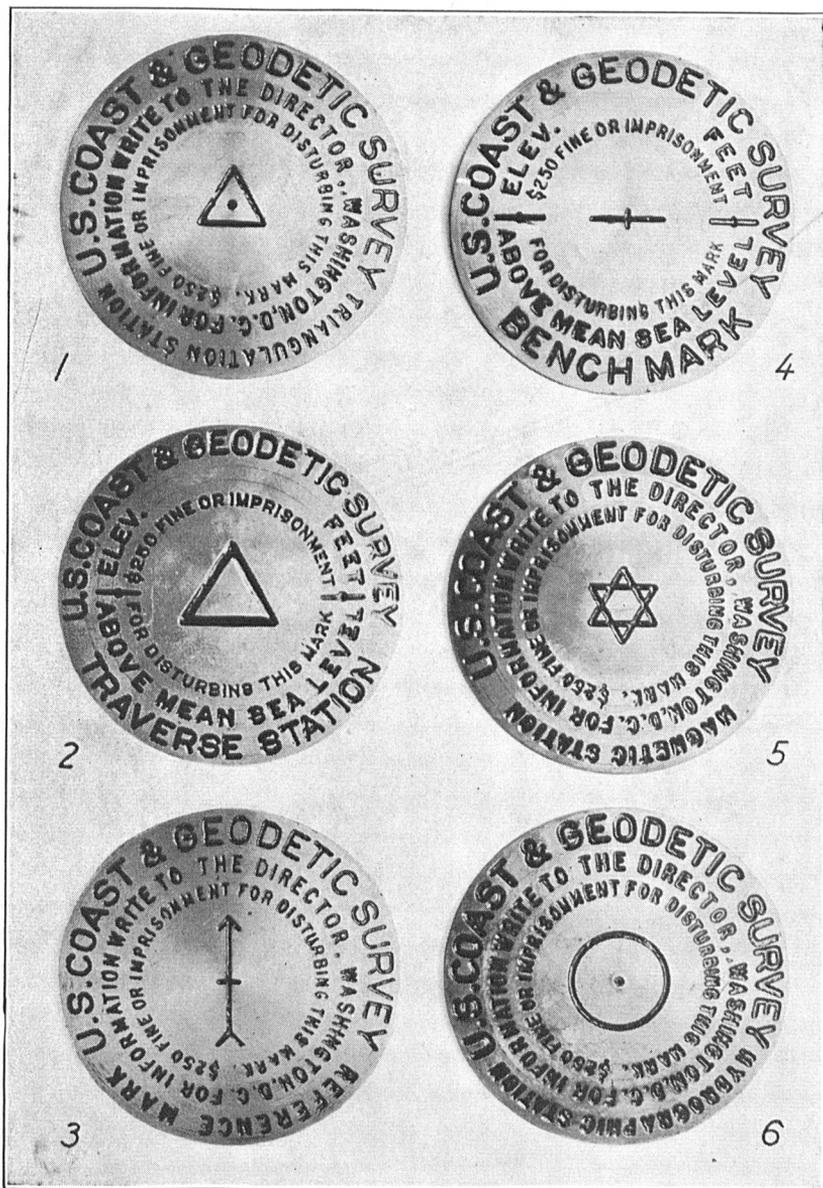


Figure 4.—Standard marks of the U. S. Coast and Geodetic Survey.

1. Triangulation station mark.
2. Traverse station mark.
3. Reference mark.

4. Bench mark.
5. Magnetic station mark.
6. Hydrographic station mark.

*Note 3.*—A standard disk triangulation station mark set in concrete in a depression in outcropping bedrock.

*Note 4.*—A standard disk triangulation station mark wedged in a drill hole in a boulder.

*Note 5.*—A standard disk triangulation station mark set in concrete in a depression in a boulder.

*Note 6.*—A standard disk triangulation station mark 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 disk triangulation station mark, (*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.

*Note 8.*—In bedrock (*a*) a standard disk triangulation station mark 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 boulder 3 feet below the ground (*a*) a standard disk triangulation station mark 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 a horizontal position with a drill hole in its upper surface.

#### *Reference marks*<sup>1</sup>

*Note 11.*—A standard disk reference mark 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 disk reference mark 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 boulder, (*d*) set in concrete in a depression in a boulder.

*Note 13.*—A standard disk reference mark 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.

### THIRTY-NINTH PARALLEL ARC

#### *Principal points*

**Treasury Mountain** (Gunnison County, Colo., W. Eimbeck, 1893).—On the summit of Treasury Mountain, a prominent peak in the Elk Mountain Range, about 2 miles southeast of the mining town of Crystal. The station is marked by a copper bolt set in a drill hole in the solid surface rock. It is also marked, 6 inches above the bolt, by a drill hole filled with plaster of paris in a brick embedded in a layer of masonry built between the bases of the three small brick piers used in mounting the instrument. The station is nearly surrounded by a ring wall of rocks 4 feet high with an inner diameter of 10 feet. Four reference marks, each

<sup>1</sup> These notes also apply to methods of setting azimuth marks, for which standard reference disks suitably stamped were first used, but for which, on later arcs, disks were used on which an appropriate legend was cast. (See p. 100.)

consisting of a drill hole in a surface rock, are just outside the wall at the following distances and azimuths from the station: 2.31 meters (7.6 feet),  $267^{\circ}10'$ ; 2.25 meters (7.4 feet),  $351^{\circ}25'$ ; 2.39 meters (7.8 feet),  $81^{\circ}45'$ ; and 2.39 meters (7.8 feet),  $177^{\circ}20'$ . Treasury Mountain latitude station, marked by a brick pier, is 31.13 meters (102.1 feet) from the station in azimuth  $327^{\circ}43'$ .

**Uncompahgre** (Hinsdale County, Colo., W. Eimbeck, 1895).—On the summit of Uncompahgre Peak, one of the most prominent and best known peaks in southwestern Colorado, about 8 miles northwest of Lake City. The station is within about 10 feet of the perpendicular cliff on the north side of the summit. It is marked by a cross in a copper bolt which is leaded in a drill hole in the solid surface rock. The station is also marked, 4 inches above the copper bolt, by a drill hole in a brick embedded in a layer of concrete which connects the bases of three small brick piers used for mounting the instrument. The station is nearly surrounded by a ring wall of rocks 4 feet high with an inner diameter of 11 feet. Four reference marks, each consisting of a drill hole in a rock filled with lead, are at the following distances and azimuths from the station: 2.48 meters (8.1 feet),  $3^{\circ}36'$ ; 2.85 meters (9.4 feet),  $89^{\circ}58'$ ; 2.65 meters (8.7 feet),  $179^{\circ}49'$ ; and 2.87 meters (9.4 feet),  $269^{\circ}56'$ . Uncompahgre latitude station, marked by a brick pier with a concrete foundation, is 15.275 meters (50.11 feet) from the station in azimuth  $305^{\circ}55'$ .

**Mount Waas** (Grand County, W. Eimbeck, 1893; 1934).—About 20 miles east of Moab, in La Sal National Forest, on highest point of Mount Waas (third prominent peak from north end of La Sal Mountains). To reach from Moab, go north on U. S. Route 450 to Colorado River bridge, turn right and go 15.5 miles up south side of river, turn right and go 9.5 miles to Castleton, continue straight ahead (east) 8.9 miles on main-traveled road up mountain to log cabin on east side of road, continue past cabin 1.8 miles, turn right and cross bridge, follow dim road 4.0 miles to end of truck travel, go west up side of mountain to north of Mount Waas, follow ridge and ascend peak from northwest side to station site. Originally marked by cross cut in copper bolt which was leaded into drill hole in rock between bases of three small brick piers used for mounting instrument. Station was reoccupied (probably by U. S. Geological Survey) prior to 1931, and concrete block was placed between the three piers. In 1931, station was re-marked by standard station disk. Original reference marks were probably drill holes in rock, at following distances and azimuths from station: 2.24 meters (7.3 feet),  $3^{\circ}58'$ ; 2.29 meters (7.5 feet),  $104^{\circ}19'$ ; 2.18 meters (7.2 feet),  $186^{\circ}37'$ ; and 2.21 meters (7.3 feet),  $275^{\circ}45'$ . Mount Waas astronomic station (concrete pier) was 28.213 meters (92.56 feet) from station in azimuth  $329^{\circ}$ . In 1934 a reference mark described as reference mark no. 2 was recovered (origin unknown) 28.658 meters (94.02 feet) from station in azimuth  $342^{\circ}59'$ . Azimuth from station to Mount Peale (cairn) is  $14^{\circ}10'50''$ .

**Tavaputs** (Garfield County, Colo., W. Eimbeck, 1891; 1934).—About 3 miles southeast of West Salt Wash,  $\frac{3}{4}$  mile west of Bitter Creek, and on southern edge of Book Mountains, which consist of low flat ridges sparsely covered with pine and aspen trees. To reach from Dragon, Utah, go south 6.6 miles along railroad tracks to a fork at fence corner, take right fork and go 1.7 miles to cattle guard and gate (150 yards left of group of ranch buildings), pass through gate and continue south 2.9 miles along canyon to log cabin on right side of road, continue south 0.5 mile to deserted mine buildings and gate, pass through gate and continue south 1.6 miles to another gate (left of small patch of cultivated ground and group of buildings), pass through gate and continue south 2.3 miles to another gate, pass through gate and proceed 0.4 mile to road fork at crest of small ridge (right fork goes to station *Book*), follow left fork 0.4 mile to corral, follow road around corral and go 0.6 mile to fork that is split by creek at bottom of canyon, follow right fork 1.5 miles to log cabin at intersection of three canyons (left fork leads to Baxter Pass), follow trail up canyon which runs in easterly direction (about 20 minutes) to long grassy draw at intersection of two canyons (deserted cabin and spring in this draw), take right-hand canyon and follow trail up east slope to its head, proceed east to crest of mountain, and follow crest to station site. Originally marked by cross in copper bolt leaded in drill hole in solid surface rock. Four inches above bolt was drill hole in brick embedded in layer of concrete which connected the bases of three small brick piers used for mounting instrument. Station is nearly surrounded by ring wall of rocks 4 feet high with an inner diameter of 11 feet. In 1931 copper bolt at center was replaced with standard station disk. Original reference marks consist of drill holes in rocks filled with lead at following distances and azimuths from station: 2.43 meters (8.0 feet),  $74^{\circ}41'$ ; 2.40 meters

(7.9 feet),  $196^{\circ}31'$ ; and 2.43 meters (8.0 feet),  $322^{\circ}12'$ . Reference mark no. 1 (1931) is probably standard reference disk, 223.13 meters (726.6 feet) from station in azimuth  $9^{\circ}21'08''$ . Reference mark no. 2 (1931) is new type mark set on copper shaft, in azimuth  $117^{\circ}20'00''$  from station. Following azimuths are from station: Highest point in La Sal Range,  $9^{\circ}53'05''$ ; sharp bluff,  $70^{\circ}02'46''$ ; and sharp bluff (west end of Grand Mesa),  $314^{\circ}45'30''$ .

**Mesa** (Mesa County, Colo., W. Eimbeck, 1893; 1934).—About 25 miles east-southeast of Grand Junction, 12 miles north-northwest of Delta, 2 miles east of west boundary of Grand Mesa National Forest, in sec. 24, T. 13 S., R. 97 W., slightly north of western part of Grand Mesa which is southeast of Kannah Creek, and about 35 feet from edge of rim rock of mesa. To reach from Mesa, go 12.7 miles on State Route 65 to Mesa Lakes Resort, continue 3.4 miles to point where road leads off to right and sign "Landsend 11 miles", turn right and go 1.1 miles to point where dim road leads off to left and down across creek, turn left and go southwest 4.8 miles along cow path to Sheep Creek Reservoir, pass through gate in log fence and go around southeast end of reservoir, follow dim trail northwest 2.6 miles to Kramers Reservoir, and go southwest 3.8 miles to rim and station site. Originally marked by copper bolt set in solid lava rock, and by drill hole in brick embedded in masonry which fills space between bases of three small brick piers used to support instrument. In 1931 station was re-marked by standard station disk, and large tripod was reported to be standing over station. Reference marks are standard reference disks. No. 1 is 194.96 meters (639.6 feet) from station in azimuth  $26^{\circ}50'53''$ . No. 2 is 2.23 meters (7.3 feet) from station in azimuth  $299^{\circ}31'$ .

**Patmos Head** (Carbon County, W. Eimbeck, 1890; 1934).—On Patmos Head (peak on south end of range of mountains known as West Tavaputs Plateau, and highest point within several miles), about  $9\frac{1}{2}$  miles by trail or  $4\frac{1}{2}$  miles airline southeast of Sunnyside, 4.0 miles south by west of Utah Fuel Co.'s pumping station, and about 3.0 miles west of Range Creek. To reach from Sunnyside, follow trail up Number Two Canyon to saddle, and follow right fork (trail) along ridge about  $4\frac{1}{2}$  miles to station. In 1890, station was marked by copper bolt in rock embedded in the ground, and about 8 inches above bolt by drill hole in another rock which is cemented to lower one. Three small piers used for mounting the instrument were about the station, and the whole was surrounded by a ring wall of rocks  $3\frac{1}{2}$  feet high with an inner diameter of 11 feet. Four reference marks were outside wall at following distances and azimuths from station: Drill hole in rock, 2.59 meters (8.5 feet),  $233^{\circ}16'$ ; drill hole in rock, 2.62 meters (8.6 feet),  $327^{\circ}07'$ ; copper bolt in rock, 3.45 meters (11.3 feet)  $343^{\circ}16'$ ; and stump, 3.35 meters (11.0 feet),  $90^{\circ}06'$ . Patmos Head astronomic station (rectangular pier of brick and stone masonry  $2\frac{1}{2}$  feet high) is 56.76 meters (186.2 feet) from station in azimuth  $190^{\circ}12'$ . In 1931, station was re-marked by standard station disk set in drill hole in boulder, note 4, about 5 inches below surface of ground. New reference marks were also set. No. 1 is standard reference disk set in drill hole in flat-topped rock, flush with surface of ground, and 2.62 meters (8.6 feet) from station in azimuth  $325^{\circ}34'$ . No. 2 is standard reference disk set in drill hole in small stone, flush with surface of ground, and 15.15 meters (49.7 feet) from station in azimuth  $60^{\circ}12'$ . Ring wall is torn down and stones scattered (1931).

**Mount Ellen** (Garfield County, W. Eimbeck, 1891; 1934).—On summit of Mount Ellen, the northernmost peak of Henry Mountains, and on barren conical peak the upper part of which is covered with rough broken pieces of granite rock. To reach from Richfield, follow Richfield to Hanksville Highway (State Route 24) 100 miles to Noton ranch, proceed south 3.5 miles, take left fork and follow main road 19.8 miles to King's ranch, proceed on wagon road and trail to Durfey's homestead cabin which is on western slope of mountain, and then follow trail northeast about 3 miles up ridge to summit of Mount Ellen and station. Marked by copper bolt in rock embedded in concrete. A few inches above bolt is drill hole in another rock set between bases of three small brick piers used for supporting the instrument. In 1891 station was nearly surrounded by ring wall of rocks  $2\frac{1}{2}$  feet thick and  $4\frac{1}{2}$  feet high, with inner diameter of 11 feet and outer diameter of 16 feet, remains of which were reported in evidence in 1934. Three reference marks (1891), each consisting of a drill hole about  $\frac{1}{8}$  inch in diameter and 2 inches deep filled with plaster of paris in solid surface rock, are just outside ring wall at following distances and azimuths from station: 2.41 meters (7.9 feet),  $23^{\circ}35'$ ; 2.44 meters (8.0 feet),  $144^{\circ}45'$ ; and 2.39 meters (7.8 feet),  $263^{\circ}34'$ . In 1934 two standard reference disks were established in bedrock according to note 12a. No. 1 is 5.690 meters (18.67 feet) from station in azimuth  $141^{\circ}50'$ . No. 2 is 7.310 meters (23.98 feet) from station in azimuth  $292^{\circ}36'$ . Mount Ellen astronomic

station, marked by brick pier, is 15.02 meters (49.3 feet) from station in azimuth  $5^{\circ}20'$ .

**Wasatch** (Sanpete County, W. Eimbeck, 1890).—On a small peak or table near the southern end of the Wasatch Mountain range, the highest point of this part of the range, and between the South Fork of Ferron Creek to the north and the North Fork of Muddy Creek to the south, the sources of both creeks being within short distances of the station. The station is marked by two copper bolts in a drill hole in a limestone rock, the lower bolt being leaded and the upper one cemented in the hole. About the station are three small brick piers used in mounting the instrument, and the whole is surrounded by a ring wall of rocks 4 feet high with an inner diameter of  $11\frac{1}{2}$  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),  $32^{\circ}12'$ ; 2.33 meters (7.6 feet),  $91^{\circ}39'$ ; 2.51 meters (8.2 feet),  $164^{\circ}26'$ ; and 2.33 meters (7.6 feet),  $305^{\circ}39'$ . Wasatch astronomic station, marked by a brick pier, is 121.0 meters (397 feet) from the station in azimuth  $218^{\circ}41'$ .

**Mount Nebo** (Juab County, W. Eimbeck, 1887; 1919).—On the southernmost summit of Mount Nebo. A trail from Willow Creek ranger station up the old Rock Quarry railroad grade and on up a wooded ridge passes to the left of north basin. The station is marked by a copper bolt in a drill hole in 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 a drill hole in the rock, are just outside the wall at the following distances and azimuths from the station: 2.56 meters (8.40 feet),  $38^{\circ}01'$ ; 2.66 meters (8.73 feet),  $121^{\circ}28'$ ; 4.25 meters (13.94 feet),  $204^{\circ}16'$ ; and 3.32 meters (10.89 feet),  $309^{\circ}39'$ . Two standard disk reference marks are at the following distances and azimuths from the station: 2.280 meters (7.48 feet),  $22^{\circ}29'$ ; and 1.756 meters (5.79 feet),  $160^{\circ}06'$ . Mount Nebo astronomic station, marked by a brick pier, is 23.25 meters (76.3 feet) from the station in azimuth  $321^{\circ}35'$ . The vertical-circle station is 4.60 meters (15.1 feet) from the station in azimuth  $49^{\circ}00'$ . The latitude pier is partly surrounded by a square rock wall, and the vertical-circle station by a circular wall similar to that about the station but smaller.

**Tushar** (Piute County; W. Eimbeck, 1885; 1925).—On the summit of Mount Belknap, the northern one of the three highest peaks of Tushar Mountains. It is best reached from Beaver via Puffer Lake road, 14 miles. Thence take the Merchant Valley road to the left about 8 miles to a sawmill. From the sawmill a Forest Service trail leads to the foot of Belknap Peak, which is the highest of the barren white limestone peaks. A foot trail leads up the southeast side of the peak. The station is marked by a copper bolt leaded in a drill hole in solid rock. It is also marked, above the bolt, by a drill hole in a flat rock fitted between the bases of three small brick piers used in mounting the instrument. The station is nearly surrounded by a ring wall of rocks  $4\frac{1}{2}$  feet high with an inner diameter of 11 feet.

**Wheeler Peak** (White Pine County, Nev., W. Eimbeck, 1882; 1925).—On Wheeler Peak, the highest and most prominent mountain of the Snake range, on the western or higher prong of the double peak. Station is best reached from Baker, Nev., by road to Lehman Caves, National Monument, thence by trail and on foot to station. 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 secured in position by the masonry foundation built for the instrument. The station is nearly surrounded by a ring wall of rocks. Three drill holes in solid rock are just outside the ring wall at the following distances from the station: 2.40 meters (7.9 feet), north; 2.60 meters (8.5 feet), east; and 2.40 meters (7.9 feet), southwest. The vertical-circle station, also surrounded by a ring wall, is 57.75 meters (189.5 feet) east of the station.

**Ibepah** (Juab County, W. Eimbeck, 1889).—About 15 miles a little east of south from Ibepah post office, on Ibepah Peak, in the Deep Creek range of mountains. The peak has the general appearance of a roof of a house with the ridge extending east and west. The peak 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 solid rock, over which is a layer of masonry built between the bases of three small brick piers used in mounting the instrument. 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),  $246^{\circ}20'$ ; 3.07 meters (10.1 feet),  $300^{\circ}12'$ ; 3.25 meters (10.7 feet),  $91^{\circ}32'$ ; and 3.18 meters (10.4 feet),  $134^{\circ}32'$ . Ibepah astronomic station, marked by a masonry pier, is 21.2 meters (70 feet) from the station in azimuth  $108^{\circ}51'$ .

**Pioche** (Lincoln County, Nev., W. Eimbeck, 1883; 1925).—About  $22\frac{1}{2}$  miles in an easterly direction from Pioche, on Pioche Peak, known locally as "Government Peak." Proceed from Modena by road to old State line, 15 miles. Truck may be driven up old road past Ophir mine to a point  $\frac{3}{4}$  mile north-northeast of the station. Station is marked by a copper bolt leaded into a drill hole in bedrock. It is also marked a few inches above the bolt by a drill hole in the flat stone in the masonry foundation used for supporting the instrument. The station is nearly surrounded by a ring wall of rocks having an inner diameter of 11 feet. Four reference marks, each a drill hole in solid rock, are just outside the wall at the following distances and azimuths from the station: 2.52 meters (8.3 feet),  $214^{\circ}28'$ ; 2.41 meters (7.9 feet),  $271^{\circ}38'$ ; 2.72 meters (8.9 feet),  $344^{\circ}46'$ ; and 2.35 meters (7.7 feet),  $92^{\circ}30'$ . 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.

**Diamond Peak** (Eureka County, Nev., W. Eimbeck, 1881).—About 12 miles northeast of Eureka, on Diamond Peak, the highest point of the Diamond range of mountains. The station is marked by a copper bolt set in 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),  $10^{\circ}04'$ ; 2.84 meters (9.3 feet),  $92^{\circ}59'$ ; 3.27 meters (10.7 feet),  $204^{\circ}29'$ ; and 4.72 meters (15.5 feet),  $291^{\circ}44'$ . Diamond Peak latitude station, marked by a masonry pier, is 25.85 meters (84.8 feet) from the station in azimuth  $250^{\circ}24'$ . The vertical-circle station, partly surrounded by a small ring wall of rocks, is 23.65 meters (77.6 feet) south of the station.

**White Pine** (Nye County, Nev., W. Eimbeck, 1881).—On a peak locally known as "Troy Peak," the highest and boldest point of the Grant range of mountains. The station is marked by a copper bolt in a drill hole in solid rock, and above the bolt by a bottle embedded in plaster at the center of a low pier used for mounting the instrument. The station is nearly surrounded by a ring wall of rocks. Three drill holes in solid rock are just outside the wall at the following distances from the station: 3.14 meters (10.3 feet), northeast; 2.33 meters (7.6 feet), southeast; and 2.74 meters (9.0 feet), west. The vertical-circle station, partly surrounded by a ring wall of rocks, is 8.42 meters (27.6 feet) north of the station.

**Deseret** (Tooele County, W. Eimbeck, 1892).—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 of Stockton. The station is marked by a copper bolt set in solid rock between the bases of three small piers used for mounting the instrument. 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 just outside the wall at the following distances and azimuths from the station: 3.10 meters (10.2 feet),  $322^{\circ}53'$ ; 2.18 meters (7.2 feet),  $88^{\circ}08'$ ; and 2.62 meters (8.6 feet),  $198^{\circ}38'$ . Deseret latitude station, marked by a stone and brick pier, is 10.85 meters (35.6 feet) from the station in azimuth  $27^{\circ}42'$ .

**Pilot Peak** (Elko County, Nev., W. Eimbeck, 1889).—On Pilot Peak, the highest peak of a prominent range of mountains bordering the Great American Desert on the west, on the highest point of the summit at the junction point of the three main spurs of the peak. The peak is very rugged and rocky and is almost inaccessible. The station 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 a flat stone embedded in the masonry built between the bases of three small piers used for mounting the instrument. The station is nearly surrounded by a ring wall of rocks, about  $4\frac{1}{2}$  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),  $47^{\circ}36'$ ; 2.73 meters (9.0 feet),  $123^{\circ}29'$ ; 2.67 meters (8.8 feet),  $189^{\circ}13'$ ; and 2.97 meters (9.7 feet),  $324^{\circ}59'$ . Pilot Peak latitude station, marked by a brick pier, is 12.65 meters (41.5 feet) from the station in azimuth  $276^{\circ}26'$ .

**Ogden Peak** (Weber County, W. Eimbeck, 1888).—On a peak of the Wasatch Mountains, about 4 miles east of Ogden. The west slope of the mountain is very steep and rough and the station is more easily reached from the east. The station is marked by a copper bolt in a drill hole in solid rock and also marked by a drill hole in a flat rock embedded in the masonry built between the bases of three

small piers used for mounting the instrument. 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),  $22^{\circ}35'$ ; 2.93 meters (9.6 feet),  $177^{\circ}55'$ ; and 2.55 meters (8.4 feet),  $288^{\circ}43'$ . Ogden Peak astronomic station, marked by a brick pier, is 13.2 meters (43 feet) from the station in azimuth  $92^{\circ}01'$ . The vertical-circle station, with a ring wall similar to that about the station, is 7.0 meters (23 feet) distant in azimuth  $310^{\circ}43'$ . The magnetic station is 20.4 meters (67 feet) from the station in azimuth  $323^{\circ}56'$ . The top of the peak was blown off and all the marks were destroyed in 1923.

**Antelope** (Davis County, W. Eimbeck, 1892).—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),  $40^{\circ}57'$ ; 2.58 meters (8.5 feet),  $174^{\circ}22'$ ; and 2.30 meters (7.5 feet),  $293^{\circ}42'$ . Antelope latitude station, marked by a brick pier, is 10.44 meters (34.3 feet) from the station in azimuth  $13^{\circ}34'$ . The vertical-circle station is 8.75 meters (28.7 feet) distant.

**Waddoup** (Davis County, W. Eimbeck, 1892).—About  $\frac{3}{4}$  mile southeast of Centerville, 27 meters (89 feet) north and 88 meters (289 feet) west of the southeast corner of the NW $\frac{1}{4}$  sec. 18, T. 2 N., R. 1 E., on the west side of Thomas Waddoup's barnyard, and 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 on top, and 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 high above the 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."

**Promontory** (Boxelder County, W. Eimbeck, 1892).—On the most southeastern summit of the Promontory Mountains, on Promontory Peninsula, which extends into Great Salt Lake from the north. The summit is very rocky and rough being composed of bare, sharp, stratified rocks, with the dip nearly vertical. 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 consisting of 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),  $213^{\circ}32'$ ; 2.44 meters (8.0 feet),  $314^{\circ}08'$ ; and 2.71 meters (8.9 feet),  $70^{\circ}48'$ . Promontory latitude station, marked by a stone and brick pier, is 16.61 meters (54.5 feet) from the station in azimuth  $88^{\circ}41'$ . The vertical-circle station is in azimuth  $11^{\circ}11'$ .

**Salt Lake southeast base** (Davis County, W. Eimbeck, 1896).—In the second field southwest of Hill's house and orchard, which is on the road between Kaysville and Syracuse, and about halfway between the first fence to the eastward and the edge of the salt grass to the southwest. The station is marked underground by a cross in a copper bolt set in a block of sandstone 2 feet square and 10 inches thick,  $4\frac{1}{2}$  feet below the surface of the ground. Above this mark is a brick pier 4 feet square at the base built to a height of about 9 feet above the ground. There is an opening in the pier at the surface of the ground to give access to the surface mark, which is exactly the same as the underground mark and is embedded in the center of the pier.

**Salt Lake northwest base** (Davis County, W. Eimbeck, 1896).—About  $1\frac{1}{2}$  miles north of Syracuse Grove, the terminus of the Syracuse Branch Railroad, in the field southeast of a road crossing, 51 meters (167 feet) from the fence to the north and 63 meters (207 feet) from the fence to the west, and on property belonging to Cato Love whose house is about 350 meters (1,148 feet) to the eastward. Gilbert Parker's house is across the road southwest of the station, and John W. Singleton's house is diagonally across the road crossing to the northwest. The station is marked underground by a cross in a copper bolt set in a block of sandstone 2 feet square and 10 inches thick, about  $2\frac{1}{2}$  feet below the surface of the

ground. Above this mark is a brick pier 4 feet square at the base built to a height of about 9 feet above the ground. There is an opening in the pier at the surface of the ground to give access to the surface mark, which is exactly the same as the underground mark and is embedded in the center of the pier.

**Cache** (Cassia County, Idaho, P. A. Welker, 1897; 1915).—On Independence Peak, about 12 miles southwest of Elba, Idaho. The station is best reached from Elba by going up the canyon past the uppermost lake. The station is marked by a copper bolt embedded in the rock. Four reference marks consisting of holes drilled in the rock 3 feet from the center mark are approximately north, east, south, and west of the station.

**Oxford** (Bannock County, Idaho, P. A. Welker, 1897; 1933).—On the peak of the same name about 6 miles west of Oxford and about 15 miles east of Malad City. To reach from Oxford, go west and north of town 3 miles, then up mountain on old log road. From post office go north 1 block then to left 0.2 mile to end of road, then to right 2.3 miles. Take left fork leaving main road and go 0.6 mile to where road turns right (this is as far as trucks can go, but road continues about two-thirds way up mountain), pack up this road to first bench then turn left up creek to top. Station is marked by  $\frac{3}{8}$ -inch copper bolt set with lead in rock. Four reference marks consisting of holes drilled in rock are 2.5 feet from the center mark and approximately north, east, south, and west therefrom. In 1933, it was reported that east drill hole was gone. Reference marks established in 1933 are standard reference disks in rock, note 12c. No. 1 is downhill, 16.12 feet (slope distance) from station in azimuth  $264^{\circ}45'$ . No. 2 is along ridge, 81.07 feet from station in azimuth  $359^{\circ}54'$ .

#### *Supplementary points*

**Chiquita** (Mesa County, Colo., W. Eimbeck, 1895; 1934).—About 19.5 miles south-southwest (by road) of Grand Junction, 3 miles north of Northeast Creek,  $\frac{1}{2}$  mile southeast of Ladder Creek, near middle of sec. 23, T. 13 S., R. 101 W., on south rim of Pinon Mesa, on east shoulder of ridge, about  $\frac{1}{4}$  mile from crest, and 50 yards north of trimmed yellow pine. To reach from railroad crossing in Grand Junction, go west 0.7 mile on Main Street, take first right fork (Ladder Creek road) and go 0.5 mile, take left fork and go 0.6 mile, turn right and go 0.2 mile, continue straight ahead 6.7 miles on main-traveled road, take left fork and go 7.0 miles, turn left passing through gate and following ridge 0.5 mile ahead, proceed 0.5 mile and pass through second gate, turn left and go 1.1 miles passing to left of burned mill and keeping along hillside, proceed 0.4 mile and pass through gate, go 0.3 mile and keep to left along old logging road on through old mill, follow trail along side of hill 0.7 mile and bear left to top of ridge, and continue up ridge 0.3 mile to station. The latter part of trip, about 2 miles, is difficult travel with passenger car, but may be made safely with truck. Originally marked by low brick pier that was used in mounting the instrument. Later, brick pier was removed and station re-marked with standard U. S. Geological Survey disk. Reference marks are probably standard reference disks in concrete. No. 1 is 3.968 meters (13.02 feet) (slope distance) from station in azimuth  $127^{\circ}38'$ . No. 2 is 11.031 meters (36.190 feet) (slope distance) from station in azimuth  $253^{\circ}29'$ .

**Valley Knob** (Grand County, W. Eimbeck, 1890; 1898).—About 5 miles east of Green River, on a bare knoll 50 feet above the valley,  $\frac{1}{4}$  mile north of the railroad track. The station is marked by a drill driven into the ground. The signal pole and the heliotrope stand weighted down with stones were left in position.

**Hartman** (Emery County, C. H. Sinclair, 1898).—About 2 miles north of the town of Green River and  $\frac{1}{2}$  mile west of the Green River, on the southeast end of a mesa which rises about 40 feet above the general level, the first prominent bank north of a deep wash. The station is marked by a drill hole in a rock over which is a pile of rocks used to secure the base of the signal pole.

**Mica** (Emery County, C. H. Sinclair, 1898).—About 800 meters south of the depot at Green River, on the east end and highest point of a conspicuous hill sloping to the westward. The station is marked by a drill hole in a piece of sandstone above which is a pile of bricks used for securing the base of the signal pole.

**Reservoir** (Emery County, C. H. Sinclair, 1898).—On the high hill just south of the railroad at Green River, near an old abandoned reservoir. The station is marked by a drill hole in a piece of sandstone, 6 feet from the north edge of the reservoir.

**Wash** (Emery County, C. H. Sinclair, 1898).—About  $1\frac{1}{2}$  miles northwest of the town of Green River on the high bluff that forms the rim of the plain just north of the railroad track. The station is about 10 feet north of the edge of the bluff and 75 feet above the plain. It is marked by a drill hole in a shale rock, over which is a pile of rocks used for securing the base of the signal pole.

**Green River east base** (Emery County, C. H. Sinclair, 1898).—Just west of the first curve of the railroad west of the depot at Green River, about 200 meters from the west water tank and 9 paces north of the track. A low ridge extending north and south is about 20 or 30 meters east of the station. The station is on the top of a low dirt pier and is marked by a drill hole in a piece of sandstone.

**Green River west base** (Emery County, C. H. Sinclair, 1898).—About  $\frac{1}{2}$  mile west of the first curve west of the depot at Green River, 194 meters west of wooden culvert No. 221A and 9 paces north of the north rail of the track. The station is between the line of telegraph poles and the track and is about 15 or 20 meters southeast of an old railroad grade extending northeast and southwest. The station is marked by a drill hole in a shale rock set flush with the surface of the ground.

**Green River north meridian** (Emery County, C. H. Sinclair, 1898).—About 625 meters directly north of *Green River longitude* station, about 30 meters north of a large wash and just west of a wagon road. The station is marked by a drill hole in a sandstone block 10 inches square and 18 inches long having a pile of bricks around the top.

**Green River south meridian** (Emery County, C. H. Sinclair, 1898).—Fifty paces south of the railroad and 12.40 meters north of *Green River longitude* station. The station is marked by a drill hole in a piece of sandstone with four reference bricks placed around it just below the surface of the ground.

**Green River longitude** (Emery County, 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 high above the ground. *Green River latitude* station, marked by a brick pier 17 inches square, is 51 inches due west of the station.

**Green River schoolhouse** (Emery County, C. H. Sinclair, 1898).—The flagstaff on the cupola of the small wooden schoolhouse about  $\frac{1}{8}$  mile northeast of the depot at Green River.

**Green River hotel** (Emery County, C. H. Sinclair, 1898).—The flagstaff on the railroad hotel just south of the depot at Green River.

**Cliff** (Emery County, C. H. Sinclair, 1898).—This station was neither occupied or marked, as its location is nearly inaccessible. It is north-northwest of the town of Green River on a lofty butte about 3 miles long east and west which rises about 2,000 feet above the plain. The upper part of the cliff is composed of stratified rock with the dip vertical and has the general appearance of a huge battleship. The station is the highest point of the cliff which is near the middle of its length.

**Scipio** (Millard County; W. Eimbeck, 1884; 1919).—On the highest peak of Canon Mountains, east of the town of Oak City, and northwest of the town of Scipio. The station is on the highest part of the summit, about 10 or 12 feet from the edge of the abrupt slope on the eastern and northeastern side of the peak. It is best reached from Leamington by Fools Creek canyon. Station is marked by a copper bolt set in a drill hole in solid rock. It is also marked, about 15 inches above the bolt, by a drill hole in a flat stone embedded in the top of a low masonry pier used for mounting the instrument. Four reference marks, each a drill hole in solid rock, are at the following distances and azimuths from the station: 2.74 meters (9.0 feet),  $177^{\circ}55'$ ; 2.77 meters (9.1 feet),  $284^{\circ}55'$ ; 2.94 meters (9.6 feet),  $41^{\circ}33'$ ; and 2.47 meters (8.1 feet)  $126^{\circ}51'$ .

**Sanpete** (Sanpete County, W. Eimbeck, 1884).—In the Wasatch Mountain range, on the northern end of the eastern spur of what is locally known as the Horseshoe.

**West Sanpete** (Sanpete County, W. Eimbeck, 1890).—In the Wasatch range of mountains, on the northern end of the western spur of what is locally known as the Horseshoe. The Horseshoe is formed by two spurs about  $\frac{1}{2}$  mile apart extending north from an undulating table which slopes toward the south. The station is marked by a copper bolt in a drill hole in solid rock.

**Cedar** (Juab County, W. Eimbeck, 1884).—On the highest peak of the mountains immediately west of Levan. The station is marked by a copper bolt in a drill hole in the rock at the highest point of the peak.

**Levan** (Juab County, W. Eimbeck, 1884).—South  $60^\circ$  east (magnetic) from Levan, on the highest peak of the mountains immediately east of Levan. The station is marked by a copper bolt in a drill hole in the rock at the highest point of the peak about 20 inches below the general surface of the ground.

**Nephi Bench** (Juab County, W. Eimbeck, 1887; 1925).—No original description available. The station mark had been destroyed, but the approximate location of the station was determined by the U. S. Forest Service and a quadripod signal erected and left standing. The signal is 72 feet north of structure no. 710-46 on the L. A. & S. L. right-of-way, 28 feet west of the center of the track and 8 feet south of the north fence line on Third South Street, Nephi, Utah.

**South Juab Base** (Juab County, W. Eimbeck, 1884; 1925).—No original description available. Station site is about 3 miles from Levan and 2 miles from Juab, on the highest part of a low swell. A small stone, believed to mark the station center, was recovered by the U. S. Forest Service and a quadripod signal built and left standing. A barbed-wire fence is about 100 yards south of the signal.

**Cervera** (Millard County, C. H. Sinclair, 1898).—On the top of a large sand hill about 8 miles east of Oasis and about 1 mile south of the Oak Creek road. The station is marked by a 2- by 4-inch stub.

**Camara** (Millard County, C. H. Sinclair, 1898).—On a high sand hill across the valley and about 8 miles northeast of the depot at Oasis. The station is marked by a 2- by 4-inch stub.

**Manterola** (Millard County, C. H. Sinclair, 1898).—About  $3\frac{1}{2}$  miles northeast of Oasis, on high ground overlooking a depression extending northwest and southeast. The station is marked by a 2- by 4-inch stub.

**Montijo** (Millard County, C. H. Sinclair, 1898).—On a sand hill about  $4\frac{1}{4}$  miles east of Oasis, on the north side of Oak Creek road. The station is marked by a 2- by 4-inch stub.

**Augusti** (Millard County, C. H. Sinclair, 1898).—On a sand hill on the desert about 3 miles east of the depot at Oasis. The station is marked by a 2- by 4-inch stub.

**Blanco** (Millard County, C. H. Sinclair, 1898).—On a very prominent sand hill about  $2\frac{1}{4}$  miles northeast of the depot at Oasis. This station is marked by a 2- by 4-inch stub.

**Canovas** (Millard County, C. H. Sinclair, 1898).—On the desert about  $1\frac{1}{4}$  miles east of Oasis, about 200 meters (656 feet) southeast of the first sand hill. The station is marked by a 2- by 4-inch stub.

**Oasis northeast base** (Millard County, C. H. Sinclair, 1898).—About  $1\frac{1}{4}$  miles northeast of the depot at Oasis, on the open desert on the southeast side of the railroad, and 24.46 meters (80.2 feet) from the rail. The station is marked by a 2- by 4-inch stub.

**Oasis southwest base** (Millard County, C. H. Sinclair, 1898).—One-fourth mile north-northeast of the depot at Oasis, on the bank of a large irrigation ditch on the southeast side of the railroad, and 24.61 meters (80.7) feet from the rail. The station is marked by a 2- by 4-inch stub.

**Oasis north meridian** (Millard County, C. H. Sinclair, 1898).—About 1 kilometer north-northwest of the depot at Oasis, on the south side of a large irrigation ditch lined with willow trees near the Sevier River. The station is 4 paces south of the line of willow trees and 10 paces west of the third fence post south of the ditch. The station is marked by a 4-inch spike driven in the top of a section of an old brick pier, 17 inches square and  $2\frac{1}{2}$  feet long, which projects 1 foot above the ground.

**Oasis south meridian** (Millard County, C. H. Sinclair, 1898).—This station is 5.22 meters (17.1 feet) due north of *Oasis astronomic* station and is marked by a 2- by 4-inch stub.

**Oasis astronomic** (Millard County, C. H. Sinclair, 1898).—About 75 meters (246 feet) southwest of the depot at Oasis. The station is marked by a 4-inch spike in the top of the pier.

**Oasis schoolhouse tower** (Millard County, C. H. Sinclair, 1898).—The schoolhouse is about  $\frac{1}{4}$  mile southeast of the depot at Oasis.

**City Creek** (Salt Lake County, W. Eimbeck, 1893).—About  $2\frac{1}{2}$  miles north of Salt Lake City, on a low east-and-west ridge of the Wasatch Mountains. The station is marked by a cross in a brass bolt in a granite monument 7 inches square on top and 18 inches long. The underground mark is a bottle, and both it and the surface mark are embedded in a mass of concrete.

**Salt Lake City longitude** (Salt Lake County, G. W. Dean, 1869; 1923).—In the southeast corner of Temple Block, now a park, 16.02 meters (52.6 feet) from the

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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*.

**Salt Lake City latitude** (Salt Lake County, F. G. Agnew, 1869).—Station is 1.46 meters (4.8 feet) directly east of *Salt Lake City longitude*. It is marked by a red sandstone post, 22 inches square and 5 feet long, projecting 3 feet above the ground.

**Ogden longitude** (Weber County, C. H. Sinclair, 1886).—Station is the east pier in the west room of brick and stone observatory established by Lieutenant Wheeler in 1873. It is on ridge above the west bank of the Weber River, directly opposite Ogden, and about 1½ miles from the courthouse.

#### FOREST AREA

##### *Principal points*

**South Tent** (Sanpete County, G. D. Cowie, 1919).—On the mountain on the North side of Reeder Canyon, near its head, on the crest of the long rocky ledge practically on the highest part of the ridge. The station is on the site of the Powell station. There are two trails, one leading off from the State Nephi-Emery road from Alpine substation, north past Orsen irrigation tunnel following the high ground between Horseshoe Mountain and South Tent and the second trail is relatively steep from Spring City past North Tent. The station is marked by a standard disk station mark. Two standard disk reference marks are respectively, 7.650 meters (25.10 feet) distant in azimuth 186°45' and 15.700 meters (51.51 feet) in azimuth 359°47' from the station.

**Indianola** (Sanpete County, G. D. Cowie, 1919).—About 8 miles east of Indianola and about 200 meters (656 feet) south of a wood road known as Browns Trail, on a low brushy knoll known locally as Brown Peak. A good wagon road from Indianola passes within 200 meters (656 feet) of the station. Station is marked by a standard disk station mark. Two standard disk reference marks are respectively, 3.280 meters (10.76 feet) distant in azimuth 95°16' and 7.400 meters (24.28 feet) distant in azimuth 241°56'.

**Wasatch 2** (Sanpete County, G. D. Cowie, 1919; 1934).—About 12 miles east of Mayfield, 3 miles east of Mount Baldy ranger station, on ridge known as Heliotrope Mountain (top is covered with small white rock), and inside of and near center of old ring wall of rock which surrounded original station *Wasatch* (see description thereof). To reach from Mayfield, follow road up Twelve Mile Creek Canyon 15.3 miles to Mount Baldy ranger station, continue 2 miles on main road to highest point and where log fence crosses road (end of truck travel), proceed east on foot along fence line to top of ridge, and then go east 1½ miles across open meadow to white ridge and onto trail leading to station site. Surface mark is standard station disk in concrete, note 1. Underground mark is bottle. Reference marks are probably standard reference marks in concrete. No. 1 is 11.640 meters (38.19 feet) from station in azimuth 99°39'. No. 2 is 12.870 meters (42.22 feet) from station in azimuth 355°00'. Azimuth mark (1934) was established in largest rock on top of hill and about ½ mile from station in azimuth 32°18'41''.

**Mount Catherine** (Millard County, G. D. Cowie, 1919).—Near the steep eastern face of a bare knoll at the head of a canyon opening out near Herbert's ranch. The station is best reached by a poor road up Willow Creek Canyon from Salina. A faint wagon road leads northward from the ridge above Willow Creek and can be followed to the station. Station mark is a standard disk. Two standard disk reference marks are respectively, 5.342 meters (17.53 feet) distant in azimuth 0°39' and 5.928 meters (19.45 feet) distant in azimuth 91°28' from the station. A rock cairn is 24.580 meters (80.41 feet) from the station in azimuth 75°01'.

**Musinia** (Sanpete-Sevier Counties, G. D. Cowie, 1919).—On the western side of Gunnison Valley, about 12 miles south and east of Mayfield on the highest point on the eastern end of the prominent white-sided peak locally known as Marys Nipple. The station is best reached by the canyon road from Mayfield toward Mount Baldy ranger station. Leave the main road at an old sawmill clearing 6 miles from Mayfield, going down across a creek, thence up toward the peak which shows clearly. The road ascends until after passing Woods Lake, then drops into Gunnison Valley. The trail to the peak follows along the eastern

side of the ridges north of the peak and can be followed to the ledges just below the station. The station is near the old station *Mooseneah* and is marked by a drill hole in white rock. No reference marks were set.

**Black Cap** (Sevier County, G. D. Cowie, 1919).—On a low but prominent peak about three miles east of Salina. The station is marked by a cross cut in the rock, surmounted by a pole signal around the base of which is a cairn about four feet high. Three reference marks, each a cross cut in a rock, are respectively 2.271 meters (7.45 feet) distant in azimuth  $333^{\circ}20'$ , 1.564 meters (5.13 feet) distant in azimuth  $82^{\circ}30'$ , and 5.974 meters (19.61 feet) in azimuth  $185^{\circ}35'$  from the station.

**Monroe 2** (Sevier County, G. D. Cowie, 1919; 1934).—About 14 miles west of Koosharem, 6 miles east of Monroe, on highest point of rocky ledge, and on peak known locally as "Gunnison Peak." Station is on same ridge as station *Monroe* (see description thereof). To reach from Grass Valley Merchandise Store in Koosharem, go west 0.2 mile, take right fork (graded road) and go 2.1 miles, follow left fork 100 yards, thence left again and continue on main-traveled road, take right fork and go 0.5 mile to pasture of ranger station, go through gate and continue across pasture to another gate, pass through gate and go about 1 mile to gate, turn sharply to right just after passing through gate and follow road to cabin and old mill site. If ground is dry, proceed west across clearing to another clearing, follow clearing 0.4 mile to gate, pass through gate and turn left following along fence to creek, go up creek to end of road, follow old trail north to summit of ridge, and then proceed north and west along ridge to highest point and station. Marked by standard station disk in concrete, note 1. Reference marks are probably standard reference disks in concrete. No. 1 is 3.672 meters (12.05 feet) in azimuth  $305^{\circ}21'$ . No. 2 is 14.678 meters (48.16 feet) from station in azimuth  $238^{\circ}09'$ .

**Mount Marvine** (Sevier County, G. D. Cowie, 1919; 1934).—On highest point of rocky ridge known locally as "Sawtooth Mountain", about 7 miles north of Fish Lake, and near U. M. Pass in Seven Mile Flat. Station is on site of old cairn established by W. Eimbeck in 1885. To reach from Salina, go east 2.7 miles on State Route 10, cross tracks and follow right fork (main-traveled road) 28.2 miles to sign facing south and reading "Sawtooth Mt. Elev. 11,601", turn left into dim road and go about 1 mile to end of truck travel, continue  $\frac{1}{2}$  mile up draw in easterly direction, then proceed south to top of ridge, then easterly up side of very steep rocky mountain to highest point and station. Marked by standard station disk in concrete, note 1. Reference marks are probably standard reference disks in concrete. No. 1 is 4.068 meters (13.35 feet) from station in azimuth  $177^{\circ}48'$ . No. 2 is 5.048 meters (16.56 feet) from station in azimuth  $325^{\circ}23'$ .

**Thousand Lake Mountain** (Wayne County, G. D. Cowie, 1919).—On top of a rocky ledge on the southern and eastern end of the Thousand Lake plateau. It is reached from Loa via Lyman, Neff's ranch, thence by wagon road up the mountain side in a northeasterly direction for 6 miles to an old sawmill where the trail branches off through thick woods to the plateau, thence through open country to the highest part of the plateau. Another route is from Elkhorn ranger station down the east side of the mountain along a blazed trail to With's pasture, thence west along a fair grade to the top of the plateau. The station is near the old Powell Survey station and is marked by a standard disk station mark. Two standard disk reference marks are respectively 1.633 meters (5.36 feet) distant in azimuth  $12^{\circ}25'$  and 1.714 meters (5.62 feet) distant in azimuth  $267^{\circ}23'$  from the station.

#### *Supplementary points*

**U. S. Forest Service no. 21** (Sanpete County, G. D. Cowie, 1919).—About  $2\frac{1}{2}$  miles southeast of the U. B. Dam where the Arrow Head trail crosses the Sevier River, on a low bare hilltop on the north end of the Valley range. Station mark is a bolt cemented in the rock and surmounted by a pole signal with a few rocks around the base. Three reference stones, each marked with a cross, the letters "MW" and the figures "21", were set. The following directions were observed: Cairn on Scipio,  $0^{\circ}00'00''$ ; first reference stone, 1.679 meters (5.51 feet),  $43^{\circ}00'20''$ ; second reference stone, 1.853 meters (6.08 feet),  $166^{\circ}04'00''$ ; and third reference stone, 1.618 meters (5.31 feet),  $278^{\circ}36'00''$ .

**U. S. Forest Service no. 1** (Juab County, G. D. Cowie, 1919).—About 5 miles east of Leamington and 1 mile south of Sevier River, on a rocky but not prominent peak on the extreme north end of the Oak Creek division. Station is marked by a nail cemented in the rock and surmounted by a pole signal. Three reference stones, each marked with a cross and the letters "MW", were set. The following directions were observed: Cairn on Scipio,  $0^{\circ}00'00''$ ; first reference stone, 2.371

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meters (7.78 feet),  $87^{\circ}03'40''$ ; second reference stone, 1.430 meters (4.69 feet),  $155^{\circ}00'30''$ ; and third reference stone, 1.277 meters (4.19 feet),  $359^{\circ}56'20''$ .

**U. S. Forest Service no. 6** (Millard County, G. D. Cowie, 1919).—About 8 miles southeast of Fillmore on the eastern and lower summit of White Pine Peak. The station is marked by a bolt cemented in the rock and surmounted by a pole signal. The following directions were observed: Cairn on Mount Catherine,  $0^{\circ}00'00''$ ; stone in place marked with cross and arrow, 8.15 meters (26.73 feet),  $94^{\circ}21'00''$ ; stone marked with cross, the letters "MW" and the figure "6", 6.794 meters (20.65 feet),  $230^{\circ}01'50''$ ; and stone in cairn marked with cross, the letters "MW" and the figure "6", 11.15 meters (36.67 feet),  $303^{\circ}12'20''$ .

**U. S. Forest Service no. 5** (Millard County, G. D. Cowie, 1919).—About 8 miles southeast of Holden and 4 miles north of the Pioneer ranger station, on a very prominent peak of the main divide. The Scipio-Pioneer trail passes about 200 yards east of the station. Station mark is a bolt cemented in the rock and surmounted by a pole signal. Three reference stones, each marked with a cross, the letters "NW", and the figure "5", were set. The following directions were observed: Mount Catherine,  $0^{\circ}00'00''$ ; first reference stone, 3.10 meters (10.18 feet),  $1^{\circ}30'30''$ ; second reference stone, 2.274 meters (7.46 feet),  $138^{\circ}33'40''$ ; and third reference stone, 1.795 meters (5.89 feet),  $265^{\circ}16'30''$ .

**U. S. Forest Service no. 3** (Millard County, G. D. Cowie, 1919).—About 9 miles west and a little north of Scipio,  $1\frac{1}{2}$  miles from Stephenson's ranch and about  $\frac{1}{4}$  mile southeast of Whiskey Creek Spring on a prominent mountain on the south side of Whiskey Creek on the Oak Creek division of the Fillmore National Forest. Station is marked by a cross surrounded by a circle cut in the rock and surmounted by a pole signal with a small cairn around the base. Scipio bears N.  $22^{\circ}$  E., Musinia S.  $66^{\circ}$  E., and Catherine S.  $14^{\circ}$  E.

**U. S. Forest Service no. 2** (Millard County, G. D. Cowie, 1919).—About  $3\frac{1}{2}$  miles due east of Scipio and  $\frac{1}{4}$  mile from the dry lake, on a bare but not prominent summit in the Valley range. Station mark is a cross surrounded by a circle cut in the rock. Three reference stones, each marked with a cross, the letters "MW" and the figure "2", were set. The following directions were observed: Cairn on Scipio,  $0^{\circ}00'00''$ ; first reference stone, 3.413 meters (11.02 feet),  $38^{\circ}46'50''$ ; second reference stone, 2.438 meters (8.00 feet),  $131^{\circ}18'00''$ ; and third reference stone, 2.640 meters (8.66 feet),  $290^{\circ}21'00''$ .

**U. S. Forest Service no. M 11** (Millard County, G. D. Cowie, 1919).—About 6 miles south and a little east of Oak City, about  $\frac{1}{2}$  mile east of the Oak City-Holden Road, on the end of a very low ridge. Station is marked by a cross surrounded by a circle cut in the rock and surmounted by a pole signal at the base of which is a small cairn. Three reference marks, each a stone in place marked with a cross and arrow, were set. The following directions were observed: Cairn on Scipio,  $0^{\circ}00'00''$ ; first reference stone, 15.136 meters (49.66 feet),  $62^{\circ}22'30''$ ; second reference stone, 9.592 meters (31.47 feet),  $168^{\circ}26'00''$ ; and third reference stone, 5.639 meters (18.35 feet),  $285^{\circ}01'00''$ .

**U. S. Forest Service no. M 9** (Millard County, G. D. Cowie, 1919).—About  $6\frac{1}{2}$  miles south of Scipio and 3 miles northwest of the north end of Round Valley Lake, on a bare point of the main divide. Station mark is a bolt cemented into the rock and surmounted by a pole signal braced against a mahogany tree. Musinia bears S.  $78^{\circ}$  E., Nebo, N.  $21^{\circ}$  E., and Scipio, N.  $16^{\circ}$  W.

**U. S. Forest Service no. M 10** (Millard County, G. D. Cowie, 1919).—About 3 miles northeast of Whiskey Creek Springs, on the east end of a flat-topped peak between the heads of Whiskey Creek and the south fork of Oak Creek on the Oak Creek division of the Fillmore National Forest. Station is marked by a bolt cemented in the rock and surmounted by a pole signal with a cairn around the base. Station Musinia bears S.  $64^{\circ}$  E.

**Stevens no. 20** (Sanpete County, G. D. Cowie, 1919).—About 7 miles west and a little north of Redmond, on the highest timbered point of the south end of Valley range. Station is a signal in the top of a tree on the east knoll of the point.

**U. S. Forest Service no. 20** (Sanpete, Millard, and Sevier Counties, G. D. Cowie, 1919).—About 7 miles west and a little north of Redmond, on the main divide of Valley range. A slightly higher timbered point (Stevens 20) is about  $\frac{1}{4}$  mile north of the station. Station is marked by a cross within a circle cut in the rock and surmounted by a flag signal with a small cairn around the base.

**Monroe Peak** (U. S. Forest Service no. 13) (Piute County, G. D. Cowie, 1919).—About 6 miles south and 2 miles east of Monroe, on a very high prominent peak. A wagon road to a sawmill goes up the west side of the peak and passes about  $\frac{1}{4}$  mile south of the station. Station is marked by a bolt cemented in the

rock and surmounted by a pole signal with a cairn around the base. The following references are given: Bolt in rock, 4.99 meters (16.83 feet) distant in azimuth  $105^{\circ} 32'$ ; nail in rock, 2.292 meters (7.54 feet) distant in azimuth  $200^{\circ} 31'$ ; bolt in rock, 6.03 meters (22.08 feet) distant in azimuth  $302^{\circ} 52'$ ; and cross within a circle in rock, 3.93 meters (12.89 feet) distant in azimuth  $304^{\circ} 04'$ .

**U. S. Forest Service no. M 8** (Piute County, G. D. Cowie, 1919).—About 3 miles west of Pittsburg, on the north side of Deer Creek Canyon. The station is on the first high point and is easiest reached from Christensen's ranch in Clear Creek. Station is marked by a bolt cemented in a crevice of rock about 6 inches below the surface of the ground and surmounted by a pole braced with a tripod. Three reference stones, each marked with a cross, the letter "M", and the figure "8", were set. The following directions were observed: Belknap  $0^{\circ}00'00''$ ; first reference stone, 5.870 meters (19.26 feet),  $218^{\circ}21'00''$ ; second reference stone, 4.584 meters (15.04 feet),  $298^{\circ}17'55''$ ; and third reference stone, 7.335 meters (24.13 feet),  $354^{\circ}31'30''$ .

**U. S. Forest Service no. 8** (Millard-Sevier Counties, G. D. Cowie, 1919).—About 7 miles northwest of Joseph and 1 mile east of Rockwood Peak, on a high aspen point. The road from Joseph to Rockwood ranger station passes about  $\frac{1}{2}$  mile south of the station. Station is marked by a bolt cemented in the rock and surmounted by a pole signal. Three reference marks, each a stone marked with a cross, the letters "MW", and the figure "8", were set. The following directions were observed: East side of house on Belknap,  $0^{\circ}00'00''$ ; first reference stone, 6.37 meters (20.9 feet),  $55^{\circ}32'00''$ ; second reference stone, 5.745 meters (18.85 feet),  $148^{\circ}20'10''$ ; and third reference stone, 4.983 meters (16.35 feet),  $300^{\circ}46'20''$ .

**U. S. Forest Service no. M 3** (Millard County, G. D. Cowie, 1919).—About 4 miles south of Kanosh, on the highest point of the ridge. Station mark is a hole drilled in a shelf of rock. A bolt was set in a crevice of the shale 4 inches west of the hole. The station is surmounted by a signal pole with a cairn around the base. The following directions were observed: Belknap,  $0^{\circ}00'00''$ ; stone marked with a cross and the letters "C. G. S." 12.226 meters (40.11 feet),  $5^{\circ}11'25''$ ; stone marked with a cross, the letter "M", and the figure "3", 11.601 meters (38.06 feet),  $85^{\circ}22'30''$ ; and stone marked with a cross and the letters "C. G. S.", 4.054 meters (13.30 feet),  $239^{\circ}14'10''$ .

**U. S. Forest Service no. 9** (Millard County, G. D. Cowie, 1919).—On a high prominent ridge about  $4\frac{1}{2}$  miles northeast of Cove Fort, near the west boundary of Fillmore National Forest. Station mark is a cross within a circle cut in the rock and surmounted by a pole signal with a cairn around the base. Three reference stones, each marked with a cross, the letters "MW" and the figure "9", were set. The following directions were observed: Belknap,  $0^{\circ}00'00''$ ; first reference stone, 8.891 meters (29.17 feet),  $77^{\circ}20'00''$ ; second reference stone, 3.383 meters (10.11 feet),  $158^{\circ}17'00''$ ; and third reference stone, 5.733 meters (18.81 feet),  $329^{\circ}12'10''$ .

**U. S. Forest Service no. M 2** (Sevier-Beaver Counties, G. D. Cowie, 1919).—About 3 miles southeast of Cove Fort and a mile east of Sulphurdale, on a ridge running north and south near the west boundary of the Fillmore National Forest. There is a lone fir tree on the ridge about 100 yards north of the signal. Station is a hole drilled in the rock surmounted by a signal pole. Belknap bears S.  $33^{\circ}$  E. and Monroe N.  $81^{\circ}$  E. from the station.

**U. S. Forest Service no. 10** (Piute County, G. D. Cowie, 1919).—On a low but prominent point in the Sevier Valley, about 2 miles east of Sevier Canyon, and  $3\frac{1}{2}$  miles southeast of Sevier,  $\frac{1}{2}$  mile west of the old wagon road between Monroe and Marysvale. Station mark is a cross within a circle cut in the rock and surmounted by a pole signal with a cairn around its base. Three reference marks, each a stone in place marked with a cross, the letters "M. W.", and the figures "10", were set. The following directions were observed: Belknap,  $0^{\circ}00'00''$ ; first reference stone, 3.877 meters (12.72 feet),  $130^{\circ}36'30''$ ; second reference stone, 6.319 meters (20.73 feet),  $230^{\circ}24'30''$ ; and third reference stone, 23.558 meters (77.29 feet),  $290^{\circ}18'00''$ .

**U. S. Forest Service no. M 7** (Sevier County, G. D. Cowie, 1919).—About  $6\frac{1}{2}$  miles southwest of Richfield and  $\frac{1}{2}$  mile north of the Elsinore-Kanosh road, on a low but prominent point on the main divide. Station mark is a bolt cemented in the rock and surmounted by a pole signal braced in a trimmed mountain-mahogany tree. Belknap bears S.  $32^{\circ}$  W. and Monroe 2 bears S.  $50^{\circ}$  E.

**Marysvale Peak** (U. S. F. S.) (Piute County, G. D. Cowie, 1919).—About 10 miles east and a little north of Marysvale, on a sharp bare point on the south

spur of Marysvale Peak. The main top of the mountain is about  $\frac{1}{4}$  mile north of the station. A trail from the road at the foot of the mountain on the southwest side ends at a large prospect hole about  $\frac{1}{4}$  mile southwest of the station. Station is marked by a bolt cemented in the rock and surmounted by a pole signal with a small cairn around its base. Three reference stones, each marked with a cross, were set. The following directions were observed: Belknap,  $0^{\circ}00'00''$ ; first reference stone, 2.252 meters (7.39 feet),  $65^{\circ}30'10''$ ; second reference stone, 9.839 meters (32.28 feet),  $123^{\circ}08'30''$ ; and third reference stone, 4.081 meters (13.39 feet),  $285^{\circ}05'40''$ .

**U. S. Forest Service no. M 1** (Sevier County, G. D. Cowie, 1919).—About 1 mile east of Pole Creek and  $1\frac{1}{2}$  miles north of Clear Creek, on a ridge (not prominent) covered with juniper and mahogany about 250 yards to the south. There is a high bare point about  $1\frac{1}{2}$  miles to the northeast. Station mark is a bolt cemented in the rock and surmounted by a pole signal. Belknap bears  $S. 9^{\circ} W.$  and *Monroe 2*  $N. 85^{\circ} E.$  from the station.

**Mahuston Peak (U. S. Forest Service no. 12)** (Piute County, G. D. Cowie, 1919).—About 7 miles east of Kingston and about  $3\frac{1}{2}$  miles north of the east fork of Sevier River, on the south end of Fishlake Plateau on Forshie Mountain. Station is on the southwest rim of the mountain about 1 mile from the south end. Station is marked by a bolt cemented in the rock and surmounted by a pole signal.

**City Creek Peak (U. S. Forest Service no. M 4)** (Piute-Beaver Counties, G. D. Cowie, 1919).—Nearly a mile east of Puffer Lake, on a prominent peak of the main divide, the first bare peak north of Circleville Mountain. Station mark is a bolt cemented in the rock and surmounted by a pole signal with a cairn around the base. *Monroe 2* bears  $N. 47^{\circ} E.$  and Thousand Lakes  $N. 82^{\circ} E.$  from the station.

**Circleville Mountain (U. S. Forest Service no. 11)** (Piute-Beaver Counties, G. D. Cowie, 1919).—About  $6\frac{1}{2}$  miles west and a little north of Circleville, on the south rim of Circleville Mountain. There is a slightly higher point about  $\frac{1}{2}$  mile to the southwest. Station is marked by a standard disk station mark, surmounted by a pole signal, with a cairn around the base. Belknap bears about  $N. 10^{\circ} W.$  and *Monroe 2* about  $N. 32^{\circ} E.$

**Delano Peak (U. S. Forest Service no. M 5)** (Piute-Beaver Counties, G. D. Cowie, 1919).—About 10 miles southwest of Marysvale, on the highest but not the most prominent peak of the Tushar Mountains. Station is marked by a bolt cemented in the rock and surmounted by a pole with a cairn around the base. Belknap bears about  $N. 32^{\circ} W.$  and *Monroe 2* about  $N. 50^{\circ} E.$

### THIRTY-NINTH PARALLEL TO NEEDLES, CALIF., ARC

#### *Principal points*

**Brian** (Iron County, W. Mussetter, 1925).—About 14 miles east of Cedar City, on the summit of Brian Head, the highest peak of the Cedar Mountains. Station may be reached from either Cedar City or Parowan by way of the Cedar Breaks, a well known national monument. About 1 mile north of a small hotel take the road leading east to the old Mitchell sawmill. From here a truck can be driven to a spring at the southeast base of the peak and about  $\frac{1}{2}$  mile southeast of the station. Station is on the brink of the cliff facing southwest and will soon be lost through erosion. Station is marked by a standard disk station mark set in rock. Two standard disk reference marks are at the following distances and azimuths from the station: 24.50 meters (80.4 feet),  $249^{\circ}32'$ ; and 22.21 meters (72.9 feet),  $305^{\circ}19'$ . The reference marks are well back from the station on solid ground.

**Burger** (Washington County, W. Mussetter, 1925).—About 18 miles north of St. George and 9 miles by trail southeast from Pine Valley, on one of the highest peaks on the southern end of the Pine Valley Mountains. Station is best reached by Forest Service trail up Forsythe Canyon. After reaching the summit where the trail becomes level, bear to the left to the summit of a rocky peak. The station is on the highest point on a small, steep, rock knob. Station is marked by a standard disk station mark set in solid rock. A standard disk reference mark, with the arrow pointing directly away from the station, is 8.463 meters (27.76 feet) from the station in azimuth  $95^{\circ}56'$ .

**Hayford** (Clark County, Nev., W. Mussetter, 1925; 1926).—About 36 miles north of Las Vegas and 26 miles west of Moapa, on the highest peak of the lofty Sheep Range of mountains. Station is best reached from Las Vegas. Take Tonopah road to Richardson's ranch at Corn Creek Spring, about 20 miles. Follow the road from the ranch leading to Alamo and Hiko 15 miles to where wheel tracks turn east at a cairn; follow tracks 4 miles to a point where Deadman Wash debouches from the mountains. Truck can be driven to this point. Follow the

trail leading up Deadman Wash to side canyon about 7 miles where trees are blazed and marked "water." Continue up main canyon about  $\frac{1}{2}$  mile to first left-hand side canyon. Follow this canyon to its head  $\frac{1}{4}$  mile southeast of the station. Station is marked by a standard disk station mark. A standard disk reference mark is 10.13 meters (37.1 feet) from the station in azimuth  $40^{\circ}37'$ .

**Virgin** (Clark County, Nev., W. Mussetter, 1925).—About 16 miles south of Bunkerville and Mesquite, on the easterly of the two highest peaks which are seen from those towns. The station is best reached from Bunkerville by truck 9 miles to Cabin Springs, thence by a poor trail about 7 miles to Wiregrass Springs, thence follow cow trail westerly which crosses ridge 200 yards south of the station, which is near the north end of the peak. Station is marked by a standard disk station mark. A standard disk reference mark is on the highest point of the peak and 5.71 meters (18.7 feet) from the station in azimuth  $15^{\circ}36'$ .

**Mormon** (Clark County, Nev., W. Mussetter, 1925).—About 12 miles north and 36 miles east of Moapa, on the ridge connecting the two high rocky peaks at the southern end of the Mormon Range, on the first hump on the ridge southwest of the very prominent high rock spire, the highest (almost inaccessible) peak in the vicinity and the only other peak from which *Haysford* and *Eight Mile Monument* can be seen. To reach the station from Moapa, go on the Bunkerville Road to a broad sand wash 1 mile east of Glendale, go north up the wash to the point where the old road leaves the wash and crosses a mesa to the foot of the mountain, cross over the ridge to the east and go to the head of a broad open wash which is about  $\frac{1}{4}$  mile east of the station. The station is marked by a standard bronze disk set in rock. The reference mark, a standard bronze disk set in rock, is 9.218 meters (30.24 feet) from the station in azimuth  $168^{\circ}46'$ .

#### Supplementary points

**Moapa** (Clark County, Nev., W. Mussetter, 1925).—About 160 meters (525 feet) southwest of the Union Pacific depot at Moapa, about 10 meters (33 feet) east of an old blacksmith shop, and on land belonging to Mrs. W. J. Powers. The station is marked by a standard bronze disk set in a concrete block 18 inches square and 30 inches deep. *Moapa B. M. I 1* (see description thereof) is 34.285 meters (112.48 feet) from the station in azimuth  $188^{\circ}44'$ . This bench mark is sufficiently close for position but should not be used as a precise-level bench mark.

**Lund** (Iron County, W. Mussetter, 1925).—At Lund, on level ground 190 meters (623 feet) northwest of the Union Pacific depot. Station is marked by a standard disk station mark set in a concrete monument 18 inches square and 40 inches deep. Underground station mark is a standard disk station mark set in a small cement block 4 inches below the bottom of the surface mark. *Lund U. S. B. M.* (see description thereof) is 116.575 meters (382.46 feet) from station in azimuth  $316^{\circ}19'39''$ . *Lund B. M. Q 8* (see description thereof) is 198.573 meters (651.48 feet) distant in azimuth  $335^{\circ}59'33''$ .

**Lund, B. M. Q 8** (Iron County, W. Mussetter, 1925).—At Lund, 6.6 meters (22 feet) southeast of center line of main track of the San Pedro, Los Angeles & Salt Lake Railroad. Mark is square cut on the steel footing of the middle one of three westerly water tank columns, and is 198.573 meters (651.48 feet) from station *Lund* (see description thereof) in azimuth  $335^{\circ}59'33''$ .

**Lund U. S. B. M.** (Iron County, W. Mussetter, 1925).—At Lund. Mark is a cut granite post 6 inches square, projecting 6 inches above ground, inscribed "U. S. B. M.", and is 116.575 meters (382.46 feet) from station *Lund* (see description thereof) in azimuth  $316^{\circ}19'39''$ .

**Hawkins** (Washington County, W. Mussetter, 1925).—About 15 miles southwest of Enterprise on the highest point of Hawkins Peak, locally known as *Lost Mountain*. The station is best reached from Enterprise by taking the road up Shoal Creek to the New Enterprise Reservoir, then take the left-hand road for 3 miles, then old wagon road to right for 2 miles to limit of truck travel. Then follow the canyon to the peak, 3 or 4 miles distant. The station is marked by a standard disk station mark set in rock.

**Eight Mile Monument** (Washington County, Utah, Mohave County, Ariz., W. Mussetter; 1925).—About 16 miles by airline or 31 miles by road west-southwest of St. George, Utah, and 7 miles north-northeast of Littlefield, Ariz., on the State line in open desert between two deep washes, and about  $\frac{1}{2}$  mile east of Arrowhead Trail. The monument is a stone projecting about 1 foot above ground, marked on the west "8M", on the north "Utah" and on the south "Arizona". Station mark is a standard disk station mark set in the top of the monument. A standard disk reference mark set in a boulder is 20.15 meters (66.1 feet) from the station in azimuth  $270^{\circ}08'$ .

**Initial (Mohave County, Ariz., W. Mussetter, 1925).**—About 24 miles south of west of St. George, Utah, and 9 miles northwest of Littlefield, Ariz., at the corner of Utah, Nevada, and Arizona. Station is on a red clay knoll overlooking lower ground to the southeast. A high table-like mesa bears north of east  $\frac{1}{2}$  mile. Station may be reached by way of Iverson's ranch which is in Beaver Dam Wash at the site of the old Mormon well. Proceed north up Beaver Dam Wash about 1 mile to its fork. Take the left or Badlands Wash to its head. Where the road emerges from the wash and crosses the divide about 4 miles from the ranch, follow the divide northeast to the station. Station is marked by a standard disk station mark set in a boulder. *Initial (Initial monument)* (see description thereof) is 286.69 meters (940.6 feet) from the station in azimuth  $154^{\circ}58'23''$ .

**Initial (initial monument)** (Utah, Nevada, Arizona boundary, W. Mussetter, 1925).—About 24 miles south of west of St. George, Utah, and 9 miles northwest of Littlefield, Ariz., at the corner common to Utah, Nevada, and Arizona. Monument is sandstone post 6 feet by 16 inches by 12 inches set in a pile of stones and marked "Nevada" on the northwest, "Utah" on the northeast, "Arizona" on the southeast, and "37 N. L. 1901" on the southwest. In 1925, a standard reference disk was placed in the top of this monument and is 286.69 meters (940.58 feet) from station *Initial* (see description thereof) in azimuth  $154^{\circ}58'23''$ .

**Moapa B M I I** (Clark County, Nev., W. Mussetter, 1925).—At Moapa, about 160 meters (525 feet) west from main track of the San Pedro, Los Angeles & Salt Lake Railroad, in front of the Muddy Vailey store and hotel, near fence line at northeast corner of hotel. Marked by steel pipe with bronze cap 34.285 meters (112.48 feet) from station *Moapa* (see description thereof) in azimuth  $188^{\circ}44'$ . It was reported in 1925 that top of pipe had rusted off, and was replaced as nearly as possible at same elevation. A hole was dug around the pipe and concrete poured around the break.

#### ONE-HUNDRED-AND-EIGHTH MERIDIAN ARC

##### *Principal points*

**Kinney** (Sweetwater County, Wyo., C. I. Aslakson, 1931).—About 47 miles (airline) southeast of Rock Springs, about 30 miles (airline) south of Bitter Creek, about 7 miles north of Colorado State line, about  $1\frac{1}{2}$  miles east of Alkali Creek, in northwest corner of T. 13 N., R. 99 W., and on prominent butte on east end of high part of Kinney Ridge. To reach from Rock Springs, go south 4 miles on Browns Park Road to fork, take left fork and follow main-traveled road 41.6 miles to another fork (posted by the Mountain Fuel and Supply Co.), take left fork and go 0.2 mile to another fork, take left fork (posted "Alkali Creek") and go 12.8 miles to fork with road sign "Wilson Dome", take right fork and continue 4.7 miles to point where road turns to right (wagon road comes in from back on left, and single wagon tracks lead toward ridge), station bears  $75^{\circ}$  magnetic from this point. Follow single wagon tracks about 100 feet to old road, turn right on this road and go about 2 miles to foot of ridge, which is end of truck travel. Go up draw to top of ridge, turn right up slope to station site (about a 45-minute pack). To reach from Bitter Creek, go south 22 miles on main-traveled road to fork (from which the Kinney ranch can be seen), turn right and go to the Kinney ranch, from here go 0.5 mile east on main-traveled road to fork, take left fork and go about 12 miles up and over Kinney Ridge to fork with sign (posted "Wilson Dome"), turn left and proceed as above. Marked by standard station disk in 4-inch pipe. Reference marks are standard reference disks in bedrock, note 12a. No. 1 is 59.179 meters (194.16 feet) from station in azimuth  $70^{\circ}36'$ . No. 2 is 90.70 meters (297.6 feet) from station in azimuth  $152^{\circ}49'51''$ . Azimuths from station to following points are: W. W. Wilson lease, well no. 1,  $23^{\circ}36'34''$ ; W. W. Wilson, steel oil derrick, lease no. 1,  $23^{\circ}38'41''$ ; J. W. Tucker lease, well no. 1,  $66^{\circ}38'35''$ ; and lease no. 1 near Hiawatha Dome,  $23^{\circ}38'41''$ .

**Brown** (U. S. G. S.) (Sweetwater County, Wyo., C. I. Aslakson, 1930).—About 33 miles south of Rock Springs, about 4.0 miles southwest of Maxon (Maxton) ranch (owned by W. H. Gottehe), in sec. 16, T. 13 N., R. 105 W., on divide between Red Creek and Front Creek (tributary to Sage Creek), on point bare of timber (second highest prominent point from east end of mountain), known locally as Little Mountain. To reach from Rock Springs, go south on C Street about 5 blocks from arch at railroad, turn left onto Pine Street, go 1 block, turn right, go 1 block, turn left and follow main-traveled road out of town 0.3 mile beyond mine trestle over road to fork. Take left fork, go 3.1 miles to another fork, take right

fork, go 3.0 miles to another fork, take right fork, go 3.9 miles to another fork, take left fork, up mountain and follow main road towards Brown's Park, keep straight ahead 4.9 miles where road to left goes to South Baxter Camp, keep straight ahead at 12.3 miles where road posted "Brooks" turns to left, and at 14.9 miles where dim road turns to left toward pipe line and more-used road to right ascends onto table land, turn right, go  $1\frac{1}{4}$  miles to fork. Take left fork, go 0.5 mile to another fork, take left fork, go 1.3 miles to another fork, take left fork, go 1.5 miles to another fork, take right fork, go 1.8 miles to another fork, take left fork, go 3.3 miles to where several roads come together at brow of hill, turn left, go 4.0 miles down hill onto Maxon ranch, which is visible all along descent into valley. From ranch building go southward about  $\frac{1}{2}$  mile along road to first fork to right at point above small meadow, turn right and follow road over ridge to corrals and dipping pen, go around northeast corner of corral, then go left on north side of corral, and follow log road up canyon to top of mountain and station site. Truck can be driven only  $\frac{3}{4}$  mile beyond corral, and station is about an hour's walk from this point. There is a spring  $\frac{1}{2}$  mile beyond corral. Marked by standard U. S. Geological Survey disk in partially buried boulder. Reference marks are standard reference disks in outcropping boulders, note 12c. No. 1 is 113.97 meters (373.9 feet) (slope) from station in azimuth  $212^{\circ}14'49''$ . No. 2 is 10.59 meters (34.7 feet) (slope) from station in azimuth  $286^{\circ}21'$ . Azimuth from station to cairn on point, distant about 1 mile, is  $40^{\circ}27'23''$ .

**Middle** (Moffat County, Colo., C. I. Aslakson, 1931).—About 45 miles southeast of Rock Springs, about 45 miles southwest by south of Bitter Creek, about 1 mile south of the Wyoming State line, about 5 miles east of the Utah State line, in the southeast part of T. 12 N., R. 103 W., on a round-topped mountain that is wooded on all sides but bare on the top known as Middle Mountain. To reach from Rock Springs, go 4.0 miles southeast on Browns Park road to fork, take left fork and go 41.6 miles to fork posted by the Mountain Fuel and Supply Co., take right fork posted "Canyon Creek Camp" and go 9.8 miles to road to right at J. W. Graham's mail box, turn right and go 1.6 miles to gate, take left fork just after passing through gate and go left on well-traveled road to another fork just beyond and follow 1.5 miles to Kershnik's ranch, there take road straight up Canyon Creek and go 2.5 miles to fork at third fence above ranch, take left fork and cross bridge and continue 0.1 mile to gate, pass through gate and go 0.2 mile to fork, take left fork and go 0.8 mile to spring, continue 1.3 miles to crossroads and keep straight ahead for 0.25 mile (as far as truck can be driven). From here station bears  $198^{\circ}$  magnetic ( $1\frac{1}{2}$  hours pack). Marked by standard station disk in outcropping bedrock, note 3. Reference marks are standard reference disks in bedrock, note 12a. No. 1 is 12.130 meters (39.80 feet) from station in azimuth  $232^{\circ}16'$ . No. 2 is 11.200 meters (36.75 feet) from station in azimuth  $133^{\circ}52'$ . Azimuths from station to following points are: W. W. Wilson lease, well no. 1,  $264^{\circ}36'52''$ ; and to first oil derrick north of W. W. Wilson's oil derrick, lease no. 1,  $264^{\circ}12'17''$ .

**Zenobia** (Moffet County, Colo., C. I. Aslakson, 1931).—About 65 miles south by east of Rock Springs, 18 miles west of Greystone post office, about 6 miles east of the Utah State line, 6 miles north of the Yampa River, 4 miles west of the Maddox ranch and sawmill, 3 miles east of Green River, in sec. 29, T. 8 N., R. 102 W., and on highest point of Zenobia Park. To reach from Greystone post office, go south 1 mile on main road to fork, take right fork (leaving main road) and go 0.4 mile to another fork, take right fork and follow it to farm in valley, follow road through farmyard up ridge to junction with another road, turn right on this road and go 4.0 miles to fork, take right fork and go 4.1 miles to gate in Maddox pasture, go through gate and continue 0.4 mile, turn left and go up draw on dim road (making sharp turn just after passing through second gate), follow road to bottom of steep hill and continue to brush and pole fence, take right trail and go to crest of saddle, turn left and climb to station site. To reach from Rock Springs or station Kinney, follow lower Browns Park through Irish Canyon to fork (19.7 miles beyond sign into Sparke ranch), take left fork and go 15.2 miles to Greystone post office, then proceed as above. Marked by standard station disk in boulder, note 4. Reference marks are standard reference disks in bed-rock, note 12a. No. 1 is 20.10 meters (65.9 feet) from station in azimuth  $252^{\circ}25'$ . No. 2 is 32.25 meters (105.8 feet) from station in azimuth  $314^{\circ}10'$ . Azimuths from station to following points are: Low sharp peak, 1 mile distant,  $120^{\circ}24'38''$ ; base of sharp bluff on edge of Irish Canyon,  $210^{\circ}28'29''$ ; and sharp peak to east (almost directly over reference mark no. 1),  $253^{\circ}24'51''$ .

**Lena** (U. S. G. S.) (Daggett-Uintah Counties, C. I. Aslakson, 1931).—About 29 miles (airline) north-northeast of Vernal, on highest point of Mount Lena, in

the Ashley National Forest. To reach from the north, leave U. S. Route 30 at Green River, cross bridge over Green River and continue to southward on the Manila-Vernal main road to village of Manila, here take road posted to Vernal and continue 43 miles to a combination store-filling station camp on left (east) side of road, go 0.1 mile north of this store to where a dim road leads right up over ridge, turn right and follow this road 0.35 mile to top of ridge (Mount Lena is in plain view to eastward, being highest point on north end of range of meadows). Continue through sage and meadows on dim roads to edge of timber on south side of meadows and follow along south side of meadows eastward to small stream, turn up into timber and proceed about 0.2 mile to small glade on west side of stream and on to station site. To reach from Vernal, go straight north from the monument for 2.6 miles to T-road, turn left and go 1.1 miles to fork, take right fork and go 0.4 mile to fork, take left fork and go 27.6 miles to filling station mentioned above. Marked by copper bolt set in drill hole in sandstone boulder. Top of bolt has small triangle in center with letters "U. S. G. S." and the elevation "9719" stamped on its surface. Reference marks are standard reference disks in boulders, note 12c. No. 1 is 6.09 meters (20.0 feet) from station in azimuth 238°51'. No. 2 is 5.87 meters (19.3 feet) from station in azimuth 128°21'. Azimuth from station to cairn on north end of first ridge east of station is 325°01'38"; and to north gable of red-topped house in valley is 86°42'40".

**Blue** (Uintah County, C. I. Aslakson, 1931).—About 13 miles east of Jensen, about 2 miles west of State boundary, about 6 miles north-northwest of K ranch on U. S. Route 40, in east central part of T. 5 N., R. 25 E., and on second highest end of Stuants Ridge on Blue Mountain. To reach from bridge over Green River at Jensen, follow Route 40 east 16.5 miles (or from State line go west 3.3 miles) to 40-inch road sign where road turns north and goes down into draw between two large trees (large boxelder on west and large cottonwood on east), follow main-traveled road north 11.5 miles to fork just beyond top of mountain, follow left fork west 2.1 miles to crossroad (just before bottom of draw), turn left and go 3.9 miles on used road through sage (passing through two gates) to third gate near corner of pasture, go through gate, turn left and follow trail 1.0 mile to foot of high ridge, climb ridge and go westward along top to station site. Marked by standard station disk in bedrock, note 2. Reference marks are standard reference disks in bedrock, note 12a. No. 1 is 4.15 meters (13.61 feet) from station in azimuth 244°35'. No. 2 is 9.428 meters (30.93 feet) from station in azimuth 125°06'. Azimuths from station to following points are: Pinnacle on south slope of mountain, 2 miles distant, 68°22'50"; Zenobia, center of peak, 212°36'49"; and south edge of sharp bluff, 1.0 mile distant, 227°11'37".

**Little** (Uintah County, C. I. Aslakson, 1931; 1936).—About 10 miles northwest of Vernal, 3 miles south-southeast of Dry Forks school, on southern end of Little Mountain, 1¼ miles south of cairn and pole on highest point of mountain marking corner of military reservation, and 200 paces southwest of lone bush. To reach from Vernal, from Conoco station at west edge of town where U. S. Highway 40 turns south, go north on gravel highway 0.5 mile; turn left (west) and follow gravel highway 2.1 miles; continue west 1 mile beyond Macser's store to crossroads; turn right and go due north on graded dirt road 3.1 miles to small bridge; cross bridge and bear northwesterly up canyon on dirt road along foot of high cliffs 5.4 miles to Dry Fork settlement on right; continue straight ahead (westerly) 0.4 mile to end of truck travel. Trail up mountain leaves road about 0.3 mile east of this point, and just west of first small gulch on road. Station lies to south from this point. Take trail up steep north side of mountain; at top of first bench, trail can be seen going up along side of next hill. Continue southeasterly to top of mountain, past old U. S. Geological Survey station with signal still standing (1936), and thence south about 1 mile to south end of mountain and station. If horses can not be obtained near end of truck travel (above), continue westerly along road 2.65 miles to top of Pine Ridge, keeping to left-hand main road; leave truck and pack southeasterly up ridges to top of mountain, thence south along top of mountain to south end and station, a 2-hour pack. Marked by standard disk in boulder, note 4. Reference marks are standard disks in boulders, note 12c. No. 1 is 16.96 meters (55.6 feet) (slope distance) from station in azimuth 193°09'. No. 2 is 5.79 meters (19.0 feet) (slope distance) from station in azimuth 312°34'. Azimuth from station to Vernal, tabernacle, dome, is 297°07'52".

**Rabbit** (Rio Blanco County, Colo., C. I. Aslakson, 1931).—About 17 miles southwest of Rangely, 8 miles east by north of Watson, Utah, 8 miles south of White River, on west end of high part of Rabbit Mountain, probably in T. 104 W., near line between Ranges 1 and 2. To reach from Rangely, go west to schoolhouse,

follow road west 100 yards to fork (main road leads north), follow left fork west 20.75 miles to point where grassy draw comes down from right (draw is fenced and property belongs to C. R. Kirk), follow lane about 0.25 mile past ranch house (reservoir here, and just beyond horse trail leads up mountain), go up trail past bluff to east end of mountain, leave trail and climb steep pitch to top, and follow along top to west edge of woods and station site (about 1 mile west of bluff). Rock cairn has been built on a stump to witness station. Marked by standard station disk set in iron post. Reference marks are standard reference disks set in iron posts. No. 1 is 9.387 meters (30.80 feet) from station in azimuth  $38^{\circ}21'$ . No. 2 is 9.870 meters (32.38 feet) from station in azimuth  $133^{\circ}11'$ . Azimuth from station to sharpest peak on far ridges to westward is  $62^{\circ}56'34''$ .

**Cone** (Uintah County, C. I. Aslakson, 1931; 1936).—About 9 miles south by west of Randlett, 7 miles west by north of Ouray, on cone-shaped butte at south-east end of Leland Ranch, and in SW $\frac{1}{4}$  sec. 30, T. 4 S., R. 1 E. Knoll on which station is located is quite small on top, and is being rapidly eroded. To reach from southwest corner of Fort Duchesne go south on graded dirt road 5.85 miles to bridge over Uinta River; continue south 0.2 mile to fork, turn left (southeast) onto track road and go 0.6 mile; take right fork and go 0.05 mile; take right fork up hill and go 1.4 miles to fork; take either fork and continue in southerly direction 0.8 mile to forks; take middle fork and keep to main track road south and south-southwesterly 1.0 mile; take left fork and go south and easterly on main track road 3.95 miles; take left fork to top of mesa and continue along top of mesa to saddle (total of 1.0 mile) to end of truck travel. From here pack easterly (5-minute pack) down into saddle and then to top of cone and station. Marked by standard disks in concrete, notes 1a and 7a; upper mark projects 2 inches above ground. Reference marks established in 1931 are standard disks in cement, placed in upper ends of 4-inch galvanized iron pipes which project 8 inches above ground, and are surrounded by small mounds of stones and sand. No. 1 (azimuth mark, 1936) is on highest knoll west of station, and distant about  $\frac{1}{4}$  mile in azimuth  $106^{\circ}28'53''$ . In 1936 it projected 2 inches. No. 2 is on same butte as station, and 5.073 meters (16.64 feet) therefrom in azimuth  $152^{\circ}02'$ . In 1936 it projected 2 inches. Reference mark No. 1 (1936) is standard disk in pipe, note 13a, projecting 4 inches above ground, and 5.612 meters (18.41 feet) southwest of station in azimuth  $37^{\circ}57'$ . Distance between reference marks is 29.18 feet. Azimuth from station to Needle Rock, distant 8 miles, is  $282^{\circ}09'59''$ ; and to cairn on small square butte (on range with gap) is  $13^{\circ}53'15''$ . Station is at site of station "Cone (U. S. G. S.)", the mark of which station, disk and small stone, was found lying on surface of ground.

**Book** (Uintah County, Utah; Garfield County, Colo., C. I. Aslakson, 1931).—About 10 miles north-northwest of Carbonera and about  $7\frac{1}{2}$  miles west-northwest of Atchee. To reach from Dragon, Utah, go south 6.6 miles along railroad tracks to fork near fence corner, follow right fork 1.7 miles to cattle guard and gate, go through gate and go 2.9 miles to log cabin on right side of road, continue south 0.5 mile to gate on road (deserted mine buildings 100 yards to left), pass through gate and continue south 1.6 miles to gate, pass through gate and continue south 1.35 miles to gate, pass through gate and go 2.3 miles to gate, pass through gate and continue 0.4 mile, follow right fork 0.8 mile to fork (left fork goes to station Tavaputs and Hill ranch) follow right fork 0.4 mile, follow right fork (obscure wagon trail) west by south 2.5 miles along crest of ridge to station site, about 65 yards southwest of road, near western edge of plateau, and in dense brush. Marked by standard station disk set into iron post, projecting about 6 inches above ground. Reference mark is standard reference disk set into iron post, projecting about 6 inches above ground, 6.123 meters (20.09 feet) from station in azimuth  $280^{\circ}30'$ . Station *Tavaputs* (see description and geographic position thereof) is visible from ground at station.

**Range** (Carbon County, C. I. Aslakson, 1931; 1936).—About 15 miles by trail or 8 miles (air line) east of Sunnyside, 2 miles north by east of Utah Fuel Company's pumping station on Range Creek, about  $1\frac{1}{2}$  miles northwest by north of Willow Springs, in SW $\frac{1}{4}$  sec. 19, T. 14 S., R. 15 E., on one of highest points of Range Valley Mountains, apparently on next to last peak from southeast end of ridge, about  $\frac{1}{2}$  mile southeast of very prominent saddle over which trail passes, at point of ridge which slopes gently to north and drops off abruptly to south, and about 200 yards from trail leading from end of truck travel. To reach from Sunnyside: From general store on east side of railroad tracks, follow main-traveled road (asphalt) up canyon in northerly direction 2.8 miles to some asphalt bunkers on right at end of aerial cableway that comes down right-hand canyon

from asphalt mine; go straight ahead up right-hand canyon along aerial cableway in northeasterly direction 2.7 miles to cableway tower at edge of road on left. About 200 yards back down mountain from this tower and on right of road is small green house. Leave road about 50 yards above tower, turn sharply to left and follow good trail southwesterly about 1 mile; here trail turns sharply to right and continues in northeasterly direction about  $1\frac{1}{2}$  or 2 miles to top of mountain, to point directly above asphalt mine. Here take left-hand trail straight ahead, then bear to right in southeasterly direction along top of Range Valley Mountain and go about 7 miles. In clearing about  $\frac{1}{2}$  mile beyond very prominent hogback ridge leave trail, turning to right, and go about 200 yards to top of ridge and station. About 4-hour pack with horses from end of truck travel. Water in canyon to southeast, about  $\frac{1}{2}$  mile from station. Marked by standard disk molded onto bronze staff driven into ground with rock piled around top. In 1936 form 18 by 24 by 6 inches in size was built around top of staff and filled with concrete and crushed rock. Mark is 8 inches above surface of ground. Reference mark no. 1 is standard disk in 6- by 12-inch boulder, flush with surface of ground, on north slope of station ridge, and 9.405 meters (30.86 feet) north from station in azimuth  $177^{\circ}25'$ . No. 2 is standard disk in boulder, flush with surface of ground, on same ridge as station, and 9.69 meters (31.8 feet) east-southeast therefrom in azimuth  $310^{\circ}31'$ . No. 3 is standard disk molded onto bronze staff driven into ground, projecting 10 inches, and having rock piled around it to protect it; it is on the south slope of station ridge, 13.99 meters (45.9 feet) south-southeast of station in azimuth  $342^{\circ}06'$ . Distance between reference marks no. 1 and no. 2 is 57.42 feet, and between no. 2 and no. 3 is 25.15 feet. Azimuth mark (1936) is standard disk molded onto bronze staff driven into ground, and projecting 10 inches; it is on first ridge northeast of station, round-topped ridge running east and west with some scattered aspen trees on it, and is approximately  $\frac{1}{4}$  mile from station in azimuth  $247^{\circ}54'17''$ . Station *Palmos Head* (see geographic position and description thereof) is visible from ground at station.

**Grand** (Mesa County, Colo., C. I. Aslakson, 1931; 1934).—About 8 miles southwest of Mesa, 7 miles southeast of Palisade, 3.0 miles northwest of Landsend Point,  $1\frac{1}{2}$  miles north of Whitewater Creek, 2.0 miles northwest of Jim Davis' ranch house,  $\frac{1}{2}$  mile southwest of small reservoir, in sec. 32, T. 11 S., R. 97 W., on most westerly part of Grand Mesa, and about 30 feet east of rim of mesa. To reach from Palisade, follow U. S. Route 40S along Colorado River 7.8 miles, turn right onto road posted "Mesa Lakes Resort" and go 26 miles to resort, continue 3.8 miles along road onto top of mesa to road posted "Landsend 11 miles", turn right and go 9.0 miles to wire fence along road, turn right and go 100 feet on dim wagon road to wire gate in fence, pass through gate and go 0.3 mile to log house near group of pines, go north through pines (passing through gate in log fence), continue northwest on cattle trail to small reservoir, and continue west on trail to second prominent point of mesa and station (just visible over first point beyond Whitewater Creek). Marked by standard station disk in bedrock, note 2. Reference marks not described. No. 1 is 93.55 meters (306.9 feet) from station in azimuth  $327^{\circ}05'$ . No. 2 is 11.31 meters (37.1 feet) from station in azimuth  $77^{\circ}18'$ .

#### *Supplementary points*

**G. L. O. Station 29, Wyo.; G. L. O. Station 2, Colo., Wyoming-Colorado boundary milepost 239.** (Wyoming-Colorado boundary, C. I. Aslakson, 1931).—About 50 yards east of closing corner of secs. 14 and 19, Tps. 12 N., Rs. 99 and 100 W., about 1 mile north of the Hiawatha Dome oil camp, about 195 yards southeast of W. W. Wilson permit oil well rig, on range line. To reach from gasoline pump at the Hiawatha Dome oil camp, go north 0.7 mile to fork, take right fork and go  $\frac{1}{4}$  mile to another fork, take left fork and go  $\frac{1}{4}$  mile to rig of W. W. Wilson permit oil well, and then go southeast about 195 yards to west edge of draw and station site. Marked by standard General Land Office disk in concrete post, east around old disk which was probably set in iron pipe. Reference mark no. 2, standard General Land Office disk in concrete post, marking closing corner of Secs. 14 and 19, Tps. 12 N., Rs. 99 and 100 W., is 46.851 meters (153.71 feet) from station in azimuth  $123^{\circ}53'$ . *G. L. O. Station 29 eccentric* is 182.450 meters (598.59 feet) from station in azimuth  $303^{\circ}53'$ . A light on oil rig used as reference mark no. 1 point was marked by nail in stake (no permanent mark was set).

**Ucolwy; G. L. O. Station 1, Utah; G. L. O. Station 23, Wyo.** (Utah-Wyoming-Colorado boundary, C. I. Aslakson, 1931)—In northwest corner of Colorado, north-

cast corner of Utah, and on south boundary line of Wyoming. To reach from railroad in Rock Springs, go south 5 blocks on C Street to Pine Street, then east 1 block, then south 1 block and turn left and follow main-traveled road east and southeast to mine trestle over road, continue southeast 0.3 mile, take left fork over bridge and go 3.1 miles, continue straight ahead and go 6.9 miles to fork, take left fork up hill and go 5 miles to a Mountain Fuel Co. sign, here take right fork and follow main-traveled road south 25.4 miles, take right fork toward Red Creek and go 3 miles, take left fork and go 1.6 miles, take right fork toward Frank Meyer's place and go 0.9 mile, take left fork and go 2.6 miles to cabin and corrals on west side of road, turn right up hill and go 2 miles, take right fork and go 0.1 mile to cabins, pass between cabins, cross wash and follow road southwest up hill and go 1.5 miles, leave road and go north-northwest about 0.2 mile to station site. Original mark was irregular-shaped rock with land description chiseled on it. In 1931, this rock was found lying loose and station was re-marked by standard General Land Office disk in concrete. Reference marks are standard reference disks in bedrock. No. 1 is 48.968 meters (160.66 feet) from station in azimuth  $198^{\circ}26'$ . No. 2 is 11.268 meters (36.97 feet) from station in azimuth  $329^{\circ}43'$ .

**G. L. O. Station 3** (Moffat County, Colo., C. I. Aslakson, 1931).—Corner of secs. 1, 6, 31, and 36, Tps. 7 and 8 N., Rs. 100 and 101 W. of the sixth principal meridian and on twelfth auxiliary guide meridian. To reach from Greystone post office (33 miles from Sunbeam, on Sunbeam-Lodore Road), go south 1.0 mile (speedometer reading) on main road toward Sunbeam, to where main road turns to left, keep straight ahead on right fork and at 1.4 miles take right fork, at 2.4 miles go through gate at end of lane, turn to right, passing through two gates between barns and corral, and follow dim road to north, at 2.8 miles go to right about 50 feet around south side of corral and then north along west edge of cultivated field, at 3.1 miles turn right and go east along fence for 0.1 mile to station site, under east-and-west fence line. Marked by standard General Land Office disk in concrete. Reference marks are standard General Land Office disks in concrete. No. 1 is 20.761 meters (68.11 feet) from station in azimuth  $224^{\circ}17'$ . No. 2 is 19.759 meters (64.82 feet) from station in azimuth  $140^{\circ}26'$ .

**G. L. O. Station 2** (Duchesne County, C. I. Aslakson, 1931).—Station is standard quarter-section corner of T. 1 N., R. 2 W., 15 meters (49 feet) west of sharp edge of bluff. To reach from Roosevelt, follow main road north to Neola, go west 1.4 miles, south 0.6 mile, west 3.2 miles, south 0.55 mile, and right (west and northwest) 3.4 miles to top of mesa, follow woods road north about 0.4 mile, and go east (cutting through scrub cedar) to crest of bluff. Marked by standard General Land Office station disk in concrete. Reference and witness marks are standard General Land Office reference disks in concrete. Reference mark no. 1 is 19.196 meters (62.98 feet) from station in azimuth  $222^{\circ}37'$ . No. 2 is 23.570 meters (77.33 feet) from station in azimuth  $137^{\circ}48'$ . Witness mark is 14.10 meters (46.3 feet) from station in azimuth  $267^{\circ}15'$ . Station *Cone* (see description thereof) can be seen in clear weather in azimuth  $323^{\circ}45'18''$ .

**Utah-Colorado milepost 224; G. L. O. Station 4, Utah; G. L. O. Station 4, Colo.** (Uintah County, Utah, Moffat-Rio Blanco Counties, Colo., C. I. Aslakson, 1931).—About 4 miles south of point where U. S. Route 40 crosses State line at K ranch, about 95 yards northwest by north of rock cairn (4 feet in diameter and 8 feet high) on small knoll, on range with rock cairn and highest point on southwest end of Blue Mountain, and about 90 feet south of 1-inch capped iron pipe marking quarter-section corner. To reach from Skull Creek store, go west 18.9 miles to dim road opposite road sign "Denver 310 Miles", turn south and go 0.2 mile, follow left fork 0.6 mile, follow left fork 1.8 miles, and go westerly 0.5 mile to rock cairn on small knoll and station. Milepost is rock about 4 by 4 by 14 inches in size, has "224" scratched on its surface and is lying on the ground. In 1931, it was reported that station was re-marked by standard General Land Office station disk in concrete.

**G. L. O. Station 5 eccentric** (Rio Blanco County, Colo., C. I. Aslakson, 1931).—Identical with reference mark no. 1 of *G. L. O. Station 5* (see description thereof) which is 49.962 meters (163.92 feet) distant in azimuth  $23^{\circ}37'$ .

**G. L. O. Station 5** (Rio Blanco County, Colo., C. I. Aslakson, 1931).—Station is standard corner of secs. 35 and 36, T. 1 N., R. 102 W., of the sixth principal meridian on sixth base line. To reach from Rangely, go west 0.6 mile to schoolhouse, follow left fork and go 0.1 mile, turn left and go 5.9 miles on main-traveled road toward Dragon, go left about 50 feet and go down onto old road, cross wash and go southeast 0.4 mile, go east 0.6 mile along top of ridge to fork, follow left fork 0.2 mile to east edge of timber and end of road (station is about  $\frac{1}{2}$  mile to

southeast), go southeast  $\frac{1}{4}$  mile along top of ridge through sage to highest point visible, and continue southeast along top of ridge (through cedar and pinion) to next low hill and station site. Marked by standard General Land Office disk in boulder. Reference marks are standard General Land Office reference disks in bedrock. No. 1, identical with *G. L. O. Station 5 eccentric* (see description thereof), is 49.962 meters (163.92 feet) from station in azimuth  $203^{\circ}37'$ . No. 2 is 12.790 meters (41.96 feet) from station in azimuth  $286^{\circ}46'$ .

**G. L. O. Station 6** (Grant County, C. I. Aslaksen, 1931; 1934).—About 4 miles northeast of Cisco. The standard corner of secs. 31 and 36, Tps. 20 S., Rs. 23 and 24 E. of the Salt Lake principal meridian, on fourth standard parallel south and Grand River guide meridian. To reach from railroad tracks at east edge of Cisco, follow old abandoned road north-northeast 3.6 miles to intersection of two forks of old highway and railroad, and go about 400 yards southeast across country to station. Marked by standard General Land Office station disk in concrete. Reference marks are standard General Land Office reference disks in concrete. No. 1 is 25.427 meters (83.42 feet) from station in azimuth  $196^{\circ}50'$ . No. 2 is 21.137 meters (69.35 feet) from station in azimuth  $106^{\circ}48'$ . Small rock on skyline in deep cut in ridge is in azimuth  $161^{\circ}53'11''$  from station.

#### GRAND JUNCTION, COLO., TO LORDSBURG, N. MEX., ARC

##### *Principal points*

**Spruce (U. S. G. S.)** (Montrose County, Colo., E. B. Latham, 1934; 1936).—About 45 miles south by east of Grand Junction, about 34 miles west of Montrose, about 31 miles southwest of Delta, about 12 miles north by east of town of Nucla, about 3 miles south of Hocker Cattle Camp, in Uncompahgre National Forest, in northeast corner of sec. 10, T. 48 N., R. 15 W., in grove of aspen trees on high point known locally as "Spruce Mountain." To reach from Monticello, go east on U. S. Highway 450 about 23 miles, then north on State Route 80 about 65 miles to town of Naturita, then north 4 miles to town of Nucla; from bell tower in center of street in Nucla go east 0.5 mile; turn left and go north and northeast 4.8 miles; take right fork and follow dirt road (MTR) northeasterly 6.95 miles; take left fork and go northeast (on MTR) 5.0 miles to white railing bridge over creek; continue north and northwest (on MTR) 5.6 miles to white cattle guard on top of Uncompahgre plateau; continue 0.7 mile (on MTR) to C. C. C. camp on right; continue 0.15 mile to T-fork reached just after crossing white bridge and sign "Delta 30 miles"; take left fork and go westerly along top of plateau 10.3 miles to white cattle guard; continue on 0.25 mile to windy point at edge of rim and plateau; there leave graded road, make U-turn to left, and follow unimproved road southeast along rim 1.3 miles to fork in small opening with poles across road; take left fork down hill and around hill and through timber on rough narrow road 1.1 miles to southeast end of opening in woods. From here pack up trail to highest point and station. Station mark is standard U. S. Geological Survey tablet set in buried boulder. Tablet is stamped "SPRUCE 1934 9715"; boulder is loose, but permanent. Reference marks (1934) are standard reference disks in boulders, note 12c. No. 1 is 24.800 meters (81.36 feet) north-northwest from station in azimuth  $162^{\circ}18'$ . No. 2 is 14.072 meters (46.17 feet) north-northeast in azimuth  $245^{\circ}53'$ .

**Summit** (San Miguel County, Colo., E. B. Latham, 1934; 1936).—About 20 miles east by north of Monticello, Utah, about 17 miles north-northwest of Dove Creek, 5 miles east of Summit Point post office, 4 miles west of State Highway 80,  $2\frac{1}{2}$  miles east of Colorado-Utah boundary line, in northwest part of T. 43 N., R. 19 W., near end of road, and 26 meters (85 feet) west of east edge of flat wooded plateau. To reach from post office in Monticello, go north 0.2 mile; turn right onto U. S. Highway 450 and go 12.6 miles to side road north and mail box marked "W. J. Long." This side road is 4.4 miles west of State line on U. S. Highway 450. Turn left onto side road and go north 9.4 miles; turn right (east) and go 1.95 miles; turn left (north) and go 2.0 miles; turn right (east) and go 2.0 miles; take left (north) fork and go 0.55 mile; turn right (east) and go 0.55 mile to ranch house on left; continue east 0.5 mile to gate; pass through gate, and go 1.0 mile; take right fork or main-traveled road to southeast and go 0.1 mile; take left (east) fork and go 0.55 mile to end of road and station. Station mark is standard disk in surface bedrock, note 2. Reference marks are standard disks in surface bedrock, note 12a. No. 1 is 27.842 meters (91.34 feet) north-northeast of station in azimuth  $209^{\circ}25'$ . No. 2 is 13.757 meters (45.13 feet) southeast in azimuth  $312^{\circ}23'$ . Azimuth mark (1936), note 12a, is on east edge of plateau,  $\frac{1}{2}$  mile north-northeast of station in azimuth  $193^{\circ}04'26''$ .

For notes in regard to marking of stations see page 100. MTR above means main traveled road.

**Lone Cone** (San Miguel-Dolores Counties, Colo., E. B. Latham, 1934).—About 31 miles north-northeast of Dolores, about 20 miles south of Norwood, about 14 miles southwest of Placerville, about  $2\frac{1}{2}$  miles north of Disappointment Creek, in Montezuma National Forest, in sec. 24, T. 42 N., R. 13 W., and on summit of Lone Cone Mountain which is highest in vicinity. To reach from Placerville, go west 15.7 miles toward Norwood to road to south, turn left and follow this road 15.8 miles to point where it curves to right, crosses bridge, and goes up hill; at this point keep straight ahead, going to left on east side of stream, and follow farm road in to Cockrum ranch. From here mountain is in plain view to south-east. Slopes of mountain up to timber line are heavily covered with trees, brush, and down timber. It is about a  $3\frac{1}{2}$  hour ride with pack horses to timber line and about 1 hour and 50 minutes pack to top. Last part of climb is very steep and dangerous. Marked by standard station disk in boulder, note 4. Reference marks are standard reference disks in boulders, note 12c. No. 1 is 11.120 meters (36.48 feet) from station in azimuth  $256^{\circ}11'$ . No. 2 is 10.745 meters (35.25 feet) from station in azimuth  $152^{\circ}08'$ .

**Ute** (Montezuma County, Colo., E. B. Latham, 1934; 1936).—About 12 miles southwest of town of Cortez, on northern boundary of Southern Ute Indian Reservation, in sec. 13, T. 35 N., R. 18 W., and at middle of sharp hogback, on summit of high prominent point known as "Ute Peak", highest mountain in immediate vicinity. To reach from Cortez: Follow U. S. Highway 666 southwest towards Shiprock 3.1 miles to schoolhouse on left reached just after crossing river; turn right (west) off U. S. Highway 666 and go 1.0 mile; turn left (south) and go 1.0 mile; turn right (west) and go 2.0 miles to T-road; turn left (south) and go 0.05 mile; take little-used road leading towards mountain and go 0.3 mile; take right fork and follow old road (keeping to main road) towards mountain 4.5 miles to wire fence and gate; continue 0.1 mile to wire corral. From here head northwest towards main ridge leading off mountain and go to top of ridge, then west and southwest up ridge to highest point and station. Three-hour pack. Top of peak is timbered. Marked by standard disk in boulder, note 5. Reference marks are standard disks in bedrock, note 12a. No. 1 is 12.770 meters (41.90 feet) north-northeast from station in azimuth  $221^{\circ}55'$ . No. 2 is 9.280 meters (30.45 feet) southeast in azimuth  $333^{\circ}30'$ . Azimuth from station to highest point of Shiprock is  $4^{\circ}27'32''$ , and to rock pinnacle is  $346^{\circ}53'52''$ .

**Madden** (La Plata-Montezuma Counties, Colo., E. B. Latham, 1934; 1936).—About 15 miles northwest of Durango, 9 miles north-of-east of Mancos, 7 miles north-northwest of Hesperus, on divide between La Plata and Mancos Rivers, which divide forms county boundary line and also boundary between San Juan and Montezuma National Forests, in sec. 18, T. 36 N., R. 11 W., on high, barren peak, known locally as "Madden Peak", second highest barren peak from south in La Plata Range. To reach from Durango, follow U. S. Highway 160 west about 12 miles to small settlement of Hesperus; from Hesperus postoffice continue west 0.4 mile to side road right, reached just after crossing bridge; cross railroad tracks, and Madden Peak can be seen directly down road. Follow road northward 4.8 miles to ranch home of Mrs. Little and small schoolhouse on left, and just south of road forks. From ranch house trail goes northwest up left side of ridge, swinging to north up to end of trail and cabin, at timber line. From cabin go north and east, and over shale rock, to highest point and station. Forty-minute pack from cabin. Marked by standard disk in bedrock, note 2. Reference marks set in 1934 are standard disks in bedrock, note 12a. No. 1 was 10.168 meters (33.36 feet) southwest from station in azimuth  $67^{\circ}12'$ ; and no. 2, 11.398 meters (37.39 feet) west in azimuth  $131^{\circ}56'$ . In 1936 reference mark reported 10.200 meters (33.46 feet) southwest from station in azimuth  $67^{\circ}12'$ , was named R. M. no. 1 (1936), and one called R. M. no. 1 (1934) was reported 4.582 meters (15.03 feet) east-northeast from station in azimuth  $259^{\circ}43'$ . Azimuth from station to Hesperus Peak, central one of three cairns, is  $192^{\circ}14'37''$ .

**Utah-Colorado boundary milepost 70** (San Miguel-San Juan Counties, E. B. Latham, 1934).—About 20 miles east by north of Monticello, Utah, 12 miles northwest of Dove Creek,  $\frac{1}{2}$  miles west and  $\frac{1}{2}$  mile south of station *Summit* (see description and geographic position thereof), on Colorado-Utah State line, in T. 43 N., and about  $\frac{1}{4}$  miles south of its north boundary. To reach from Dove Creek, go west on U. S. Route 160 to State line, then continue west 4.3 miles on U. S. Route 450, then right (north) 9.2 miles, right (east) 1.8 miles, left (north) 2.0 miles, right (east) 2.0 miles, and left (north) 0.25 mile to milepost. Station is on east edge of road at point where road swerves a little to miss post. Marked by tablet on top of pipe reinforced with concrete and marked "U. S. C. & G. S. 1934."

**G. L. O. Station 12** (Dolores County, Colo., E. B. Latham, 1934).—On the tenth standard parallel north, standard corner of secs. 31 and 36, Tps. 41 N., Rs. 19 and 20 W. of the New Mexico principal meridian. To reach from Dove Creek post office, go west 8.0 miles on U. S. Route 160 to point where highway turns north and old road turns south, turn left (south) and go 1.0 mile to station which is 12 feet from edge of road where it turns east. A new section of highway is being built which crosses present highway 2.0 miles north of station. Marked by standard station disk in concrete, note 1a. Reference marks are standard reference disks in concrete, note 11a. No. 1 is 22.203 meters (72.84 feet) from station in azimuth  $240^{\circ}54'$ . No. 2 is 22.714 meters (74.52 feet) from station in azimuth  $145^{\circ}56'$ .

**Four Corners (G. L. O. Station 1) eccentric** (San Juan County, E. B. Latham, 1934).—Identical with reference mark no. 3 of station *Four Corners (G. L. O. Station 1)* (see description thereof) which is marked by standard General Land Office tablet in concrete monument, distant from station 279.798 meters (917.97 feet) in azimuth  $350^{\circ}15'50''$ . Station is marked by standard General Land Office tablet in concrete post.

**Four Corners (G. L. O. Station 1)** (N. Mex., Ariz., Colo., and Utah boundary lines, E. B. Latham, 1934).—About 36.6 miles (road distance) west of Shiprock, N. Mex., and about 75 yards west of old abandoned stone building. To reach from junction of U. S. Route 666 and State Route 19 in Shiprock, go south 0.6 mile on Route 666, turn right (west) and go 6.0 miles, take right fork and go 15.3 miles to trading post, continue west 7.4 miles on main road to a well-traveled Indian road, turn right and go 0.45 mile, take right fork and go 6.85 miles on main road to station site. Originally marked by stone post 7 feet by 12 inches by 6 inches set 3 feet in ground, and marked on northeast face "Colo.  $37^{\circ}$  N. L."; on southeast face "N. Mex.  $32^{\circ}$  N. L."; on the southwest face "Arizona"; and on northwest face "Utah 1875". In 1931, station was re-marked by standard General Land Office tablet in concrete monument, projecting 2 feet above ground. Originally stamped "G. L. O. #1", and "Four Corners" added in 1934. Reference marks are standard General Land Office tablets in concrete posts. No. 1 is 22.870 meters (75.03 feet) from station in easterly direction. No. 2 is 22.860 meters (75.00 feet) from station in westerly direction. No. 3, identical with station *Four Corners (G. L. O. Station 1) eccentric* (see description thereof), is 279.798 meters (917.97 feet) from station in azimuth  $170^{\circ}15'51''$ .

#### SALINA, UTAH, TO GRAND CANYON, ARIZ., ARC

##### *Principal points*

**Tantlus** (Garfield County, Charles Pierce, 1934).—In Powell National Forest, about 2 miles northwest of Wildcat Ranger Station, on most northeastern point of Boulder Top Range, at an elevation of 10,787 feet. To reach from Teasdale, follow Forest Service road 20 miles to Wildcat Ranger Station; take trail to northward marked "Boulder Top and Chokecherry"; take left fork marked "Boulder Top", and continue to summit. From trail end on summit station is about 200 yards to east, on point of ridge. Station mark is standard disk in boulder, note 2. Reference marks are standard disks in boulders, note 12a. No. 1 is west of station, 17.448 meters (57.24 feet) distant in azimuth  $96^{\circ}19'$ ; no. 2 is to north, 8.332 meters (27.34 feet) from station in azimuth  $174^{\circ}20'$ ; no. 3 (azimuth mark) is to southwest, on smooth, bare rock slope, about  $\frac{3}{8}$  mile from station in azimuth  $49^{\circ}56'28''$ . Station *Tantlus (U. S. F. S.)* (see geographic position and description thereof) is 12.770 meters (41.90 feet) from station in azimuth  $354^{\circ}49'$ . Pack to station requires  $1\frac{1}{2}$  hours.

**Bowns Point** (Garfield County, Charles Pierce, 1934).—Five miles southwest of Wildcat Ranger Station, about 1 mile south of Bowns Reservoir, on southeastern point of rim of Boulder Top. To reach from Teasdale, follow road to Powell National Forest east 8.6 miles to Grover; turn sharply to right at ranch house and go 0.4 mile; take right fork (sign reads "Boulder 20, Wildcat Ranger Station 10") and go 11.2 miles; turn right off road and go 0.1 mile to end of truck travel. Continue up trail to sign "Trail" carved on tree with arrow carved below it; take right fork and continue to open meadow and sign "Boulder Top 1 mile, Pleasant Creek Meadow 4 miles"; follow Boulder Top trail 1.0 mile to top of rim, thence down ridge 100 yards to station. About 3-hour pack. Station mark is standard disk in outcropping boulder, note 2. Reference marks are standard disks in outcropping boulders, note 12a. No. 1 is south of station, 4.820 meters (15.81 feet) distant in azimuth  $2^{\circ}14'$ ; no. 2 is to north-northwest, 9.393 meters (30.82

feet) distant in azimuth  $144^{\circ}23'$ . Station *Bowns Point* (U. S. F. S.) (see geographic position and description thereof) is 2.180 meters (7.15 feet) from station in azimuth  $143^{\circ}55'$ .

**Pockets** (Garfield County, Charles Pierce, 1934; 1936).—On high mesa in Water Pocket Fold, long range of hills lying east of Escalante River and west of Hoxie Creek (locally known as Grand Gulch). From north, station mesa appears as long ridge broken in middle by deep saddle in center of which is small sheer-faced butte. Station is on west end of mesa, to west of saddle, and at edge of sheer rock cliffs which form west end of mesa. It is 10 feet east of edge of cliff, about 200 yards south of most northwestern point of mesa, and on large rounded rock outcrop. Reached in 1936 from East Boulder Ranch (Bowns Ranch), which is 11.0 miles south of Notom, by driving south down Grand Gulch 25.0 miles to gate in drift fence; continue south 2.5 miles to point where wash comes in from west and end of truck travel. From here, pack west up gravel wash through canyon in Water Pocket Fold 4.0 miles to high ridge that runs south towards station mesa. Follow south along top of ridge to base of mesa 1.0 mile; pack to top of mesa and go south 0.5 mile to rim rock; ascend rim rock on northeast side of mesa and go west 0.25 mile to highest point on west edge of mesa and station. Four-hour pack. Mark is standard disk station mark in outcropping bedrock, note 2. Reference and azimuth marks are standard disks in outcropping bedrock, note 12a. No. 1 is flush with outcrop, and is 7.523 meters (24.68 feet) north of station in azimuth  $212^{\circ}45'$ . No. 2 is flush in outcrop, and 4.205 meters (13.80 feet) east of station in azimuth  $301^{\circ}34'$ . No. 3 (azimuth mark) is on large dome-shaped rock, about  $\frac{1}{4}$  mile southwest from station in azimuth  $292^{\circ}27'54''$ . Distance between reference marks no. 1 and no. 2 is 28.01 feet.

**Collet** (Kane County, Charles Pierce, 1934).—About 21 miles (air line) south of town of Escalante, on highest point of mountain known locally as Escalante Mountain. To reach from Escalante, go southeast on Boulder Road 5.4 miles; turn shortly after crossing deep ravines and go 0.2 mile; take right fork and go 5.8 miles; continue straight ahead 8.6 miles to end of truck travel at Collet Creek (known locally as Twenty-Mile Creek). Travel on horse up right side of Collet Creek about 15 miles to mouth of Long Canyon, thence to left up Long Canyon 2 miles to trail up steep slope to left (southeast) to summit of Big Flat, thence across flat (south) 4 miles to highest point and station. Road is long and hard to follow. Mr. Hiram Gates, of Escalante, knows road and station site. Station mark is standard disk in outcropping bedrock, note 2. Reference marks are standard disks in outcropping bedrock, note 12a. No. 1 is northeast of station, 4.508 meters (14.79 feet) distant in azimuth  $210^{\circ}46'$ . No. 2 is to northwest, 6.880 meters (22.57 feet) distant in azimuth  $126^{\circ}54'$ .

**Steep** (Garfield County, Charles Pierce, 1934).—In Powell National Forest, 22 miles (air line) south-southeast of town of Teasdale, about 150 yards south of point where Forest Service road known as "Grover-Boulder Road" crosses saddle between Steep and Frisky Creeks, on prominent knob at northwest end of long ridge, and about 50 yards south-southwest and up-slope from small group of quaking aspen trees. To reach station, follow road from Teasdale to Powell National Forest east 8.6 miles to Grover; turn sharply to right at ranch house and go 0.4 mile; take right fork (sign reads "Boulder 20, Wildcat R. S. 10") and follow road to saddle described above, and south 150 yards to station. Station marked by standard disk in outcropping bedrock, note 2. Reference marks are standard disks in outcropping bedrock, note 12a. No. 1 is northwest from station, 5.855 meters (19.21 feet) distant in azimuth  $105^{\circ}03'$ ; No. 2 is to southwest, 6.582 meters (21.59 feet) distant in azimuth  $21^{\circ}29'$ . Azimuth mark is standard disk in boulder, note 12c, about  $\frac{1}{4}$  mile north-northeast of station in azimuth  $207^{\circ}59'08''$ .

**Navajo Mountain** (San Juan County, Charles Pierce, 1934; 1936).—About 40 miles northwest of Kayenta, Arizona, about 4 miles north of Rainbow Lodge, near Rainbow Natural Bridge, on highest point of prominent peak known as Navajo Mountain (elevation 10,416 feet), on sandstone outcrop which forms highest point of mountain. Mountain is in narrow strip of land between Colorado River and Arizona State line and is highest in vicinity. Mark was placed at spot marked by target established by Fairchild Aerial Surveys and is probably on site of old U. S. Geological Survey Station, only sign of which is clearing of timber done years ago. To reach from Inscription House Trading Post, go north 35 miles on unimproved road, following Rainbow Lodge signs to lodge from here there are two trails leading up mountain. The Horse trail circles base of mountain to right (east) before starting to climb and leads by War God Spring, thence southwest about  $\frac{1}{2}$  mile, thence west up steep slope and along ridge to station site

For notes in regard to marking of stations see page 100.

(4-hour horse pack). Other trail is shorter and steeper and suitable only for foot travel. Marked by standard station disk in bedrock or boulder, note 2 or 4. Reference marks are standard reference disks in outcropping bedrock, note 12a. No. 1 is 6,690 meters (21.95 feet) north-northwest of station in azimuth  $160^{\circ}01'$ . No. 2 is 6,746 meters (22.13 feet) east-southeast of station in azimuth  $297^{\circ}06'$ . Distance between reference marks is 41.05 feet.

**Keam** (Coconino County, Ariz., Charles Pierce, 1934).—Thirty miles by road west of Kaibito Trading Post, 12 miles southeast of Lees Ferry bridge, about 9 miles southwest of prominent flat-topped butte known locally as "Clachee", near southwest end of low flat-topped butte, southwest end of which breaks off in steep white slope, and northwest end in gradual slope. To reach from Tuba City, drive about 25 miles east to Red Lake Trading Post; turn left at bottom of hill and sign "Kaibito Trading Post" and go 21.2 miles to point reached 1.3 miles before Kaibito Trading Post would be reached; turn sharply to left ( $170^{\circ}$ ) and go 0.4 mile; turn right and go 0.7 mile; take left fork, go 0.5 mile, continue straight ahead across dim crossroad and go 1.5 miles; turn right and go 0.6 mile; turn right and go 0.8 mile; turn left and go 0.6 mile; take right fork and go 0.5 mile; take right fork (large blaze on cedar tree on right) and go 10.6 miles; turn sharply left onto dim road (small cairn on left) and go 4.8 miles, dropping into valley and switching back sharply to left ( $170^{\circ}$ ) go 0.6 mile, turn left, go 0.6 mile, continue straight ahead at oblique crossroad and go 0.4 mile; take right fork and go 3.2 miles; take left fork and go 0.6 mile, past small dirt dam on right; continue 0.8 mile, take right fork and go 0.6 mile; take right fork and go 1.0 mile, pass stone-covered dirt dam on left, and continue on 0.4 mile; turn left off road and go 0.3 mile to foot of butte, thence southwest  $\frac{1}{4}$  mile to station on summit of butte. Roads given in above description are little-used wagon roads, subject to change. Station mark is standard disk in surface of rock level with ground, note 2. Reference marks are standard disks in rock rim at edge of butte, note 12a. No. 1 is 14,310 meters (46.95 feet) southwest from station in azimuth  $62^{\circ}45'$ . No. 2 is 14,595 meters (47.88 feet) southeast in azimuth  $326^{\circ}38'$ . No. 3 (azimuth mark) is in large boulder on small hill at base of butte,  $\frac{1}{8}$  mile north of station in azimuth  $176^{\circ}05'46''$ . Azimuth from station to Paria Needle, 12 miles to west, is  $109^{\circ}53'49''$ .

**Cedar Mountain** (Kane County, Charles Pierce, 1934).—About 4 miles southwest of Wahweap Creek, 4 miles northeast of Paria Creek, on highest point of long ridge known locally as "Cedar Mountain." To reach from Kanab, follow Johnson road east 8.6 miles; turn right and go 7.7 miles; take left fork with sign "Pahreah" and go 12.8 miles; keep to left-hand road, passing old corrals on left, and go 17.0 miles to Paria River and Pahreah Ranch, now owned by James E. Smith. From ranch, station is reached by wagon or horseback along road down Paria River about 10 miles, thence eastward over small ridge and along wagon tracks around southern end of blue-grey hills, continuing in easterly direction to Wahweap Canyon, approximately 20 miles. Follow down canyon about 4 miles, passing Cottonwood Spring, and on 6 miles to small spring on left and red sandy ridge on right. Turn right, following up red ridge, and go across country in westerly direction to mountain and station, approximately 5 miles, with no trail. From Pahreah Ranch to station is 2-day trip. Camp at White Rock Springs (alkaline water), about 3 miles west of Wahweap Canyon. Station mark is standard disk in outcropping bedrock, note 2. Reference marks are standard disks in outcropping bedrock, note 12a. No. 1 is 15,385 meters (50.48 feet) north from station in azimuth  $142^{\circ}14'$ . No. 2 is 10,935 meters (35.88 feet) southwest in azimuth  $23^{\circ}30'$ . Azimuth from station to *Boundary monument no. 130* (see geographic position thereof) distant 590.70 meters (1,938.0 feet) is  $345^{\circ}38'05''$ ; and to *Boundary monument no. 140* (see geographic position thereof)  $271^{\circ}51'46''$ .

**Paria** (Coconino County, Ariz., Charles Pierce, 1934).—On small flat-topped mesa, on southern edge of Paria Plateau. There are several mesas on this plateau, station mesa being about  $\frac{1}{4}$  mile in area, the one nearest to Lees Ferry Bridge, and almost directly above it in westerly direction. On southern point of mesa is large cairn established by Powell Survey. Sharp sandstone butte known as Paria Needle is about 300 yards northwest of, but not visible from station. To reach from House Rock on U. S. Highway 89, go north on winter road 9.5 miles to dim right-hand fork between two piles of stones; turn right and go 1.4 miles to corral; turn sharp right and go 19.3 miles to point opposite Joe's Ranch (corrals and reservoir); continue past ranch, following large swale 3.3 miles; continue east 1.0 mile to saddle opposite and south of white rock point; continue southeasterly 0.9 mile to another saddle, and on 0.5 mile to sandstone gap; pass through gap and go 1.5 mile to shallow sinkhole. From here cairn and station bear  $115^{\circ}$  magnetic.

Follow this bearing 3.5 miles to end of truck travel, thence 20-minute hike to station. Station marked by buried boulder. Reference marks are standard disks in bedrock, note 12a. No. 1 is 10.350 meters (33.96 feet) southeast of station in azimuth  $319^{\circ}10'$ . No. 2 is 12.560 meters (41.21 feet) southwest in azimuth  $12^{\circ}16'$ . No. 3 (azimuth mark) is in sandstone ledge about  $\frac{1}{4}$  mile to northeast in azimuth  $239^{\circ}09'08''$ . *Paria* (U. S. G. S.), *cairn* (see geographic position and description thereof) is 13.40 meters (44.0 feet) from station in azimuth  $337^{\circ}38'$ .

**Brown** (Coconino County, Ariz., Charles Pierce, 1934).—Two miles west of Colorado River, 1 mile east of Wahweap Canyon,  $\frac{1}{2}$  mile south of large rock mountain, and on small brown knoll. To reach from Kanab, Utah, go east on Johnson road 8.6 miles; turn right and go 7.7 miles; take left fork at sign reading "Pahreah" and go 12.8 miles, keeping to left-hand road passing old corral on left, and continue 17.0 miles to Paria River, and Pahreah Ranch owned (1934) by James E. Smith. From ranch further travel must be by wagon or on horseback. Mr. Smith knows location of station and can furnish transportation. Route from ranch leads down Paria River approximately 10 miles, thence eastward over small ridge, following wagon tracks around southern end of blue-grey hills and continuing in easterly direction approximately 20 miles to Wahweap Canyon. Go down canyon about 4 miles, passing Cottonwood Spring; continue 12 miles down canyon to Wahweap Spring, and on about  $1\frac{1}{2}$  miles to place where old road leads northeast up most easterly of two washes coming in from north; follow old road approximately  $\frac{1}{2}$  mile; turn right (east) out of wash and continue 1 mile, passing 150 feet to right of spring of good water, then bear right (southeast), passing to right of large rock dome; continue about  $\frac{1}{2}$  mile south-southeast to small brown knoll and station. From Pahreah Ranch to station is two-day trip. Camp at White Rock Springs (alkaline water) about 3 miles west of where one enters Wahweap Canyon. Station mark is standard disk in outcropping bedrock, note 2. Reference mark no. 1 is standard disk in outcropping bedrock, note 12a, 13.260 meters (43.50 feet) from station in azimuth  $185^{\circ}29'$ . *G. L. O. boundary mark* (see geographic position and description thereof) is 16.982 meters (55.72 feet) east of station in azimuth  $258^{\circ}16'$ . Azimuth from station to *Boundary monument 140* (see geographic position thereof) is  $90^{\circ}01'12''$  and to *Boundary monument 143* (see geographic position and description thereof), distant 556.565 meters (1,826.00 feet), is  $90^{\circ}19'27''$ .

#### Supplementary points

**Tantlus** (U. S. F. S.) (Garfield County, Charles Pierce, 1934).—Forest Service mark 12.770 meters (41.90 feet) in azimuth  $354^{\circ}49'$  from station *Tantlus* (see geographic position and description thereof).

**Bowns Point** (U. S. F. S.) (Garfield County, Charles Pierce, 1934).—Forest Service mark 2.180 meters (7.15 feet) in azimuth  $143^{\circ}55'$  from station *Bowns Point* (see geographic position and description thereof).

**G. L. O. boundary mark** (Kane County, Utah, Coconino County, Ariz., Charles Pierce, 1934).—Mark is 16.982 meters (55.72 feet) in azimuth  $258^{\circ}16'$  from station *Brown* (see geographic position and description thereof).

**Boundary monument 143** (Kane County, Utah, Coconino County, Ariz., Charles Pierce, 1934).—Mark is 556.565 meters (1,826.00 feet) in azimuth  $90^{\circ}19'27''$  from station *Brown* (see geographic position and description thereof).

**Wahweap** (Coconino County, Ariz., Charles Pierce, 1934).—On summit of first range of hills  $\frac{3}{4}$  mile south of Wahweap Creek, 1 mile west of where trail from Lees Ferry descends to creek. To reach from Kanab, Utah, go to ranch of James E. Smith, and on to Wahweap Spring (see description of station *Brown*). Turn right and follow Lees Ferry trail out of canyon for  $\frac{1}{2}$  mile, bear to left over sandy knoll towards highest ridge in vicinity and station, which is on extreme northern end of ridge, about 50 yards east of highest part of ridge. Station mark is standard disk in concrete, note 1c. Reference marks are standard disks in outcropping bedrock, note 12a. No. 1 is 16.437 meters (53.93 feet) north from station in azimuth  $192^{\circ}35'$ . No. 2 is 16.242 meters (53.29 feet) east-northeast in azimuth  $254^{\circ}45'$ . Azimuth from station to *Boundary monument 140* (see geographic position thereof) is  $196^{\circ}07'56''$ .

**Paria** (U. S. G. S.), *cairn* (Coconino County, Ariz., Charles Pierce, 1934).—U. S. Geological Survey mark 13.40 meters (44.0 feet) in azimuth  $337^{\circ}38'$  from station *Paria* (see geographic position and description thereof).

For notes in regard to marking of stations see page 100.

## UINTAH-OURAY INDIAN RESERVATION ARC

*Principal Points*

**Altonah** (Duchesne County, W. R. Porter, 1936).—On Uintah-Ouray Indian Reservation,  $5\frac{1}{4}$  miles north-northeast of town of Altonah, in northeastern part of T. 1 S., R. 4 W., on easterly one of two bare ridges. Station *Altonah* (U. S. G. S.) (see geographic position and description thereof) is in partially torn-down cairn, 3.103 meters (10.18 feet) (slope distance) from station in azimuth  $271^{\circ}47'$ . To reach from Altonah: Go north on road which passes through west edge of town 1.1 miles to crossroad. This road crosses irrigation ditch on bridge just as it leaves village. Continue straight ahead (north) from crossroads 1.1 miles to where road forks just after crossing irrigation ditch; ford ditch and turn sharply to left and go 0.55 mile on track road to dim forks; keep to right and go north-west and north up valley 1.85 miles to intersection with graded road coming down hill from right. There is dirt tank and stockyard here. Turn right onto graded road, go up ridge, and thence northeast total of 0.75 mile to rock cairn on left of road and azimuth mark. From this point station ridge can be seen northwest. Station hump is just to left of more distant hump, which appears from here to be highest hump, but is not. Continue on main graded road to point about 0.1 mile beyond curve where telephone line crosses road, about  $\frac{1}{2}$  mile from azimuth mark. Here track road turns off to left and goes toward station ridge. Follow track road about 0.3 mile, leave road, and proceed westward through sagebrush to foot of ridge. Climb ridge to west to top and station. Mark is standard disk in boulder, note 4. Reference and azimuth marks are standard disks in boulders, note 12c. Reference mark no. 1 in boulder about 18 inches in diameter, and 12.385 meters (40.63 feet) (slope distance) west of station in azimuth  $60^{\circ}47'$ . No. 2 is in boulder 15 inches in diameter, 43.20 feet south of *Altonah* (U. S. G. S.) and 13.730 meters (45.05 feet) (slope distance) from station in azimuth  $344^{\circ}24'$ . Distance between reference marks is 52.97 feet (slope distance). Azimuth mark is on road to station (see above), in boulder nearly flush with ground, 60 feet west of center line of north-south graded road,  $47\frac{1}{2}$  feet west of rock cairn, and about  $1\frac{1}{4}$  miles southeast of station in azimuth  $346^{\circ}38'29''$ . Following distances and azimuths are from station: Altonah, creamery, slim black stack,  $5\frac{1}{4}$  miles,  $359^{\circ}52'33''$ ; Mountain Home, school chimney, 7 miles,  $37^{\circ}11'26''$ ; Kings Peak, cairn, 20 miles,  $178^{\circ}13'00''$ ; Mt. Emmons, cairn, 16 miles,  $186^{\circ}17'01''$ .

**Roosevelt** (U. S. G. S.) (Uintah County, W. R. Porter, 1936).—Established by U. S. Geological Survey in 1913, in sec. 30, T. 2 S., R. 1 E., about  $2\frac{1}{4}$  miles south and  $2\frac{1}{4}$  miles east of town of Roosevelt, on south-central rim of largest and most easterly of three small buttes. Ridge is flat-topped and bare, and drops off abruptly on all sides. It is about 57 feet wide and 150 yards long. To reach from Roosevelt: Go north on main street to where U. S. Highway 40 turns east; follow U. S. Highway 40 east 0.8 mile to side road right; turn right, south, onto graded road and go 2.0 miles to side road left; turn left, east, and go 1.05 miles to ranch buildings on right and stone garage built in hillside on left; continue straight ahead on main-traveled road 1.25 miles to where road skirts north end of butte and end of truck travel. Pack northerly up over rim rock to station. Ten-minute pack. Azimuth mark is reached from end of truck travel by going south-southeast 0.4 mile to rocky ridge and mark. Mark is standard U. S. Geological Survey disk set flush with rock as described in note 2. It is 6 feet north-northwest of south edge of ridge, and 51 feet south-southeast of north edge of ridge. Reference mark no. 1 is standard disk in boulder, flush with ground, note 12c, 12 feet south of north edge of ridge, and 13.565 meters (44.50 feet) north-northwest of station in azimuth  $170^{\circ}18'$ . Reference mark no. 2 is standard disk in bedrock, note 12a, 18 feet north of south edge of ridge, and 8.985 meters (29.48 feet) west-southwest from station in azimuth  $76^{\circ}39'$ . Distance between reference marks is 54.89 feet. Azimuth mark is standard disk in rock, note 12a, about 5 feet in diameter projecting 8 inches above ground; it is on rocky ridge south-southeast of station, 200 feet west of point of ridge, 50 feet south of base of ridge, and approximately 0.8 mile from station in azimuth  $325^{\circ}22'16''$ . Azimuth from station to *Myton water tank* (see geographic position and description thereof), distant  $8\frac{1}{4}$  miles, is  $53^{\circ}08'16''$ .

**Antelope** (U. S. G. S.) (Duchesne County, W. R. Porter, 1936).—About  $13\frac{1}{2}$  miles south and 6 miles west of Myton, 10 miles south and 10 miles east of Duchesne, on bare knoll with scattering cedars around edges, about halfway between Wells Draw and Antelope Canyon, and in sec. 22, T. 9 S., R. 15 E. There are many similar knolls to west and south, and higher ground to south. To reach from Myton, go west 0.45 mile on U. S. Highway 40 to black and yellow

water tank; continue west 0.8 mile to graded side road; leave highway and go south and west 0.6 mile to three forks; take middle fork up hill and along top of mesa 1.1 miles to forks and sign to Price; take right fork and follow bladed road southwest and south 3.65 miles to bridge with white railing; continue south on bladed road 1.4 miles to fork; leave bladed road, take right fork on trail road 0.2 mile to fork; take left fork (main trail) and go 1.7 miles to fork; take either fork and go 1.75 miles to crossroads with U. S. Geological Survey bench mark (M-74-1934 elevation 5,924.2 feet) on right; continue southwest 2.0 miles to very dim fork, take left fork (southwest) 0.2 mile to fork; take left (main) fork southwesterly 0.8 mile to top of small rise; leave road and go right (west) along slope of hill to north side of creek bottom 0.75 mile to top of knoll and station site. Marked by standard U. S. Geological Survey station disk in outcropping bedrock. Reference marks are standard reference disks in concrete, note 11a. No. 1 projects 12 inches, and is 14.944 meters (49.03 feet) southwest of station in azimuth  $39^{\circ}47'$ . No. 2 projects 8 inches, and is 14.633 meters (48.01 feet) west-northwest of station in azimuth  $113^{\circ}07'$ . Distance between reference marks is 58.01 feet. Azimuth mark is standard disk in concrete, note 11a, projecting 8 inches, and 0.75 mile east-northeast of station in azimuth  $248^{\circ}01'28''$ .

**Farm Creek Pass** (Duchesne County, W. R. Porter, 1936).—On Uintah-Ouray Indian Reservation, 4 miles east and 6 miles north of Tabiona, on divide between Rock Creek and Farm Creek, at head of first gulch north of Dick Hollow, on highest point of small bare rocky north-and-south ridge, which is narrow and has timber at north end. From south and west this ridge appears as middle one of three humps of station mountain. To reach from Tabiona: Follow main road north and west 4.1 miles to sharp left turn with dirt road leading off to right (east). Turn right onto dirt road (Farm Creek Pass Road) and follow to summit of pass. From summit, station is hidden from view by sharp peak to north (left) of pass. Continue over summit 0.15 mile to where track road leads left and main road swings to right, going down past Ranger's cabin to Rock Creek. Take left fork (track road) and drive up gulch north 0.3 mile to approximate end of truck travel. Good camp ground here. Covered spring of good water is few yards southeast of small corral. Truck can be driven  $\frac{1}{4}$  mile further up valley to right. Keep to right-hand trail up this valley; it soon develops into well-worn Forest Service trail. Continue on this trail until it comes out into clearing high up on right (east) side of mountain. Here, trail dips down again and passes through grove of quaking aspen trees. Leave trail here and work up through trees to west; above quaking aspen trees one reaches clearing with steep slope ahead covered with deadfalls. Continue up this slope, which forms sort of valley, to top of ridge; thence left along top of ridge which is timbered to crest of mountain; bear to right (northerly) along crest to top of bare ridge and station. About 1-hour pack. Mark is standard disk in boulder, note 4. Reference and azimuth marks are standard disks set in boulders, as described in note 12c. Reference mark no. 1 is on west slope of ridge, 10 yards west of crest, and 9.590 meters (31.46 feet) (slope distance) west of station in azimuth  $69^{\circ}14'$ . No. 2 is on west slope of ridge, 5 yards west of crest, and 8.670 meters (28.44 feet) (slope distance) north of station in azimuth  $155^{\circ}40'$ . Distance between reference marks is 40.69 feet (slope distance). Azimuth mark is on second small hump south of station peak, 1 foot north of small cairn, and 150 yards (slope distance) south of station in azimuth  $344^{\circ}09'52''$ .

**Cottonwood** (Duchesne County, W. R. Porter, 1936).—About 9.5 miles (air line) south and 4.0 miles west of town of Duchesne, 2.0 miles south of north boundary of Uinta National Forest, on timbered ridge that lies between Cottonwood Creek and Tabby Creek, and about 0.25 mile west of corner common to secs. 19, 20, 29, and 30, T. 9 S., R. 13 E. Station ridge runs southwest and northeast, and is higher to southwest. To reach from Duchesne post office: Drive east 0.25 mile on U. S. Highway 40 to street running south; turn right off U. S. Highway 40 and go south and east on main-traveled road 0.4 mile to bridge over Strawberry Creek; cross bridge and continue 1.85 miles to fork; take right fork and go east 0.1 mile; take right fork and go southwest up draw 1.4 miles; take left fork (MTR) and go 1.05 miles to forks in wash; take left fork and go 0.8 mile to crossroads; continue straight ahead (southwest) 0.7 mile to forks; take either fork and go south up small draw, leaving main draw, 1.25 miles to forks; take right fork and go south 0.1 mile to fork and U. S. Geological Survey B. M. on right; take right fork (MTR) and go southerly 0.55 mile to two dim forks about 50 yards apart; keep to left forks (MTR) for 0.25 mile; take right fork, (southwest) and go 0.2 mile; take left fork and go 0.55 mile to forks; then left 0.1 mile to deep wash; cross wash and continue on to another U. S. Geological Survey B. M. (elevation, 6,201.3 feet) on right. Continue south (on MTR) 0.25 mile to forks,

take right fork, cross wash, and go up hill in southerly direction to top of ridge, thence along top of ridge 1.5 miles to another U. S. Geological Survey B. M. on right; from here go east and south (on MTR) down grade 0.3 mile to forks; take right fork and go southwesterly upgrade along ridge 0.85 mile to fork; take left fork southwesterly (on MTR) along top of ridge through timber 5.7 miles to triangle blazed on tree on right. Station is 30 yards west of this point, and is 3.45 miles northeast, by road, from Forest Service boundary-line fence. Surface mark is standard disk station mark in concrete post projecting 4 inches above ground, note 1a. Underground mark is standard disk station mark in concrete, note 7a. Reference marks are standard disks in concrete posts, note 11a. No. 1 projects 4 inches above ground, and is 24.216 meters (79.45 feet) north-northwest from station in azimuth  $170^{\circ}05'$ . No. 2 projects 4 inches, and is 32.004 meters (105.00 feet) northeast of station in azimuth  $219^{\circ}19'$ . Distance between reference marks is 68.65 feet. Azimuth mark is standard disk set in concrete in top of iron pipe embedded in ground and projecting about 8 inches above surface, and 0.5 mile west-southwest from station in azimuth  $63^{\circ}08'42''$ .

**Red** (Wasatch County, W. R. Porter, 1936).—In Uinta National Forest, about 35 miles west-northwest of Duchesne, 22 miles east-northeast of Heber, 5 miles south of Wolf Creek Pass and camp grounds, in sec. 10, T. 1 S., R. 10 W., on summit of high, prominent, and almost bald mountain known to Forest Service as Red Creek Mountain, and marked on U. S. Geological Survey map as Tabbie Mountain. This mountain is on divide between west fork of Duchesne River to north and Currant Creek to south, and just west of head of Red Creek. To reach from Duchesne: Follow Kamas Road north and northwest, 49.5 miles to summit of Wolf Creek Pass and camp grounds; immediately west of signboard at summit bear to left (west) on new Forest Service road leading west along summit of ridge between west fork of Duchesne River and Provo River. Follow this main road, which has no well-marked branches, west 10.5 miles to where telephone line crosses it and another road leads back (east) to Lake Creek Ranger Station, visible from junction; continue straight ahead on main road 1.85 miles to junction at signboard on summit near small pond; road straight ahead goes to Heber; turn left onto Currant Creek Road and follow main road south 3.65 miles to signboard on left; turn left (east) onto Currant Creek Ridge Road and follow it (no forks) 11.6 miles to dim forks; from here main trail descends into basin; keep to right on dim tracks along ridge 0.45 mile to where road is seen passing on two routes left slope of smooth bare hogback; follow road to right (south) to top of hogback and then east along top of hogback to end of truck travel at point where hogback narrows down and becomes rocky. Timbered basin is on north side of this point, hogback dropping sharply into it. Station mark is standard station disk in boulder, note 4. Reference and azimuth marks are standard disks in boulders, note 12c. No. 1 is on south slope of peak, 26.450 meters (86.78 feet) south of station in azimuth  $354^{\circ}28'$ . No. 2 is on south slope of peak, 36.125 meters (118.52 feet) southwest of station in azimuth  $65^{\circ}04'$ . Distance between reference marks is 120.00 feet. These are all slope distances. Azimuth mark is on highest point of north-south ridge which connects peak with large green hogback ridge to south, and about  $\frac{1}{2}$  mile south-southwest from station in azimuth  $39^{\circ}53'33''$ .

**Strawberry** (Wasatch County, W. R. Porter, 1936).—About 10 miles northeast of Soldier Summit, in sec. 12, T. 5 S., R. 10 W., on northeasterly and slightly lower of two main summits of Strawberry Mountains, and within boundaries of Uinta National Forest. Peak is an almost bare round-topped ridge which ascends to north and south, and lies between Slab Canyon on west and head of Pine Hollow Canyon on southeast. To reach from Duchesne: Go southerly 27.0 miles on State Highway 33 to summit of road; continue 1.0 mile to buildings of Utah Highway Commission on east side of road; from here continue 0.2 mile down grade to road on right; leave highway and turn right (west) and go 18.75 miles to fork and sign on left reading "Soldier Summit"; keep right fork straight ahead for 4.15 miles to old pole corral and end of truck travel; from left side of corral, follow plain trail which can be seen climbing face of the mountain diagonally to top of plateau; from here go north and northeast 1.0 mile to top of plateau and "Slab Canyon" sign; keep right-hand (Slab Canyon) trail, and go 0.5 mile northeast to fork and another "Slab Canyon" sign; take right-hand lower fork about 1.25 miles to saddle between heads of canyons to north and south and another signboard; take right-hand trail to southeast up ridge, and follow circling course along ridges to southeast and north about 1.25 miles to station site. Main trail passes over summit of mountain. Back-packing requires  $2\frac{1}{2}$  hours. Water at seep springs to right of corral at end of road, also at spring to right of road 8.65 miles west of State Highway 33, and at snow banks near summit. Marked by

standard station disk in pipe, note 6a. Reference marks are standard reference disks in buried boulders 6 inches in diameter and projecting 4 inches above ground. No. 1 is 12.479 meters (40.94 feet) west-southwest of station in azimuth  $59^{\circ}11'$ . No. 2 is 7.586 meters (24.89 feet) northwest of station in azimuth  $169^{\circ}41'$ . Distance between reference marks is 54.79 feet. Azimuth mark is station Strawberry Peak (U. S. G. S.), originally marked by cross on rock, but remarked in 1936 by standard disk in outcropping bedrock, note 12a; it is about 5 feet east-southeast of 6-foot rock cairn, on peak higher than station peak, and 1.5 miles southwest of station in azimuth  $77^{\circ}46'26''$ .

**Buck** (Uintah County, W. R. Porter, 1936).—About 25 miles south-southeast of Ouray, 24 miles west-southwest of Watson, in or near  $SE\frac{1}{4}$  sec. 27, T. 12 S., R. 21 E., on highest point of cedar-covered ridge lying between Willow Creek on west and Sand Draw on east, about 2 miles northwest of head of Buck Canyon, on highest point in vicinity, on small knoll, 15 feet northwest of southwest edge of knoll, and 32 feet northeast of its southwest edge. Station knoll slopes off abruptly to southeast and south and gently to southwest and west. To reach from Ouray, drive south across bridge over Green River 3.0 miles to bridge over White River; cross bridge and continue on main trail (left fork) 2.0 miles; take right fork (south) down into rocky canyon and go 4.4 miles to stone house on Willow Creek; continue up Willow Creek 0.85 mile to junction with Hill Creek road; take left fork and go up Willow Creek Canyon (there is only one road up canyon) 23.05 miles to road leading left up side canyon; turn left (east) and go 3.6 miles to crossroads at head of Buck Canyon; turn left (north) and go 0.4 mile to dim sheep wagon road on left; turn left onto this road and follow rim northwesterly 1.25 miles to fork; take right fork and go along rim 1.4 miles to where well-beaten trail bears to right; turn to right up steep grade and go 0.15 mile; leave trail and drive to right (easterly) across country along ridge 0.35 mile to top of knoll and station. Station mark is disk in outcropping bedrock, note 2. Reference and azimuth marks are standard disks in outcropping bedrock, note 12a. No. 1 is 6 feet northeast of southwest edge of station knoll, and 7.244 meters (23.77 feet) southwest from station in azimuth  $53^{\circ}35'$ . No. 2 is at west edge of station knoll, and 12.290 meters (40.32 feet) west-northwest from station in azimuth  $108^{\circ}25'$ . Distance between reference marks is 32.95 feet. Azimuth mark is 18 feet east of rock rim, 30 feet west of trail road, and about 0.5 mile south-southeast of station in azimuth  $341^{\circ}25'18''$ .

**Maud** (Duchesne County, W. R. Porter, 1936).—About  $33\frac{1}{2}$  miles (air line) due south of town of Roosevelt, near southeast corner of Duchesne County, in northeast corner of sec. 33, T. 11 S., R. 17 E., on first high range of hills north of Minnie Maud Creek, at east end of Bad Land Cliffs, about 4 miles west of where Minnie Maud Creek empties into Green River, on middle one of three hills about  $\frac{1}{4}$  mile apart. Station hill drops off to Minnie Maud Creek very sharply, and cliffs are almost vertical. To reach station from Pariette Gilsonite Mine (see description of station *Bench*), keep to main fork over creek and follow unimproved road southeast 1.8 miles to fork in wash; take left fork (south) up out of wash 0.3 mile to old mine and steam boiler on right; continue on main-traveled road east and south 0.45 mile to fork and old mine on right; take left fork and follow main-traveled road straight ahead 2.0 miles to fork and U. S. B. M. on left (elevation, 5,188.6 feet); take left fork and go southeast and east 3.7 miles; take right fork and go southeast 0.25 mile; take right fork and go 0.05 mile to dim fork; go straight ahead (south) on left fork 2.0 miles to station *Bench* on left side of road; continue south and southwest on main-traveled unimproved road 2.6 miles to dim fork just east of rocky hill with rock cairn on it; take left fork and follow dim track road south 0.3 mile to where well-traveled road comes in from right; follow well-made road southeast 0.25 mile to fork; follow right fork 0.35 mile; take left fork and go 1.0 mile; continue straight ahead on left fork 1.35 miles to where road leaves wash; turn left up hill out of wash on main-traveled road and go 1.3 miles to fork; take left fork and go 3.4 miles to fork in bottom of draw; take right fork and go 0.4 mile to where draw forks; follow left fork up draw 1.35 miles to dim fork; take left fork and go southeast 0.35 mile; follow right fork southeast 0.25 mile to top of ridge; continue down hill southeast 0.8 mile to small wash coming in on right and large rock with several small rocks on it, and small triangle on large rock on right side of road. Leave main road, turn to right and go west up bottom of wash 0.2 mile to where several large rocks stand on end. These rocks are on end of small ridge about 50 yards up to left of wash. Leave wash, turn left to rocks standing on end and drive up ridge to southwest 0.5 mile to cairn built of white bones; from bone cairn, leave ridge, turn left and go south across

sagebrush draw 0.3 mile to sheep trail on north slope of ridge which drops off into Minnie Maud Creek on south; turn left and follow sheep trail east 0.1 mile to bone cairn; continue east along rim 1.8 miles to saddle and end of truck travel. Pack east up hill to top and station. About 5-minute pack. Station mark is standard disk in outcropping bedrock, note 2. Reference mark no. 1 is standard disk in boulder, note 12c, on rim of canyon, 8.063 meters (26.45 feet) northwest of station in azimuth  $117^{\circ}50'$ . Reference mark no. 2 is standard disk in outcropping bedrock, note 12a, 10.981 meters (36.03 feet) west-southwest of station in azimuth  $39^{\circ}23'$ . Distance between reference marks is 40.23 feet. Azimuth mark is standard disk in outcropping bedrock, note 12a, on rock ledge about 10 feet from canyon rim of Minnie Maud Creek, and about 0.5 mile northwest of station in azimuth  $127^{\circ}36'50''$ .

**Black Knoll** (Utah County, W. R. Porter, 1936).—About 42 miles south of Ouray, on northerly and higher of row of timbered hills known as the Black Knolls, on divide between Hill Creek on west and Willow Creek on east, 1 mile north of Utah-Grand County line, and probably in sec. 32, T. 15 S., R. 20 E. To reach from Ouray, drive south across Green River Bridge 10.2 miles to fork which is 0.85 mile south of rock house on right; take left fork (south) on Willow Creek Road and go 21.35 miles to road on right into Santio's ranch; turn right (west) across small bridge and between two small houses and go 0.2 mile to wire gate; pass through gate and keep to all right-hand forks for 0.4 mile, then go to left up narrow dugway to top of ridge. Follow this road from above-mentioned gate 3.2 miles to fork; take left fork (south) and go 18.0 miles to opening in log and brush drift fence; continue south 2.0 miles to point east of station; turn right (west) and drive across country to edge of clearing and end of truck travel. Pack west to top of knoll and station. Ten-minute pack. Station mark is standard disk in outcropping bedrock, note 2. Reference mark no. 1 is standard disk in top of iron pipe with arrow pointing to station, set in ground and projecting 6 inches above the surface, and 9.490 meters (31.14 feet) south of station in azimuth  $8^{\circ}28'$ . Reference mark no. 2 is standard disk in top of 1- by 2-foot boulder, flush with ground, note 12c, and is 8.428 meters (27.65 feet) west-northwest of station in azimuth  $120^{\circ}00'$ . Distance between reference marks is 48.70 feet. Azimuth mark is standard disk, note 12a, in 6- by 8-foot slab of bedrock cracked off southwest side of rock ledge which extends to south; slab is approximately 100 feet northwest of end of ledge. Mark is 4 feet north of south edge of slab, and about 1.0 mile east-northeast from station in azimuth  $252^{\circ}18'18''$ . From ledge there are abrupt drops to southeast, south, and southwest.

**Black Hill** (Emery County; W. R. Porter, 1936).—About  $2\frac{1}{2}$  miles southeast of Carbon and Emery Counties, boundary marker (see geographic position and description thereof), on second high point about  $\frac{1}{4}$  mile from southeast end of Range Valley Mountain, on top of flat sage-covered ridge running in northwesterly-southeasterly direction, 300 feet north of where slope of ridge breaks off sharply to south, and about  $\frac{1}{2}$  mile south of cabin in aspen grove in draw. To reach from Sunnyside, which is about 25 miles by road east-northeast of Price: From general store on east side of railroad tracks follow main-traveled road (asphalt) up canyon in northerly direction 2.8 miles to asphalt bunkers on right at end of cableway that comes down right-hand canyon from asphalt mine; continue straight ahead up right-hand canyon along cableway in northeasterly direction 2.7 miles to cableway tower at edge of road on left. Small green house is on right of road about 200 yards back down mountain from this tower. Leave road about 50 yards past tower, turn sharply to left and pack southwesterly on good trail. Follow trail about 1 mile, to where trail turns sharply to right and goes in northeasterly direction about  $1\frac{1}{2}$  or 2 miles to top of mountain. This point is directly above asphalt mine. Take left-hand trail, straight ahead, then bear to right and go in southeasterly direction along top of Range Valley Mountain for about 20 miles to buried boulder 57 feet to left of trail. This boulder marks line between Carbon and Emery Counties. It is on low sagebrush-covered knoll about 100 yards beyond large pole corral through which trail passes. Continue about  $\frac{1}{4}$  mile to where main trail turns left (easterly). Leave main trail and follow dim sheep trails along top of rim southeasterly about 2 miles to station, passing through gate about  $\frac{1}{4}$  mile from where trail forks. About 8-hour pack with horses from end of truck travel. Good water at sheep camp in canyon about  $1\frac{1}{2}$  miles northeast of station. Mark is standard disk station mark flush in top of 18- by 24-inch boulder which is flush with ground. Reference and azimuth marks are standard disks in boulders, see note 12c. No. 1 is in top of 18- by 24-inch sandstone boulder which is flush with ground, at same elevation as station, and is 15.413 meters (50.57 feet) southeast of station in azimuth  $324^{\circ}40'$ . No. 2 is at slightly

lower elevation than station, about 6 feet to right of line from station to two sharp cone-shaped peaks to southwest, one of which is distant about 5 miles and other about 30 miles and on horizon; it is in center of 2-foot square, flat-topped sandstone boulder, flush with ground, and is 25.710 meters (84.35 feet) southwest of station in azimuth  $47^{\circ}08'$ . Distance between reference marks is 92.47 feet. Azimuth mark is on top of bare flat-topped ridge running north and south; this is first ridge east-southeast of station, and slopes sharply to east to Green River; mark is in center of top of 2- by 5-foot flat-topped sandstone boulder which projects 5 inches above ground, and is about  $\frac{1}{2}$  mile from station in azimuth  $277^{\circ}00'56''$ . *Carbon and Emery Counties, boundary marker* is about  $2\frac{1}{2}$  miles from station in azimuth  $139^{\circ}11'44''$ .

**Toad** (Grand County, W. R. Porter, 1936).—In T. 16 S., R. 19 E., on round-topped, bare hill which is highest point on ridge west of Hill Creek. Hill is covered with small limestone fragments. Station is 300 yards north of well-traveled track road which circles base of station hill. To reach from Ouray go south across Green River bridge and across river flats on main-traveled unimproved road 1.6 miles to cable suspension bridge over White River; cross bridge and go 0.05 mile to fork, and 0.5 mile southeast across flats to fork; take right fork and go south across badlands 0.85 mile to dim fork; continue straight ahead on left fork (south) 1.5 miles to dim fork; continue straight ahead on left fork (south) 1.5 miles to fork and pile of rocks; follow right fork south down canyon 4.4 miles to stone house on right at north side of Willow Creek; continue up Willow Creek 0.85 mile to fork. Right fork goes up Hill Creek and left fork up Willow Creek. Take right fork, cross wooden bridge, with A-truss frame, across Willow Creek, and continue along Willow Creek 4.4 miles to ranch on left. At this point Hill Creek joins Willow Creek. Continue 0.25 mile to old abandoned schoolhouse on right; continue up Hill Creek 4.2 miles to wire corral on right and road that turns left to ranch house; continue up right side of Hill Creek 0.2 mile to iron gate; pass through gate and go 0.35 mile to fork; take left fork (right fork goes to ranch) and go 0.15 mile to bridge over Hill Creek; cross bridge and continue on main-traveled road, leaving Hill Creek, and go up canyon to its head and over badlands in southerly direction 8.6 miles to where road arrives at Hill Creek again; continue up left side of Hill Creek 1.0 mile to wood gate, through gate, and on 0.6 mile to another gate reached just after passing ranch house on right. Pass through gate and go 0.05 mile to fork; take right fork up Hill Creek and go 3.0 miles to where road turns right across Hill Creek; continue straight ahead up left side of Hill Creek 3.95 miles to fork. Right fork goes to Taylor's ranch just across the creek. Take left fork and continue up left side of Hill Creek, passing through 5 gates, and go 4.7 miles to fork with corrals on right; turn right, pass through gate between corrals, cross creek, and go 0.05 mile to Wardle's ranch on left. This is at mouth of Horse Corn Canyon and last water is here. From ranch follow main-traveled road west and southwest up Horse Corn Canyon 1.0 mile to wire gate; pass through gate and continue up bottom of canyon 9.3 miles to where canyon forks and road leaves bottom of wash; continue up left canyon 2.85 miles to saddle on divide and head of canyon. At this point wagon road comes in from right. Go south along top of ridge 5.5 miles to dim fork; take right fork and go 4.55 miles; take left fork and go 0.8 mile to bare round-topped hill on left of road; leave road and drive to top of hill and station. Station mark is standard disk in pipe, note 6a, projecting 4 inches above ground. Reference marks are standard disks in pipes, note 13a, projecting 4 inches. No. 1 is 18.982 meters (62.28 feet) northeast from station in azimuth  $213^{\circ}41'$ . No. 2 is on west slope of station hill, 19.406 meters (63.67 feet) north-northwest of station in azimuth  $146^{\circ}33'$ . Distance between reference marks is 69.66 feet. Azimuth mark is standard disk in pipe, note 13a, projecting 6 inches, on second knoll northwest of station, 56 feet south of center line of track road which circles base of station hill, and is about 0.9 mile northwest of station in azimuth  $124^{\circ}41'04''$ . *Carbon and Emery Counties, boundary marker* (see geographic position and description thereof) is 18 miles distant and visible from station, in azimuth  $111^{\circ}42'40''$ .

**Hill** (Grand County, W. R. Porter, 1936).—In T. 18 S., R. 19 E., on east edge of badlands east of Green River and near head of Hill Creek, on highest point between head of Hill Creek and Green River. Peak is second one from south of four high points in this vicinity, and has gradual slopes on all sides except southeast, which drops sharply into deep canyon. To reach station from Wardle's ranch at mouth of Horse Corn Canyon (see description of station *Toad*): Go west and southwest up Horse Corn Canyon 1.0 mile to wire gate; pass through gate and continue up canyon 9.3 miles to where canyon forks and road leaves bottom of wash; go up left canyon 2.85 miles to saddle on divide and head of canyon. At

this point wagon road comes in from right. Go south on main road along crest of ridge 5.5 miles to fork; take right fork and go 4.55 miles; take left fork and go 2.0 miles to dim road to left; keep to right fork on top of ridge for 1.05 miles; take left fork around hillside and down into draw and go 1.4 miles to log cabin and branding corrals. There is fenced-in spring, with good water, on right. Turn right across stream from spring, and follow road up draw to south 2.5 miles to unfinished log cabin straight ahead, road turning left up hill. In 1936 this was end of truck travel, road being washed out at this point. From here follow road up hill about  $\frac{1}{4}$  mile to where it crosses ridge and goes down other side. About 100 feet before reaching extreme top of ridge, road is crossed by well-traveled cattle trail. Turn right along this trail and go along top of ridge about  $\frac{1}{2}$  mile in southerly direction to fork in trail and boulder in fork with triangle cut into it; take left fork and follow dim blazed trail about 400 yards to opening in timber and log salt trough in center of open space; keep to left of opening and pick up well-traveled trail coming in from left; continue straight ahead (south) along top of ridge on main trail about 2 miles to where trail swings around left side of sage-covered hill; continue straight ahead on main trail about  $\frac{1}{2}$  mile to where trail skirts left side of another hill and starts dropping into canyon on left. Small rock cairn and triangle of rocks is on right side of trail at this point. At triangle of rocks leave trail and continue around hillside to right about 200 yards to edge of deep canyon; turn right (west) along edge of canyon around first hill and into saddle beyond; continue along edge of canyon to top of next hill and station, about 1 mile from triangle of rocks. Station marked by standard disk in boulder, note 4, 8 inches in diameter and flush with ground. Reference and azimuth marks are standard disks in boulders, note 12c. No. 1 is in boulder 8 inches in diameter and projecting 5 inches above ground; it is 8.122 meters (26.65 feet) north-northeast of station in azimuth  $205^{\circ}28'$ . No. 2 is in boulder 10 inches in diameter projecting 2 inches above ground, and is 8.901 meters (29.20 feet) west of station in azimuth  $99^{\circ}38'$ . Azimuth mark is in boulder 14 by 28 inches in size, flush with ground, and about  $\frac{1}{2}$  mile east-southeast from station in azimuth  $297^{\circ}51'50''$ . Azimuth to Carbon and Emery Counties boundary marker (see geographic position and description thereof), distant 21 miles, is  $129^{\circ}29'01''$ .

**Flat Rock** (Grand County, W. R. Porter, 1936).—About 50 miles south of Ouray, 8 miles south by west from station *Black Knoll* (see description thereof), probably in sec. 5, T. 17 S., R. 20 E., on small but prominent bare peak on south end of series of long ridges known locally as Flat Rock Ridge, and on knoll about 100 feet in diameter, 35 feet north of south edge, 25 feet east of west edge, 60 feet west of east edge, 80 feet south of north edge. To reach from Ouray, go south 9.35 miles to rock house on right; continue south 0.85 mile; take left fork (Willow Creek Road) south 21.35 miles to road on right into Santio's ranch; turn right (west) across bridge and between two small houses and go 0.2 mile to wire gate; pass through gate and keep to right-hand road north 0.4 mile; then go left up narrow dugway to top of ridge; follow this road from above gate 3.2 miles to forks; take left fork (south) and follow main trail 18.0 miles to opening in log and brush drift fence; continue south on main trail 11.25 miles to dim sheep wagon road on left leading northeast down slope; turn left onto dim road and go 0.3 mile; leave dim road, turn right across country and go 200 yards to top of hill and station site. Marked by standard station disk in pipe projecting 6 inches, note 6a. Reference and azimuth marks are standard disks in pipes, note 13a. No. 1 projects 4 inches, and is 15.120 meters (49.61 feet) east-northeast of station in azimuth  $255^{\circ}23'$ . No. 2 projects 6 inches and is 15.418 meters (50.58 feet) north-northeast of station in azimuth  $187^{\circ}54'$ . Distance between reference marks is 55.25 feet. Azimuth mark projects 6 inches, is 168 feet east of Flat Rock Road, 60 feet northeast of highest point of hill, and 0.5 mile southwest of station in azimuth  $41^{\circ}47'06''$ .

**Wilcox** (Grand County, W. R. Porter, 1936).—About 58 miles south of Ouray, 4 miles north of divide between Willow Creek and Colorado River, which is known as Roan or Brown Cliffs, on summit of bare round-topped peak, fourth highest of East Tavaputs Plateau, three higher peaks lying to south; it is probably in sec. 13, T. 18 S., R. 19 E., on homestead of Loren Wilcox who lives in Green River and is 280 feet east of Flat Rock Road. To reach from Ouray, drive south 9.35 miles to rock house on right; continue south 0.85 mile to forks; take left fork or Willow Creek Road south for 21.35 miles to road to right into Santio's ranch; turn right (west) across creek over small bridge and between two small houses and go 0.2 mile to wire gate; pass through gate, and keep to right-hand road north 0.4 mile; turn left up narrow dugway to top of ridge, and follow road to forks 3.2 miles from above-mentioned gate. Take left (south) fork and go 18.0 miles to opening in log and brush drift fence. Continue south on main trail 19.5 miles to

gate in wire fence; pass through gate and go 0.45 mile; leave trail and turn left (east) and go 100 yards to station. Station mark is standard disk in pipe, note 6a. Its projects 8 inches above ground. Reference and azimuth marks are standard disks in pipes, note 13a. No. 1 projects 4 inches above ground and is 13.336 meters (43.75 feet) south-southwest from station in azimuth  $30^{\circ}31'$ . No. 2 projects 6 inches, and is 12.236 meters (40.14 feet) east-southeast of station in azimuth  $288^{\circ}29'$ . Distance between reference marks is 65.26 feet. Azimuth mark projects 6 inches, is on Flat Rock Road, 18 yards west of road center line, 0.1 mile north of gate in wire fence, and about 0.55 mile north of station in azimuth  $168^{\circ}13'31''$ . Azimuth of point on Flat Rock Road distant 307.5 feet is  $63^{\circ}51'$ , and to another point on same road 301 feet distant is  $107^{\circ}25'$ .

**Ice Cave Peak** (Uintah County, W. R. Porter, 1936).—Thirteen miles north-northwest of village of Lapoint, 4 miles due south of Paradise Park Ranger Station, 1 mile west of graded Mosby Mountain Road, on highest point of Ice Cave Peak, which is the highest point on Mosby Mountain. Peak is covered with aspen and pine trees. Station is 6 feet northeast of 8-inch aspen with triangle-shaped blaze cut in it. To reach station from Lapoint, go east on main highway 0.4 mile across second small bridge reached after leaving town; continue 0.1 mile to T-intersection; leave highway, turn left, and follow graded road 5.0 miles; follow left fork up small hill and go northwesterly 5.8 miles to coal mine; pass coal mine and follow main graded road northerly 4.4 miles to cattle guard and boundary of Ashley National Forest; continue on 7.3 miles to where "Sawmill" road leads to right; keep straight ahead for 2.2 miles to Paradise Valley (or Park) Ranger Station. It is advisable to secure aid from ranger for remainder of journey, which may be described as follows: From ranger station backtrack southerly over route of approach 3.8 miles, to where Forest Service sign on west side of road reads "Mosby Mountain Snow Survey Course #1, elevation 9,700 feet." At point 150 feet north of this is trail blazed to west from log culvert. Follow this trail west-southwesterly carefully, as there are numerous unnecessary blazes in vicinity. After about  $\frac{1}{4}$  to  $\frac{1}{2}$  mile old log road is reached; follow log road in southerly direction, keeping to main track road for 200 paces to where pine tree has fallen across it. Leave track road and follow blazed trail in west-southwesterly direction 250 paces to junction with another dim log road; follow this new road which gradually develops into cow path, westerly to clearing. Cross clearing and skirt its edge to top of small ridge which leads southwesterly. Follow ridge northwesterly to top of mountain and station. Station mark is standard disk in pipe, note 6a, projecting 7 inches above ground. Reference marks are standard disks in pipes, note 13a. No. 1 is 38.2 feet east-southeast of blazed tree and 11.380 meters (37.34 feet) (slope distance) east-southeast of station in azimuth  $293^{\circ}30'$ . No. 2 is 32.1 feet west-southwest of blazed tree and 11.450 meters (37.57 feet) (slope distance) west-southwest of station in azimuth  $50^{\circ}38'$ . Distance between reference marks is 63.90 feet (slope distance). Azimuth mark is standard disk in pipe projecting 6 inches above ground, on south slope of mountain at place where ground levels off for a few yards, and about 150 yards south-southwest from station in azimuth  $343^{\circ}09'47''$ .

**Lapoint** (Uintah County, W. R. Porter, 1936).—About  $3\frac{1}{2}$  miles north and 2.0 miles east of Lapoint post office, in sec. 27, T. 1 N., R. 2 E., on mesa that runs south-southwest from Little Mountain. Mesa is covered with sagebrush, and has juniper trees around its edges. To reach from Lapoint post office go east on graded dirt road 1.4 miles to top of mesa; continue on graded road northeast 0.3 mile to trail crossroads; turn left (northwest) and go 3.6 miles on unimproved road to forks. Station is about 18 yards northeast of forks. Surface and underground marks are standard station disks in concrete, notes 1a and 7a; upper mark projects 4 inches above ground. Reference and azimuth marks are standard disks in concrete, note 11a, projecting 4 inches above ground. No. 1 is 13.725 meters (45.03 feet) east-northeast of station in azimuth  $260^{\circ}30'$ . No. 2 is 14.118 meters (46.32 feet) south of station in azimuth  $356^{\circ}59'$ . Distance between reference marks is 68.14 feet. Azimuth mark is 0.3 mile north of station in azimuth  $183^{\circ}22'53''$ . Distance and azimuth from station to stake at trail fork are 49.8 feet,  $66^{\circ}14'$ ; and to stake at center of right fork, 29.0 feet,  $112^{\circ}07'$ . Distance between stakes is 36.2 feet.

**Canal** (Uintah County, W. R. Porter, 1936).—About 13 miles east and 1 mile north of Roosevelt, 6 miles east and 2 miles north of Fort Duchesne, 0.3 mile north of U. S. Highway 40, 0.05 mile west of Ouray Valley Canal, on top of small divide between the Uinta River and Hollow Creek, in northeast corner of sec. 11, T. 6 S., R. 2 E. To reach from north edge of Roosevelt, follow U. S. Highway 40 east 7.2 miles to bridge over Uinta River; continue east on highway 6.3 miles to

metal corrugated culvert which crosses highway at top of ridge; leave highway just west of culvert and go north and northwest on dim road along west side of dry canal 0.2 mile to dim crossroads; continue northwest along canal on dim road 0.15 mile; turn left, leaving canal, and go west-southwest along top of small ridge 0.5 mile to station site. Station ridge is sandy. Surface and underground marks are standard station disks in concrete, notes 1a and 7a. Reference and azimuth marks are standard disks in concrete posts, note 11a. No. 1 projects 8 inches, and is 10.434 meters (34.23 feet) north-northeast of station in azimuth  $204^{\circ}59'$ . No. 2 projects 6 inches, and is 10.050 meters (32.97 feet) east-southeast of station in azimuth  $288^{\circ}06'$ . Distance between reference marks is 44.58 feet. Azimuth mark projects 10 inches, is 65 yards southwest of fence corner,  $1\frac{1}{2}$  feet southeast of right-of-way fence, and 45 feet northwest of center line of U. S. Highway 40, and 0.3 mile south of station in azimuth  $345^{\circ}37'48''$ .

**Spur (U. S. G. S.)** (Duchesne County, W. R. Porter, 1936).—On Uintah-Ouray Indian Reservation,  $6\frac{1}{2}$  miles north of town of Mountain Home, in sec. 7, T. 1 N., R. 5 E., on south slope of high ridge between Pigeon Water Creek and Lake Fork Creek. To reach from Duchesne: Go north on street passing post office, cross river and follow main road north 21.0 miles to town of Mountain Home. From general store in Mountain Home, go north 0.8 mile to turn in road; turn right (east) and go 0.2 mile to turn in road; turn left (north) and follow main road north and east across cedar ridge 3.5 miles to azimuth mark (see below) on west side of road at point reached just before dropping off ridge. From azimuth mark drive northwesterly down grade 1.4 miles to fork at signboard reading "Lake Fork I.E.C.W Camp No. 2"; take right fork, downhill, 0.6 mile to fork and sign "Moon Lake 9 Miles"; take left fork, Moon Lake Road, and follow main road north-northwest 2.1 miles to fork; take left fork northwest and west 3.0 miles to sharp left turn at summit of ridge; this is highest point of ridge, and old sawmill site and some sawdust piles will identify it. Here leave main road, turn right (north) onto dim road past old sawmill site and go 0.15 mile to forks; take left fork (very dim road) up draw and go 0.05 mile to dim forks; take right fork and go 50 yards, then left fork through meadow about 0.4 mile to large pile of poles on left. Follow dim road to left around poles and go southwesterly into heavy timber, up grade, 0.45 mile to place where truck can be turned around and end of truck travel. From here pack southwest over low ridge about 250 yards to trail; follow trail westerly, up draw, to base of steep slope of ridge (station ridge) to southwest; leave trail, bear left and pack southwesterly up steep slope to point about 200 yards south of highest point along ridge and station, at north edge of clearing. From trail, pack is through heavy timber and over fallen logs. Hard one-hour pack with load. Station marked by standard U. S. Geological Survey disk with cross in center, set in boulder which projects 4 inches above ground. Reference mark no. 1 is standard disk in boulder, note 12c, projecting 4 inches above ground, on west slope of station ridge, and 4.121 meters (13.52 feet) west of station in azimuth  $81^{\circ}57'$ . Reference mark no. 2 is standard U. S. Geological Survey disk marked "SPUR M-1934" set in boulder projecting 4 inches above ground, on slope of station ridge and 7.570 meters (24.84 feet) southeast of station in azimuth  $308^{\circ}09'$ . Distance between reference marks is 35.50 feet. Azimuth mark is standard disk in pipe, note 13a, which projects 12 inches above ground; it is 4.5 miles by road from Mountain Home (see above), 44 feet west-southwest of center line of road, and about 5 miles from station in azimuth  $306^{\circ}12'01''$ . Azimuth from station to cairn, distant approximately 9 miles, is  $84^{\circ}19'27''$ .

**Dry Gulch** (Duchesne County, W. R. Porter, 1936).—In Uintah-Ouray Indian Reservation, in T. 2 N., R. 3 W., at head of Spring Creek, on westerly end of one of three points at south end of heavily-timbered ridge between Dry Gulch and Uinta River, and about  $\frac{1}{2}$  mile north of head of trail which leads from Dry Gulch to top of ridge. To reach from town of Altonah, go north on road which passes through west edge of town 1.1 miles to crossroad; continue straight ahead, north, 1.1 miles to where road fords irrigation ditch and forks just beyond; take left fork and go 0.55 mile to dim fork; keep to right fork and follow track road northwest and north up valley 1.85 miles to graded road coming down hill from right; turn right and follow graded road which crosses over ridge and swings northeast up valley along Forest Service telephone line 3.5 miles to sheep pen on left and road fork on right. Take left fork (main road) up hill in easterly direction and go 4.9 miles to ranger station on left side of road; continue on main road 0.4 mile to intersection with graded road; turn left onto graded road and go 1.2 miles to road fork just beyond white cattle guard; take right fork up east branch of Dry Gulch 1.85 miles to side road right; continue straight ahead on main road 1.75 miles to triangular blaze on left and old woods road turning sharply back to right.

Follow old woods road which leads across creek beds and rock 0.4 mile to meadow and good camp ground. Unless camping it is not advisable to drive into meadow. From northeast corner of meadow pack to left across stream, and follow good forest trail up canyon along left side of stream for about 2 miles; cross fence line and proceed to right across stream and up canyon about 1 mile; leave stream, bear right on forest trail up mountain about 1 mile to top of ridge into meadow. Continue straight ahead, southeasterly across meadow about  $\frac{1}{2}$  mile to heavily timbered land; bear slightly to left into timber and go 250 yards to open space and station. Hard  $\frac{1}{2}$ -hour pack with load. Station mark is standard disk, note 4, flush in top of 2- by 2-foot boulder which projects 4 inches above ground. Reference marks are standard disks in boulders, note 12c. No. 1 is flush in top of 18-inch circular boulder which projects 4 inches, and is 11.057 meters (36.28 feet) northwest of station in azimuth  $112^{\circ}14'$ . No. 2 is flush in top of 1- by 2-foot boulder which projects 4 inches and is 10.824 meters (35.51 feet) north-northeast of station in azimuth  $195^{\circ}22'$ . Distance between reference marks is 47.64 feet.

**Blue Bench** (Duchesne County, W. R. Porter, 1936).—Twelve miles west of Myton and 7 miles east-northeast of Duchesne (air line distances), 8 miles west of junction of Lake Fork and Duchesne Rivers, on what is known locally as Blue Bench, on property of The Jesse Knight Investment Company, on long north-and-south bench, 20 feet southwest of edge of rim, 96 feet north of Y-intersection of track roads, 670.82 feet north of General Land Office mark, and 27 feet north of fifth transmission-line pole from west edge of rim. To reach from Duchesne post office: Go north on graded road 6.15 miles to track road leading right at General Land Office mark stamped "T-3-S; R-5&4-W; S6, S7, S1 & S12-1914". From this point go east (on MTR) 6.15 miles to highest point of bench and edge of rim, and station on left at Y-intersection. Surface mark is standard disk station mark in concrete, note 1a, projecting 6 inches above ground. Underground mark is standard disk station mark in concrete, note 7a. Reference marks are standard disks in concrete, note 11a. No. 1 projects 6 inches above ground, is 50 feet west of edge of rim, 36 feet north of Y-intersection, and 18.510 meters (60.73 feet) south of station in azimuth  $15^{\circ}38'$ . No. 2 projects 4 inches, is 65 feet west-southwest of edge of rim, 20 feet northeast of center line of northernmost track road, and 22.366 meters (73.38 feet) west-northwest from station in azimuth  $117^{\circ}53'$ . Distance between reference marks is 104.30 feet. Azimuth mark is B.M. M 93 (U. S. G. S.), 1934, marked by 8-inch concrete post projecting 10 inches above ground, in southwest angle of graded crossroads, 1 foot east of west right-of-way fence line, 12 feet south of fence corner, 22 feet south of irrigation ditch, 30 feet west of center line of north-and-south graded road, 75 feet southwest of intersection of east-west and north-south roads, and approximately 2 miles east of station in azimuth  $271^{\circ}30'13''$ . Chimney of white schoolhouse on west side of north-and-south road is about 1.5 miles east-northeast of station in azimuth  $259^{\circ}21'30''$ . Azimuth from station to General Land Office mark, *T. 3 S., R. 4 W., secs. 13 and 24, quarter corner* (see geographic position thereof), distant 204.466 meters (670.82 feet), is  $8^{\circ}04'30''$ . Azimuth to *Myton water tank* (see geographic position and description thereof), distant approximately  $12\frac{1}{2}$  miles, is  $277^{\circ}18'56''$ . Azimuth from station to trail intersection, distant 96 feet, is  $12^{\circ}04'$ ; while edge of rim in azimuth  $245^{\circ}$  is distant 20 feet.

**Cedar Rim** (Duchesne County, W. R. Porter, 1936).—About 14 miles (air line) west of Duchesne, 11 miles (air line) east of Fruitland, 2 miles south of U. S. Highway 40, on west end of east-and-west ridge, 150 feet from its western edge, and 39 feet from its southern edge. Ridge is sparsely covered with scrub pine and cedar trees, is rather open on north side, and slopes off gently to north and east and abruptly to south and west. To reach from Duchesne post office, go west 17.1 miles on U. S. Highway 40 to side road south (this road is 35 paces west of U. S. Geological Survey bench mark 53-1934); turn south (left) onto this road and go 0.15 mile; take right fork and go 0.2 mile; take left fork and go 0.55 mile; take left fork and go 0.6 mile to end of truck travel. Continue on foot in south-westerly direction towards highest point of ridge and station on southwest point. Pack is not very steep and requires about  $1\frac{1}{2}$  hours. Marked by standard station disk in boulder flush with ground, note 4. Reference marks are standard reference disks in boulders, note 12c. No. 1 is flush with ground, and 10.842 meters (35.57 feet) north of station in azimuth  $201^{\circ}22'$ . No. 2 is in boulder projecting 4 inches above ground, and 9.420 meters (30.91 feet) east of station in azimuth  $284^{\circ}38'$ . Distance between reference marks is 44.28 feet. Station *Water* (see description and geographic position thereof) is visible from ground.

For notes in regard to marking of stations see page 100. MTR above means main traveled road.

**Hanna** (Duchesne County, W. R. Porter, 1936).—About 1.3 miles north and 2.5 miles east of Hanna post office, on south boundary of Wasatch National Forest, about  $\frac{1}{2}$  mile west of intersection of Blind Stream Creek and Forest boundary, on south slope of bare ridge (not highest part of ridge), on west edge of small spur which takes off to south, and in T. 1 N., R. 8 W. To reach from Hanna, follow main road west 2.9 miles from Mercantile General Store to road leading off to right at U. S. Forest Service sign "Blindstream Road" (this road is just beyond south turn in main road); turn right onto Blindstream Road through cattle guard and follow main road up canyon 5.0 miles to where road and creek are crowded to left side of canyon by large rock slide. At this point (which is at top of small rise and end of truck travel) there is large quaking aspen tree covered with names and dates and having U. S. Forest Service sign "Prevent Forest Fires" on north side of trunk. Tree is on right bank of road; on west side of road opposite tree there is well-worn sheep trail angling to left up side of ridge; follow trail to top of ridge, where trail turns west and drops down into small depression to left of grove of quaking aspen trees; beyond this point trail rises again to top of ridge. Turn south over top of ridge and go about 200 yards to station site. Good water and camp site at point where sheep trail leaves canyon. Marked by standard station disk in boulder, note 4. Reference marks are standard reference disks in boulders, note 12c. No. 1 is in boulder pile near top of southwest slope of ridge, and 14.745 meters (48.38 feet) south of station in azimuth  $14^{\circ}48'$ . No. 2 is on southwest slope of ridge, 16.368 meters (53.70 feet) north of station in azimuth  $184^{\circ}06'$ . Distance between reference marks is 101.62 feet. Azimuth mark is standard disk in boulder, note 12c, on higher ground which appears from station to be spur of station ridge, and  $\frac{1}{2}$  mile from station in azimuth  $192^{\circ}36'02''$ .

**Water** (Wasatch County, W. R. Porter, 1936).—About 8 miles (air line) west of Fruitland post office, at east end of low, brush-covered ridge running east and west, sloping gently to west, and abruptly to east, north, and south. To reach station from Fruitland post office, which is 25 miles west of Duchesne on U. S. Highway 40, follow U. S. Highway 40 westerly 8.2 miles to where track road leads off to right across dirt fill. About 65 feet further along this road is concrete culvert in which azimuth mark is set. Leave highway, cross fill and follow track road on left fork 0.2 mile to T-road intersection; turn left and go 0.25 mile; take right fork (dim road) and go northerly up grade 0.6 mile to top of saddle and end of truck travel. Last 0.6 mile is very rough and crosses several ditches. It would be bad traveling in wet weather. From end of truck travel pack up ridge to right (east) to highest point along ridge and station. Station can also be approached from east by turning right at T-road intersection 0.2 mile from U. S. Highway 40, and following this road around to east end of station ridge, about 0.5 mile. Station is on highest point on first ridge north-northwest of T-road intersection. Leave track road and drive westerly across country to base of ridge. Pack westerly up steep slope to highest point and station. Packing from east is much steeper but shorter than from west. Twenty-minute pack. No water available. Station mark is standard disk in boulder, note 4. Reference marks are standard disks in outcropping bedrock, note 12c. No 1 is on same ridge as station, in rock flush with ground, and 8.238 meters (27.03 feet) east-northeast of station in azimuth  $256^{\circ}25'$ . No. 2 is on southeast slope of station ridge, and 5.356 meters (17.57 feet) from station in azimuth  $327^{\circ}35'$ . Distance between reference marks is 27.10 feet. Azimuth mark is standard disk set flush in top of north end of concrete culvert (see above), at west edge thereof, 21 feet north of center line of U. S. Highway 40 and 66 feet west of center line of track road leading off to north. It is about 1 mile southwest from station in azimuth  $37^{\circ}09'54''$ . Following azimuths are from station: Cairn, about 14 miles north-northeast,  $195^{\circ}08'39''$ ; cairn, about 13 miles south,  $353^{\circ}55'05''$ ; and *Greyhead Peak*, cairn (see geographic position thereof) about 22 miles south-southeast,  $322^{\circ}11'53''$ .

**Minnie** (Wasatch County, W. R. Porter, 1936).—In Uinta National Forest, on sharp conical peak (timbered to northeast), about 10 miles northeast of Soldier Summit, between Timber Canyon to northwest and head of Minnie Creek to southeast, in sec. 29, T. 5 S., R. 9 W. There are higher peaks to east and northeast on same divide. To reach from Duchesne, go southerly 27.0 miles on State Highway 33 to top of summit; continue 1 mile to buildings owned by Utah Highway Commission on east side of road; continue 0.20 mile to road on right; leave highway, turn right (west) and go 18.75 miles on this main graded road to Soldier Summit signboard on left; continue on main road north 0.35 mile to trail road and sign reading "Avintaquin Ranch 10 mi."; take right fork (northeast) and go 1.30 miles to fork; take left fork up ridge 1.25 miles to rock cairn. Trail bears to right

along side of hill to northeast of cairn and becomes impassible. Truck can be taken about 500 yards farther, to northeast end of knoll and end of truck travel. From here station is seen to north-northeast about 2 miles distant. Pack along ridge following wagon trail to bare white bluff; take horse trail to right of bluff and continue to station site. Pack requires  $1\frac{1}{2}$  hours. Marked by standard station disk in iron pipe projecting about 8 inches, note 6a. Reference marks are standard reference disks in pipes, projecting 8 inches, note 13a. No. 1 is 13.350 meters (43.80 feet) east-southeast of station in azimuth  $296^{\circ}46'$ . No. 2 is 14.286 meters (46.87 feet) southwest of station in azimuth  $41^{\circ}12'$ . Distance between reference marks is 70.78 feet. Station *Strawberry* (see description and geographic position thereof) can be seen from ground.

**Grey** (Duchesne County, W. R. Porter, 1936).—About 15 miles (air line) west-southwest of Duchesne, at south end of bare-topped shale ridge running north and south. To reach from Duchesne post office: Go west 1 block on U. S. Highway 40; turn left onto State Highway 33 and go 10.2 miles to left curve 0.2 mile beyond buildings and corrals on left side of road; leave State Highway 33, turn right and go southwesterly up canyon on trail road 1.6 miles to abandoned ranch buildings on right; continue southwesterly up main canyon 3.4 miles to another deserted ranch house and corrals; pass to left of buildings and continue 1.3 miles to deserted buildings on right; continue up canyon 2.7 miles to gate at boundary of Uinta National Forest; pass through gate, keep to right of ranch buildings and corrals, and go 1.1 miles; leave track road, turn right, and drive westerly across country into smaller canyon, going 0.3 mile from road to end of truck travel. From end of truck travel pack southwesterly on stock trail, pass through gate at about 200 yards, and continue southwesterly on trail for about 300 yards; leave trail, turn right, and pack westerly up smaller canyon; keep on right-hand slope of canyon, bearing to right near its head. Station is on south end of ridge leading to head of this canyon. Pack is very steep, most of way being over loose shale rock formation. Hard two-hour pack. No water available. Mark is standard station disk in pipe, note 6a, projecting 10 inches above surface. Reference marks are standard disks in pipe, note 13a. No. 1 projects 4 inches, is on same ridge as station, and 15.938 meters (52.29 feet) northeast of station in azimuth  $243^{\circ}03'$ . No. 2 projects 8 inches, is on same ridge as station, and 19.523 meters (64.05 feet) north-northwest from station in azimuth  $180^{\circ}05'$ . Distance between reference marks is 65.77 feet. Azimuth mark is standard disk in boulder, note 12c, flush with ground, on same ridge as station, and about 0.4 mile north of station in azimuth  $191^{\circ}33'13''$ . Azimuth from station to *Greyhead Peak*, cairn (see geographic position thereof), distant about 2.5 miles, is  $38^{\circ}06'28''$ .

**Wolf** (Wasatch County, W. R. Porter, 1936).—About 39 miles northwest of Duchesne, 22 miles east of Heber, in Uinta National Forest,  $1\frac{1}{2}$  miles northeast of summit of Wolf Creek Pass and camp grounds on road between Hanna and Kamas, in sec. 10, T. 1 N., R. 10 W., and near end of long bare ridge which drops off steeply to south and slopes gradually away to north, and is visible  $\frac{1}{4}$  mile to northwest from point of leaving main road. Station ridge overlooks valley to southeast which contains several small lakes, and clump of fir trees near middle and south rim of ridge is about 125 yards west of station, which is 7 yards northwest of southern rim. To reach from Wolf Creek Camp grounds at summit of Wolf Creek Pass, go east on main road towards Hanna 0.65 mile to curve and fork; take left fork (ungraded road) and go east 0.25 mile; take left fork and follow road northwest and then east about 1 mile from forks, and at any point along here, turn south and ascend ridge. When near top, turn east to station site between two clumps of trees. From road to station is about  $\frac{3}{4}$  mile. Marked by standard station disk in concrete, note 1a. Reference mark no. 1 is standard reference disk in boulder, note 12c, 7 yards northwest of southern rim of station ridge, and 17.273 meters (56.67 feet) west of station in azimuth  $59^{\circ}52'$ . Reference mark no. 2 is standard reference disk in concrete, note 11a, 19 yards west of east rim of station ridge, and 17.485 meters (57.36 feet) north-northwest of station in azimuth  $149^{\circ}39'$ . Distance between reference marks is 80.48 feet. Azimuth mark is standard U. S. Geological Survey bench mark stamped "Elevation 10,024 feet"; it is on Wolf Creek Mountain, 1 foot north of 6-foot cairn, and  $1\frac{1}{4}$  miles southwest of station in azimuth  $27^{\circ}26'03''$ . Azimuth mark reached from Wolf Creek Camp grounds at summit of Wolf Creek Pass by going southeast from drinking fountain on trail to summit; trail easy to follow.

**Leota** (Uintah County, W. R. Porter, 1936).—About 6.5 miles north and 4 miles east of Ouray, in sec. 25, T. 7 S., R. 20 E., on high bluff (Green River flows on east and northeast sides of bluff) which slopes to west and northwest and breaks abruptly to south, east, and north. Station is 50 yards north of south edge and

75 yards south of north edge of bluff. To reach from southwest corner of Fort Duchesne, go east 0.3 mile on oiled road; take right fork (southeast) on graded dirt road 0.2 mile to two bridges over Uinta River; cross bridges and continue on 0.1 mile; take right fork and follow main graded road south and southeast 5.2 miles to side road on west and church at corner; continue straight ahead on main road 1.15 miles; take left fork and go east 2.25 miles; thence right (south) 0.25 mile; thence left (east) 2.2 miles; thence right (south) 0.5 mile; thence left (east) 0.75 mile; turn right (south) and take left fork on bladed road southeast 1.05 miles to crossroads; continue southeast 1.1 miles to another crossroads; turn left (east) on graded road and go 1.65 miles; take right fork and follow unimproved road 1.4 miles to fork; turn left (southeast) 0.1 mile to top of ridge and point where main road begins to descend; leave main road and take dim road northeast and east along top of ridge for 0.5 mile to saddle; go east up saddle to top of bench, and across bench 0.1 mile to station. Marked by standard station disk in pipe projecting 3 inches above ground, note 6a. Reference and azimuth marks are standard reference disks in pipes, note 13a. No. 1 projects 2 inches, and is 26.426 meters (86.70 feet) north of station in azimuth  $178^{\circ}39'$ . No. 2 projects 6 inches, and is 22.723 meters (74.55 feet) east of station in azimuth  $269^{\circ}04'$ . Distance between reference marks is 114.75 feet. Azimuth mark projects 6 inches, is 90 feet west-northwest of forks in road, 35 feet north of center line of road, and 2.0 miles west-northwest of station in azimuth  $120^{\circ}36'49''$ .

**Two Water** (Uintah County, W. R. Porter, 1936).—About 9 miles east and 7 miles south of Ouray, 6 miles west and  $1\frac{1}{2}$  miles north of mouth of Two Water Creek,  $5\frac{1}{2}$  miles south of White River, on top of small hill which is top of mesa in badlands southeast of Green River, and in sec. 1, T. 10 S., R. 21 E. Hill has two large outcropping rocks on it, one projects about 6 feet, the other (station site) about 15 feet above ground. To reach from Ouray, go south across Green River and follow main-traveled road south across river flats 1.6 miles to cable suspension bridge over White River; cross bridge and go 0.05 mile to fork; take right fork, southeast across flats for 0.5 mile; take right fork on main-traveled unimproved road south over badlands 0.85 mile; take left fork on main-traveled unimproved road south 1.5 miles to dim fork; then straight ahead on main-traveled road (left fork south) 0.55 mile to fork and small pile of rocks; leave main-traveled road, take left fork and follow unimproved road southerly 3.3 miles to road coming in on left (rock cairn is on small hill just to east at this point); continue on main-traveled road southeasterly 0.35 mile to dim fork; take left fork on main-traveled road southeast 1.95 miles to fork reached just after passing small hill on left; take left fork (right fork goes down into Willow Creek) on main-traveled road southeast 1.4 miles to rock hill about 100 yards to right and old sheep bedding ground on left (wood tripod made of 4-foot poles is about 30 yards to left of road); leave main-traveled road, turn left and go east past pole tripod and follow dim road east 0.3 mile to rocky cone-shaped hill with rock cairn to left of road; continue east on main-traveled road 0.3 mile; take right fork (east) 1.5 miles to large wash; cross wash and continue on road up steep hill and along top of mesa 2.0 miles to dim fork; take left fork on main-traveled road east 1.25 miles to old well-traveled T-road running north and south; make sharp turn to left and follow road down valley 3.65 miles to triangle trench and mound with several rocks on it about 12 feet to right of road. From here station site can be seen to east, bearing  $87^{\circ}$  magnetic; leave main-traveled road here, turn right and head south-southeast across country, on bearing  $143^{\circ}$  magnetic, 0.3 mile to base of mesa; go up mesa and continue east 0.55 mile to end of truck travel; from here pack about 100 yards northeast to highest point and station site. Marked by standard station disk in boulder, note 4. Reference marks are standard reference disks in outcropping bedrock, note 12a. No. 1 is about 15 feet below station mark, and 13.205 meters (43.32 feet) (slope distance) west of station in azimuth  $90^{\circ}01'$ . No. 2 is about 15 feet below station mark, and 12.896 meters (42.31 feet) (slope distance) north-northeast of station in azimuth  $193^{\circ}31'$ . Azimuth mark is standard disk in large sandstone outcrop about 100 feet in diameter, note 12a, 0.5 mile southwest of station in azimuth  $71^{\circ}36'45''$ .

**Bench** (Uintah County, W. R. Porter, 1936).—About 20.5 miles south and 1.5 miles east of Roosevelt, 7.0 miles southeast of Pariette Gilsonite Mine, 0.9 mile east of the Duchesne County line, in sec. 25, T. 5 S., R. 1 E., on low flat sage-covered mesa which breaks off to west and is known as Pariette Bench. Station is 75 yards east of the breaks, and 24 feet east of center line of track road. To reach from Myton, go west 0.45 mile on U.S. Highway 40 to black and yellow water tank; continue west on highway 1.4 miles to graded side road; leave highway and go south and west on graded road 0.6 mile to three forks; take middle

fork up hill and to top of mesa 1.1 miles to forks and sign "Price"; take left fork and follow graded dirt road south and southeast to fork (total distance of 7.05 miles); take left fork 0.5 mile to side road west to Pariette Gilsonite Mine; keep straight ahead on left fork, cross creek and go 0.05 mile to another side road west to same mine; keep to left fork and follow unimproved road southeast 1.8 miles to fork in wash; take left fork (south) up out of wash for 0.3 mile to old mine and steam boiler on right; continue on main road east and south 0.45 mile to fork and old mine on right; take left fork straight ahead on main road 0.2 mile to fork with U.S. bench mark, elevation 5,188.6 feet, on left; take left fork and go southeast and east 3.7 miles; take right fork southeast 0.25 mile; take right fork 0.05 mile to dim fork and continue straight ahead (south) on left fork 2.0 miles to station site on left side of road. Marked by standard station disk in pipe projecting 6 inches above ground, note 6a. Reference marks are standard reference disks in pipes projecting 6 inches above ground, note 13a. No. 1 is 18 feet west of center line of track road, and 12.685 meters (41.62 feet) west-northwest of station in azimuth  $121^{\circ}44'$ . No. 2 is 40 feet east of center line of track road, and 13.320 meters (43.70 feet) northeast of station in azimuth  $216^{\circ}32'$ . Distance between reference marks is 62.83 feet. Azimuth mark is standard disk in concrete post projecting 4 inches above ground, note 11a, 65 yards east of center line of track road, and 0.5 mile north-northeast of station in azimuth  $208^{\circ}28'51''$ . Azimuth from station to cairn 13 miles south-southwest is  $24^{\circ}39'05''$ .

**Edge** (Uintah County, W. R. Porter, 1936).—About 15 miles south and  $2\frac{1}{2}$  miles east of Ouray, on east rim of Willow Creek Canyon, about 45 feet south of center line of track road on round-topped knoll, and about on line between T. 11 S., R. 20 E. and T. 11 S., R. 21 E. There is slightly higher ground to south. To reach from Ouray, go south across bridge over Green River; follow main-traveled road south across river flats 1.6 miles to cable suspension bridge over White River; cross bridge and go 0.05 mile to fork; take right fork and go 0.5 miles; then right fork and go 0.85 mile; follow left fork on main-traveled unimproved road south 1.5 miles to dim fork; keep straight ahead (south) on left fork 0.55 mile to another fork and small pile of rocks; leave main-traveled road, take left fork in southerly direction and go 3.3 miles to road coming in on left (there is rock cairn on small hill just east of this point); continue on main-traveled road in southeasterly direction 0.35 mile to dim fork; take left fork southeast 1.95 miles to fork reached just after passing small hill on left; follow left fork on main-traveled road southeast (right fork goes down into Willow Creek) 1.4 miles to top of rise and rocky hill about 100 yards to right and old sheep bedding grounds on left (tripod of poles about 4 feet high is on left side of road at this point); take right fork at pole tripod and go 0.3 mile to fork just beyond small hilltop; take right fork south 1.3 miles to dim fork; keep to right fork and main-traveled road which drops down into draw 0.95 mile to fork in bottom of draw; take right fork 4.95 miles to top of hill and station site. Marked by standard station disk in pipe, note 6a. Reference marks are standard reference disks in boulders 12 inches in diameter projecting 2 inches above ground, note 12c. No. 1 is 18.444 meters (60.51 feet) south-southeast of station in azimuth  $348^{\circ}21'$ . No. 2 is 29.108 meters (95.50 feet) southwest of station in azimuth  $39^{\circ}36'$ . Distance between reference marks is 74.38 feet. Azimuth mark is standard disk in out-cropping bedrock, note 12a, on west edge of rock ledge which forms east edge of small canyon, and is 0.65 mile southeast of station in azimuth  $307^{\circ}37'48''$ .

**Taylor** (Uintah County, W. R. Porter, 1936).—About 3 miles east of Green River, near west end of flat bench, on highest point of low small ridge covered with piñon and cedar trees, in sec. 24, T. 14 S., R. 17 E., and about 2 miles north of Mr. Taylor's cabin in Post Canyon. Reached from Wardle's ranch at mouth of Horse Corn Canyon (see description of station *Toad*) as follows: From ranch house follow main-traveled road west and southwest up Horse Corn Canyon 1.0 mile to wire gate; pass through gate and continue up bottom of canyon 9.3 miles to where canyon forks and road leaves wash; go up left canyon 2.85 miles to saddle on divide and head of canyon. At this point wagon road comes in from right. Turn right onto wagon road and follow it northwest 1.05 miles to point reached about 100 yards before arriving at gate. At this point turn right and go through sagebrush along top of ridge and follow it in northerly direction about  $1\frac{1}{2}$  miles; then turn to left and go in northwesterly direction 0.1 mile to open place in sage brush and end of truck travel. From here pack northwest along top of ridge about 3 miles to point which has compass bearing of  $299^{\circ}$  from point where truck was left. From this point compass bearing of next ridge to head for is  $312^{\circ}$ , and distance is about 2 miles air line. To reach it, follow old wagon tracks along

For notes in regard to marking of stations see page 100.

highest part of ridge west and northwest. From this point, which is last prominent point on route before dropping down onto sagebrush flats, station bears about  $310^\circ$  and is about  $2\frac{1}{4}$  miles distant, air line. After getting down onto flats, station ridge can be identified by 5 or 6 trees that project above other trees and are on station ridge about 200 or 300 yards north of station site. The middle tree of group is largest. After reaching flats, head across them through sagebrush towards this ridge and station, keeping to high ground in order to head all canyons. From end of truck travel to station is about 5-hour pack with horses. Nearest water to station is about 2 miles south at Taylor's cabin. Station mark is standard disk in outcropping bedrock, note 2. Reference and azimuth marks are standard disks in bedrock, note 12a. No. 1 is 8.379 meters (27.49 feet) north of station in azimuth  $200^\circ 10'$ . No. 2 is 8.193 meters (26.88 feet) east-southeast of station in azimuth  $307^\circ 52'$ . Distance between reference marks is 43.94 feet. *Taylor azimuth* (see geographic position and description thereof) is on southwest corner of solid rock point, on east-west ridge that slopes sharply into valley on west, and about 1.6 miles north-northwest of station in azimuth  $169^\circ 11' 28''$ .

**Taylor azimuth** (Uintah County, W. R. Porter, 1936).—One and six-tenths miles northwest of station *Taylor* (see geographic position and description thereof) on east-west ridge that drops sharply into valley at west end, and on southwest corner of solid rock point. To reach, follow directions given for route to station *Taylor*, until flats from which station ridge is seen and identified is reached, then as follows: After reaching flats, head across sagebrush towards ridge and station *Taylor*, keeping to high ground to head all canyons; continue in northerly direction to edge of canyon; turn right and follow edge of canyon to hogback; cross hogback and turn left (west) along south rim of ridge to high solid rock point and station. From end of truck travel to this station is about 5-hour trip with horses. Nearest water is in canyon at Taylor's cabin about 4 miles to south. Mark is standard disk in outcropping bedrock, note 12a. Distance and azimuth to station *Taylor* are 1.6 miles,  $349^\circ 11' 15''$ .

**Big Horn** (Emery County, W. R. Porter, 1936).—About 4 miles northwest of junction of Price and Green Rivers, in about center of T. 18 S., R. 16 E., on south end of highest flat-topped ridge between Green and Price Rivers. Ridge runs in general north-and-south direction and is locally known as "Big Horn Mountain." Top of mountain is about 600 feet wide at south end; on north it narrows in from east and widens out to west; south end is almost rectangular with south edge lying almost directly east and west. Station is near southwest corner of rectangular top, 15 feet north of south rim of top projected to west and 4 feet east of west edge of rim of cap-rock. To reach from White River, go north 2.8 miles from Whiteway Service Station on gravel road (Power House road); turn right (east) and follow main road east and north 1.0 mile to another right-hand turn; turn right (east) and go 0.5 mile; turn left (north) and follow main-traveled road 2.4 miles to some tin shacks and power house on right at end of improved road; keep straight ahead on track road along river 0.5 mile to side road right on top of hill; continue on track road (left-hand road) 2.0 miles to first ranch house on left; continue on 0.2 mile to Pat Brown's ranch (get guide and horses here); from here road leads across fields to north and east about 2.0 miles to point where road comes to river bank at bluff. Pack up trail along west bank of Green River for about 8.0 miles to mouth of Price River (first canyon with flow of water); ford Price River and continue up Green River about 5.0 miles to where there is large rock pinnacle on bank of river, and trail leaves edge of river and follows draw around west side of pinnacle; from north end of pinnacle go about 50 yards to gravel wash and narrow canyon coming in from left; continue on another 50 yards to rocky draw on left; turn left (west) up draw on well-worn sheep trail which goes up around ledge rock and drops into canyon about  $\frac{1}{2}$  mile above; continue up dry wash in bottom of canyon, in westerly direction, about  $1\frac{1}{2}$  miles to where creek bed is blocked by large boulders and becomes impassable to horse travel. Leave creek bed and follow dim sheep trail along right bank about  $\frac{1}{2}$  mile to small canyon forking left and ending in rock wall about 400 yards from main canyon; keep to right (main canyon) about 500 yards to Y-fork, with both branches ending in rock walls about 200 yards from the fork; continue straight ahead between forks up steep grade on dim trail which switch-backs up hill and to left and comes out on top of cliff about 250 yards from fork; turn left across small dry wash and follow steep bunch-grass covered hogback in southerly direction to top of ridge; turn right (west) and go along top of ridge to prominent flat-topped mesa and station site. Marked by standard station disk in outcropping bedrock, note 2. Reference marks are standard reference disks in outcropping bedrock, note 12a. No. 1 is 3

feet north of point where mountain breaks off sharply to south, and is 20.800 meters (68.24 feet) east of station in azimuth  $279^{\circ}16'$ . No. 2 is 3 feet east of point where mountain breaks off sharply to west, and is 20.586 meters (67.54 feet) north of station in azimuth  $173^{\circ}16'$ . Distance between reference marks is 108.52 feet. Azimuth mark is standard disk in outcropping bedrock, note 12a, on top of first well-defined western point of mountain from south end, 8 feet north of south edge of rim of cap rock on point, and 3 feet east of west edge of rim of cap rock on point, at slightly lower elevation than station mark, and  $\frac{1}{2}$  mile north-northwest of station in azimuth  $143^{\circ}20'26''$ . The line of sight from station to azimuth mark forms chord of natural arc of circle described by cap rock on top of mountain.

**Wood** (Uintah County, W. R. Porter, 1936).—About 32 miles south-southeast of Ouray, 26 miles southwest of Watson, on highest part of piñon-covered ridge about 0.5 mile south of head of Wood Canyon, at southeast edge of second large clearing south of head of Wood Canyon, 30 feet south-southwest of one blazed tree, and 31 feet west of another blazed tree. Station site overlooks wooded country to south and southwest. Considerable clearing is necessary to see in northerly direction. There is higher ridge about 3 miles to southwest. To reach from Ouray, go 33.3 miles to Buck Canyon; then east 3.6 miles to head of Buck Canyon at crossroads; turn right and follow main road southeast 11 miles to fork (there is log house and reservoir visible just ahead); take right fork, around fence, and go 3 miles; then right onto main-traveled road and go 0.35 mile to crossroads; continue straight ahead 0.2 mile to Squire's signboard; follow left fork 1.5 miles to road turning sharply to right; turn right and continue westerly 4.35 miles to top of short grade and onto flat bench or ridge (there is triangular blaze facing west on 16-inch piñon south of road); turn left and go 100 yards to station site. Marked by standard station disk in boulder, note 4. Reference and azimuth marks are standard disks in boulders, note 12b. No. 1 is 13.076 meters (42.90 feet) from station in azimuth  $21^{\circ}42'$ . No. 2 is 21.381 meters (70.15) feet from station in azimuth  $98^{\circ}06'$ . Azimuth mark is about 0.3 mile southeast of station in azimuth  $344^{\circ}56'42''$ . To reach azimuth mark, follow wash southwest from water hole southeast of station to point where another wash comes in from southeast; cross wash and continue up southeast wash 150 yards to blaze on lone cedar tree; continue south and east to mark which is on slight rise on ridge.

**Winter** (Uintah County, W. R. Porter, 1936).—About 42 miles south of Ouray, 34 miles southwest of Watson, on broad flat ridge known locally as Winter Ridge, which lies between Main Canyon to northeast and Meadow Canyon to southwest (both tributaries to Willow Canyon),  $\frac{1}{4}$  mile north-northwest of head of Trapper Canyon, and 45 feet south-southwest of old road running along ridge. Reached from Tracy Ranch by pack train to Tracy Meadow Creek Ranch; thence about 1 mile up Meadow Creek Canyon to junction with Trapper Canyon; turn left and follow Trapper Canyon to head and top of ridge; locate and follow old wagon road north-northwest to station site. Guide should be hired. Marked by standard station disk in top of  $3\frac{1}{2}$ -inch iron pipe projecting about 10 inches. Azimuth mark is standard disk in top of  $3\frac{1}{2}$ -inch iron pipe projecting 10 inches above ground, on station ridge, 33 feet south of old wagon road, and 0.5 mile west of station in azimuth  $109^{\circ}27'25''$ . Azimuth from station to Dome Peak is  $153^{\circ}23'$ .

**Moon** (Grand County, W. R. Porter, 1936).—About 50 miles south of Ouray, on high ridge separating Meadow Creek on northeast and Ten Mile Creek on southwest (both tributaries of Willow Creek), and about 9 miles south of Tracy Meadow Creek Ranch. Reached by pack train from Tracy Ranch to Tracy Meadow Creek Ranch; thence up Kelley Canyon  $\frac{1}{4}$  mile to mouth of Trail Canyon; continue due south up Trail Canyon keeping left main wash to head of canyon; thence south-southwest about 1 mile to station at edge of scrub cedar thicket. About 25-mile pack. Guide should be hired. Marked by standard station disk in top of  $3\frac{1}{2}$ -inch iron pipe projecting about 10 inches above ground. Reference mark no. 1 is standard disk in top of  $3\frac{1}{2}$ -inch iron pipe projecting about 10 inches, 20 paces north of blazed tree, and 14.908 meters (48.91 feet) southeast of station in azimuth  $303^{\circ}54'$ . Azimuth mark is standard disk in rock ledge, note 12b, which can be seen from station through opening in trees, 0.5 mile northwest of station in azimuth  $163^{\circ}27'18''$ . Distances and azimuths from station to two blazed cedars are: 29 paces,  $28^{\circ}56'$ ; and 47 paces,  $319^{\circ}23'$ .

For notes in regard to marking of stations see page 100.

**Carbon and Emery Counties, boundary marker** (Carbon and Emery Counties, W. R. Porter, 1936).—About  $2\frac{1}{2}$  miles northwest of station *Black Hill* (see geographic position and description thereof), 57 feet northeast of trail leading from end of truck travel to that station, and 100 yards southeast of large pole corral through which trail passes. Marked by boulder 8 inches thick, 10 inches wide at top and 14 inches wide at ground, and projecting 2 feet above ground. On top of boulder is 4- by 8-inch tin plate with "Carbon County" stamped on one side, and "Emery County" on other. To reach, follow directions given in description of station *Black Hill*.

#### *Supplementary points*

**Myton, water tank** (Duchesne County, W. R. Porter, 1936).—Center of base of water tank, on west edge of town of Myton, on north side of U. S. Highway 40 at bend in road 0.45 mile west of where highway turns north in town. Tank is about 50 feet high and has two large orange squares painted on either side.

**Altonah** (U. S. G. S.) (Duchesne County, W. R. Porter, 1936).—About  $5\frac{1}{4}$  miles north-northeast of town of Altonah, in northeastern part of T. 1 S., R. 4 W., on easterly one of two bare ridges, and 3.103 meters (10.18 feet) from station *Altonah* (see geographic position and description thereof) in azimuth  $271^{\circ}47'$ . Mark is standard U. S. Geological Survey bench mark disk set in large boulder which projects about 10 inches above ground. Disk marked "M-1934". Recovered in good condition in 1936. For route to station see description of station *Altonah*.

#### SAN JUAN RIVER ARC

##### *Principal points*

**Monitor** (San Juan County, W. R. Porter, 1936).—About 36 miles north-northwest of Kayenta, Ariz., 15 miles northwest of Oljato trading post, near center of T. 41 S., R. 13 E., and on highest summit of large, prominent, isolated mesa which is known as Monitor Mesa and lies between San Juan River on north and Copper Canyon on southwest. To reach from Oljato trading post, cross Moonlight Wash and go northwest 5.2 miles, take right fork northwest across rocky area and then down Copper Canyon 11.7 miles to point where road bears left out of wash (end of truck travel); go northeast toward mouth of small canyon, following wagon trail, and up canyon, across mesa 1.0 mile to point where it veers to left and descends to cross shallow canyon; leave wagon trail and bear to right (southeast) across open mesa, keeping on ridge separating canyons to north and south, 2.0 miles to crossing of shallow canyon, in white sandstone, which drains to left; from canyon, head northwest about 1 mile to isolated, low clay hill, thence north on route marked by small cairns about 0.5 miles toward two prominent conical clay knolls at south end of large clay formation (the first cone is reddish and the second and higher is grey on top). Keep to right, along base of above knolls, about 200 yards to steep, reddish slope, leading upward, climb slope just to right of clay formation to summit of ridge and bear left, along crest 0.25 mile into higher barren clay hills along route marked by small cairns; pick up horse trail which leads north over highest hill and go across grey clay formation and around base of loose red slope 0.25 mile to point where trail bears to right down hill and towards San Juan River; leave trail and bear left, keeping on level ground, around slope of red hill which has large cairn on summit, to clay ridge connecting it with main mesa 0.5 mile northwest; follow dividing ridge between heads of ravines to north and south to cairn at foot of talus slope of main mesa; head straight up (west) toward extreme southeast tip of mesa (this is only place where rim can be ascended); climb steel pins up sheer bluff for 50 feet to top of mesa. The sandstone is loose and climb dangerous. From summit follow ridge northerly for 0.75 mile to east base of white sandstone which forms summit of main mesa; thence west 0.5 mile to highest point and station site. This is hard 5-hour pack. Limited supply of water may be found in rock pockets above rim rock on main mesa. Marked by standard station disk in outcropping bedrock, note 2. Reference marks are standard reference disks in outcropping bedrock, note 12a. No. 1 is 9.750 meters (31.99 feet) from station in azimuth  $344^{\circ}14'$ . No. 2 is 10.523 meters (34.52 feet) from station in azimuth  $92^{\circ}54'$ . Distance between reference marks is 54.01 feet. Azimuth mark is standard disk in boulder 8 feet high and 15 feet in diameter, note 12c, on south side of Copper Canyon, 3.5 miles southwest of station in azimuth  $40^{\circ}41'49''$ .

**North Woodenshoe (U. S. G. S.)** (San Juan County, W. R. Porter, 1936).—About 35 miles west-southwest of Monticello, 27 miles west-northwest of Blanding, on west boundary of La Sal National Forest, on highest and easternmost point of North Woodenshoe Butte, and in sec. 29, T. 35 S., R. 18 E. To reach from Blanding, go west 30.6 miles on Natural Bridges Road to ungraded road leading right (west) at sign "Twin Springs" (this road is 2.45 miles past gate at Kigalia Ranger Station and just beyond road leading to corral to right of main road); follow Twin Springs Road northwest 2.05 miles to large pole corral on north side of which is Forest Service sign "Woodenshoes" and "J. N. Pasture"; follow left fork as indicated by sign 1.75 miles; then follow left fork along ridge 1.6 miles to small reservoir and end of truck travel. Pack north-northwest from north side of reservoir on plain cow trail, skirting east slope of South Woodenshoe 2.0 miles to broad saddle between two buttes. Trail continues straight forward. From saddle at north end of South Woodenshoe, continue on main trail northwest across low ridges 1.0 mile to point 0.5 mile southwest of station; leave trail and follow brushy ridge northeast 0.5 mile to station. Horses may be taken to top of ridge and station site; 2.5-hour pack. Probably marked by standard U. S. Geological Survey station disk in boulder, set flush with ground, note 4. Reference marks are standard reference disks in boulders, note 12c. No. 1 is 4.212 meters (13.82 feet) southeast of station in azimuth  $302^{\circ}37'$ . No. 2 is 5.278 meters (17.32 feet) south of station in azimuth  $43^{\circ}40'$ . Distance between reference marks is 24.11 feet. Azimuth mark is standard disk in pipe projecting 8 inches above ground, note 13a, 5 feet northeast of a 30-inch pine tree with large square blaze and 3.0 miles southeast from station in azimuth  $322^{\circ}39'41''$ .

**Lee (San Juan County, W. R. Porter, 1936).**—About 20 miles (air line) south by west of Bluff, 6 miles (air line) northwest of Goodridge or Mexican Hat, on high mesa 3 miles north of San Juan River, between John's Canyon and Lime Creek, on small knoll about  $1\frac{1}{2}$  miles north of rim, in cleared sagebrush flat; there are many piñon trees to south and east at rim of mesa, a juniper on north edge of station knoll, and dead-limbed tree on northeast slope. To reach from Bluff post office, follow State Highway 47 west 21.85 miles to sign and painting "W-L Ranch"; turn right and go 7.4 miles to this ranch; turn right around ranch house and go 1.0 mile to foot of rim and site of old oil well (end of truck travel); pack up west wash to rim (wire cable leads over this point); follow piñon trees easterly around bluff 100 feet to next wash over rim (20-foot rope is needed for heavy packs at this point); from top of rim go southwesterly, skirting rim and heading small washes through piñon trees for about 4 or 5 miles to clearing at west edge of piñon trees; continue west-southwest across flats about 1 mile to knoll with lone piñon tree on north edge and station site. Water at Bluff and at Lee's ranch. Marked by standard station disk in pipe, projecting 5 inches above ground, note 6a. Reference mark is standard reference disk in pipe projecting 4 inches, note 13a, 13.002 meters (42.66 feet) north-northeast of station in azimuth  $206^{\circ}21'$ . Azimuth mark is standard disk in pipe projecting 6 inches, note 13a, 0.5 mile east of station in azimuth  $275^{\circ}16'11''$ .

**Bears Ears (U. S. G. S.)** (San Juan County, W. R. Porter, 1936).—About 32 miles southwest of Monticello, about 21 miles west of Blanding, in La Sal National Forest, on top of easterly and higher of two mountain peaks known as "Bears Ears", in sec. 29, T. 36 S., R. 19 E., at southeasterly end of pine, quaking aspen and cedar-covered mountain peak, about 50 feet north of south slope, and about 10 feet west of east slope of mountain. There are no trees in immediate vicinity of station, and long line has been cleared over top of mountain to northwest. To reach from Utah Oil Refining Station in Blanding, follow Natural Bridges Road westerly 28.1 miles to Kigalia Ranger Station; continue 4.0 miles on same road to point on slope of mountain about 0.15 mile northeast of cattle guard; turn left and climb mountain to southeast about 0.6 mile to top and station site. Marked by standard U. S. Geological Survey disk stamped "Bears Ears 1934" in top of buried boulder which is flush with ground. Reference marks are standard U. S. Geological Survey reference disks in top of buried boulders which are flush with ground. No. 1 stamped "No. 1 1934 Bears Ears" is 5.616 meters (18.43 feet) west of station in azimuth  $105^{\circ}15'$ . No. 2 stamped "No. 2 1934 Bears Ears" is 4.615 meters (15.14 feet) north of station in azimuth  $204^{\circ}21'$ . Distance between reference marks is 25.62 feet. Azimuth mark is standard azimuth disk in top of 4-inch terra cotta pipe filled with concrete and projecting 12 inches above ground, stamped "Bears Ears U. S. G. S. 1936", 28 feet west of center line of graded road and  $1\frac{1}{2}$  miles north-northeast of station in azimuth  $183^{\circ}41'49''$ . Following distances and azimuths are from station: South end of

short flat ridge, 5 miles,  $64^{\circ}41'$ ; center of corral, 0.5 mile,  $237^{\circ}53'$ ; Blanding, high school chimney, about 21 miles,  $269^{\circ}33'24''$ ; and southeast end of long ridge, 3 miles,  $278^{\circ}23'$ .

**Bluff** (San Juan County, W. R. Porter, 1936).—About 3 miles north of Bluff City, 3 miles east of Bluff City-Blanding Road, on southeast end of badlands mesa. To reach from Blanding, go south on Bluff City-Blanding Road 15.8 miles to where road turns east at bottom of steep hill; continue straight ahead (south) on main road 1.1 miles to three board shacks on west side of road; continue south 6.0 miles to second plank bridge over small wash; continue south 0.75 mile to small rock cairn on left side of road and truck tracks turning east across prairie (this rock cairn is about 3 miles north of Bluff City); follow tracks east across country 1.0 mile to end of truck travel; continue east across dunes to base of mesa (about 1 mile across these dunes); climb to top of mesa, turn right (southeast) and go along top of mesa to extreme southeast end and station. Marked by standard station disk in boulder 18 inches in diameter, note 4. Reference and azimuth marks are standard disks in boulders, note 12c. No. 1 is 13.651 meters (44.79 feet) east of station in azimuth  $308^{\circ}42'$ . No. 2 is on south slope of station ridge, 10.400 meters (34.12 feet) from station in azimuth  $24^{\circ}23'$ . Distance between reference marks is 49.12 feet. Azimuth mark is 12 feet south of rock cairn and 0.35 mile west-northwest of station in azimuth  $125^{\circ}06'53''$ .

**Abajo Peak** (U. S. G. S.) (San Juan County, W. R. Porter, 1936).—About 7 miles south of west of Monticello, in La Sal National Forest, on highest point of Abajo Peak of Blue Mountains, and in sec. 12, T. 34 S., R. 22 E. To reach from Redd Store in Monticello, go west 9.25 miles on graded road to summit of saddle in mountains and end of truck travel; pick up Forest Service trail which leads south toward Jackson Camp, and go southeast down hill and nearly parallel to road for about 100 yards, then bear right along hillside in timber; follow this trail south up steep slope 0.5 mile to log corral in saddle of main ridge; bear left from corral and go southeast up to point of partly timbered ridge and to open hillside meadow near summit; bear left along ridge to saddle at ruins of old cabin, and continue east up ridge about 300 yards to station site. About  $1\frac{1}{2}$ -hour pack. Marked by standard station disk flush in 12-inch square boulder which is about 4 inches below ground surface, note 4. Reference marks are standard reference disks in boulders, note 12c. No. 1 is 6.396 meters (20.98 feet) northeast of station in azimuth  $212^{\circ}23'$ . No. 2 is 4.943 meters (16.22 feet) south of station in azimuth  $51^{\circ}48'$ . Distance between reference marks is 36.63 feet. Azimuth mark is standard disk in outcropping bedrock, note 12a, 0.3 mile south-southwest of station in azimuth  $58^{\circ}58'21''$ .

**Horsehead** (San Juan County, W. R. Porter, 1936).—About 10 miles east and  $8\frac{1}{4}$  miles south of Monticello, on highest point just east of Horses Head Canyon, on sagebrush, pine, and cedar-covered low flat hill, in sec. 10, T. 40 N., R. 25 E., 600 feet southwest of ranch buildings of Mr. Johnson, 55 feet south of fence line, 65 feet southeast of fence corner, on property owned by Joe E. Weston, of Monticello. To reach from Monticello post office, go north 0.2 mile; turn right and follow U. S. Highway 160 east 11.5 miles to crossroads; turn right (south) and go 6.15 miles to side road leading west about 100 yards before reaching farmhouse; turn right and go west 0.95 mile to T-road; jog left about 50 yards and go through gate in wire fence; continue west on wagon road along south side of fence line through sagebrush 0.1 mile to station site. Marked by standard station disk in pipe which projects 6 inches above ground, note 6a. Reference marks are standard reference disks in pipes, note 13a. No. 1 projects 12 inches above ground, is 1 foot south of east-and-west fence line, and 16.532 meters (54.24 feet) north-northeast of station in azimuth  $194^{\circ}57'$ . No. 2 projects 8 inches, is 65 feet south of east-and-west fence line, and 18.170 meters (59.61 feet) east of station in azimuth  $282^{\circ}25'$ . Distance between reference marks is 78.81 feet. Azimuth mark is standard disk in pipe projecting 6 inches, note 13a, approximately 0.3 mile east of T-intersection, 30 feet north of center line of road, in right-of-way fence line, and about 0.4 mile east of station in azimuth  $267^{\circ}42'38''$ . Following distances and azimuths are from station: Chimney on house, about 600 feet,  $222^{\circ}53'$ ; road intersection, about 0.1 mile,  $265^{\circ}33'$ ; chimney on house, about 0.5 mile,  $14^{\circ}03'46''$ .

#### *Supplementary points*

**60-Mile** (Kane County, W. R. Porter, 1936).—On the first bench of the Kaiparowits Plateau, about 52 miles (air line) southeast of Escalante, about 7 miles west of Colorado River, about  $5\frac{1}{2}$  miles southwest of mouth of Escalante River, and on northeast rim of long mesa that runs out from southeast end of high part

of Kaiparowits Plateau (50 Mile Mountain). Reached from Willow Springs concrete reservoir which is 40 miles southeast of Escalante and at end of truck travel, by going on horses southeast along road for 1 hour and 45 minutes to top of ridge reached just after crossing Sooner Gulch, which is identified by several red rock hills in it, just below which road crosses; leave road and go south on right fork towards slide in mountain on dim road for about 15 minutes to Cottonwood Seep and watering troughs. This is nearest water to station, and base camp for horses must be made here. From Cottonwood Seep follow trail south towards Sooner Slide; follow trail up slide to first bench; go southeast on trail along base of highest bench for about 4 hours to east point of high bench. From this point station site can be seen on lower mesa in magnetic bearing  $85^\circ$ . Continue in this direction about 3 miles to station. Mr. Hyrum Gates, of Escalante, knows entire country and can supply necessary pack train. Station marked by standard disk in boulder, note 4. Reference and azimuth marks are standard disks in outcropping bedrock, note 12a. No. 1 is on ledge below station site and 14,996 meters (49,20 feet) (slope distance) east-northeast of station in azimuth  $253^\circ 27'$ . No. 2 is on point which extends east from station ridge, and 24,171 meters (79,30 feet) north-northwest from station in azimuth  $166^\circ 48'$ . Distance between reference marks is 88.81 feet. Azimuth mark is  $\frac{1}{4}$  mile from station in azimuth  $357^\circ 11' 58''$ .

**Hall** (Kane County, W. R. Porter, 1936).—About 12 miles northwest of Colorado River, 6.5 miles west-northwest of Hall's Crossing, 3.0 miles south of Baker's Ranch, on high point in Water Pocket Fold. To reach from Baker's Ranch (which is 60 miles down Grand Gulch along Hall Creek from Notom, and approximately 50 miles south of East Boulder Ranch), go northwest 0.5 mile up wash; turn left (west) for 1.0 mile to top ridge; turn left (southeast) along top of ridge and go 2.0 miles to station site, three-hour pack. Marked by standard station disk in outcropping bedrock, note 2. Reference marks are standard reference disks in outcropping bedrock, note 12a. No. 1 is 7,763 meters (25,47 feet) from station in azimuth  $358^\circ 19'$ . No. 2 is 5,280 meters (17,32 feet) east of station in azimuth  $286^\circ 13'$ . Distance between reference marks is 26.00 feet.

**Grey Mesa** (San Juan County, W. R. Porter, 1936).—About 7 miles east of junction of San Juan and Colorado Rivers, on south edge of Grey Mesa, about 2 miles west of and on second point of mesa west of big bend in San Juan River,  $221^\circ$  true bearing from  $\frac{1}{4}$ -corner of sections 1 and 6 which is south of Old Mormon Road and about 0.7 mile distant, about 200 yards south of the Old Mormon Road, and 10 feet northeast of point where Grey Mesa breaks off to southwest. To reach from Green Water on Old Mormon Road, go west on above road to top of Grey Mesa. Marked by standard station disk in boulder flush with ground, note 4; high point on boulder northwest of disk projects 2 inches above ground. Reference and azimuth marks are standard disks in boulders flush with ground, note 12c. No. 1 is about 65 feet north-northeast of point where Grey Mesa breaks off to south-southwest, and 16,235 meters (53,26 feet) north-northeast of station in azimuth  $204^\circ 03'$ . No. 2 is about 33 feet northeast of point where Grey Mesa breaks off to southwest, 15,828 meters (51,93 feet) northwest of station in azimuth  $146^\circ 21'$ . Distance between reference marks is 58.62 feet. Azimuth mark is on south rim of Grey Mesa, near 2-foot high rock cairn, and  $\frac{1}{4}$  mile from station in azimuth  $219^\circ 25' 24''$ . Azimuth from station to highest point on ridge to north-northwest, distant 6 miles, is  $166^\circ 58'$ .

**40-Mile** (Kane County, W. R. Porter, 1936).—About 42 miles (air line) southeast of Escalante, about 8 miles due east of Willow Spring concrete reservoir (nearest water to station),  $5\frac{1}{2}$  miles northwest of 40 Mile Gulch, about  $4\frac{1}{2}$  miles southwest of Escalante River, about 2 miles southeast of mouth of Coyote Gulch, on top of low sagebrush-covered mesa which is known locally as 40 Mile Ridge, and about 200 yards southwest of most northern point of mesa. To reach from Escalante, go to Willow Springs concrete reservoir which is about 40 miles by road to southeast and is end of truck travel; from here go down Hurricane Gulch (northeast) for about 25 minutes on fast walking horses; leave gulch and turn right (east) across country for about 1 hour to what appears to be highest point on ridge; then head east across sandy flats for about 1 hour to top of low mesa that is fairly steep at its northwest edge and slopes gradually to south and southeast; turn left and go north to north part of mesa and station site. Surface mark is standard station disk in pipe, note 6a, projecting about 12 inches above ground. Underground mark is standard station disk in concrete, note 7a. Reference mark no. 1 is standard reference disk in pipe, projecting 8 inches above ground, note 13a, 12,000 meters (39,37 feet) east of station in azimuth  $275^\circ 21'$ . Reference mark

no. 2 is standard reference disk in outcropping bedrock, note 12a, on northwest edge of mesa, and 15.296 meters (50.18 feet) north-northwest of station in azimuth  $174^{\circ}41'$ . Distance between reference marks is 69.29 feet. Azimuth mark is standard azimuth disk in large rock outcrop, note 12a,  $\frac{1}{2}$  mile west of station in azimuth  $106^{\circ}03'28''$ .

**Bullfrog** (Kane County, W. R. Porter, 1936).—About  $2\frac{1}{2}$  miles north of old Halls Crossing,  $5\frac{1}{2}$  miles southeast of Baker's Ranch, about 2 miles northwest of Colorado River, on north end and highest point of flat-topped sagebrush-covered mesa (80 feet from east edge, 30 feet from west edge, and 36 feet from north edge) that has steep red rock walls on all sides, between Hall Creek and Bullfrog Creek. To reach from Baker's Ranch (which is approximately 60 miles south of Notom) on Hall Creek, go down creek for about 1 hour's travel on horseback to where fence line made of poles comes into creek from east; go east along fence line about 200 yards to gate; turn south through gate and continue straight ahead about 400 yards to top of red rock mesa; from here station site can be seen in magnetic bearing  $108^{\circ}$ . Head across country toward saddle between mesas on magnetic bearing  $96^{\circ}$  for about 25 minutes travel to divide between two mesas and divide between Hall Creek and Bullfrog Creek. Just before reaching divide, General Land Office mark will be found on north side of divide; mark projects about  $1\frac{1}{2}$  feet and is stamped "1923, sec. 12, sec. 13". From here head easterly along base of red rock hill on right for about 300 yards, climb up to right to saddle in red rock hill, and thence southeasterly and south up hill to highest point on north end of mesa and station site. Truck may be driven about halfway to Baker's Ranch. Marked by standard station disk in boulder, note 4. Reference marks are standard reference disks in boulders, note 12c. No. 1 is at west edge of mesa, 9.145 meters (30.00 feet) southwest of station in azimuth  $41^{\circ}32'$ . No. 2 is at north edge of mesa, 11.148 meters (36.57 feet) northwest of station in azimuth  $146^{\circ}07'$ . Distance between reference marks is 52.83 feet. Azimuth mark is standard disk in boulder, note 12c, on cone-shaped sand rock, approximately 0.3 miles northwest of station in azimuth  $147^{\circ}24'35''$ .

**North Gulch** (San Juan County, W. R. Porter, 1936).—About  $\frac{1}{4}$  mile west of Red Rock Springs, on top of first high red (Navajo) sandstone knoll west of Red Rock Springs, about  $\frac{1}{2}$  mile due south of sand slide into North Gulch which is only point at which North Gulch can be entered from south. Station, sand slide, and easternmost peak of Little Rockies form north-and-south straight line. There are two small high points of sandstone and cedar bush at southwest end of knoll. From station there is good visibility to west and northwest, but only close ridges and high points can be seen to east and southeast. To reach from Red House Springs (which is end of truck travel), follow Old Mormon Trail southwesterly about 10 miles to Clay Hill Pass; thence down Castle Wash southwesterly about 2 miles to Green Water, Green Water Springs, and cow camp; thence down Castle Wash about 3 miles to point where wash widens out (about  $\frac{1}{2}$  mile below this point Castle Wash turns due south); thence northwesterly up big sand wash about 3 miles to top of divide; thence westerly down over slick rocks and sand about 4 miles to Red Rock Springs. Red Rock Springs is at head of 2-mile long north-and-south branch canyon of North Gulch; it contains only water between Castle Wash and North Gulch. This canyon is distinctly defined by many large cottonwood trees growing in it. Marked by standard station disk in bedrock, note 2. Reference marks are standard reference disks in outcropping bedrock, note 12a. No. 1 is 60 feet east of east side of easternmost high point of sandstone at southwest end of station knoll, and 28.107 meters (92.21 feet) southeast of station in azimuth  $323^{\circ}40'$ . No. 2 is 18 feet east of small cedar bush, 12 feet north of north side of westernmost high point of sandstone at southwest end of station knoll, and 22.480 meters (73.75 feet) southwest of station in azimuth  $50^{\circ}50'$ . Distance between reference marks is 115.08 feet. *North Gulch azimuth* (see geographic position and description thereof) is marked by standard disk in outcropping bedrock, note 12a, on highest point of group of Navajo sandstone domes, on first high point west of sand slide, and about 1 mile west-northwest of station in azimuth  $108^{\circ}09'26''$ .

**North Gulch azimuth** (San Juan County, W. R. Porter, 1936).—About 1.5 miles west-northwest of station *North Gulch* (see geographic position and description thereof), about 1.5 miles west of sand slide which is only point at which North Gulch can be entered from south, on highest point of group of Navajo sandstone domes, first high point west of afore-mentioned sand slide. Reached from Red House Springs in vicinity of station *North Gulch* by going northwesterly about 1.5 miles over rock. Marked by standard reference disk in outcropping bed rock, note 12a, stamped "North Gulch Azimuth 1936."

**Red House** (San Juan County, W. R. Porter, 1936).—About 13 miles southwest of Natural Bridges, about 3 miles northwest of Red House Springs, on northeast end of high, flat-topped mesa, and about ½ mile northwest of rim where mountain breaks off sharply to valley. Between station and rim is small draw. Rim to southeast appears higher than station. Station is on high sandy point which is southeast part of small circular ridge about 200 feet in diameter, and is about 100 feet southeast of low point which contains remains of broken Indian pottery. Reached from Red House Springs with pack horses by following old Mormon Road west and northwest about 12 miles to top of Clay Hill divide; continue on down trail about 2 miles to first large canyon leading north and east from Castle Wash above Irish Green Springs. Turn right up wash and go about ¼ mile to gate in drift fence; follow this canyon, keeping all main right-hand forks about 6 or 7 miles to 8-inch triangle, and arrow pointing to trail and "Red House" chiseled in face of large boulder which almost blocks bed of canyon. From triangle turn left up steep bank 100 feet to shelf above; turn left along shelf 100 yards to top of first bench; swing back, right, and up along shelf about 300 yards to small ridge and canyon head; turn left, up ridge, along edge of canyon about 200 yards to rim rock. Go through break in rim rock to shelf just above and swing right along shelf about ¼ mile to second ridge leading down from rim above; turn left up this ridge to point just under rim rock; then turn right and up to break in rim, about 200 yards; go up over rim through break and keep straight ahead (northeasterly) along mesa about ¼ mile to station site. Triangle and arrow on boulder in canyon mark only known pass to top of mesa. Trail is very steep and dangerous. Only best pack animals can be used. Advisable to obtain guide. There is good water in canyon just before reaching boulder with triangle and arrow. Nine-hour pack from Red House Springs. Mark is probably standard disk in boulder flush with ground. Reference mark no. 1 is probably standard disk in boulder flush with ground, on northwest side of small sand ridge, near northeast corner of sand blow-out, and 21.080 meters (69.16 feet) (slope distance) east-northeast of station in azimuth 251°18'. Reference mark no. 2 is 25.065 meters (82.23 feet) (slope distance) south of station in azimuth 346°04'. Azimuth mark is probably standard disk in rock outcrop which slopes to west, immediately to left from white formation as viewed from station, and 0.5 mile east-southeast of station in azimuth 291°02'44". Azimuth from station to Dragontooth Rock, approximately 10 miles southeast, is 344°14'57".

**Grand** (San Juan County, W. R. Porter, 1936).—Near junction of San Juan River and Grand Gulch, about 1½ miles north of river and about 1 mile west of gulch, on small group of sand domes which are about 50 feet higher than surrounding country (there is boulder about 10 feet across and 3 feet thick balancing on northwest edge of the hill about 50 feet from station in north-northwesterly direction), 105 feet north of division crack between white and red sand rock, 13 feet west of upper rim, 200 feet west of edge of lower rim, and 100 yards northwest of small canyon. To reach from Blanding, go in westerly direction 46.5 miles on the Natural Bridges Road to side road left, about 1.5 miles before reaching the first of the Natural Bridges; turn left (south) and go 0.35 mile; take left fork and follow road (MTR) 7.6 miles; take left fork and go 6.7 miles to old camp site at head of canyon; thence bear to right around rock ledge for about ¼ mile to end of ridge; from here go in magnetic bearing 183° towards sand rock with cone-shaped peak for about 4 miles; on reaching this group of rocks another group may be seen a little to west of south, approximately 2.5 miles distant; from this second group of sand rocks go in southwesterly direction along low ridge for about 3 miles to large sand rock with cairn on top (this rock is on ridge being followed); continue along ridge about 1.5 miles to station on sand rock outcrop, these rocks being higher than any others nearby. Marked by standard station disk in outcropping bedrock, note 2. Reference marks are standard reference disks in outcropping bedrock, note 12a. No. 1 is 5 feet west of east edge of rim rock, 17.529 meters (57.51 feet) south-southeast of station in azimuth 347°52'. No. 2 is 12 feet east of west edge of rim rock, 15.144 meters (49.68 feet) west of station in azimuth 95°20'. Distance between reference marks is 86.56 feet. Azimuth mark is standard disk in outcropping bedrock, note 12a, on sandy flat, 0.2 mile north-northeast of station in azimuth 201°48'46". Azimuth from station to balancing rock 50 feet distant is 165°43'.

**Bridges** (San Juan County, W. R. Porter, 1936).—About 28 miles south of west of Blanding, 3 miles south-southeast of Owachomo Natural Bridge, 32 feet east of cedar tree with triangular blaze, 20 feet north of center line of graded road leading to Natural Bridge, and in sec. 24 or 25, T. 37 S., R. 17 E. To reach from Utah

For notes in regard to marking of stations see page 100. MTR above means main traveled road.

Oil Refining Station in Blanding, follow Natural Bridges Road westerly 28.1 miles to Kigalia Ranger Station; continue 4.0 miles to cattle guard, continue west on same road 12.35 miles to station, which is reached 3.45 miles before reaching end of road at Natural Bridge. Marked by standard station disk in concrete post, note 1a, projecting 6 inches above ground. Reference marks are standard reference disks in concrete, note 11a, projecting 6 inches above ground. No. 1 is 30 feet south of center line of road, and 15.148 meters (49.70 feet) south-southwest of station in azimuth  $19^{\circ}22'$ . No. 2 is 18 feet north of center line of road, and 15.743 meters (51.65 feet) southeast of station in azimuth  $300^{\circ}18'$ . Distance between reference marks is 64.49 feet. Azimuth mark is standard disk in outcropping bedrock flush with ground, note 12a, 65 feet north of center line of road, and approximately 0.7 mile southeast from station in azimuth  $304^{\circ}37'15''$ .

**Horn** (San Juan County, W. R. Porter, 1936).—About 29 miles (air line) west of Bluff, 19 miles (air line) northwest of Mexican Hat (Goodridge), on land north of San Juan River and between Slick Horn and Grand Gulch Canyons, in clearing of sagebrush, just west of rim of Slick Horn Canyon, and south of outcropping rock bench just off rim and  $\frac{1}{4}$  mile distant. To reach from Bluff, go west 21.85 miles to sign "W-L Ranch"; turn right and go 7.4 miles to W-L Ranch (this is Lee Ranch and horses may be obtained here); use pack horses and go westerly between rim and San Juan River  $4\frac{1}{2}$  hours to John's Canyon where good water and pasture are available for camping; continue for  $8\frac{1}{2}$  hours, following rim of river to Slick Horn Canyon, where river doubles back; continue up Slick Horn Canyon for  $1\frac{1}{2}$ -hour ride, as far as horses may be taken; continue on foot for 2 hours, bearing left up canyon to blazed cottonwood tree in wash; turn left, climb rim rock to top, and go about  $\frac{1}{2}$  mile west along rim to station site. A 20-foot rope would be useful with heavy packs. There is good water at spring about  $\frac{3}{4}$  mile northwest of station. Marked by standard station disk in boulder, note 4. Reference mark no. 1 is standard reference disk in outcropping bedrock, note 12a, 23.463 meters (76.98 feet) southeast of station in azimuth  $334^{\circ}49'$ . Reference mark no. 2 is standard reference disk in boulder, note 12c, 11.519 meters (37.79 feet) southwest of station in azimuth  $66^{\circ}35'$ . Distance between reference marks is 86.63 feet. Azimuth mark is standard disk in outcropping bedrock, note 12a, 0.2 mile south of rock cairn, and about  $\frac{1}{2}$  mile north-northeast of station in azimuth  $230^{\circ}16'56''$ .

**Monocline** (San Juan County, W. R. Porter, 1936).—About 13 miles west of Bluff City, 0.9 mile south of Bluff City-Mexican Hat Road, on south end of flat-topped mesa locally known as Lime Ridge, 25 feet north of rock cairn which is on point of mesa, and 15 feet east-northeast of rim rock. To reach from Bluff City, go west on Bluff City-Mexican Hat Road 8.7 miles to bottom of Comb Wash (spring 400 yards south in bottom of wash); continue west along main road 4.65 miles to where road skirts head of rocky draw; continue on main road 0.2 mile; turn left (south) and go across country 0.9 mile to rock cairn at south end of mesa and station site. Marked by standard station disk in outcropping bedrock, note 2. Reference and azimuth marks are standard azimuth disks set as follows: Reference mark no. 1 is 20 feet north of edge of rim rock, and 13.895 meters (45.59 feet) northeast of station in azimuth  $248^{\circ}.1$ . Reference mark no. 2 is 33 feet east of edge of rim rock, and 19.576 meters (64.23 feet) northwest of station in azimuth  $155.5^{\circ}$ . Distance between reference marks is 79.75 feet. Azimuth mark is set in solid rock, 100 feet west of west end of W. P. A. dam, and about  $\frac{3}{4}$  mile southwest of station in azimuth  $49^{\circ}29'03''$ . Following distances and azimuths are from station: Rock cairn, 4 miles northwest,  $131^{\circ}26'25''$ ; cone-shaped peak, approximately 35 miles,  $240^{\circ}31'48''$ ; apparently highest peak to east,  $267^{\circ}07'48''$ .

**Horse** (San Juan County, W. R. Porter, 1936).—About 22 miles (air line) northwest of Blanding, 3 miles (air line) north-northeast of Gooseberry Ranger Station, on southeast side of Horse Mountain in the La Sal National Forest, at heads of Beef Basin Canyon and Poison Canyon, about 175 yards northwest of U. S. Geological Survey signal pole which is on point near rock cairn. There is hill covered with quaking aspens and several lone pines to northwest which is slightly higher. To reach from Gooseberry Ranger Station, go 0.1 mile west to gate, pass through gate; turn sharply right and go north through woods 1.0 mile to fence and bars; continue through meadow on bladed road 2.25 miles to larger flat where road ends; go northeast across meadow 0.3 mile to base of hill; pack up hill in northeasterly direction to station site. About  $\frac{1}{2}$ -hour pack. Marked by standard station disk in boulder flush with ground, note 4. Reference marks are standard reference disks in boulders, note 12c. No. 1 is flush with surface of ground, 14.585 meters (47.85 feet) southwest of station in azimuth  $52^{\circ}05'$ . No. 2 projects 1 inch above ground, and is 10.997 meters (36.08 feet) northwest of station in azimuth  $124^{\circ}57'$ . Distance between reference marks is 56.06 feet. Azimuth

mark is azimuth disk in boulder 4 feet in diameter and 3 feet high, on station ridge,  $\frac{1}{4}$  mile south-southeast of station in azimuth  $337^{\circ}11'05''$ .

**Notch** (San Juan County, W. R. Porter, 1936).—About  $23\frac{1}{2}$  miles (air line) south-southwest of Monticello, 17 miles (air line) west-northwest of Blanding, in La Sal National Forest, about 3 miles west of Cottonwood Canyon, on road leading from Kigalia Ranger Station to Gooseberry Ranger Station, at southeast end of long ridge (this point may be seen just before reaching station at beginning of very steep grade), where U. S. Geological Survey has erected signal pole and cairn 14 feet northwest of southeast edge of bluff, 20 feet southwest of northeast edge, and 27 feet northeast of southwest edge. To reach from Blanding, go west on short stretch of gravel road leaving State Highway 47 at Blanding service station and Nielson store, and following signs towards "Natural Bridges" for 15.1 miles to Y-intersection and sign "Bridges"; bear sharply to left and go 12.6 miles to sign in flat "2 miles to Kigalia R. S. 24 miles to the Natural Bridges"; take dim right fork and go 1.8 miles to fork; take right fork and go 1.8 miles to gate; pass through gate and go 1.0 mile to gate; pass through gate and go 3.65 miles to two blazed trees on right and end of truck travel; thence easterly through brush to southeast point of ridge and station site. About 10-minute pack. Spring and good water about 1 mile northwest of end of truck travel. Marked by standard station disk in outcropping bedrock, note 2. Reference marks are standard reference disks in outcropping bedrock, note 12a. No. 1 is on point 4 feet southwest of the northeast edge of bluff and 8.533 meters (28.00 feet) east-northeast of station in azimuth  $241^{\circ}44'$ . No. 2 is on point 2 feet north of southwest edge of bluff and 8.327 meters (27.32 feet) south-southwest of station in azimuth  $23^{\circ}41'$ . Distance between reference marks is 52.04 feet. Azimuth mark is standard disk in boulder 6 feet in diameter, note 12c, 15 feet east of the center line of graded road,  $\frac{1}{4}$  mile south of station in azimuth  $359^{\circ}40'46''$ .

**Twin** (San Juan County, W. R. Porter, 1936).—In La Sal National Forest, about 16 miles north of Blanding, 8 miles west of Monticello, and about 2 miles east of Indian Creek, on highest point of Twin Peak Mountain, 40 feet north of pole drift fence. To reach from L. H. Redd's department store in Monticello, go west on graded road 0.8 mile to ranger station gate; jog south 200 feet; then westerly on C. C. C. improved road through gently sloping foothills 5.5 miles to cattle guard; turn right and continue on slightly improved road up North Creek Canyon to saddle in mountains and end of truck travel. From saddle, follow partly made road (1936) along southwest side of mountain about  $\frac{1}{4}$  mile to another saddle in mountains; thence, westward along top of saddle and up Twin Peak Mountain about  $\frac{1}{4}$  mile to top and station. Marked by standard station disk in pipe, note 6a, projecting 8 inches above ground. Reference and azimuth marks are standard disks in pipes, note 13a, projecting 12 inches. No. 1 is 12 feet north of pole drift fence and 7.520 meters (24.67 feet) (slope distance) south of station in azimuth  $22^{\circ}37'$ . Azimuth mark is  $1\frac{1}{2}$  miles from station in azimuth  $292^{\circ}40'04''$ .

**Bridger Jack** (San Juan County, W. R. Porter, 1936).—About 19 miles west-northwest of Monticello, 9.0 miles southwest of Dugout Ranch, about 150 yards north of extreme southwest point of Bridger Jack Mesa, and in sec. 25, T. 32 S., R. 20 E. To reach from Monticello, follow U. S. Highway 450 north 15.25 miles to small board shack and sign reading "Home of Truth" on left; leave highway and go west on ungraded road past Home of Truth 20.65 miles to Dugout Ranch. Just before ascending short grade to ranch gate, bear left down creek between bank and small buildings on very dim tracks crossing Indian Creek and following up west side of Cottonwood Creek 8.1 miles to old corrals at deserted Hi Wilson Ranch and end of truck travel (last 8.1 miles of truck travel are very bad); from ranch follow main cattle trail up west side of canyon 2.0 miles to first large side canyon to west (this canyon is just above mouth of blind canyon and low red ridge extends out from west side of Cottonwood Canyon just below it); follow trail up side canyon, across sage brush flats about 0.5 mile; thence up along south wall 0.5 mile to where it climbs onto mesa near foot of high steep mesa to west; bear south across Juniper Mesa about 0.25 mile to foot of steep ridge extending eastward from high mesa to where well-marked trail will be found, circling up through rim rock about 1.0 mile to summit of main mesa; from top of mesa, follow trail northwest along narrow ridge about 0.75 mile to point where mesa widens; from here follow near left-hand (south) rim about 0.5 mile to extreme southwest and highest point and station site. Back packing requires 5 hours. Marked by standard station disk in outcropping bedrock, note 2a. Reference marks are standard reference disks in outcropping bedrock, note 12a. No 1 is

8.426 meters (27.64 feet) south-southwest of station in azimuth  $20^{\circ}14'$ . No. 2 is 3.970 meters (13.02 feet) northwest of station in azimuth  $127^{\circ}40'$ . Distance between reference marks is 33.89 feet.

**Hart** (San Juan County, W. R. Porter, 1936).—About  $9\frac{1}{2}$  miles north-northwest of Monticello,  $1\frac{1}{2}$  miles east of Hartsdraw, 3 miles west of U. S. Highway 450, on long north-and-south ridge covered with cedar and pine trees, sloping gradually to east and dropping off abruptly to west at rim, on highest part of ridge to south and 30 feet east of rim, in small opening in trees. About 1 mile to north is another and slightly higher ridge. Lines have been cleared to east and south at station site. To reach from post office in Monticello, go north 6.35 miles on U. S. Highway 450 to side road left at bottom of hill; turn left and go 0.45 mile to opening in wire fence and house on right; continue (on MTR) 0.1 mile; take left fork and go 0.15 mile to opening in wire fence; continue through opening for 0.35 mile; take right fork and go 0.05 mile to opening in wire fence and sign "National Forest Boundary"; continue 0.5 mile to crossroads, turn right and go 0.15 mile; take right fork and go 0.35 mile to opening in wire fence and another sign "National Forest Boundary"; continue for 0.3 mile to wash in bottom of Bridge Canyon, cross wash and follow left fork 0.65 mile; take right fork and go 0.8 mile; take right fork and go 0.5 mile to end of truck travel at south edge of canyon. From here continue across canyon north-northwesterly to highest point of ridge and station site. Pack requires 45 minutes. Marked by standard station disk in boulder flush with ground, note 4. Reference marks are standard reference disks in outcropping bedrock flush with ground, note 12a. No. 1 is 5 feet east of west rim and 10.126 meters (33.22 feet) north of station in azimuth  $182^{\circ}57'$ . No. 2 is at edge of rim and 9.643 meters (31.64 feet) west-southwest of station in azimuth  $76^{\circ}00'$ . Distance between reference marks is 52.27 feet. Azimuth from station of cleared line to east is  $266^{\circ}$ .

**Bridger Jack azimuth mark** (San Juan County, W. R. Porter, 1936).—About 19 miles west-northwest of Monticello, 9.0 miles southwest of Dugout Ranch, in La Sal National Forest. To reach, follow route to station *Bridger Jack* (see geographic position and description thereof) to top of main mesa; from here follow trail northwest along narrow ridge about  $\frac{1}{2}$  mile to highest point of narrow ridge and azimuth mark site. Marked by standard azimuth disk in outcropping bedrock flush with surface of ground, note 12a. Due to excessive clearing required, this mark was not observed from station *Bridger Jack*.

**Blanding** (San Juan County, W. R. Porter, 1936).—About 1.5 miles north of Blanding, on south end of cedar-covered hill, 60 feet east of west edge and 70 feet north of south edge. To reach from Neilson's Cash Store in Blanding, go west on gravel road 0.3 mile to crossroads; turn left (north) and go 0.3 mile to C. C. C. camp; turn left and go 0.05 mile to southwest corner of C. C. C. camp grounds; turn right (north) and go 0.25 mile to where graded road turns left; continue straight ahead (north) 0.4 mile to Y-forks; take left fork and go northwest and north 0.6 mile to dim left fork; follow main-traveled road 0.15 mile to clay pit and brick kiln; turn right (east) through clay pit for 50 yards to dim road on right up ridge; follow dim road up ridge (southeast) 0.5 mile to south end of ridge and station. Surface and underground marks are standard station disks in concrete, notes 1a and 7a; upper mark projects 4 inches. Reference and azimuth marks, are standard disks in concrete, note 11a. No. 1 projects 5 inches and is 14.135 meters (46.37 feet) east-southeast of station in azimuth  $292^{\circ}17'$ . No. 2 projects 3 inches and is 14.105 meters, 46.28 feet south of station in azimuth  $3^{\circ}01'$ . Distance between reference marks is 53.60 feet. Azimuth mark projects 6 inches, is in fence line 30 feet east of center line of Natural Bridges Highway where road turns west, 66 feet northeast of power-line pole, 2 feet north of corner post in fence line, and 1.0 mile from station in azimuth  $1^{\circ}03'35''$ .

**Recapture** (San Juan County, W. R. Porter, 1936).—About 14 miles (air line) south of Blanding,  $11\frac{1}{2}$  miles (air line) north of Bluff, 0.1 mile west of State Highway 47, on north edge of 18-foot circular mound on knoll lying between Recapture Creek and Cottonwood Wash. To reach from Blanding, follow State Highway 47 south 14.4 miles; at this point (which is 12.15 miles north of Bluff) turn left (west) and go 0.1 mile to top of knoll and station site. Marked by standard station disk in concrete post projecting 6 inches above ground, note 1a. Reference mark no. 1 is standard reference disk in concrete post projecting 4 inches, note 11a, and is 10.558 meters (34.64 feet) east from station in azimuth  $308^{\circ}51'$ . Reference mark no. 2 is standard reference disk in outcropping bedrock, note 12a, and is 30.160 meters (98.95 feet) southwest from station in azimuth  $39^{\circ}19'$ . Distance between reference marks is 105.05 feet. Azimuth mark is U. S. C. & G. S. bench mark D-23, standard bench mark disk in concrete post projecting 10 inches above

ground, stamped "Elevation 4,982.693 feet", and is 54 feet west of center line of State Highway 47, 26 feet east of west right-of-way fence, 3 feet east of telephone pole, about  $\frac{1}{2}$  mile north-northwest of board shacks, and 1.5 miles from station in azimuth  $26^{\circ}56'37''$ .

**Montezuma** (San Juan County, W. R. Porter, 1936).—About 20 miles southeast of Blanding, 16 miles north of west of McElmo, about 2 miles west of Montezuma Creek, on promontory of large mesa made by junction of Alkali and Montezuma Creeks (Alkali Creek being to north); on small knoll at west edge of some piñon trees. There is large water hole about 350 feet south-southeast of station. To reach from Bluff, follow Blanding Road north 11.1 miles to side road to right (this road is 15.45 miles south of Blanding on State Highway 47); turn right and go 4.5 miles, crossing Cottonwood Wash and following road through badlands to water tank and trough on right; continue straight ahead 2.4 miles to sheep corral on right; continue 0.5 mile to fork; take left fork and go 4.1 miles to side road to right; turn right and go 0.8 mile to reservoir on left and old ruins off road to right; leave road and go in magnetic azimuth  $90^{\circ}$ , heading towards Ute Mountain, about  $3\frac{1}{2}$  miles to station. Truck can be driven to station. Marked by standard station disk in boulder, note 4. Reference marks are standard reference disks in boulders flush with ground, note 12c. No. 1 is 19.050 meters (62.50 feet) north of station in azimuth  $196^{\circ}06'$ . No. 2 is 14.899 meters (48.88 feet) east of station in azimuth  $266^{\circ}54'$ . Distance between reference marks is 65.54 feet. Azimuth mark is standard disk in concrete flush with ground, note 11c, on route to station, and 0.3 mile west of station in azimuth  $134^{\circ}42'37''$ . Azimuth from station to cairn is  $106^{\circ}11'36''$ .

**Iron** (San Juan County, W. R. Porter, 1936).—About 6 miles east and 9 miles north of Monticello, on top of low wooded hill that has sage flats to east, in east side of sec. 13, T. 32 N., R. 24 E., and 0.3 mile south of pipe with bronze cap marked "T-32-S; R-24-E; R-25-E; S12/S13:S7/S18". To reach from post office in Monticello: Go north 0.2 mile; turn right and follow U. S. Highway 450 (gravel) east 2.95 miles to where old highway forks to left; leave U. S. Highway 450, take left fork and follow old highway 1.15 miles to side road left; leave old highway, turn left, and follow main-traveled unimproved road north and northeast 2.4 miles to fork; continue straight ahead on left fork (main-traveled road) northeast 1.9 miles to crossroads; turn left and go north on main-traveled road 0.2 mile to fork; take right fork and follow main-traveled road northeast 1.3 miles to fork; leave main-traveled road, take left fork (north) and go 0.75 mile to gate; pass through gate and go 0.25 mile to crossroads; continue north 0.1 mile to dirt reservoir on right; continue north 0.9 mile to crossroads at section corner and old fence corner. From here go north 0.1 mile, then follow left fork on main-traveled road northwest 1.1 miles to dirt dam; cross dam and continue northwest and north along section-line road 1.4 miles to side road west and old dilapidated house on right; thence north on main-traveled road 0.7 mile to top of small rise and station on left. Mark is standard disk in pipe, note 6a, projecting 8 inches above ground. Reference and azimuth marks are standard disks in pipes, note 13a. Reference mark no. 1 projects 8 inches above ground and is 12.591 meters (41.31 feet) east of station in azimuth  $289^{\circ}09'$ . No. 2 is 15.785 meters (51.79 feet) south of station in azimuth  $6^{\circ}30'$ . Distance between reference marks is 58.75 feet. Azimuth mark projects 8 inches above ground, is 25.90 feet northeast of section corner (above), 15 feet west of center line of dim road, and 0.3 mile north of station in azimuth  $179^{\circ}48'51''$ . General Land Office mark is standard  $3\frac{1}{2}$ -inch bronze cap marked as stated above, on top of iron pipe which projects about 20 inches above ground, 10 feet east of center line of dim road, and about 0.3 mile from station in azimuth  $180^{\circ}46'18''$ . Pipe has been disturbed and leans to south  $15^{\circ}$  from vertical.

**Ismay** (San Juan County, Utah, Montezuma County, Colo., Charles Pierce, 1936).—About 24 miles north of west of Cortez, Colo.,  $15\frac{1}{2}$  miles west-northwest of Ute Mountain, 2 miles north (air line) of McElmo Creek Road, at extreme northeast corner of Navajo Indian Reservation where north boundary of reservation intersects Colorado-Utah State line. To reach from Cortez, Colo., go west on U. S. Highway 666 to end of pavement at city limits; continue on highway west and south 2.9 miles; turn right onto gravel road and go west 8.2 miles; take left fork (main-traveled road) and go 20.5 miles to Ismay Trading Post; continue on main road 0.4 mile across main wash to fork in wash; keep to right (north) up wash 1.2 miles to where road turns left up side wash; leave road and go up dry wash bed 1.2 miles to wire fence crossing wash and end of truck travel. Follow fence up steep rocky bluff to right for about 20-minute walk to top of mesa and station site. Marked by standard station disk in bedrock, note 2. Reference and azi-

mark marks are standard disks in bedrock, note 12a. No. 1 is 9.119 meters (29.92 feet) southwest of station in azimuth  $50^{\circ}20'$ . No. 2 is 11.559 meters (37.92 feet) north-northwest of station in azimuth  $160^{\circ}15'$ . Distance between reference marks is 55.76 feet. Azimuth mark is on rocky point near end of bluff, about 400 yards west-southwest of station in azimuth  $82^{\circ}22'50''$ . Azimuth from station to fence corner, intersection of north boundary of Navajo Indian Reservation and Colorado-Utah State Line, distance 84.8 meters (278 feet), is  $80^{\circ}07'54''$ .

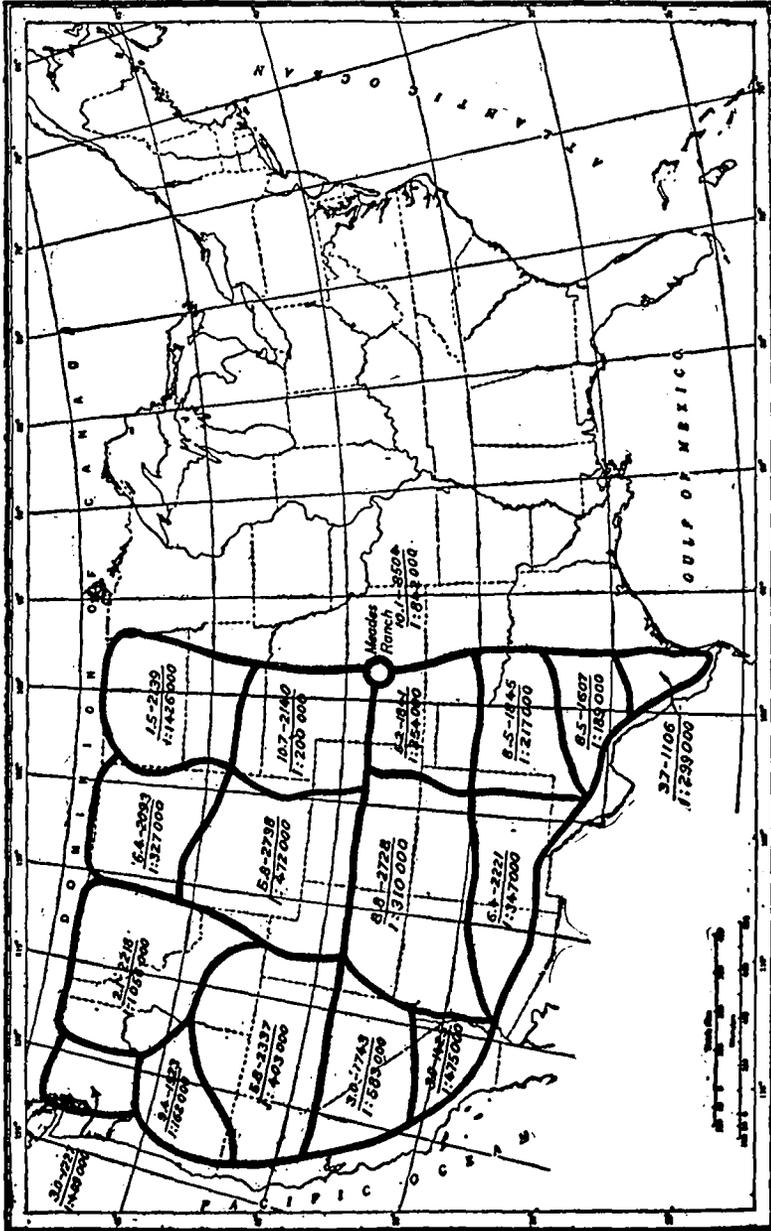


FIGURE 5.—Arcs included in western adjustment and loop closures  
 The first number above the line is the total closure of the loop in meters and the second number is the approximate length of the loop in kilometers. Below the line is the approximate proportional part of the whole circuit represented by the closure.

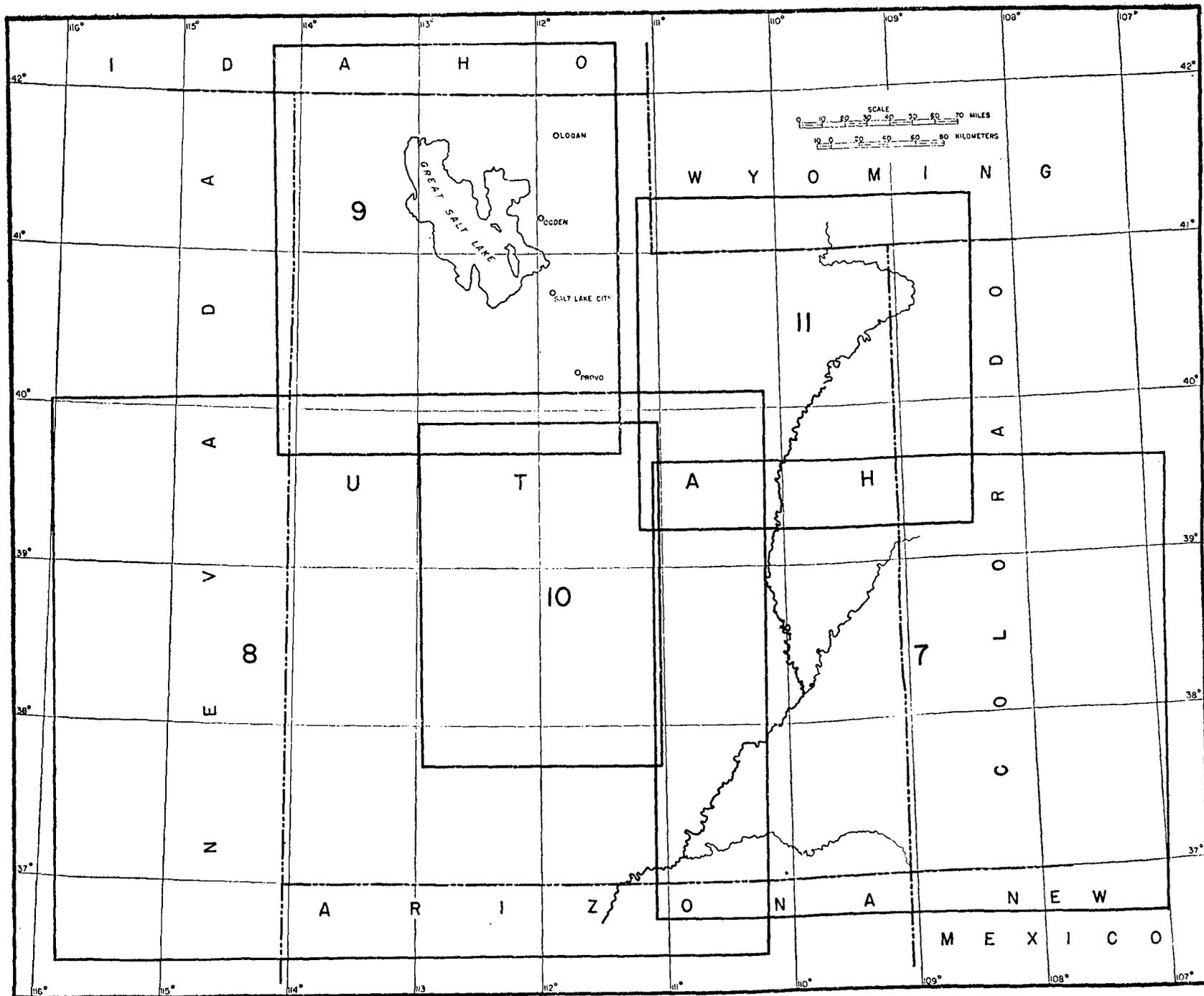


FIGURE 6.—Index map of Utah showing areas covered by the following sketches, figures 7 to 11.

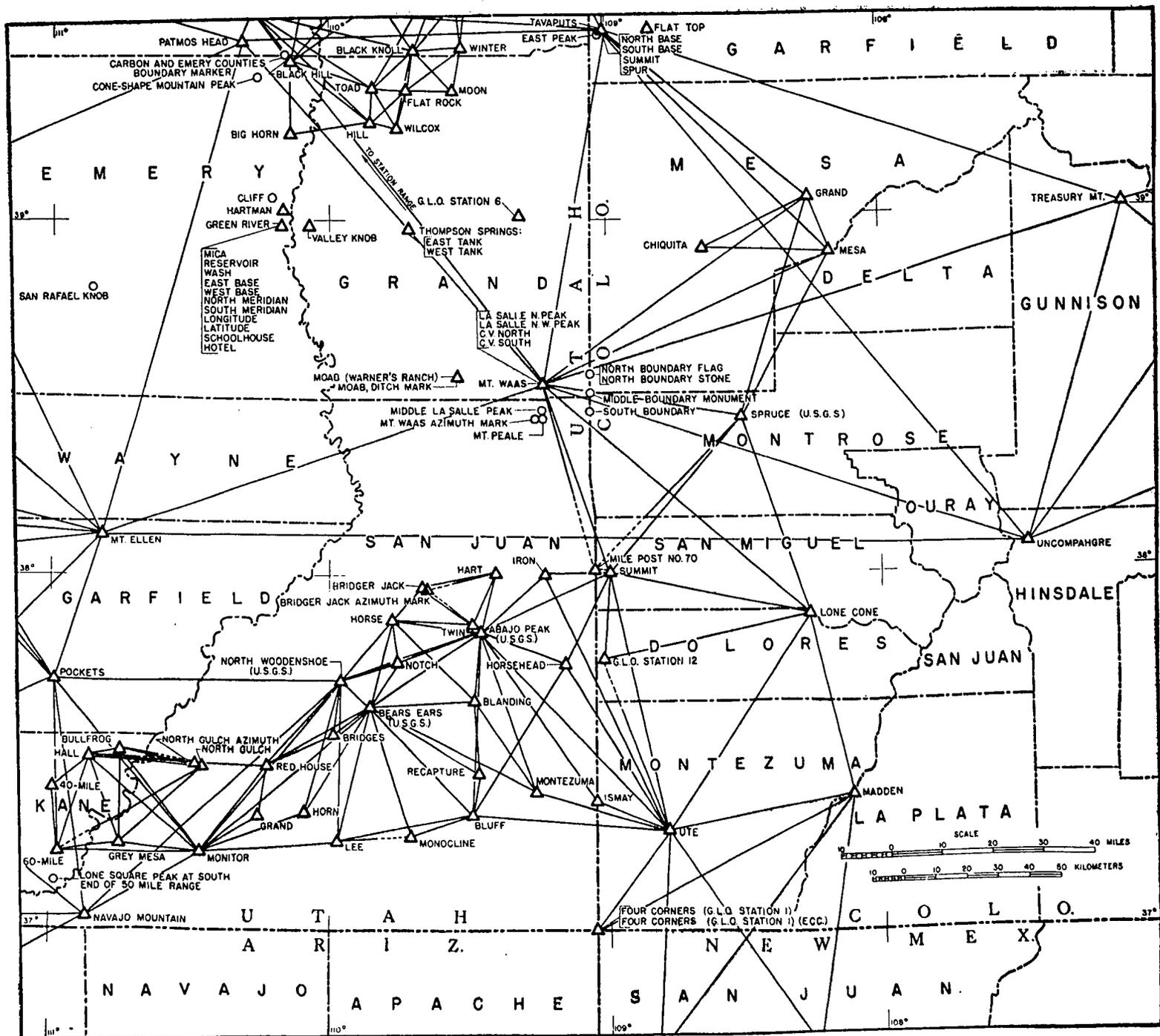


FIGURE 7.—Triangulation along the thirty-ninth parallel arc, the Grand Junction, Colo., to Lordsburg, N. Mex., and the San Juan River arc.



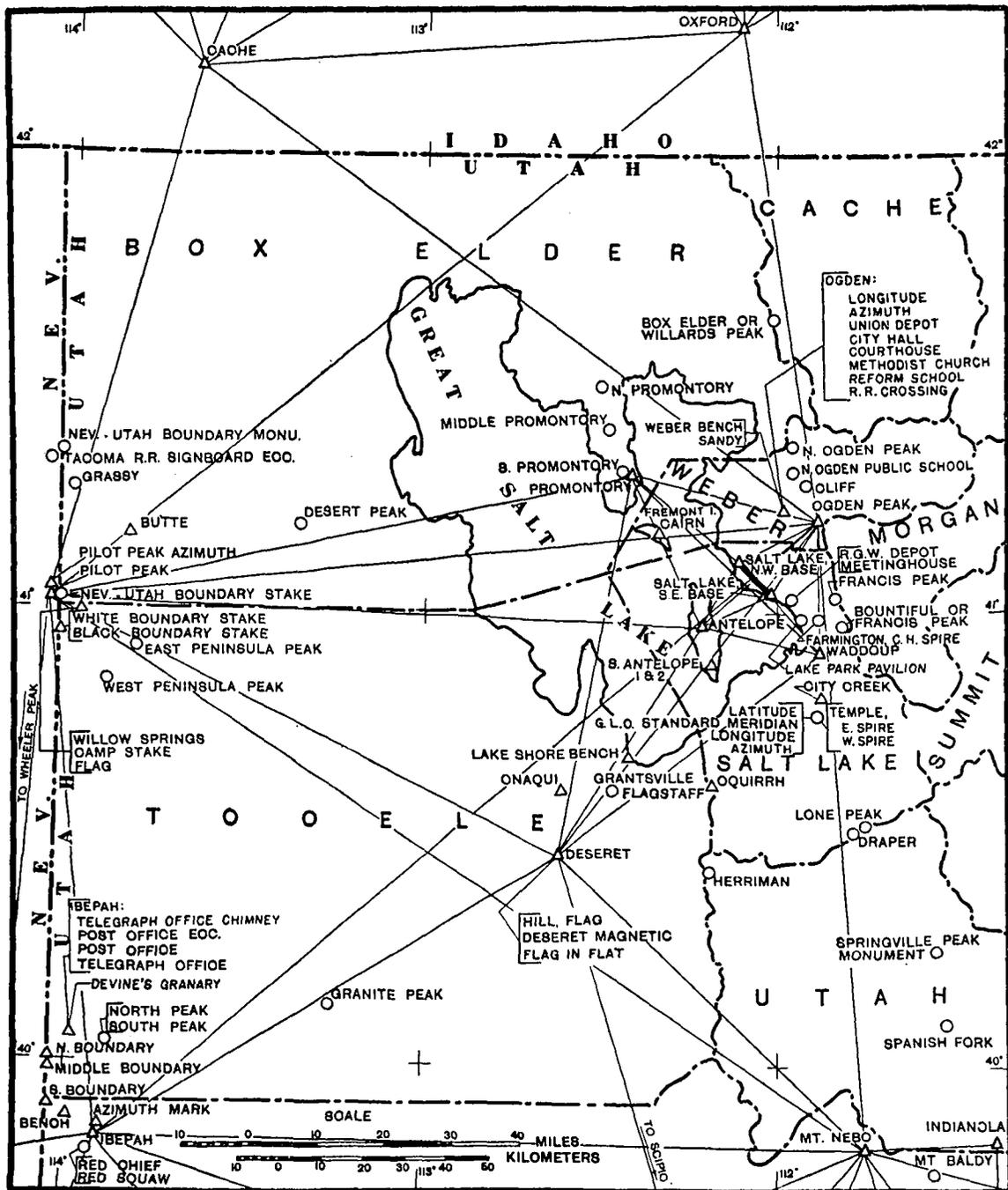


Figure 9.—Triangulation from the thirty-ninth parallel to the Salt Lake base net.

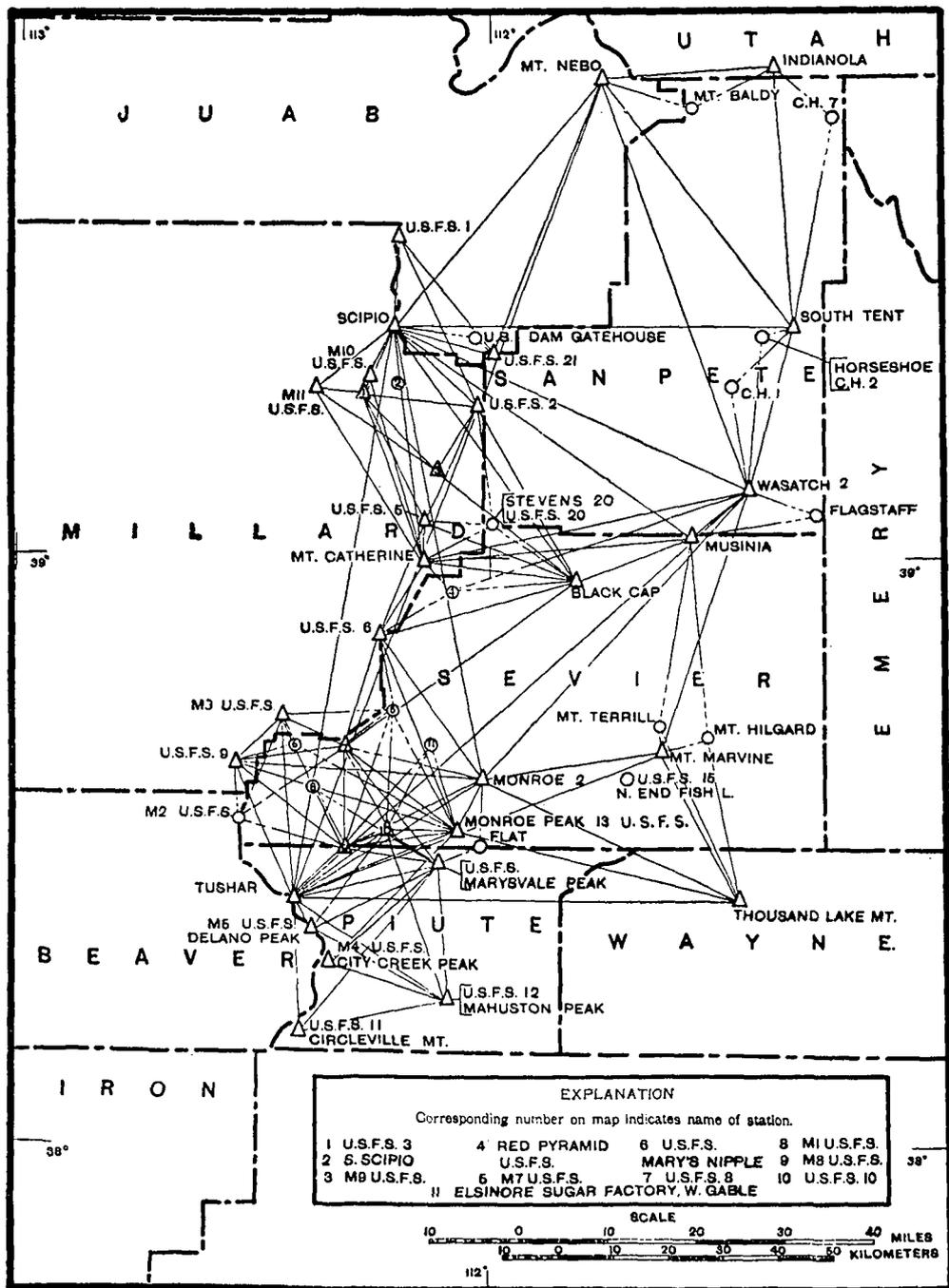


FIGURE 10.—Triangulation in the forest area.

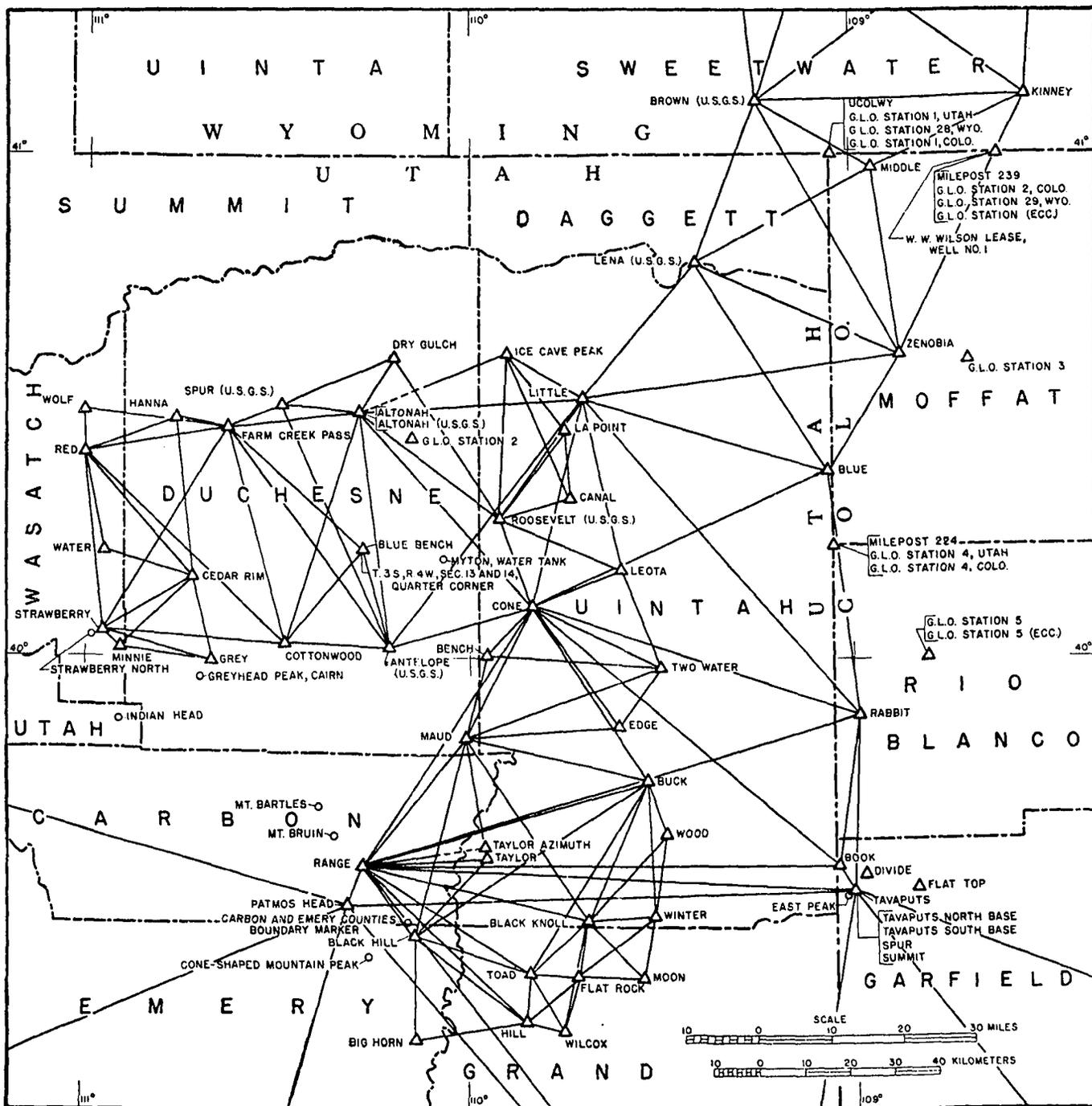


FIGURE 11.—Triangulation along the One-hundred-and-eighth meridian arc, and the Uintah-Ourray Indian Reservation arc.

## INDEX TO GEOGRAPHIC POSITIONS, PLANE COORDINATES, ELEVATIONS, DESCRIPTIONS, AND SKETCHES

Station	Geo-graphic position	Plane coordinates	Elevation	Description	Sketch
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Abajo Peak (U. S. G. S.).....	53	78		146	7
Altonah.....	48	72		128	11
Altonah (U. S. G. S.).....	52	73		144	11
Antelope.....	21	59, 63	97	106	9
Antelope (U. S. G. S.).....	48	72		128	11
Antelope Mountain or Swasey Peak.....	28	66	97		8
Arizona-Utah. (See Utah-Arizona.)					
Astronomic:					
Gunnison.....	26	65			8
Oasis.....	28	66		109	8
August.....	27	60		109	8
Azimuth:					
North Gulch.....	53	79		148	7, 8
Ogden.....	35	61			9
Salt Lake City.....	33	60, 68			9
Taylor.....	51	73		142	11
Azimuth mark:					
Bridger Jack.....	54	79		152	7
Ibepah.....	28	66			8, 9
Mount Waas, cairn.....	23	64, 74			7
Pilot Peak (Nev.).....	34	61, 68			9
White Pine (Nev.).....	31	75			8
Bears Ears (U. S. G. S.).....	52	78		145	7
Beaver.....	26	65, 74	97		8
Beaver:					
Flagstaff (U. S. Engineers astronomic station).....	28	75			8
Meeting house.....	28	75			8
Beehive (Red Pyramid) (U. S. F. S.).....	28	69	98		10
Bench (Juab County).....	29	69			8, 9
Bench (Uintah County).....	51	73		140	11
B. M. Q 8, Lund.....	42	77	99	115	8
Big Horn.....	51	73		142	7, 11
Birch Creek, cairn.....	26	74			8
Black boundary stake.....	34	60, 68			9
Black Cap.....	37	69	98	111	8, 10
Black Hill.....	49	72		132	7, 11
Black Knoll.....	49	72		132	7, 11
Blanco.....	27	66		100	8
Blanding.....	55	79		152	7
Blue.....	43	62, 71	99	118	11
Blue Bench.....	50	72		137	11
Bluff.....	52	78		140	7
Book (Colo.).....	44	71	99	119	11
Boundary, flag:					
North.....	31	67			8, 9
North, Colorado-Utah.....	23	64, 74			7
South.....	31	67			8, 9
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Boundary marker, Carbon and Emery Counties.....	51	73		144	7, 11
Boundary, middle.....	31	67			8, 9
Boundary milepost 70, Utah-Colorado.....	46	77		123	7
Boundary milepost 224, Utah-Colorado; G. L. O. Station 4, Utah; G. L. O. Station 4, Colo. (Utah-Colo.).....	45	71	99	121	11
Boundary milepost 239; G. L. O. Station 29 Wyo.; G. L. O. Station 2, Colo. (Wyo.-Colo.).....	44	62, 71		120	11
Boundary Monument:					
Middle, Colorado-Utah.....	23	64, 74			7
Nevada-Utah (Box Elder County, Utah, Elko County, Nev.).....	36	62			9
Nevada-Utah (Millard County, Utah, White Pine County, Nev.).....	30	66			8
No. 130 (Utah-Ariz.).....	47	78			8
No. 140 (Utah-Ariz.).....	47	78			8
No. 143 (Utah-Ariz.).....	47	78		127	8
Boundary signal, north.....	29	75			8
Boundary, south, Colorado-Utah.....	23	64, 74			7

Station	Geo- graphic position	Plane coordi- nates	Elevation	Descrip- tion	Sketch
	<i>Page</i>	<i>Page</i>	<i>Page</i>	<i>Page</i>	<i>Figure</i>
Boundary stake:					
Black.....	34	60, 68			9
Nevada-Utah.....	34	61, 68			8
No. 1.....	29	75			8
No. 2.....	29	75			0
White.....	34	60, 68			7
Boundary stone, north, Colorado-Utah	23	64, 74			9
Bountiful Peak or Francis Peak, cairn	34	61, 68	98		8
Bowns Point.....	46	78		124	8
Bowns Point (U. S. F. S.).....	47	78		127	9
Box Elder Peak or Willards Peak, cairn	37	62			8
Brian.....	42	76	99	114	7
Bridger Jack.....	54	79		151	7
Bridger Jack azimuth mark	54	79		152	7
Bridges.....	54	79		149	7
Brown (Ariz.).....	47	78		127	8
Brown (U. S. G. S.) (Wyo.).....	43	62, 71	99	116	11
Buck.....	48	72		131	11
Bullfrog.....	53	79		148	7, 8
Burger.....	42	76	99	114	8
Butte (Box Elder County).....	36	61, 69			9
Butte (Iron County).....	29	75			8
Cache (Idaho).....	21	60	97	107	9
Cairn:					
Birch Creek.....	26	74			8
Bountiful Peak or Francis Peak	34	61, 68	98		9
Box Elder Peak or Willards Peak	37	62			9
C. V. North.....	23	64, 74			7
C. V. South.....	22	64, 74			7
Delano.....	26	65, 74	97		8
Desert Peak.....	35	61	98		9
Duckwater (Nev.).....	31	67	97		8
Francis Peak or Bountiful Peak	34	61, 68	98		9
Fremont Island.....	35	61	98		9
Grassy.....	36	61			9
Greyhead Peak.....	51	73			11
La Salle, north peak.....	22	64, 74			7
La Salle, northwest peak.....	22	64, 74			7
Lone Tree.....	26	65	97		8
Middle Promontory.....	37	62			9
Mount Moriah (Nev.).....	29	66	97		7
Mount Waas azimuth mark.....	23	64, 74			9
North Promontory.....	37	62			9
Paria (U. S. G. S.) (Ariz.).....	47	78		127	8
Red Chief.....	28	66			9
Red Squaw.....	28	66			8, 9
Salt Creek.....	25	65	97		8
South Antelope No. 1.....	33	60, 68			9
South Promontory.....	36	62	98		9
South Scipio.....	26	65	97		8, 10
Spanish Fork.....	32	67			9
Ward, small (Nev.).....	30	67	97		8
White (Nev.).....	30	75			8
Willards Peak or Box Elder Peak	37	62			9
Camara.....	27	65		109	8
Camp stake.....	34	61, 68			9
Canal.....	49	72		135	11
Canovas.....	27	66		109	8
Canyon Peak (Nev.).....	29	75			8
Carbon and Emery Counties, boundary marker	51	73		144	7, 11
Cedar.....	25	65		108	8
Cedar Mountain.....	47	78		126	8
Cedar Rim.....	50	72		137	11
Cedar Spur (Nev.).....	30	66			8
Cervera.....	27	65		109	8
C. H. 1.....	38	69			10
C. H. 2 (Horseshoe).....	38	69	98		10
C. H. 7.....	38	69			10
Chimney:					
R. G. W. depot, Kaysville.....	35	61, 68			9
Telegraph office, Ibepah.....	32	67			9
Chiquita (Colo.).....	22	63	97	107	7
Circleville Mountain (U. S. Forest Service no. 11)	41	76	98	114	10
City Creek.....	33	60, 68	97	109	9
City Creek Peak (U. S. Forest Service no. M 4)	41	76	98	114	10
City Hall, Ogden.....	35	61			9
Cliff.....	24	66		108	7
Cliff, flag.....	36	61			9
Collet.....	46	78		125	8

Station	Geo-graphic position	Plane coordinates	Elevation	Description	Sketch
<i>Colorado-Utah (see also Utah-Colorado):</i>					
Middle boundary monument	Page 23	Page 04, 74	Page	Page	Figure 7
North boundary flag	23	04, 74			7
North boundary stone	23	04, 74			7
South boundary	23	04, 74			7
<i>Colorado-Wyoming. (See Wyoming-Colorado.)</i>					
Cone	44	71	99	119	11
Cone-shaped mountain peak	52	73			7, 8, 11
Cottonwood	48	72		129	11
<i>Courthouse:</i>					
Flagstaff, Ogden	36	61			9
Spire, Farmington	35	61, 68			9
C. V. North, cairn	23	04, 74			7
C. V. South, cairn	22	04, 74			7
Delano, cairn	26	65, 74	97		8
Delano Peak (U. S. Forest Service no. M 5)	41	70, 76	98	114	10
Deseret	21	59, 63	97	105	8, 9
Deseret magnetic	32	60, 67			9
Desert Peak, cairn	35	61	98		9
Devine's granary	32	67			9
Diamond Peak (Nev.)	21	63	97	105	8
Ditch mark, Moab	23	04, 74			7
Divide (Colo.)	22	63			11
Draper	32	60, 67	97		9
Dry Gulch	50	72		136	11
Duckwater, cairn (Nev.)	31	67	97		8
East base, Green River	23	64		108	7
East Peak (Colo.)	22	63			7, 11
East Peninsula Peak	34	60, 68			9
East Ridge (Nev.)	29	75			8
East spire, Salt Lake City Temple	33	60, 68	97		9
East tank, Thompsons Springs	23	64			7
Edge	51	73		141	11
Eight Mile Monument (Utah-Ariz)	42	77		115	8
Elsinore sugar factory, west gable, flagpole	41	70, 76			10
Emery and Carbon Counties, boundary marker	51	73		144	7, 11
Farm Creek Pass	48	72			11
Farmington, courthouse, spire	35	61, 68		129	9
Flag	34	61, 68			9
<i>Flag:</i>					
Cliff	36	61			9
Hill	32	60, 67			9
In flat	32	60, 67			9
Pavillion, Lake Park	35	61, 68			9
Telegraph office, Ibepah	31	67			9
Flagpole, Elsinore sugar factory, west gable	41	70, 76			10
<i>Flagstaff:</i>					
Beaver (U. S. Engineers astronomic station)	28	75			8
Courthouse, Ogden	30	61			9
Grantsville	33	60, 67			9
U. S. Forest Service	39	70	98		10
Flat	41	70, 76	98		10
Flat Rock	49	72		134	7, 11
Flat Top (Colo.)	22	63			7, 11
40-Mile	53	79			7, 8
Four Corners (G. L. O. Station 1) (Utah-Colo.-Ariz.-N. Mex.)	46	77		124	7
Four Corners (G. L. O. Station 1) eccentric (San Juan County)	46	77		124	7
Francis Peak	35	61, 68	98		9
Francis Peak or Bountiful Peak, cairn	34	61, 68	98		9
Freemont Island, cairn	35	61	98		9
Frisco Mount, tree	28	66, 75	97		8
G. L. O. boundary mark (Utah-Ariz)	47	78		127	8
G. L. O. Standard meridian, Salt Lake City	33	60, 68			9
G. L. O. Station eccentric. (See G. L. O. Station 20 eccentric.)					
G. L. O. Station 1, Colo.; G. L. O. Station 1, Utah; G. L. O. Station 28, Wyo.; Ucolwy (Utah-Colo.-Wyo.)	45	62, 71	99	120	11
G. L. O. Station 1 (Four Corners) (Utah-Colo.-Ariz.-N. Mex.)	40	77		124	7
G. L. O. Station 1 (Four Corners) eccentric (San Juan County)	46	77		124	7
G. L. O. Station 1, Utah; G. L. O. Station 1, Colo.; G. L. O. Station 28, Wyo.; Ucolwy (Utah-Colo.-Wyo.)	45	62, 71	99	120	11

Station	Geo- graphic position	Plane coordi- nates	Elevation	Descrip- tion	Sketch
	Page	Page	Page	Page	Figure
G. L. O. Station 2	45	62, 71	99	121	11
G. L. O. Station 2, Colo.; G. L. O. Station 29, Wyo.; Wyoming-Colorado boundary milepost 239 (Wyo.- Colo.)	44	62, 71		120	11
G. L. O. Station 3 (Colo.)	45	62, 71	99	121	11
G. L. O. Station 4, Colo.; G. L. O. Station 4, Utah; Utah-Colorado boundary milepost 224 (Utah- Colo.)	45	71	99	121	11
G. L. O. Station 4, Utah; G. L. O. Station 4, Colo.; Utah-Colorado boundary milepost 224 (Utah- Colo.)	45	71	99	121	11
G. L. O. Station 5 (Colo.)	45	71	99	121	11
G. L. O. Station 5 eccentric (Colo.)	45	71	99	121	11
G. L. O. Station 6	45	71	99	122	7
G. L. O. Station 12 (Colo.)	46	77		124	7
G. L. O. Station 28, Wyo.; G. L. O. Station 1, Utah; G. L. O. Station 1, Colo.; Ucolwy (Utah-Colo.- Wyo.)	45	62, 71	99	120	11
G. L. O. Station 29, Wyo.; G. L. O. Station 2, Colo.; Wyoming-Colorado boundary milepost 239 (Wyo.- Colo.)	44	62, 71		120	11
G. L. O. Station 29 eccentric (Wyo.)	44	62, 71	99		11
Granary, Devine's	32	67			9
Grand	53	79		149	7, 8
Grand (Colo.)	44	71		120	7
Granite Peak	32	67	97		9
Grantsville, flagstaff	33	60, 67			9
Grassy, cairn	36	61			9
Green River:					
East base	23	64		108	7
Hotel	24	65		108	7
Latitude	24	64		(1)	7
Longitude	24	64		108	7
North meridian	24	64		108	7
Schoolhouse	24	65		108	7
South meridian	24	64		108	7
West base	24	64		108	7
Grey	50	73		139	11
Grey Mesa	53	79		147	7, 8
Greyhead Peak, cairn	51	73			11
Gunnison astronomic	26	65			8
Hall	53	79		147	7, 8
Hanna	50	72		138	11
Hart	54	79		152	7
Hartman	23	64		107	7
Hawkins	42	67		115	8
Hayford (Nev.)	42		99	114	8
Herriman	32	60, 67	97		9
Highland Peak, summit (Nev.)	30	75	97		8
Hill	49	72		133	7, 11
Hill, flag	32	60, 67			9
Horn	54	79		150	7
Horse	54	79		160	7
Horsehead	53	79		146	7
Horseshoe (C. H. 2)	38	69	98		10
Hotel, Green River	24	65		108	7
Ibepah	20	63	97	104	8, 9
Ibepah:					
Azimuth mark	28	66			8, 9
Post office eccentric	31	67			9
Post office, southeast corner	31	67			9
Telegraph office, chimney	32	67			9
Telegraph office, flag	31	67			9
Ice Cave Peak	49	72		135	11
Indian Head, summit	25	65			8, 11
Indian Peak	28	75	97		8
Indianola	37	69	98	110	8, 9, 10
Initial (Ariz.)	42	77		116	8
Initial (initial monument) (Utah-Nev.-Ariz.)	43	77		116	8
Iron	55	79		153	7
Ismay (Colo.)	55	79		153	7
Kaysville:					
Meeting house, spire	35	61, 69			9
R. G. W. depot, chimney	35	61, 68			9
Kean (Ariz.)	47	78		126	8
Kinney (Wyo.)	43	62, 71	99	116	11

<sup>1</sup> See description of Green River longitude.

Station	Geo-graphic position	Plane coordinates	Elevation	Description	Sketch
	Page	Page	Page	Page	Figure
Knotch Peak or Sawtooth Mountain	28	60	97		8
La Salle, north peak, cairn	22	64, 74			7
La Salle, northwest peak, cairn	22	64, 74			7
Lake Park, pavillon, flag	35	61, 68			9
Lake Shore, bench	33	60, 68			9
Lapoint	49	72		135	11
Latitude:					
Green River	24	64		( <sup>1</sup> )	7
Salt Lake City	33	60, 68		110	9
Lee	52	78		145	7
Lena (U. S. G. S.)	43	62, 71	99	117	11
Leota	50	73		139	11
Levan	25	65		109	8
Little	44	62, 71	99	118	11
Lone Cone (Colo.)	45	77		123	7
Lone Peak, needle	33	60, 67	97		9
Lone square peak at south end of 50-mile range	55	79			7, 8
Lone Tree, cairn	26	65	97		8
Longitude:					
Green River	24	64		108	7
Ogden	35	61	97	110	9
Salt Lake City	33	60, 68		109	9
Lund	42	77	99	115	8
Lund, B. M. Q 8	42	77	99	115	8
Lund U. S. B. M.	42	77	99	115	8
M 1, U. S. Forest Service no.	41	70, 76	98	114	10
M 2, U. S. Forest Service no.	40	70, 76	98	113	10
M 3, U. S. Forest Service no.	40	70, 76	98	113	10
M 4, U. S. Forest Service no. (City Creek Peak)	41	76	98	114	10
M 5, U. S. Forest Service no. (Delano Peak)	41	70, 76	98	114	10
M 7, U. S. Forest Service no.	41	70, 76	98	113	10
M 8, U. S. Forest Service no.	39	70, 76	98	113	10
M 9, U. S. Forest Service no.	39	70	98	112	10
M 10, U. S. Forest Service no.	39	70	98	112	10
M 11, U. S. Forest Service no.	39	70	98	112	10
Madden (Colo.)	45	77		123	7
Mahuston Peak (U. S. Forest Service no. 12)	41	70	98	114	10
Manterola	27	65		109	8
Marys Nipple (U. S. F. S.)	40	70, 76	98		10
Marysvale Peak (U. S. F. S.)	41	70, 76	98	113	10
Maud	48	72		131	11
Meeting house:					
Beaver	28	75			8
Kaysville, spire	35	61, 69			9
Mesa (Colo.)	20	63	97	103	7
Methodist Church, Ogden	36	61			9
Mica	23	64		107	7
Middle (Colo.)	43	62, 71	99	117	11
Middle boundary	31	67			8, 9
Middle boundary monument, Colorado-Utah	23	64, 74			7
Middle La Salle Peak	22	64, 74			7
Middle Promontory, cairn	37	62			9
Milepost:					
70, Utah-Colorado boundary	46	77			7
224, Utah-Colorado boundary; G. L. O. Station 4, Utah; G. L. O. Station 4, Colo. (Utah-Colo.)	45	71	99	121	11
239, Wyoming-Colorado boundary; G. L. O. station 29, Wyo.; G. L. O. Station 2, Colo. (Wyo.-Colo.)	44	62, 71			11
Milford Needle	27	66, 74			8
Minnie	50	73		138	11
Moab (Warner's ranch)	23	64, 74			7
Moab, ditch mark	23	64, 74			7
Moapa (Nev.)	42	76	99	115	8
Moapa, B. M. I I (Nev.)	43	77		116	8
Moapa, railroad water tank (Nev.)	43	77			8
Monitor	52	78		144	7, 8
Monocline	54	79		150	7
Monroe	25	65, 74	97		8
Monroe 2	37	69, 75	98	111	8, 10
Monroe Peak (U. S. Forest Service no. 13)	39	70, 76	98	112	10
Montezuma	56	79		153	7
Montijo	27	66		109	8
Monument:					
Pioche Peak (Nev.)	30	75	97		8
Springville Peak	32	67	97		9
West Beaver	26	65, 74			8
Moon	51	73		143	7, 11
Mooseneah	25	65	97		8
Mormon (Nev.)	42	76	99	115	8

<sup>1</sup> See description of Green River longitude.

Station	Geo- graphic position	Plane coordinates	Elevation	Descrip- tion	Sketch
<b>Mount:</b>	<i>Page</i>	<i>Page</i>	<i>Page</i>	<i>Page</i>	<i>Figure</i>
Aliso	26	65, 74	97		8
Baldy	38	69	98		8, 9, 10
Bangs (Ariz.)	43	77			8
Bartles, summit	24	65			8, 11
Bruin, summit	24	65			8, 11
Catherine	37	69	98	110	8, 10
Ellen	20	73	97	103	7, 8
Grafton, summit (Nev.)	30	67, 75	97		8
Hamilton (Nev.)	31	67	97		8
Hilgard (U. S. F. S.)	39	70, 76			8, 10
Irish (Nev.)	31	75			8
Marvine	37	69, 76	98	111	8, 10
Moriah, cairn (Nev.)	29	66	97		8
Nebo	20	63	97	104	8, 9, 10
Peale	22	64, 74			7
Terrill (U. S. F. S.)	39	70, 76	98		10
Waas	20	63, 73	97	102	7
Waas azimuth mark, cairn	23	64, 74			7
Mountain peak, cone-shaped	52	73			7, 8, 11
Musinia	37	69	98	110	8, 10
Myton, water tank, base	52	73		144	11
<b>Navajo Mountain</b>	47	78		125	7, 8
Needle, Lone Peak	33	60, 67	97		9
Nephi Bench	26	65		109	8
<b>Nevada-Utah:</b>					
Boundary monument (Box Elder County, Utah, Elko County, Nev.)	66	62			9
Boundary monument, (Millard County, Utah, White Pine County, Nev.)	30	66			8
Boundary stake	34	61, 68			9
<b>Nevada-Utah-Arizona:</b>					
Initial (initial monument)	43	77		110	8
North base, Tavaputs (Colo.)	22	63			7, 11
North boundary flag	31	67			8, 9
North boundary flag, Colorado-Utah	23	64, 74			7
North boundary signal	29	75			8
North boundary stone, Colorado-Utah	23	64, 74			7
North end of Fish Lake (U. S. Forest Service no. 15)	40	70, 76			10
North Gulch	53	79		148	7, 8
North Gulch azimuth	53	70		148	7, 8
<b>North meridian:</b>					
Green River	24	64		108	7
Oasis	27	66		109	8
<b>North Ogden Peak</b>	36	62	98		9
North Ogden public school	36	62			9
North Peak, Shell Creek (Nev.)	29	66			8
North Peak, tree, east prong	31	67			9
North Promontory, cairn	37	62			9
North Woodenshoe (U. S. G. S.)	52	78		145	7
Northeast base, Oasis	27	66		100	8
Northwest base, Salt Lake	21	59, 63	97	106	9
Notch	54	70		151	7
<b>Oasis:</b>					
Astronomic	28	66		109	8
North meridian	27	66		109	8
Northeast base	27	66		109	8
Schoolhouse tower	28	66		109	8
South meridian	27	66		109	8
Southwest base	27	66		109	8
<b>Ogden:</b>					
Azimuth	35	61			9
City Hall	35	61			9
Courthouse, flagstaff	36	61			9
Longitude	35	61	97	110	9
Methodist Church	36	61			9
Peak	31	59	97	105	9
Railroad crossing, U. P. and U. C.	25	61			9
Reform School	36	61			9
Union Depot	35	61			9
<b>Onaquí</b>	33	60, 68	97		9
<b>Oquirrh</b>	38	60, 68	97		9
<b>Oxford (Idaho)</b>	21	60	97	107	9
<b>Paria (Ariz.)</b>	47	78		126	8
Paria (U. S. G. S.), cairn (Ariz.)	47	78		127	8
Patmos Head	20	63	97	103	7, 8, 11
Pavilion flag, Lake Park	35	61, 68			9
Pilot Peak (Nev.)	21	59, 63	97	105	8, 9
Pilot Peak azimuth mark (Nev.)	34	61, 68			9
Pine Hill (Nev.)	29	75			8

Station	Geo-graphic position	Plane coordinates	Elevation	Description	Sketch
	Page	Page	Page	Page	Figure
Pioche (Nev.)	21	74	97	105	8
Pioche Peak, monument (Nev.)	30	75	97		8
Pockets	46	78		125	7, 8
Post office eccentric, Ibepah	31	67			9
Post office, southeast corner, Ibepah	31	67			9
Promontory	21	59	97	106	9
Public school, North Ogden	36	62			9
Quarter corner, T. 3 S., R. 4 W., secs. 13 and 24	52	73		(?)	11
Rabbit (Colo.)	44	71	99	118	11
Railroad crossing, U. P. and U. C., Ogden	35	61			9
Railroad signboard eccentric, Tecoma (Nev.)	36	62			9
Range	44	71	99	119	7, 8, 11
Recapture	55	79		152	7
Red	48	72		130	11
Red Chief, cairn	28	66			8, 9
Red House	53	79		149	7, 8
Red Pyramid (Beehive) (U. S. F. S.)	38	69	98		10
Red Squaw, cairn	28	66			8, 9
Reference mark, Wheeler Peak (Nev.)	30	66			8
Reform School, Ogden	36	61			9
Reservoir	23	64		107	7
R. G. W. depot, chimney, Kaysville	35	61, 68			9
Road Summit (Nev.)	29	75			8
Roosevelt (U. S. G. S.)	48	72		128	11
Sagasta	27	66			8
Salt Creek, cairn	25	65	97		8
Salt Lake:					
Northwest base	21	59, 63	97	106	9
Southeast base	21	59, 63	97	106	9
Salt Lake City:					
Azimuth	33	60, 68			9
G. L. O. standard meridian	33	60, 68			9
Latitude	33	60, 68		110	9
Longitude	33	60, 68		109	9
Temple, east spire	33	60, 68	97		9
Temple, west spire	33	60, 68			9
San Rafael Knob	24	65, 74	97		7, 8
Sandy	35	61			9
Sanpets	25	65	97	108	8
Sawtooth Mountain or Knotch Peak	28	66	97		8
Schoolhouse, Green River	24	65		108	7
Schoolhouse tower, Oasis	28	66		109	8
Scipio	25	65	97	108	8, 9, 10
Sections 13 and 24, T. 3 S., R. 4 W., quarter corner	52	73		(?)	11
Shell Creek, north peak (Nev.)	29	66			8
Shell Creek, south peak (Nev.)	29	66			8
Signal, north boundary	29	75			8
60-Mile	53	79		146	7, 8
Snake Creek	30	66			8
South Antelope no. 1, cairn	33	60, 68			9
South Antelope no. 2	33	60, 68			9
South base, Tavaputs (Colo.)	22	63			7, 11
South boundary, Colorado-Utah	23	64			7
South boundary flag	31	67			8, 9
South end of 50-mile range, lone square peak	55	79			7, 8
South Juab Base	26	65		109	8
South meridian:					
Green River	24	64		108	7
Oasis	27	66		109	8
South Peak, middle tree	31	67			9
South peak, Shell Creek (Nev.)	29	66			8
South Promontory, cairn	36	62	98		9
South Scipio, cairn	26	65	97		8, 10
South Tent	37	69	98	110	8, 10
Southeast base, Salt Lake	21	59, 63	97	106	9
Southwest base, Oasis	27	66		109	8
Spanish Fork, cairn	32	67			9
Spire:					
Courthouse, Farmington	35	61, 68			9
Meeting house, Kaysville	35	61, 69			9
Springville Peak, monument	32	67	97		9
Spruce (U. S. G. S.) (Colo.)	45	72, 77		122	7
Spur (Colo.)	22	63			7, 11

<sup>1</sup> See description of Blue Bench.

Station	Geo- graphic position	Plane coordi- nates	Elevation	Descrip- tion	Sketch
	Page	Page	Page	Page	Figure
Spur (U. S. G. S.)	49	72		136	11
Standard meridian, G. L. O., Salt Lake City	33	60, 68			9
Steep	47	78		125	8
Stevens 20	39	70	98	112	10
Strawberry	48	72		130	11
Strawberry North, summit	32	67			8, 11
Summit (Garfield County, Colo.)	22	63			7, 11
Summit (San Miguel County, Colo.)	45	77		122	7
Summit:					
Highland Peak (Nev.)	30	75	97		8
Indian Head	25	65			8, 11
Mount Bartles	24	65			8, 11
Mount Bruin	24	65			8, 11
Mount Grafton (Nev.)	30	67, 75	97		8
Strawberry North	32	67			8, 11
Ward, north (Nev.)	31	67			8
White Pine, south	31	75			8
Swasey Peak or Antelope Mountain	28	66	97		8
T. 3 S., R. 4 W., secs. 13 and 24, quarter corner	52	73		(?)	11
Tank:					
Thompsons Springs, east	23	64			7
Thompsons Springs, west	23	64			7
Tantlus	46	78		124	8
Tantlus (U. S. F. S.)	47	78		127	8
Tavaputs (Colo.)	20	63	97	102	7, 11
Tavaputs north base (Colo.)	22	63			7, 11
Tavaputs south base (Colo.)	22	63			7, 11
Taylor	51	73		141	11
Taylor azimuth	51	73		142	11
Tecoma, railroad signboard, eccentric (Nev.)	36	62			9
Telegraph office:					
Ibepah, chimney	32	67			9
Ibepah, flag	31	67			9
Temple, Salt Lake City:					
East spire	33	60, 68	97		9
West spire	33	60, 68			9
Thompsons Springs:					
East tank	23	64			7
West tank	23	64			7
Thousand Lake Mountain	37	69, 75	98	111	8, 10
Toad	49	72		133	7, 11
Transit Venus station (Nev.)	30	66			8
Treasury Mountain (Colo.)	20	63	97	101	7
Tree:					
Frisco Mount	28	66, 75	97		8
North Peak, east prong	31	67			9
South Peak, middle	31	67			9
Tushar	20	63, 74	97	104	8, 10
Twin	54	79		151	7
Two Water	51	73		140	11
U. B. Dam, gatehouse	38	69			10
Ucolwy; G. L. O. Station 1, Utah; G. L. O. Station 1, Colo.; G. L. O. Station 2S, Wyo. (Utah-Colo- Wyo.)	45	62, 71	99	120	11
Uncompahgre (Colo.)	20	73	97	102	7
Union Depot, Ogden	35	61			9
U. P. and U. C. railroad crossing, Ogden	35	61			9
U. S. B. M., Lund	42	77	99	115	8
U. S. Engineers astronomic station, Beaver, flagstaff	28	75			8
U. S. Forest Service:					
Marys Nipple	40	70, 76	98		10
Marysvale Peak	41	70, 76	98	113	10
No. 1	38	69	98	111	10
No. 2	39	69	98	112	10
No. 3	38	69	98	112	10
No. 5	38	69	98	112	10
No. 6	38	69	98	112	10
No. 8	40	70, 76	98	113	10
No. 9	40	70, 76	98	113	10
No. 10	40	70, 76	98	113	10
No. 11 (Circleville Mountain)	41	76	98	114	10
No. 12 (Mahuston Peak)	41	76	98	114	10
No. 13 (Monroe Peak)	39	70, 76	98	112	10
No. 16 (north end of Fish Lake)	40	70, 76			10
No. 20	39	70	98	112	10
No. 21	38	69	98	111	10
No. M. 1.	41	70, 76	98	114	10

\* See description of Blue Bench.

Station	Geo-graphic position	Plane coordinates	Elevation	Description	Sketch
U. S. Forest Service—Continued.					
	<i>Page</i>	<i>Page</i>	<i>Page</i>	<i>Page</i>	<i>Figure</i>
No. M 2	40	70, 76	98	113	10
No. M 3	40	70, 76	98	113	10
No. M 4 (City Creek Peak)	41	76	98	114	10
No. M 5 (Delano Peak)	41	70, 76	98	114	10
No. M 7	41	70, 76	98	113	10
No. M 8	39	70, 76	98	113	10
No. M 9	39	70	98	112	10
No. M 10	39	70	98	112	10
No. M 11	39	70	98	112	10
Red Pyramid (Beehive)	38	69	98	-----	10
Utah-Arizona:					
Boundary monument no. 130	47	78	-----	-----	8
Boundary monument no. 140	47	78	-----	-----	8
Boundary monument no. 143	47	78	-----	127	8
Eight mile monument	42	77	-----	115	8
G. L. O. boundary mark	47	78	-----	-----	8
Utah-Colorado (see also Colorado-Utah):					
Boundary milepost 70	46	77	-----	123	7
Boundary milepost 224; G. L. O. Station 4, Utah; G. L. O. Station 4, Colo.	46	71	99	121	11
Utah-Nevada. (see Nevada-Utah.)					
Ute (Colo.)	45	77	-----	123	7
Valley Knob					
Virgin (Nev.)	23	64	-----	107	7
	42	-----	99	115	8
Waddoup					
Wahweap (Ariz.)	21	50, 63	97	106	9
Ward, north summit (Nev.)	47	78	-----	127	8
Ward, north summit (Nev.)	31	67	-----	-----	8
Ward, small cairn (Nev.)	30	67	97	-----	8
Warner's ranch (Moab)	23	64, 74	-----	-----	7
Wasatch	20	63	97	104	8
Wasatch 2	37	69	98	110	8, 10
Wash	23	64	-----	108	7
Water	60	73	-----	138	11
Water tank:					
Mospa, railroad (Nev.)	43	77	-----	-----	8
Myton, base	52	73	-----	144	11
Weber bench	35	61	-----	-----	9
Well no. 1, W. W. Wilson Lease	45	62, 71	-----	-----	11
West base, Green River	24	64	-----	108	7
West Beaver, monument	26	65, 74	-----	-----	8
West Peninsula Peak	34	60, 68	-----	-----	9
West Sanpete	25	65	-----	109	8
West spire, Salt Lake City Temple	33	60, 68	-----	-----	9
West tank, Thompsons Springs	23	64	-----	-----	7
Wheeler Peak (Nev.)	20	63	97	104	8, 10
Wheeler Peak reference mark (Nev.)	30	66	-----	-----	8
White boundary stake	34	60, 68	-----	-----	9
White cairn (Nev.)	30	75	-----	-----	8
White Pine (Nev.)	21	74	97	105	8
White Pine azimuth mark (Nev.)	31	75	-----	-----	8
White Pine, south summit (Nev.)	31	75	-----	-----	8
White Rock (Nev.)	29	75	97	-----	8
Wilcox	49	72	-----	134	7, 11
Willards Peak or Box Elder Peak, cairn	37	62	-----	-----	9
Willow Springs	34	61, 68	-----	-----	9
Winter	51	73	-----	143	7, 11
Wolf	60	73	-----	139	11
Wood	81	73	-----	143	11
W. W. Wilson Lease, well no. 1	45	62, 71	-----	-----	11
Wyoming-Colorado boundary milepost 239; G. L. O. Station 29, Wyo.; G. L. O. Station 2, Colo. (Wyo.-Colo.)					
	44	62, 71	-----	120	11
Zenobia (Colo.)	43	62, 71	99	117	11



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