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UNITED STATES GEOLOGICAL SURVEY

J. W. POWELL, DIRECTOR

RESULTS

OF

PRIMARY TRIANGULATION

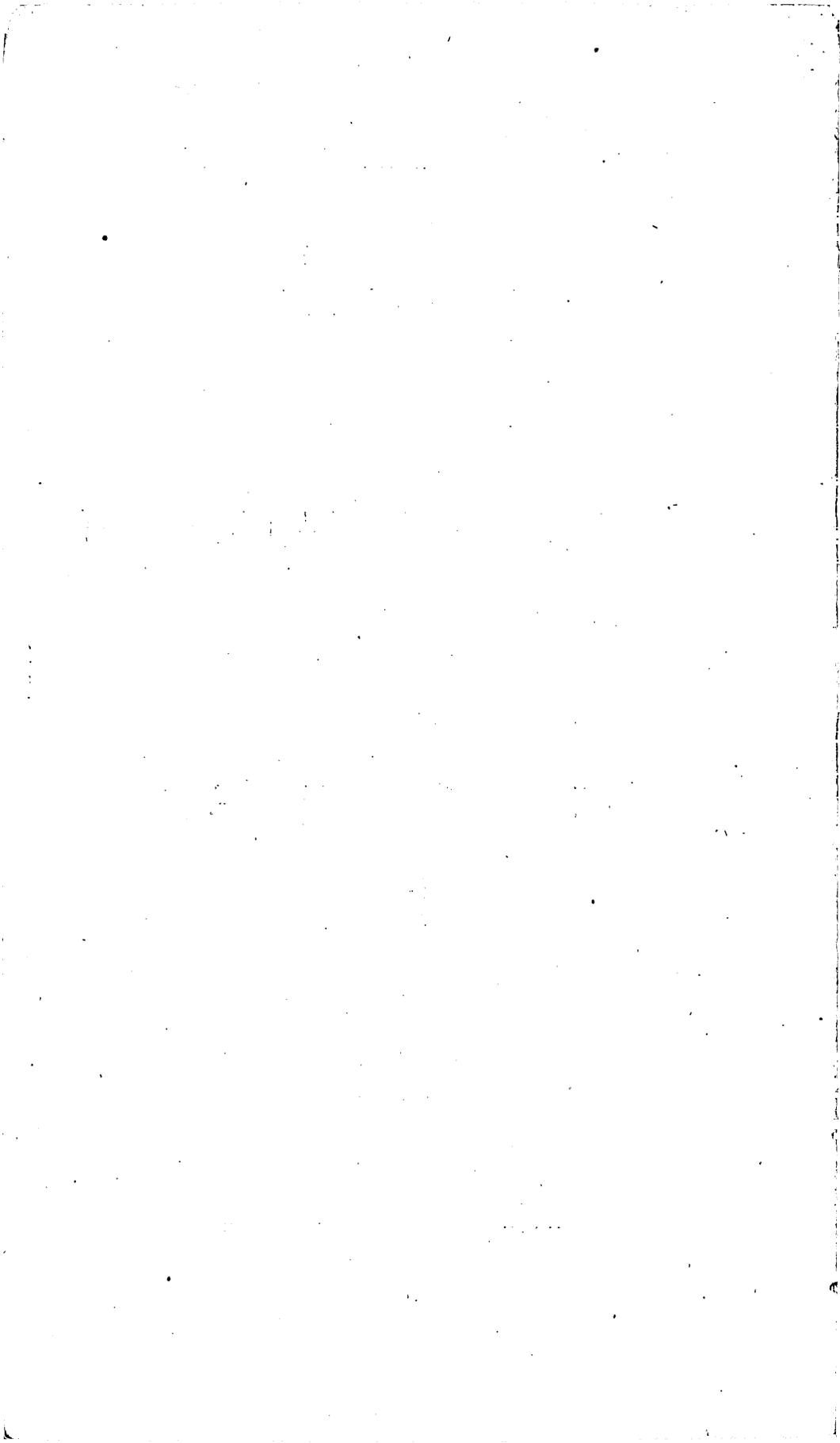
BY

HENRY GANNETT



WASHINGTON
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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
U. S. GEOLOGICAL SURVEY, DIVISION OF GEOGRAPHY,
Washington, D. C., June 30, 1894.

SIR: I have the honor to transmit herewith, in form for publication, the results of the primary triangulation executed by the U. S. Geological Survey during the past twelve years—that is, since the commencement of work upon the topographic atlas of the United States.

The work of compiling this bulletin has been executed by Messrs. H. M. Wilson, R. U. Goode, and S. S. Gannett.

Very respectfully submitted,

HENRY GANNETT,
Chief Topographer.

Hon. J. W. POWELL,
Director U. S. Geological Survey.

RESULTS OF PRIMARY TRIANGULATION.

By HENRY GANNETT.

INTRODUCTION.

The triangulation of the U. S. Geological Survey is executed solely for the primary control of topographic work upon scales not exceeding 1:62500. The extreme of accuracy has therefore not been sought, but only such a degree of accuracy as to insure that the maximum accumulated error be imperceptible upon the maps.

Wherever work has been done by other organizations, which is of sufficient accuracy for the control of the maps of this organization, such work has been utilized both immediately for the location of topographic work and also for the extension of triangulation therefrom by this organization. The work of the U. S. Coast and Geodetic Survey has been largely used in this manner, especially in the eastern part of the country. The maps in New England, New York, New Jersey, and Pennsylvania rest in large part directly upon the points determined by this organization, while in the Appalachian region, triangulation has been extended by this organization from points determined by the U. S. Coast and Geodetic Survey. The work of the U. S. Lake Survey and also that of the New York State survey has been extensively utilized in a similar manner, as is fully set forth in the descriptions accompanying the different groups of results. In the interior of the country and in the Far West, work has been done ab initio by this Survey. Astronomical determinations of positions have been made, base lines have been measured and expansions effected by it.

The results have been arranged in chapters by geographical groups, the arrangement being as natural as possible, and as an introduction to each chapter there is given a description of the work, outlining the methods employed and instruments used, and stating by whom the work was done.

The groups into which the work is arranged are as follows:

NEW ENGLAND:

The triangulation of the U. S. Coast and Geodetic Survey covers the entire coast of Maine and extends far inland. It covers most of New Hampshire and much of Vermont, while practically the entire areas of the remaining States of this group are covered by its primary stations.

In Massachusetts the numerous stations of the Borden survey have been adjusted by the U. S. Coast and Geodetic Survey to agreement with its own positions, and have thus become available for use. Outside of Massachusetts the stations of the U. S. Coast and Geodetic Survey are, as a rule, far apart, and much work of a supplementary character has been found necessary, in order to obtain enough points for instituting plane-table triangulation. This work of supplementing the triangulation of the U. S. Coast and Geodetic Survey has been executed by Messrs. S. S. Gannett and R. U. Goode.

NEW YORK, NEW JERSEY, AND PENNSYLVANIA:

In New York a large amount of triangulation has been executed by the U. S. Coast and Geodetic Survey. Its work extended from New York Harbor up the Hudson and through Lake Champlain and up the Mohawk Valley to a connection with the U. S. Lake Survey near Oswego. Triangulation has been extended along the shores of Lakes Erie and Ontario by the U. S. Lake Survey. The New York State survey, under Mr. J. T. Gardiner, starting from points near the Hudson, determined by the U. S. Coast and Geodetic Survey, has been extended westward to the foot of Lake Erie and southward across the middle of the State to the Pennsylvania line.

The entire area of New Jersey has been closely covered by triangulation by the U. S. Coast and Geodetic Survey, and the New Jersey Geological Survey.

The work of the U. S. Coast and Geodetic Survey extends over a large part of eastern Pennsylvania.

In New York and Pennsylvania it has been found necessary to execute much supplementary triangulation, both for the purpose of supplying more points in areas already covered by triangulation and in the extension of triangulation into new areas. In all this work, as in New England, the work of other organizations, above specified, has furnished the base lines. The work in these States has been executed by Mr. S. S. Gannett.

SOUTHERN APPALACHIAN REGION:

The U. S. Coast and Geodetic Survey has carried a belt of large figures from the head of Chesapeake Bay southwestward to central Alabama, along the east front of the Appalachian Mountain system. The lines of this belt have served as a series of base lines for the extension of triangulation by the U. S. Geological Survey westward and northward over the mountain region. This work has been going forward for a number of years and has been executed by several different men. It was instituted by Prof. W. C. Kerr, while most of it has been done by Mr. S. S. Gannett. Others who have contributed to it are Prof. J. H. Gore, Mr. C. M. Yates, Mr. W. T. Griswold, and Mr. F. J. Knight.

The text accompanying the descriptions and positions of points in New England, New York, New Jersey, and Pennsylvania, and the southern Appalachian region has been prepared by Mr. S. S. Gannett.

MICHIGAN:

A small area of triangulation has been executed by Mr. F. J. Knight upon the upper peninsula of Michigan, extending westward from Marquette. It rests upon two stations determined by the U. S. Lake Survey near Marquette.

ARKANSAS:

The work in Arkansas depends upon two baselines located respectively near Fort Smith and Little Rock. It was executed by Messrs. S. S. Gannett and G. T. Hawkins. A description has been prepared by the first-named gentleman.

KANSAS:

The work in Kansas consists practically of two belts of triangulation running westward in different latitudes nearly across the State. They depend upon stations in western Missouri and eastern Kansas in the transcontinental belt of triangulation of the U. S. Coast and Geodetic Survey. The work was executed by Messrs. R. U. Goode, J. H. Renshaw, and H. L. Baldwin, and the text has been prepared by Mr. Baldwin.

TEXAS:

The work in Texas is in two isolated parts. One extended area occupies the central part of the State, while the other, much more restricted, is in the Trans-Pecos region. The first rests upon two base lines, one near Austin, the other near Cisco. This triangulation was executed by Messrs. R. U. Goode, E. M. Douglas, and C. F. Urquhart.

That in the Trans-Pecos region rests upon a base near El Paso. The work was done by Messrs. R. U. Goode, A. P. Davis, and C. F. Urquhart. The text relating to the Texas work has been prepared by Mr. Goode.

BLACK HILLS OF SOUTH DAKOTA:

This body of triangulation rests upon a base measured near Rapid City. The work was done by Mr. E. M. Douglas, who has prepared the text relating to it.

ASPEN, COLO.:

A little triangulation has been done in the neighborhood of this mining camp, resting upon points determined by the Hayden Survey. The work was done by Messrs. E. M. Douglas and Morris Bien.

WYOMING:

In southern Wyoming a little triangulation has been done for the control of work in the neighborhood of Laramie. This was extended from a measured base by Mr. Frank Tweedy.

MONTANA:

The triangulation in Montana and northwestern Wyoming rests upon a base line measured near Bozeman. From this base triangulation has been extended southward over the Yellowstone Park and the country east thereof, and westward over the upper waters of the Mis-

souri River. The work was done by Messrs. J. H. Renshawe, E. M. Douglas, and Frank Tweedy. The descriptive text has been written by Mr. Tweedy.

IDAHO:

A base measured near Boise serves as the beginning of this work. The triangulation has been done by Mr. W. T. Griswold and the description of it was written by Mr. E. T. Perkins.

CALIFORNIA:

The work in California is in two parts, an extended area in central and northern California, extending northward into southwest Oregon, and a much smaller area in the neighborhood of Los Angeles and San Diego. The former of these areas rests upon stations of the U. S. Coast and Geodetic Survey. The work has been executed by a number of different men, Messrs. Gilbert Thompson, Mark B. Kerr, H. M. Wilson, E. M. Douglas, and H. E. C. Feusier. This work has been described by Mr. Douglas.

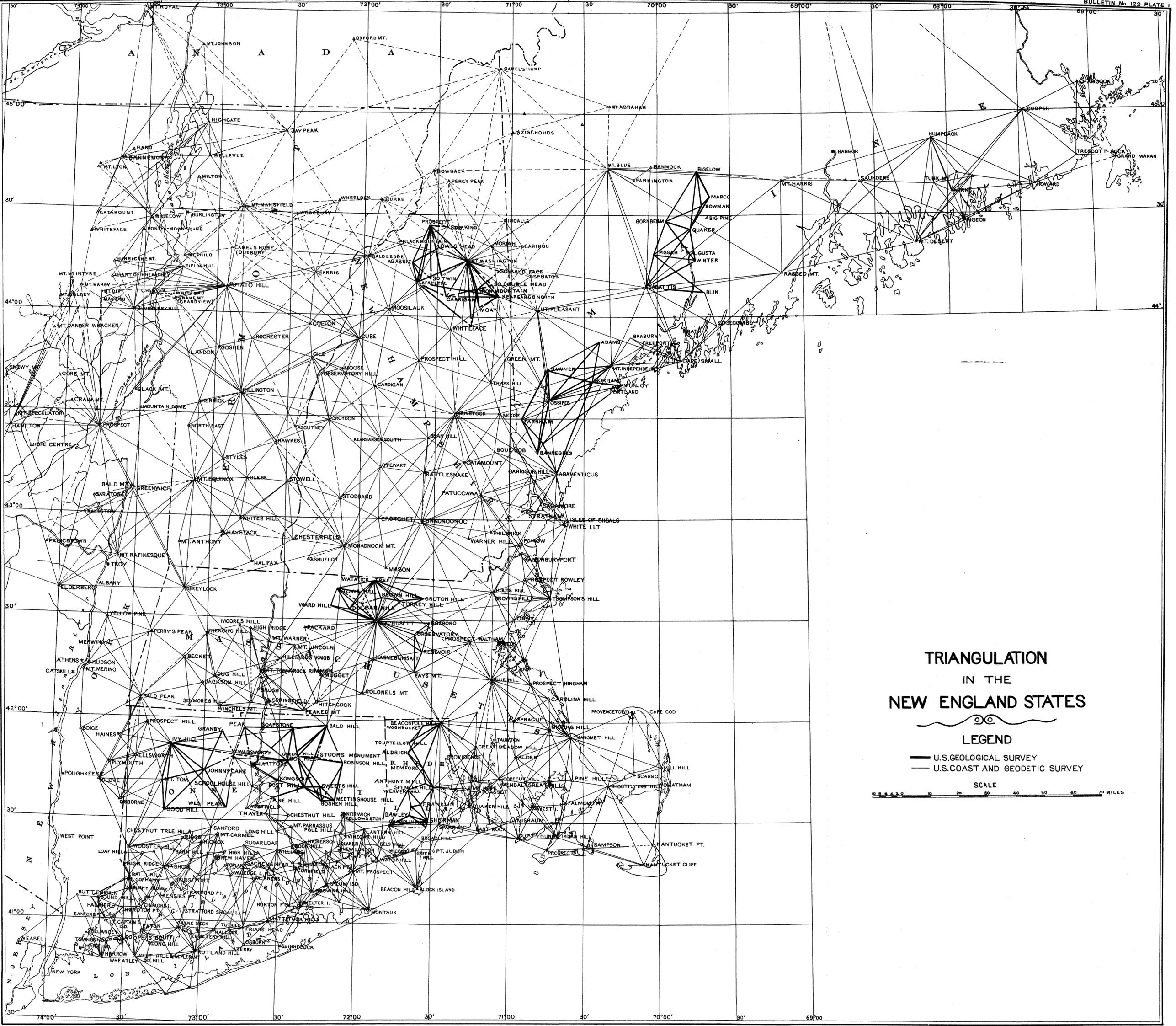
The work in southern California rests upon a base measured by the U. S. Coast and Geodetic Survey. It has been executed by Mr. A. P. Davis, and is described by him.

THE PLATEAU REGION:

The work in the Plateau region of New Mexico and Arizona rests upon a base measured near Fort Wingate, whence it has been extended eastward and westward. This work was done by Messrs. Gilbert Thompson, A. P. Davis, F. J. Knight, and H. M. Wilson. The description was prepared by Mr. Davis.

The triangulation executed by early surveys in the West, known as the Hayden, the Powell, and the Wheeler surveys, has been utilized to some extent for the control or initiation of work; that of the Wheeler but little, and that of the Hayden to a greater extent, especially in Colorado. That of the Powell survey, the results of which have never heretofore been published, has been used very largely, inasmuch as the maps prepared by that organization have been published as atlas sheets by this Survey. These cover nearly all of Utah and northern Arizona, and it has seemed proper in this publication to include a description of this work and the positions of the points determined by it in extenso. A description of this work will be found in its proper place, written by Mr. A. H. Thompson, who, with Mr. G. K. Gilbert, executed the work.

All positions herewith presented are referred to the Clarke spheroid of revolution of 1866; the unit of length is the iron committee meter brought to this country by Hassler, and now in the possession of the Bureau of Weights and Measures. In the Northeastern States, the positions are referred to the mean positions of the U. S. Coast and Geodetic Survey; elsewhere they are, as stated in the text accompanying the various groups of work, referred to isolated astronomical determinations, which are, of course, subject to unknown station errors.



TRIANGULATION IN THE NEW ENGLAND STATES

LEGEND

U.S.GEOLOGICAL SURVEY
 U.S.COAST AND GEODETIC SURVEY

SCALE
 0 10 20 30 40 50 60 70 MILES

NEW ENGLAND.
METHODS OF WORK.

MAINE.

The triangulation in southwestern Maine executed in 1888 was based upon two stations of the U. S. Coast and Geodetic Survey, Ossipee and Independence; a third, Agamenticus, was occupied, but the station mark could not be identified and a new point was established. From these stations thirteen others in York and Cumberland counties, distributed over seven atlas sheets, were located.

In 1890 a system of quadrilaterals was extended from Sabattus-Blin, stations of the U. S. Coast and Geodetic Survey, up the Kennebec Valley about 45 miles; twelve stations, distributed over five atlas sheets, were located. Isolated, bare hills favorably located for topographic purposes were generally utilized. A tripod signal of simple form was used, the materials for which were generally obtainable at the nearest farmhouse.

Angles were measured by S. S. Gannett with a Fauth 8-inch theodolite, reading by micrometer microscopes to two seconds of arc. Local or station adjustment was made in most cases, but figure adjustment was not considered necessary and has not been made.

NEW HAMPSHIRE.

In 1892 the triangulation of the U. S. Coast and Geodetic Survey in the White Mountain region was supplemented by erecting in additional points. Mounts Washington, Kearsarge, and Lafayette were used as initial points, and three other stations were occupied; altogether, eleven points, furnishing control for four atlas sheets, were located.

Angles were measured with a Fauth 8-inch theodolite by S. S. Gannett and B. C. Washington, jr. Adjustment of figures by least squares was not made.

MASSACHUSETTS.

Eleven new stations, controlling four atlas sheets, were located in Worcester County in 1887 by Mr. R. U. Goode. The lines Wachusett-Watatic and Wachusett-Fay, established by the U. S. Coast and Geodetic Survey, were used as bases.

Lone trees on bare hills were utilized as signals.

Angles were measured with the Gambey 11-inch theodolite, reading by verniers to ten seconds. This work was not adjusted.

RHODE ISLAND.

The western portion of Rhode Island was controlled during 1888 by triangulation extended from the lines of the U. S. Coast and Geodetic Survey, Beaconpole-Spencer, Spencer-Sherman, and Sherman-Champlin. This work was slow and difficult. The hills being of about the same height and heavily wooded, the building of high scaffolds was necessary. A tall tree was usually selected, its branches cut off, and the trunk used as one leg of a triangular scaffold.

Angles were measured with a light 6-inch theodolite mounted on its own tripod on the floor of the scaffold from 40 to 60 feet above the ground.

This work was done by Mr. R. U. Goode and Mr. C. F. Urquhart. No least square adjustments were made.

CONNECTICUT.

Control for north central Connecticut was obtained by extending triangulation from the U. S. Coast and Geodetic Survey stations Good Hill, Mount Tom, and Ivy, in Litchfield and Hartford counties, and from Box Hill and Bald Hill in Tolland, Windham, and New London counties.

Seventeen stations, controlling ten atlas sheets, were located in 1889. Isolated, cleared hills were usually available, and were selected as stations. Various forms of signals were used, the usual form being a tripod under which the theodolite was centered.

Angles were measured with a Fauth 8-inch theodolite, reading by micrometer to two seconds, by S. S. Gannett.

A least square adjustment of the angles was made at each station, but no figure adjustment was made.

DESCRIPTIONS AND POSITIONS OF STATIONS.

BIGELOW.

Four miles south of the village of Skowhegan, Somerset Co., Me., on land owned by J. W. Packard. Summit entirely cleared of trees.

Permanent mark: Iron bolt in solid ledge.

[Latitude, 44° 42' 47"-91. Longitude, 69° 43' 39"-72.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bowman.....	353 10 30.0	173 11 42.8	4.282315
Quaker.....	6 59 15.0	186 57 15.0	4.492396
Hornbeam.....	34 02 10.9	213 52 45.1	4.502702
Marco.....	335 05 23.8	155 08 47.5	4.181320

MARCO.

Situated in pasture owned by Peter Marco, on highest part of hill, 2½ miles north-northwest of Waterville, in southern edge of town of Fairfield, Somerset Co., Me.

Permanent mark: A pole 25 feet high with flag at top and four boards nailed across 12 to 15 feet from ground.

[Latitude, 44° 35' 21"·72. Longitude, 69° 38' 49"·84.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bowman.....	38 09 29·4	218 07 18·3	3·824352
Bigelow	155 08 47·5	335 05 23·8	4·181320
Quaker			4·298319

BOWMAN.

In Oakland, Kennebec Co., Me., on a flat, cleared hill, 1½ miles east of village. Land owned by Mr. Bowman, who lives one-eighth of a mile from triangulation point.

Permanent mark: A pole 25 feet high, with white flag at top and boards nailed across just above braces.

[Latitude, 44° 32' 31"·67. Longitude, 69° 41' 56"·60.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Quaker	27 08 44·9	207 05 32·9	4·123305
Hornbeam.....	69 55 40·1	249 45 02·9	4·330181
Marco	218 07 18·3	38 09 29·4	3·824352
Bigelow	173 11 42·8	353 10 30·0	4·282315

HORNBEAM.

In Kennebec Co., Me., on a cleared hill 2½ miles southeast of the village of Mount Vernon and 14 miles from Augusta, a few trees standing on eastern edge of the hill. Station not on highest part of hill, but on ground 4 or 5 feet lower than and 200 feet south of highest part.

Permanent mark: A rock pile 4 feet high.

[Latitude, 44° 28' 32"·84. Longitude, 69° 57' 05"·58.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Quaker	287 31 48·4	107 39 14·7	4·168100
Winter	322 02 14·2	142 11 04·1	4·436338
Pisgah	17 08 40·6	197 05 37·3	4·294608
Bowman.....	249 45 02·9	69 55 40·1	4·330181
Bigelow	213 52 45·1	34 02 10·9	4·502702

QUAKER.

In Sidney, Kennebec Co., Me., on a high cleared ridge, 10 miles from Augusta. An old schoolhouse stands on top of ridge, 174.2 feet south of station. Station is on highest part, on land owned by L. B. Ward. A wagon road passes 50 feet east of station.

Permanent mark: Iron bolt in soft rock, arrowheads cut in ledge pointing to center.

[Latitude, $44^{\circ} 26' 08''$.63. Longitude, $69^{\circ} 46' 30''$.63.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Winter	350 57 38.6	170 59 04.4	4.238470
Pisgah	54 10 38.3	234 00 11.0	4.389549
Sabattus			4.607323
Hornbeam	107 39 14.7	287 31 48.4	4.168100
Bowman	207 05 32.9	27 08 44.9	4.123305
Bigelow	186 57 15.0	6 59 15.0	4.492396

PISGAH.

In Kennebec Co., Me., on a high bare hill in southwestern part of Winthrop. C. B. Stanton lives on south end of hill, 4 miles from Winthrop village and 1 mile from triangulation point.

Permanent mark: A rock cairn 10 feet high, on most northern and highest summit.

[Latitude, $44^{\circ} 18' 22''$.67. Longitude, $70^{\circ} 01' 27''$.66.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sabattus	13 34 24.4	193 32 07.7	4.268767
Hornbeam	197 05 37.3	17 08 40.6	4.294608
Blin	306 48 44.1	127 03 05.6	4.535429
Winter	276 45 46.0	96 57 38.1	4.357368
Quaker	234 00 11.0	54 10 38.3	4.389549

WINTER.

Triangulation station of the U. S. C. & G. S. in Chelsea, Kennebec Co., Me., 4 miles by road southeast of Augusta. Trees stand on northern and eastern sides of hill, with an unobstructed view in other directions.

Permanent mark: Copper bolt in ledge.

[Latitude, $44^{\circ} 16' 54''$.54. Longitude, $69^{\circ} 44' 27''$.94.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sabattus	60 31 18.9	240 17 11.1	4.491934
Pisgah	96 57 38.1	276 45 46.0	4.357368
Hornbeam	142 11 04.1	322 02 14.2	4.436338
Quaker	170 59 04.4	350 57 38.6	4.238470

SABATTUS.

Triangulation station of the U. S. C. & G. S. in Androscoggin Co., Me., 4 miles from Leeds Junction, and in the town of Wales. Summit is bare with the exception of a few trees on eastern edge.

Permanent mark : Copper bolt in solid ledge.

[Latitude, 44° 08' 37''-83. Longitude, 70° 04' 43''-74.] .

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Blin	274 28 12-85	94 44 49-62	4-5041408
Independence	24 31 22-95	204 21 18-70	4-6713784
Pisgah.....	193 32 07-70	13 34 24-40	4-268767
Winter.....	240 17 11-10	60 31 18-90	4-491934
Monks Hill.....	212 56 34-00	33 04 45-00	4-45716

BLIN.

Triangulation station of the U. S. C. & G. S. in Dresden, Lincoln Co., Me. It is on a flat hill owned by Zina Blin, timbered on eastern side and view to north interrupted by orchard and buildings.

Permanent mark : Hole drilled in ledge and rock piled around.

[Latitude, 44° 07' 14''-72. Longitude, 69° 40' 52''-26.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pisgah	127 03 05-60	306 48 44-10	4-535429
Sabattus.....	94 44 49-62	274 28 12-85	4-5041408
Monks Hill.....	148 47 48-00	328 39 20-00	4-49292

MONKS HILL.

Not occupied. A high bare hill in Readfield, Kennebec Co., Me., 7 miles northwest of Augusta. A chestnut tree still standing on western edge of summit.

Permanent mark: A pile of rocks.

[Latitude, 44° 21' 36''-25. Longitude, 69° 53' 00''-15.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Blin	328 39 20	148 47 48	4-49292
Sabattus.....	33 04 45	212 56 34	4-45716

ADAMS.

In West Gray, Cumberland Co., Me. Station is on roof of house of Silas Adams. on a flat cleared ridge.

Permanent mark: Center of white cupola of house.

[Latitude, 43° 52' 53''-95. Longitude, 70° 23' 28''-51.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gorham	11 25 34	191 23 15	4·357428
Sawyer	62 34 11	242 19 08	4·517042

INDEPENDENCE.

Triangulation station of the U. S. C. & G. S. in Falmouth, Cumberland Co., Me., 8 miles north of Portland; hill entirely cleared of timber.

Permanent mark: An earthen cone buried about 3 feet below surface.

[Latitude, 43° 45' 33''-75. Longitude, 70° 19' 14''-34.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sabattus.....	204 21 18·70	24 31 22·95	4·0713784
Pleasant.....	126 33 00·63	306 12 07·39	4·6999260
Agamenticus	26 55 50·74	206 40 29·47	4·824134
Ossipee.....	60 54 23·53	240 36 58·50	4·5894007
Sawyer.....	87 28 35·00	267 10 37·00	4·542959
Munjoy.....	330 56 38·00	150 59 37·00	4·076807

MUNJOY.

Station in the observatory, 80 feet high, on Munjoy Hill, Portland, Cumberland Co., Me., owned by John W. York.

Permanent mark: Center of observatory.

[Latitude, 43° 39' 55''-64. Longitude, 70° 14' 55''-64.]

To station.	Azimuth.	Backazimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ossipee.....	78 02 09	257 41 46	4·608904
Independence	150 59 37	330 56 38	4·076807

GORHAM.

Normal school, Gorham, Cumberland Co., Me.

Permanent mark: Center of tallest tower on building.

[Latitude, 43° 40' 50''-60. Longitude, 70° 26' 49''-96.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ossipee.....	66 44 49	246 32 39	4·412059
Sawyer.....	106 10 11	285 57 29	4·409907
Adams.....	191 23 15	11 25 34	4·357428

SAWYER.

In York Co., Me. A bald and grassy ridge on line between Limington and Limerick, owned by A. W. Sawyer, who lives one-fourth of a mile below summit on southwest side.

Permanent mark: A rock cairn 7 feet square at base, tapering to 3 feet square at top, and 14 feet high.

[Latitude, 43° 44' 41''-00. Longitude, 70° 45' 13''-06.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Independence	267 10 37	87 28 35	4·542959
Ossipee	356 38 25	176 38 56	4·240003
Gorham	285 57 29	106 10 11	4·409907
Adams	242 19 08	62 34 11	4·517042

OSSIPEE.

Triangulation station of the U. S. C. & G. S. in York Co., Me., 2 miles from Waterboro. Summit cleared of timber. Land owned by Thomas Smith, who lives on side of mountain one-half mile from triangulation point.

Permanent mark: A copper bolt in solid rock.

[Latitude, 43° 35' 18''-87. Longitude, 70° 44' 27''-66.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Agamenticus	354 26 44·96	174 28 45·04	4·6101160
Independence	240 36 58·50	60 54 23·53	4·5894007
Bauneg Beg	8 59 31·00	188 57 41·00	4·361474
Farnham	57 42 32·00	237 34 44·00	4·256611
Sawyer	176 38 56·00	356 38 25·00	4·240003
Gorham	246 32 39·00	66 44 49·00	4·412059
Munjoy	257 41 46·00	78 02 09·00	4·608904

FARNHAM.

On a ridge owned by Horace Farnham, in town of Acton, about midway between Milton Mills and South Acton, York Co., Me.

Permanent mark: A tall Lombardy poplar tree in field south of barn.

[Latitude, 43° 30' 05''-77. Longitude, 70° 55' 47''-06.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ossipee	237 34 44	57 42 32	4·256611
Bauneg Beg	318 04 47	138 10 44	4·243370

BAUNEG BEG.

In the town of North Berwick, York Co., Me., 7 miles northwest from the depot. The station is on the highest of the three summits. Several acres of timber were cut down, but much is still standing on the western side of the hill.

Permanent mark: A pine tree, shaped like a lyre; trimmed up.

[Latitude, 43° 23' 03''-18. Longitude, 70° 47' 07''-26.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ossipee	188 57 41	8 59 31	4·361474
Agamenticus	337 03 22	157 07 12	4·287596
Farnham	138 10 44	318 04 47	4·243370
Tare Shirt	23 13 31	203 11 59	3·882960

AGAMENTICUS.

Triangulation station of the U. S. C. & G. S., about 12 miles from Portsmouth, N. H., in York Township, about midway between York Corner and North Berwick, York Co., Me. Summit cleared of timber except on west and northwest sides.

Permanent mark: A rock cairn 8 feet square, 15 feet high, 28 feet northwest of signal.

[Latitude, 43° 13' 24''-63. Longitude, 70° 41' 32''-91.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Independence	206 40 29·47	26 55 50·74	4·824134
Bauneg Beg	157 07 12·00	337 03 22·00	4·287596
Ossipee	174 28 45·04	354 26 44·96	4·6101160
Tare Shirt	135 48 57·00	315 43 36·00	4·18023

TARE SHIRT.

Not occupied. A long, flat ridge, partly in cultivation, in Berwick, York Co., Me.; on land owned by George Guptill.

Permanent mark: The tallest tree in a clump of pines.

[Latitude, 43° 19' 15''-90. Longitude, 70° 49' 20''-85.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bauneg Beg	203 11 59	23 13 31	3·88296
Agamenticus	315 43 36	135 48 57	4·18023

PROSPECT HILL.

Three miles south of Lancaster Coos Co., N. H., reached by wagon road to summit. An abandoned hotel on top of hill was used as signal. A flag pole on roof over front door was sighted. Instrument was mounted on railing on south edge of roof over front door.

[Latitude, 44° 27' 05''-88. Longitude, 71° 34' 16''-80.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Washington (obs'y)	313 14 03·2	133 25 16·6	4·467167
Lafayette	10 19 21·2	190 16 16·2	4·516447

STARR KING.

Triangulation station of the U. S. C. & G. S. in Coos Co., N. H. A
 bridle path from road near the Wannebec House, Jefferson village, leads
 to station. Summit clear. Land owned by N. R. Perkins of Jefferson.
 Permanent mark: A bolt and triangle.

[Latitude, 44° 26' 04''-5. Longitude, 71° 25' 59''-8.]

To station.	Azimuth.	Back Azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald Ledge	69 34 02	249 11 16	4·6647814
Lafayette.....	29 03 44	208 54 52	4·5417566

AGASSIZ.

Reached by wagon road from Bethlehem, Grafton Co., N. H. (2
 miles). Theodolite was mounted on roof of first floor of observatory.
 Flagstaff marks center of station.

[Latitude, 44° 15' 58''-17. Longitude, 71° 40' 38''-05.]

To station.	Azimuth .	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Washington (obs'y).	268 55 40·7	89 11 19·1	4·474540
Lafayette.....	347 32 26·2	167 33 47·4	4·078725

LAFAYETTE.

Triangulation station of the U. S. C. & G. S. in Grafton Co., N. H.
 Reached from Profile House (4 miles) by a steep trail too rough for
 horses. Station of U. S. C. & G. S. was probably identified by an iron
 bolt.

Permanent mark: Rock cairn 10 feet high was erected over center.

[Latitude, 44° 09' 38''-92. Longitude, 71° 38' 41''-66.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Washington (obs'y).	245 46 44·0	66 01 00·3	4·4751569
Prospect Hill	190 16 16·2	10 19 21·2	4·516447
Agassiz	167 33 47·4	347 32 26·2	4·078725
Starr King	208 54 52·0	29 03 44·0	4·5417566
Carrigain	295 12 30·2	115 20 45·2	4·24251
Kearsarge, north	277 42 15·5	98 05 14·6	4·6479026

MOUNT WASHINGTON.

Triangulation station of the U. S. C. & G. S. in Coos Co., N. H.
 Two stations were occupied, the first one 102.75 feet southeast of large
 kitchen chimney or Quimby U. S. C. & G. S. point, to which sights
 taken to signals east and south were reduced. The second station
 was the old tripod and observatory over Bache's U. S. C. & G. S. point,
 from which the western stations were sighted.

Chimney.

[Latitude, 44° 16' 14''-44. Longitude, 71° 18' 11''-49.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kearsarge, north.	317 37 35.3	137 46 18.3	4.3937849
Iron	341 27 24.7	161 30 04.2	4.2040230

Observatory.

[Latitude, 44° 16' 14''-06. Longitude, 71° 18' 13''-65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lafayette.....	66 01 00.3	245 46 44.0	4.4751569
Carrigain.....	30 20 50.7	210 14 50.3	4.3573200

SOUTH BALDFACE.

On a hill in Coos Co., N. H. Reached from George Chandler's house, North Chatham (4 miles) by well-defined path. Summit cleared, giving a good view.

Permanent mark: Bolt in solid ledge covered with a pile of loose rocks.

[Latitude, 44° 13' 51''-46. Longitude, 71° 04' 42''-45.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Washington (chimney)	103 53 13.7	283 43 49.1	4.26682
Kearsarge, north	5 21 26.5	185 20 45.3	4.14492

CARRIGAIN.

Four and a half miles by path from Livermore (Sawyers) Mills, Grafton Co., N. H. Station on eastern of two distinct summits. Some scrub spruce trees still standing.

Permanent mark: Pile of stones.

[Latitude, 44° 05' 37''-23. Longitude, 71° 26' 50''-87.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Washington (observatory)	210 14 50.3	30 20 50.7	4.35732
Lafayette	115 20 45.2	295 12 30.2	4.24251

IRON.

Three miles west-southwest of Jackson, Carroll Co., N. H., on highest part of summit near south end.

Permanent mark: Iron bolt in solid ledge.

[Latitude, 44° 08' 03''-02. Longitude, 71° 14' 22''-65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Washington (chimney)	161 30 04·2	341 27 24·7	4·204023
Kearsarge, north	285 07 50·7	105 13 53·8	4·079743
Moat	349 05 24·3	169 06 25·1	4·01234

KEARSARGE NORTH.

A triangulation station of the U. S. C. & G. S., 5 miles by road and trail north northeast of North Conway, Carroll Co., N. H. Station marks left by U. S. C. & G. S. could not be identified. All observations were referred to hole in ledge, said by Mr. Eastman, keeper of the house on top of mountain, to be the place where Prof. Quimby set his theodolite.

[Latitude, 44° 06' 21''-06. Longitude, 71° 05' 41''-12.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Washington (chimney)	137 46 18·3	317 37 35·3	4·3937849
Lafayette	98 05 14·6	277 42 15·5	4·6479026
Iron	105 13 53·8	285 07 50·7	4·0797431
South Baldface	185 20 45·3	5 21 26·5	4·14492
Moat	54 16 53·6	234 11 51·7	4·07566

MOAT.

In Carroll Co., N. H., on north summit of mountain, a bare rocky ridge running north and south and about 3 miles long. Station on bare, rocky knob. Ascended from end of highway near Diana's Bath, about 2 miles west of North Conway.

Permanent mark: Iron bolt in solid rock.

[Latitude, 44° 02' 35''-70. Longitude, 71° 12' 55''-18.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Iron	169 06 25·1	349 05 24·3	4·01234
Kearsarge, north	234 11 51·7	54 16 53·6	4·07566

WATATIC.

An old Borden station on Watatic Mountain, Worcester Co., Mass. The description of station says that there is a copper bolt, but it could not be found; a hole apparently drilled was found and it is probable

that this hole held the bolt. A tree 36 feet distant was used as center and signal in triangulation.

Tree.

[Latitude, 42° 41' 48''-47. Longitude 71° 53' 34''-40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Groton Hill.....	289 05 37	109 19 14	4 46377
Turkey Hill.....	308 13 30	128 20 52	4 27752
Brown Hill.....	336 03 12	156 05 09	3 98767
Wachusett (chimney).....	358 54 24	178 54 37	4 36285
Ward Hill.....	58 38 41	238 27 17	4 43117
Dolbar Hill.....	39 05 42	218 58 58	4 33375
Town Hill.....	48 59 17	228 53 33	3 99996

Borden station.

[Latitude, 42° 41' 48''-55. Longitude, 71° 53' 34''-87.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wachusett C. S. station...	358 48 56	178 49 10	4 36320

TOWN HILL.

A station situated on Town Hill about 6 miles west of Ashburnham Center and 4 miles north of Gardner, Worcester Co., Mass.

Permanent mark: A tree that stands about 200 or 300 feet northeast of summit of hill.

[Latitude, 42° 38' 15''-54. Longitude, 71° 59' 05''-39.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Watatic.....	228 53 33	48 59 17	3 99996
Brown Hill.....	281 20 34	101 26 10	4 06886
Wachusett (chimney).....	334 06 35	154 10 32	4 26291
House on hill.....	359 26 11	179 26 13	3 79814
Dolbar Hill.....	30 42 47	210 39 50	4 07328

WARD HILL.

A station on Ward Hill in pasture one-half mile south of Templeton and Athol road, at point about 3 miles from Athol, Worcester Co., Mass.

Permanent mark: Large dead tree that stands near summit of hill.

[Latitude, 42° 34' 12''-13. Longitude, 72° 10' 24''-85.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Two tree.....	194 27 36	14 28 47	3 97883
Watatic.....	238 27 17	58 38 41	4 43117
Dolbar Hill.....	285 43 47	105 48 23	3 99224
Wachusett (chimney).....	290 48 11	110 59 47	4 40066

DOLBAR HILL.

About half a mile south of Templeton, Worcester Co., Mass., on summit of hill in pasture.

Mark: Stone + U. S. G. S.

[Latitude, 42° 32' 45''-62. Longitude, 72° 03' 30''-40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Town Hill.....	210 39 50	30 42 47	4-07328
Watatic.....	218 58 58	39 05 42	4-33375
Wachusett (chimney)....	294 07 07	114 14 03	4-18739
Ward Hill.....	105 48 23	285 43 47	3-99224

BROWN HILL.

This station is on land belonging to Thomas Costello, and is about 4 miles northwest of Fitchburg, Worcester Co., Mass.

[Latitude, 42° 37' 00''-54. Longitude, 71° 50' 41''-31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Turkey Hill.....	284 34 42	104 40 0-2	4-05316

TURKEY HILL.

About 1 mile east of Lunenburg, Worcester Co., Mass. on land belonging to Mr. John F. Brown.

[Latitude, 42° 35' 28''-03. Longitude, 71° 42' 41''-63.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Groton Hill.....	260 12 26	80 18 36	4-10729
Watatic.....	128 20 52	308 13 30	4-27752
Wachusett (chimney).	52 00 17	231 53 08	4-26385

GROTON HILL.

On land belonging to Mr. Dodge, about one-half mile west of Groton Center, Middlesex Co., Mass. Station is on top of hill, about 60 feet west from dead tree.

[Latitude, 42° 36' 38''-28. Longitude, 71° 33' 28''-31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Watatic.....	109 19 14	289 05 37	4-46377
Turkey Hill.....	80 18 36	260 12 26	4-10729
Wachusett (chimney).	63 38 21	243 24 58	4-48073

WACHUSETT (CHIMNEY).

A U. S. C. & G. S. point in Worcester Co., Mass. This was transferred to chimney of Summit Hotel, which was used as center of station.
Mark: Chimney of Summit Hotel.

[Latitude, 42° 29' 21''-28. Longitude, 71° 53' 15''-13.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Brown Hill	193 53 44	13 55 28	4 16433
Turkey Hill	231 53 08	52 00 17	4 26385
Groton Hill	243 24 58	63 38 21	4 48073
Boxboro	269 21 38	89 36 13	4 47099
Observatory	286 35 16	106 45 49	4 34969
Reservoir	300 59 52	121 12 47	4 48694
Fay Mountain	322 17 39	142 28 07	4 54359
Ward Hill	110 59 47	290 48 11	4 40066
Dolbar Hill	114 14 03	294 07 07	4 18739
Watatic	178 54 37	358 54 24	4 36285
Town Hill	154 10 32	334 06 35	4 26291

C. & G. S. station.

[Latitude, 42° 29' 20''-78. Longitude, 71° 53' 13''-98.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Fay Mountain....	322 18 46	142 29 13	4 54323

BOXBORO.

In belfry of town hall at Boxboro, Middlesex Co., Mass.
Mark: Center of tower.

[Latitude, 42° 29' 29''-94. Longitude, 71° 31' 39''-96.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Reservoir	11 42 13	191 40 39	4 21642
Observatory	50 42 22	230 38 21	4 02316
Wachusett (chimney).	89 36 13	269 21 38	4 47099

OBSERVATORY.

This station is center of observatory in pasture belonging to Mr. Cunningham, and about 4 miles east of Clinton and 1¼ miles west of Bolton, Worcester Co., Mass.

[Latitude, 42° 25' 53''-23. Longitude, 71° 37' 37''-19.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Boxboro	230 38 21	50 42 22	4 02316
Reservoir	332 51 34	152 53 36	4 02526
Fay Mountain	00 19 59	180 19 50	4 32780
Wachusett (chimney).	106 45 49	286 35 16	4 34969

RESERVOIR.

Center of tower in upper reservoir at Marlboro, Middlesex Co., Mass.

[Latitude, 42° 20' 47''-50. Longitude, 71° 34' 05''-96.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Boxboro	191	40	39	11	42	13	<i>Meters.</i> 4 21642
Observatory	152	53	36	332	51	34	4 02526
Fay Mountain	22	45	28	202	43	02	4 10846
Wachusett (chimney).	121	12	47	300	59	52	4 48694

FAY MOUNTAIN.

An old Borden station about 2 miles a little west of south from Westboro, Worcester Co., Mass, in pasture, about three-eighths of a mile northwest from Mr. James Hannahan's house.

[Latitude, 42° 14' 23''-79. Longitude, 71° 37' 42''-54.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Observatory	180	19	50	00	19	59	4 32780
Reservoir	202	43	02	22	45	28	4 10846
Wachusett (chimney).	142	28	07	322	17	39	4 54359

BALD HILL.

Triangulation station of the U. S. C. & G. S. in the southwestern portion of the town of Union, Tolland Co., Conn., on the land of Capt. Burke Foster.

Permanent mark: Copper bolt in rock on the summit of hill.

[Latitude, 41° 58' 25''-89. Longitude, 72° 11' 55''-03.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Wachusett (chimney).	204	05	01-00	24	17	34-50	4 7975447
Mount Tom	128	48	17-33	308	30	11-05	4 678130
Green Hill	41	57	56-00	221	50	22-00	4 370084
Soapstone	84	47	38-00	254	39	00-00	4 252875
Box Hill	47	57	32-58	227	47	14-07	4 4598537
Storrs Monument	15	56	41-00	195	54	15-00	4 264726
Post Hill	19	08	11-00	199	02	34-00	4 551575
Robinson Hill	333	33	21-00	153	38	06-00	4 344868

SOAPSTONE.

In southeastern corner of town of Somers, Tolland Co., Conn., 6 miles from Stafford Springs. Several acres of timber were cut, giving a good view in nearly all directions.

Permanent mark: A large boulder due south of signal; distance 25½ feet.

[Latitude, 41° 57' 32''·50. Longitude, 72° 24' 49''·30.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald Hill	264 39 00	84 47 38	4·252975
Box Hill	11 14 26	191 12 45	4·255619
Green Hill .....	.....	.....	4·202901
Peak	90 06 25	269 53 20	4·432218

PEAK.

Station on Copper Hill, 1½ miles north-northwest of East Granby village, Hartford Co., Conn., 4 miles north-northeast of Tariffville, one-half mile by path east of old Newgate prison.

Permanent mark: A pine tree near edge of bluff at south extremity of long summit; tree trimmed up.

[Latitude, 41° 57' 32''·48. Longitude, 72° 44' 24''·02.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Soapstone	269 53 20	90 06 25	4·432218
Box Hill	306 45 01	126 56 24	4·469305

ROBINSON HILL.

A perfectly bald hill in town of Hampton, Windham Co., Conn., 2 miles northwest of the village. Land owned by Ralph W. Robinson, who lives one-fourth of a mile from triangulation station, on southeast side. Station on south side of a stone wall running east and west and crossing the hill at highest point.

Permanent mark: Rocks piled at foot of pole.

[Latitude, 41° 47' 43''·61. Longitude, 72° 04' 48''·29.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Box Hill	91 02 29	270 47 27	4·494768
Bald Hill	153 38 06	333 33 21	4·344868
Storrs Monument .....	.....	.....	4·177694

STORRS MONUMENT.

Not occupied. On a hill back of Storrs Agricultural College, northern central part of town of Mansfield, Tolland Co., Conn. Hill partly covered with trees and birch brush.

Permanent mark: Granite shaft 25 feet high.

[Latitude, 41° 48' 52''-51. Longitude, 72° 15' 33''-98.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Green Hill.....	91 20 02	271 14 55	4·026446
Bald Hill.....	195 54 15	15 56 41	4·264726
Robinson Hill.....			4·177694

GREEN HILL.

A bald hill in the northwest part of the town of Coventry, Tolland Co., Conn. Station in field owned by Samuel Green, on highest part of ridge. Some timber still stands on northwest edge of field. Samuel Green lives one-third of a mile west and Ambrose Royal lives one-third of a mile southeast of triangulation point.

Permanent mark: A chestnut pole 30 feet high.

[Latitude, 41° 49' 00''-26. Longitude, 72° 23' 14''-32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Box Hill.....	71 54 38	251 51 53	3·778222
Bald Hill.....	221 50 22	41 57 56	4·370084
Post Hill.....			4·222644
Soapstone.....			4·202901
Storrs Monument.....	271 14 55	91 20 02	4·026446
Sweets Hill.....	321 03 21	141 09 37	4·317776

BOX HILL.

Triangulation station of the U. S. C. & G. S. in the town of Bolton, Tolland Co., Conn. Station is on the highest point directly in line from Bald Hill to Sandford.

Permanent mark: Drill hole, with a copper bolt in rock.

[Latitude, 41° 47' 59''-79. Longitude, 72° 27' 21''-40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Tom.....	162 03 16·31	341 55 31·98	4·7127917
Bald Hill.....	227 47 14·07	47 57 32·58	4·4593557
Ivy Hill.....	97 23 00·05	276 52 14·77	4·3084201
Green Hill.....	251 51 53·00	71 54 38·00	3·778222
Peak.....	126 56 24·00	306 45 01·00	4·469305
Robinson Hill.....	270 47 27·00	91 02 20·00	4·494768
Soapstone.....	191 12 45·00	11 14 26·00	4·255019
Post Hill.....	325 44 53·00	145 49 34·00	4·238931

MEETING HOUSE HILL.

In Franklin township, New London Co., Conn., one-half mile from Franklin depot. Station in field belonging to Mr. Ladd, whose house

is 150 yards north-northwest. Summit, flat; view partly cut off by orchard to northward.

Permanent mark: Flag pole, 15 feet high.

[Latitude, 41° 36' 08" 68. Longitude, 72° 08' 38" 97.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Post Hill	115 11 06	295 03 20	4·253116
Sweet Hill	136 43 15	316 39 49	4·020371

SWEET HILL.

A partly cleared hill, 3½ miles south-southwest of Willimantic, and in the town of Lebanon, New London Co., Conn. The Willimantic and Lebanon road passes around the hill on the eastern side. Hill owned by Dr. Sweet, Lebanon village. A few oak trees on southeast edge of summit.

Permanent mark: Rocks piled up.

[Latitude, 41° 40' 15" 88. Longitude, 72° 13' 49" 55.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Post Hill	89 53 29	269 49 10	3·955375
Green Hill	141 09 37	321 03 21	4·317776
Meeting House Hill ..	316 39 49	136 43 15	4·020371

POST HILL.

Station on land owned by W. C. Robinson, 8 miles southwest of Willimantic, in town of Columbia, Tolland Co., Conn., near Hebron line. Apple trees interfere with the view to the west; no obstructions in other directions.

Permanent mark: A flag pole, 30 feet high.

[Latitude, 41° 40' 15" 15. Longitude, 72° 20' 19" 64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Box Hill	145 49 34	325 44 53	4·238931
Bald Hill	199 02 34	19 08 11	4·551575
Green Hill .....	.....	.....	4·222644
Meeting House Hill ..	295 03 20	115 11 06	4·253116
Sweet Hill	269 49 10	89 53 29	3·955375

GRANBY.

On land owned by A. C. Teeter 2 miles north of North Canton village, and in the southwest corner of Granby township, Hartford Co., Conn. Summit flat and cleared of timber.

Permanent mark: A chestnut tree trimmed up.

[Latitude, 41° 55' 57"-08. Longitude, 72° 53' 18"-88.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Johnny Cake	23 57 11	203 52 56	4·337369
Ivy	76 30 33	256 17 06	4·457468

IVY.

Triangulation station of the U. S. C. & G. S. on the summit at the south end of the ridge known as Ivy Hill in North Goshen, and about 2 miles north from Goshen Center village, Litchfield Co., Conn. The farm immediately south of station is owned by Mr. Dana Bently, and his house is about one-quarter of a mile southwest of station.

Permanent mark: Copper bolt inserted in rock. The head of bolt is one inch in diameter with two lines crossing the center at right angles.

[Latitude, 41° 52' 18"-50. Longitude, 73° 13' 27"-93.]

To station.	Azimuth.	Back azimuth.	Log. Dist.
	° ' "	° ' "	Meters.
Sandford	333 14 07·82	153 25 05·06	4·7071382
Granby	256 17 06·00	76 30 33·00	4·457468
Box Hill	276 52 14·77	97 23 00·05	4·8084201
Johnny Cake	304 27 26·00	124 36 37·00	4·364915
Mohawk	47 08 17·00	227 05 23·00	3·915723
Wooster	20 54 59·84	200 44 28·82	4·7915137
West Peak	317 28 36·00	137 43 47·00	4·671544
Ellsworth	67 57 00·30	247 47 50·30	4·312546

JOHNNY CAKE.

Station on highest part of Johnny Cake or West Mountain, in western central part of Burlington Township, Hartford Co., Conn., on land owned by Frank Recor. Summit entirely cleared. A wagon road crosses the mountain from north to south and passes within 150 yards of triangulation station. John Edwards lives one-fourth of a mile north of triangulation point.

Permanent mark: Hole drilled in solid rock.

[Latitude, 41° 45' 12"-79. Longitude, 72° 59' 41"-01.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Good	44 17 05	224 06 30	4·501402
Ivy	124 36 37	304 27 26	4·364915
Mount Tom			4·383078
Granby	203 52 56	23 57 11	4·337369
Talcott			4·256039
West Peak			4·396534

MOUNT TOM.

U. S. C. & G. S. station: Station on highest part of Mount Tom, in Washington Township, Litchfield Co., Conn., on land belonging to Albert Anson. The new road leaves Mount Tom pond to the south a short distance beyond the "Corners." The first road west of the pond gives best ascent to the mountain.

Permanent mark: A hole drilled in ledge, at the extreme southwest end of the summit.

[Latitude, 41° 41' 36''-43. Longitude, 73° 16' 25''-54.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Tashua	357 39 55.72	177 40 51.49	4.6823488
Wooster	25 17 53.27	205 09 21.10	4.6235632
Mohawk	172 13 51.00	352 12 55.00	4.1563950
West Peak			4.5884380
Johnny Cake			4.3830780

WEST PEAK.

Five miles by road northwest of the city of Meriden, New Haven Co., Conn. Station on the highest part of bare ledge, 27 feet 2 inches northeast of flagstaff hole, near edge of cliff.

Permanent mark: Hole drilled in solid rock.

[Latitude, 41° 33' 34''-90. Longitude, 72° 50' 38''-78.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Good	88 08 05	267 51 31	4.540789
Ivy	137 43 47	317 23 36	4.671544
Mount Tom			4.588438
Johnny Cake			4.396534

GOOD.

Triangulation station of the U. S. C. & G. S. situated on the highest part of Good Hill, in town of Woodbury, Litchfield Co., Conn. Land owned by Nathan B. Smith. The station is about one-quarter of a mile from Four Corners, in a pasture.

Permanent mark: A flat glass bottle sunk 3 feet in ground, bottom up. Over it are two layers of inch boards, on which rest a large stub reaching to surface; in center of stub a nail.

[Latitude, 41° 32' 55''-52. Longitude, 73° 15' 36''-75.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Tashua	358 31 27.66	178 31 51.09	4.5054630
Wooster	41 03 04.58	220 54 00.85	4.4635225
Wing	92 50 42.00	272 40 02.00	4.3495800
West Peak	267 51 31.00	88 08 05.00	4.5407890
Johnny Cake	224 06 30.00	44 17 05.00	4.5014020

BEACONPOLE.

Triangulation station of the U. S. C. & G. S. in Providence Co., R. I. A 20-foot platform was erected and the Coast Survey signal, which was still standing July, 1888, was used.

[Latitude, 41° 59' 42''·47. Longitude, 71° 27' 01''·26.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Memford.....	19 08 03·19	199 03 53·14	4·4218726
Tourtellot.....	56 38 32·09	236 30 20·63	4·3072428
Spencer (2).....	6 17 11·20	186 15 19·12	4·5501573
Woonsocket.....	77 33 33·10	257 29 23·12	3·9451619

WOONSOCKET.

Station on Woonsocket Hill, Providence Co., R. I.

Permanent mark: Copper wire in hole drilled in a large rock 12 feet square.

[Latitude, 41° 58' 40''·81. Longitude, 71° 33' 15''·16.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Tourtellot.....	41 56 38·02	221 52 36·62	4·0954877
Beaconpole.....	257 29 23·12	77 33 33·10	3·9451619

TOURTELLOT.

Station on Tourtellot Hill in town of Glocester, Providence, Co., R. I., about 2 miles southeast from Chepachet.

Permanent mark: Spruce tree denuded of limbs, one side (40-foot observing platform).

[Latitude, 41° 53' 40''·34. Longitude, 71° 39' 16''·43.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Memford.....	328 52 31·54	148 56 32·11	4·2071185
Aldrich.....	371 44 43·62	191 44 07·23	3·7914820
Beaconpole.....	236 30 20·63	56 38 32·09	4·3072428
Woonsocket.....	221 52 36·62	41 56 38·02	4·0954877

ALDRICH.

Station on north end of Chopmist Hill, in town of Scituate, Providence Co., R. I. A 50-foot observing platform was erected.

Permanent mark: A chestnut tree.

[Latitude, 41° 50' 23''·92. Longitude, 71° 40' 11''·00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Weaver.....	358 36 21·73	178 36 35·77	4·3000474
Memford.....	308 52 48·54	128 57 25·32	4·0305367
Tourtellot.....	191 44 07·23	371 44 43·62	3·7914820

MEMFORD.

An old barn belonging to Mrs. Isaac Memford, in town of Cranston, Providence Co., R. I., and about 10 miles west of the city of Providence.

Permanent mark: A piece of brass set into stone foundation of barn 5 feet 3 inches from top of foundation.

[Latitude, $41^{\circ} 46' 13''$. 10. Longitude, $71^{\circ} 33' 15''$. 83.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Spencer (2)	335	07	48.35	155	10	05.71	4.0552672
Weaver	36	45	54.42	216	41	32.19	4.1828648
Beaconpole	199	03	53.14	19	08	03.19	4.4218726
Anthony Mill	355	29	05.38	175	29	24.01	3.9150112
Aldrich	128	57	25.32	308	52	48.54	4.0305307
Tourtellot	148	56	32.11	328	52	31.54	4.207185

ANTHONY MILL.

Point was not occupied in 1888. In town of Coventry, Kent Co., R. I., village of Anthony. Point sighted was cupola of new mill in Anthony.

[Latitude, $41^{\circ} 41' 47''$. 30. Longitude, $71^{\circ} 32' 47''$. 82.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Memford	175	29	24.01	355	29	05.38	3.9150112
Spencer (2)	297	02	99.97	117	04	08.68	3.6660774

SPENCER (2).

This station is in Mr. Benjamin F. Dawley's pasture, town of Warwick, Kent Co., R. I., just south of his house. A 24-foot platform was erected. Station is 790 feet south $55^{\circ} 46'$ west from U. S. Coast and Geodetic Survey station Spencer and 10 feet west of cross mark cut on rock.

Permanent mark: Cross mark cut on rock.

[Latitude, $41^{\circ} 40' 38''$. 87. Longitude, $71^{\circ} 29' 49''$. 30.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Spencer (C. & G. S.)				55	46	30.00	Meters. 2.3816593
Beaconpole	186	15	19.12	6	17	11.20	4.5501573
Anthony Mill	117	04	08.68	297	02	09.97	3.6660774
Franklin	91	55	51.02	211	53	06.92	4.0340647
Memford	155	10	05.71	335	07	48.35	4.0552672
Weaver	82	14	33.84	262	07	54.58	4.1468498

WEAVER.

On Weaver Hill, Coventry Township, Kent Co., R. I., a 50-foot observing platform was erected.

Permanent mark: Spruce tree from which nearly all of the limbs were cut and which formed one side of triangular observing platform.

[Latitude, 41° 39' 37''-21. Longitude, 71° 39' 49''-84.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Spencer (2)	262 07 54.48	82 14 33.84	4.1488498
Franklin	311 36 34.71	131 40 29.54	4.0394200
Aldrich	178 36 35.77	358 36 21.73	4.3000474
Memford	216 41 32.19	36 45 54.42	4.1828648

FRANKLIN.

Near Franklin Corner, in the town of Exeter, Washington Co., R. I., a 60-foot observing platform was erected.

Permanent mark: Oak tree (part of platform).

[Latitude, 41° 35' 41''-35. Longitude, 71° 33' 56''-30.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Spencer (2)	211 53 06.92	31 55 51.02	4.0340647
Sherman	337 20 31.00	157 22 30.46	4.0351512
Weaver	131 40 29.54	311 36 34.71	4.0394200

DAWLEY.

On rocky point northwest of highest point of what is known as the mountain road, in town of Richmond, Washington Co., R. I., a 50-foot observing platform was erected.

Permanent mark: Cross and U. S. G. S. cut in solid rock.

[Latitude, 41° 32' 12''-06. Longitude, 71° 33' 02''-68.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sherman	287 25 44.38	107 31 06.89	4.0728640
Kingston Church Steeple	300 59 33.79	121 04 31.44	4.0847784
Champlin	63 19 28.22	243 14 19.37	4.0819936

SHERMAN.

Triangulation station of the U. S. C. & G. S. in Washington Co., R. I. A 24-foot observing platform and tripod was erected at a point 2° 10' north of west from U. S. Coast and Geodetic Survey station Sherman, and 13 feet distant.

Permanent mark: Same as made by U. S. C. & G. S.

[Latitude, $41^{\circ} 30' 16''\cdot94$. Longitude, $71^{\circ} 30' 56''\cdot19$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Spencer (2)	184 36 35·54	4 37 19·94	4·2844114
Pine Hill	131 20 35·94	311 16 07·86	4·0959827
Franklin	157 22 30·46	337 20 31·00	4·0351512
Dawley.....	107 31 06·89	287 25 44·38	4·0728640

CHAMPLIN.

Station is about $1\frac{3}{4}$ miles due north of Hopkinton, Washington Co., R. I. A 24-foot observing platform and tripod was erected at a point $10^{\circ} 14'$ south of east from Coast Survey station, Champlin Hill, distant 11 feet 3 inches; the latter is marked by iron spikes in two rocks.

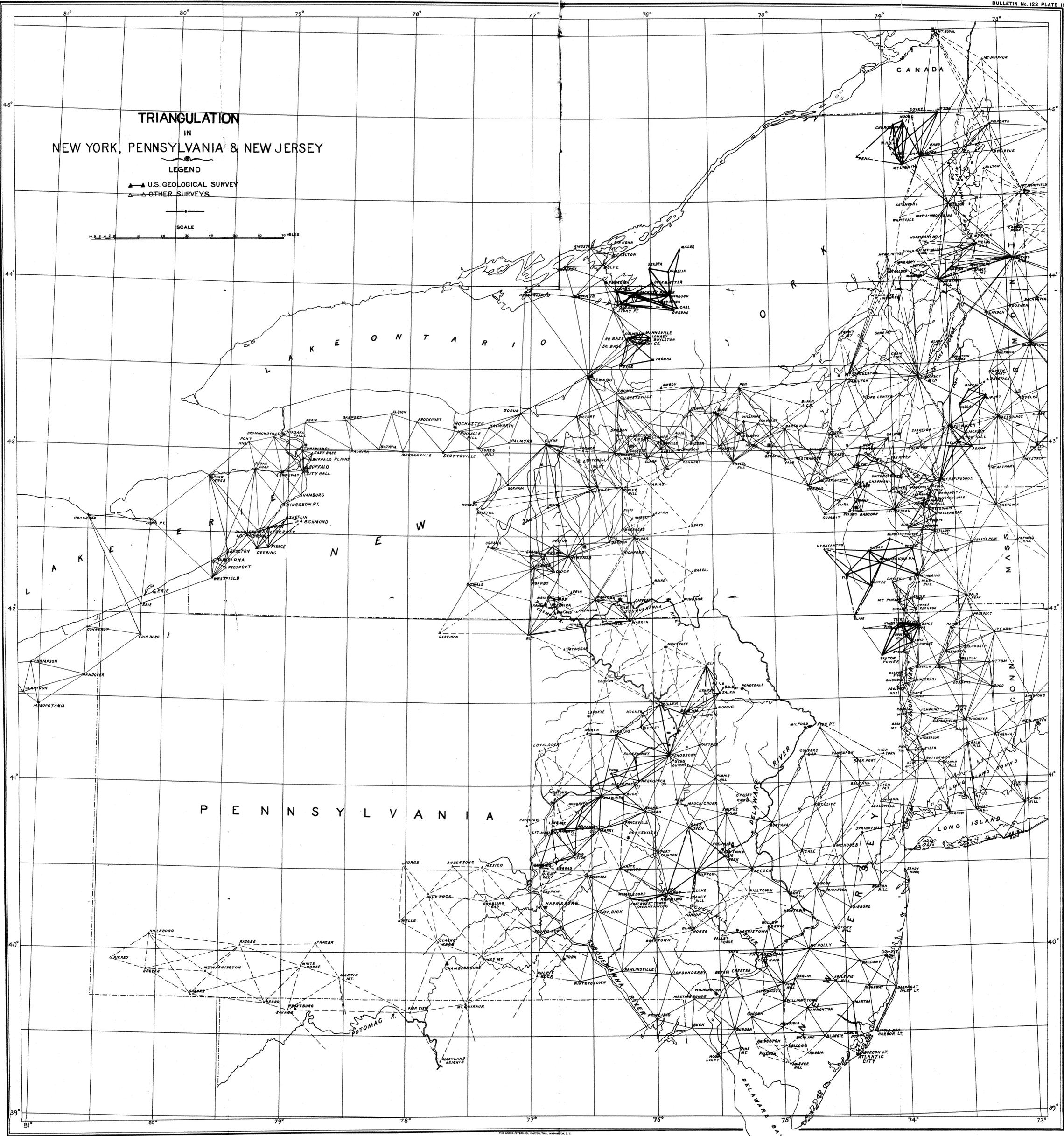
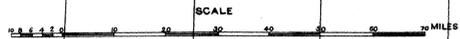
[Latitude, $41^{\circ} 29' 16''\cdot04$. Longitude, $71^{\circ} 46' 47''\cdot91$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Dawley.....	243 14 19·37	63 19 28·22	4·0819936

TRIANGULATION IN NEW YORK, PENNSYLVANIA & NEW JERSEY

LEGEND

- ▲ U.S. GEOLOGICAL SURVEY
- △ OTHER SURVEYS



NEW YORK AND PENNSYLVANIA.

METHODS OF WORK.

NEW YORK.

A comparatively small amount of triangulation has as yet been necessary in addition to that of other organizations. The State is about half covered by triangulation, including the work of the U. S. Lake Survey, along the Great Lakes and St. Lawrence River; that of the U. S. Coast and Geodetic Survey along the Hudson River, Lake Champlain, and the Mohawk Valley; and that of the New York State survey in the central and southern portions of the State. The work in certain areas was supplemented by the U. S. Geological Survey during 1892 and 1893. In June, 1892, a small belt was extended northeastward through Washington County, starting from stations Greenwich, Rafinesque, of the U. S. Coast and Geodetic Survey. Nine stations, controlling four atlas sheets, were occupied. Stations were located on bare hills, though they were not always the highest in the locality, to avoid erection of expensive scaffolds, or heavy damages for destruction of timber.

Later in the season of 1892 a system of quadrilaterals was started across the Catskill region from Powell-Merino, stations of the U. S. Coast and Geodetic Survey in the Hudson Valley near Coxsackie. Seven stations, controlling three atlas sheets, were located. Old observatories were found on many of the wooded mountain summits and were sighted as signals and occupied with the theodolite.

During 1893 work was extended across Clinton County from the line Lyon-Dannemora, of the U. S. Coast and Geodetic Survey. The northern border of the State is very difficult to triangulate, there being no well-defined points after leaving the high rocky peaks of the Adirondack region, the ridges being flat and heavily wooded. Eight stations within three atlas sheets were located.

The work in Oswego and Jefferson counties was based upon stations of the U. S. Lake Survey, Sandy Creek-Mannsville being used as a base in Oswego County and Cooper-Gleason in Jefferson County. Eighteen stations were occupied in this portion of the State, furnishing control for five atlas sheets.

A few stations in addition to those of the U. S. Lake Survey were located in Chautauqua and Erie counties. The line Silver Creek-Dunkirk light-house was used as a base from which the positions of five stations were determined.

In October, 1893, four stations were located in Ulster County, southwest of Kingston; these were based upon Terry, Prospect, and Lloyd, stations of the U. S. Coast and Geodetic Survey on the banks of the Hudson near Rondout.

All of the work of the U. S. Geological Survey in New York has been done by S. S. Gannett, assisted by B. C. Washington, jr. A Fauth 8-inch theodolite has been used, angles having been read, in most cases, by the method of directions. No least square figure adjustment has been made.

PENNSYLVANIA.

Triangulation of the U. S. Coast and Geodetic Survey in the anthracite coal region was supplemented during the years 1889, 1890, and 1891. Twenty-five points were located, furnishing control for fifteen atlas sheets.

The location of stations on flat, wooded, mountain summits in many cases necessitated the elevation of the theodolite from 10 to 50 feet above the ground, an interior tripod for the support of the instrument being built with an exterior structure for the observer.

In August, 1892, a few stations were added to those already located in the vicinity of Reading and Allentown. Angles were measured with a Fauth 8-inch theodolite. No figure adjustment has been made.

DESCRIPTIONS AND POSITIONS OF STATIONS.

DEERING.

Station located on north end of high ridge, in town of Arkwright, Chautauqua Co., N. Y., about one-eighth of a mile south of Sheridan line, 175 yards west of main north and south road. Louis Deering owner of property.

Permanent mark: Copper bolt in bowlder.

[Latitude, 42° 25' 49''-50. Longitude, 79° 14' 19''-03.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Dunkirk, L. H.	126 32 17.5	306 27 36.1	4.07358
Brooks (chimney) . . .	130 51 26.9	310 47 59.1	3.96816
Pierce	265 43 43.8	85 47 06.4	3.83766
Dean	209 02 04.8	29 05 29.7	4.15428
Silver Creek	186 44 32.3	6 45 07.2	4.00268

SHEFLIN.

Two miles south southeast of Angola Depot, in town of Evans, Erie Co., N. Y., about 75 yards north of Brant line or road: One-fourth of a mile east of north and south road. Station in pasture on highest ground owned by Jacob Sheflin.

Permanent mark: Stone monument 4 feet long, copper bolt stamped U. S. G. S., 459, N. Y.

[Latitude, 42° 36' 38''·41. Longitude, 79° 00' 30''·72.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pierce	31 45 15·2	211 39 18·2	4·36053
Dean	57 47 53·1	237 41 58·0	4·15089
Richmond	283 07 13·0	103 12 33·2	4·04439

RICHMOND.

Not occupied, situated in Erie Co., N. Y. Station on land owned by Nathaniel Richmond, in North Collins, 1½ miles west of Langford, just north of main east and west road; just north of and 75 yards distant from house of Charles Cook, 10 feet northeast of old well.

Permanent mark: Stone monument, copper bolt No. 458, U. S. G. S., N. Y.

[Latitude, 42° 35' 16''·65. Longitude, 78° 52' 37''·69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pierce	53 28 02·2	233 16 45·7	4·45452
Sheffin	103 12 33·2	383 07 13·0	4·04439

DEAN.

One mile east of Silver Creek depot, Chautauqua Co., N. Y., just outside of corporation limits, on highest ground in immediate vicinity. Station about 150 feet north of main east and west road on line running east and west, separating property of George Dean and Dr. Evarts.

Permanent mark: Stone monument, copper bolt stamped U. S. G. S., 460, N. Y.

[Latitude, 43° 32' 33·61''. Longitude, 79° 09' 15·62'']

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pierce	0 21 05·2	180 21 03·0	4·07774
Deering	29 05 29·7	209 02 04·8	4·15428
Sheffin	237 41 58·0	57 47 53·1	4·15089

SILVER CREEK.

Triangulation point of the U. S. Lake Survey in Sheridan Township, Chautauqua Co, N. Y., 3 miles west of village of Silver Creek, three-quarters of a mile east of Sheridan railroad station. A new railroad has cut through primary station, destroying center mark. A new

station was established about 75 feet south of railroad track in open field.

Permanent mark: Stone monument marked U. S. Reference stone, monument north $58^{\circ} 08'$ east, 233.9 feet.

[Latitude, $42^{\circ} 31' 13''$.34. Longitude, $79^{\circ} 13' 27''$.28.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Deering	6 45 07.2	186 44 32.3	4.00268
Brooks (chimney)	64 31 29.4	244 27 26.9	4.95879
Dunkirk, L. H.	74 38 49.2	254 33 33.0	4.045157
Pierce	329 04 40.7	149 07 28.5	4.04343

PIERCE.

Station on a knoll in cultivated field, in town of Villenova, Chautauqua Co., N. Y., about 50 yards south of Hanover line, close by main road to Forestville. L. J. Pierce, owner. L. W. Geer lives on place.

Permanent mark: Cut marble post 8 by 8 by 30 inches flush with ground. Copper bolt stamped U. S. G. S., 457, N. Y.

[Latitude, $42^{\circ} 26' 06''$.00. Longitude, $79^{\circ} 09' 18''$.82.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Deering	85 47 06.4	275 43 43.8	3.83766
Silver Creek	149 07 28.5	329 04 40.7	4.04343
Richmond	233 16 45.7	53 28 02.2	4.45452
Shedin	211 39 18.2	31 45 15.2	4.36053
Dean	180 21 03.0	0 21 05.2	4.07774

DUNKIRK, LIGHT-HOUSE.

Triangulation point of the U. S. Lake Survey, situated $1\frac{1}{4}$ miles northwest of city of Dunkirk, Chautauqua Co., N. Y. Instrument on iron platform about 35 feet above ground.

Permanent mark: Center of brick tower.

[Latitude, $42^{\circ} 29' 37''$.80. Longitude, $79^{\circ} 21' 15''$.80.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Silver Creek	254 33 33.0	74 38 49.2	4.045157
Deering	308 27 36.1	126 32 17.5	4.07358

COOPER.

Triangulation point of the U. S. Lake Survey. Station one-quarter of a mile from end of Peninsula Point, Jefferson Co., N. Y., and nearly west of Sacketts Harbor in cultivated field.

Permanent mark: Hole drilled in stone post 1 foot below surface.

Reference post, south 68° west 36·0 meters.

Reference post, north 73° east 52·0 meters.

Reference post, north 24° east 62·5 meters.

[Latitude, 43° 57' 48''·2. Longitude, 76° 16' 41''·5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Horse Island	281 57 39·4	102 03 11·5	4·037713
Hovey.....	338 51 49·1	158 53 34·2	3·972121
Greene	287 34 30·3	107 53 46·9	4·591839

GLEASON.

Triangulation point of the U. S. Lake Survey. Station 4 miles north-east of Stony Point light-house, about $1\frac{3}{8}$ miles southwest of the west end of Snowshoe Bay, Jefferson Co., N. Y.

Permanent mark: Triangular hole drilled in bed rock 1 foot below surface. A surface stone is planted directly over it.

[Latitude, 43° 52' 48''·9. Longitude, 76° 15' 32''·8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Horse Island	232 38 31·0	52 43 15·0	4·060565

HOVEY.

In town of Henderson, Jefferson Co., N. Y., on flat bluff on west side of Henderson Bay, in cleared pasture, with fringe of timber around edge of bluff. Land owned by Mr. Hovey, who lives half a mile northeast of station. The mark is a hole drilled in solid rock 1 foot below surface. Surface mark, a boulder set over center with a cross cut a half-inch deep on its top.

[Latitude, 43° 53' 04''·77. Longitude, 76° 14' 09''·99.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Johnson	256 04 34·99	76 20 57·66	4·512470
Horse Island	228 21 33·99	48 25 20·75	3·989328
Cooper	158 53 34·19	338 51 49·10	3·972121
Greene	275 10 40·49	95 28 11·39	4·531514
Carl	274 03 13·99	94 22 06·34	4·563231

CARL.

A round bare hill three-fourths of a mile northeast of Cronk Corners, Lewis Co., N. Y., owned by Thomas Carl.

Permanent mark: Stone monument, copper bolt stamped U. S. G. S., 449, N. Y. Stones piled around monument.

[Latitude, 43° 51' 37''-67. Longitude, 75° 46' 56''-10.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Greene	79 54 50-30	259 53 28-80	3-426238
Johnson	155 07 25-60	335 04 55-00	4-061204
Boynton	109 35 50-80	289 29 46-90	4-094678
Hovey	94 22 06-34	274 03 13-99	4-563231

GREENE.

A cleared ridge in town of Pinckney, Lewis Co., N. Y., in lot 30, Franklin Greene owner, 2½ miles east-southeast of Whitesville.

Permanent mark: Stonemonument, in which is a copper bolt stamped U. S. G. S., 448, N. Y.

[Latitude, 43° 51' 22''-53. Longitude, 75° 48' 53''-76.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cooper	107 53 46-90	287 34 30-30	4-591839
Johnson	168 29 45-60	348 28 36-50	4-046701
Carl	259 53 28-80	79 54 50-30	3-426238
Hovey	95 28 11-39	275 10 40-49	4-531514

BOYNTON.

Station on cleared ridge, 5 miles south of Watertown, Jefferson Co., N. Y., owned by Lester Boynton. Highest land within 6 or 8 miles.

Permanent mark: Stone monument 4 feet long; in which is a copper bolt stamped U. S. G. S., 450, N. Y.

[Latitude, 43° 53' 52''-46. Longitude, 75° 55' 41''-02.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Carl	289 29 46-9	109 35 50-8	4-094678
Buckminster	160 34 41-1	340 32 05-0	4-177686
Horse Island	106 05 15-3	285 56 12-8	4-258931
Johnson	227 29 42-6	47 33 16-1	3-968754

LOOMIS.

Triangulation point of the U. S. C. & G. S. Station is situated near the village of Palermo, Oswego Co., N. Y., about four-fifths of a mile south-southwest from "Jennings Corner" or "Palermo Center," on land owned by Mr. J. W. K. Loomis.

Permanent mark: An apothecary's short-neck bottle filled with ashes 30 inches below surface; a marble post 30 inches long rests on the bottle with letters U. S. C. S. upon its top. Four other posts are set with centers, each 5 feet north, south, east, and west (true) from the station.

[Latitude, 43° 21' 18''·46. Longitude, 76° 17' 10''·37.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Florence.....	265 44 53·68	86 10 41·57	4·7064895
Fenner	314 53 10·34	135 15 27·12	4·7960549

JOHNSON.

A bare summit on edge of table-land, 4 miles southeast of Watertown, Jefferson Co., N. Y.

Permanent mark: Copper bolt in solid rock, stamped U. S. G. S., 451 N. Y.

[Latitude, 43° 57' 16''·05. Longitude, 75° 50' 33''·36.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Carl	335 04 55·00	155 07 25·60	4·061204
Greene	348 28 36·50	168 29 45·60	4·046701
Boynton	47 33 16·10	227 29 42·60	3·968754
Seeber	140 59 02·60	320 51 50·60	4·341508
Miller	192 18 14·20	12 21 50·70	4·510670
Pamelia	169 50 50·70	349 49 26·30	4·185362
Buckminster	123 44 54·60	303 38 44·70	4·184169
Horse Island	87 05 51·00	266 53 14·70	4·386219
Hovey.....	76 20 57·66	256 04 34·99	4·512470

HORSE ISLAND.

Light-house on Horse Island, Sacketts Harbor, Jefferson Co., N. Y., one-half mile from village. Instrument on iron platform about 80 feet above ground, outside of lenses.

Permanent mark: Center of brick tower.

[Latitude, 43° 56' 34''·70. Longitude, 76° 08' 43''·00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Johnson	266 53 14·7	87 05 51·0	4·386219
Boynton	285 56 12·8	106 05 15·3	4·258931
Hovey	48 25 22·8	228 21 36·0	3·989328
Buckminster	233 26 50·1	53 33 17·1	4·188920
Cooper.....	102 03 11·5	281 57 39·4	4·037713
Gleason.....	52 43 15·0	232 38 31·0	4·060565

BUCKMINSTER.

Two miles north of Brownville, Jefferson Co., N. Y., on highest land within several miles.

Permanent mark: Stone monument 3 feet long set in shale rock 2 feet east of stone fence.

[Latitude, 44° 01' 32'' 44. Longitude, 75° 59' 25'' 80.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Johnson	303	38	44.7	123	44	54.6	<i>Meters.</i> 4.154169
Boynton	340	32	05.0	160	34	41.1	4.177686
Horse Island	53	33	17.1	233	26	50.1	4.188920
Seeber	167	46	24.7	347	45	22.9	3.970462

PAMELIA.

Station in field north of road leading west from Pamela Four Corners, Jefferson Co., N. Y., about one-third of a mile from the Corners on land belonging to David Countryman.

Permanent mark: Copper bolt in boulder.

Station to hickory tree (blazed) northeast, 55.8 feet.

Station to hickory tree (blazed) east, 27.8 feet.

Station to arrowhead in boulder northwest, 12.0 feet.

Station to arrowhead in boulder west, 8.0 feet.

[Latitude, 44° 05' 24'' 76. Longitude, 76° 52' 34'' 78.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Miller	210	03	54.8	30	08	56.2	<i>Meters.</i> 4.282475
Johnson	349	49	26.3	169	50	50.7	4.185362
Seeber	100	02	30.5	279	56	42.5	4.052824

SEEBER.

In Clayton Township, 2½ miles west of Stone Mills, 3 miles north of Perch River, Jefferson Co., N. Y., 400 yards north of house of Walter Seeber, just inside of fence on east side of road and on edge of grain field.

Permanent mark: Stone monument, copper bolt, distance to small tree near rail fence to northward, 264 feet.

[Latitude, 44° 06' 28'' 26. Longitude, 76° 00' 54'' 81.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Pamelia	279	56	42.5	100	02	30.5	<i>Meters.</i> 4.052824
Johnson	320	51	50.6	140	59	02.6	4.341508
Buckminster	347	45	22.9	167	46	24.7	3.970462

MILLER.

Three miles northeast of Theresa village, Jefferson Co., N. Y., on highest land within many miles.

Permanent mark: Copper bolt in bowlder.

[Latitude, 44° 14' 21''-87. Longitude, 75° 45' 22''-13.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Johnson	12 21 50·7	192 18 14·2	4·510670
Pamela	30 08 56·2	210 03 54·8	4·282475

COLWELL.

In Ellisburg, Jefferson Co., N. Y., 4 miles southwest of Ellisburg village, three-fourths mile east of Lake Ontario, on land owned by Hamilton Colwell, jr., 150 yards west of his residence.

Permanent mark: Cut marble post 8 by 8 by 30 inches set flush with surface. Copper bolt No. 437.

[Latitude, 43° 41' 40''-56. Longitude, 76° 11' 10''-78.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lowrey	269 08 15·4	89 16 01·5	4·170366
Sandy Creek	304 57 33·7	125 01 07·4	3·917406
Dyke	13 13 00·3	193 10 46·5	4·270942
Thomas	308 20 09·4	128 28 37·7	4·323686

MANNSVILLE.

Triangulation point of the U. S. Lake Survey, situated in Mannsville, Jefferson Co., N. Y., one-half mile northeast of the village of Mannsville; in lot 177, Ellisburg Township, on highest ground in the vicinity.

Permanent mark: Marble post 1½ feet below surface. Reference posts—one north 67° 48' east, distant 91·79 meters; one south 54° 10' east, distant 107·84 meters; one south 34° 06' west, distant 393·1 meters.

[Latitude, 43° 12' 54''-41. Longitude, 76° 03' 14''-61.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sandy Creek	29 01 23·36	208 59 23·34	3·904569
Oswego	51 05 31·07	230 46 29·63	4·679876
South Base	52 25 20·85	232 19 23·89	4·164962
North Base	71 10 47·73	251 04 43·36	4·096264
Stony Point	127 29 58·81	307 20 08·21	4·380805
Colwell	77 58 48·70	257 53 19·70	4·037532
Lowrey	294 55 22·20	114 57 39·50	3·690725

LOWREY.

In Oswego Co., N. Y., one-half mile south of Jefferson Co. line, 4 miles from Mannsville, 6 miles from Sandy Creek, in field of James E. Lowrey, one-third of a mile south of his house.

Permanent mark: Dressed stone with copper bolt in center of top, No. 439.

[Latitude, $43^{\circ} 41' 47''$. 37. Longitude, $75^{\circ} 59' 55''$. 94.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mannsville	114 57 39.5	294 55 22.2	3.690725
Colwell	89 16 01.5	269 08 15.4	4.179366
Sandy Creek	59 20 57.2	239 16 40.0	3.986883
Dyke	46 10 02.4	226 00 03.6	4.432104

SANDY CREEK.

Triangulation point of the U. S. Lake Survey. Station in Sandy Creek Township, Oswego Co., N. Y., 1 mile northwest of village of Sandy Creek. Land owned by Jacob Hadley, who lives 300 feet east of station.

Permanent mark: Dressed stone 1 foot below surface.

[Latitude, $43^{\circ} 39' 06''$. 93. Longitude, $76^{\circ} 06' 08''$. 40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lowrey	239 16 40.00	59 20 57.20	3.986883
Colwell	125 01 07.40	304 57 38.70	3.917406
Mannsville	208 59 23.34	29 01 23.36	3.904569

THOMAS.

Station on cleared hill three-fourths of a mile east of Orwell village, Oswego Co., N. Y., 300 yards south of main east and west road, in a cultivated field belonging to George Thomas, hotel-keeper at Orwell.

Permanent mark: Dressed stone set 8 inches below surface. White ash tree north $13^{\circ} 34'$ west 117.3 feet; dressed stone north $83^{\circ} 48'$ east 241.8 feet.

[Latitude, $43^{\circ} 34' 36''$. 42. Longitude, $75^{\circ} 58' 54''$. 09.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Dyke	75 26 38.1	255 15 56.9	4.334257
Colwell	128 28 37.7	308 20 09.4	4.323686

DYKE.

In town of Mexico, Oswego Co., N. Y., 4 miles from the village, in a cleared field on shores of Mexico Bay, 100 yards from water's edge, and about 100 yards from Richland town line. Denny Dyke owner of land.

Permanent mark: Stone set 2 feet in ground; projects 6 inches; copper bolt in stone, No. 436.

[Latitude, 43° 31' 39''-54. Longitude, 76° 14' 24''-76.]

To station.	Azimuth,	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Colwell	193 10 46·5	13 13 00·3	4·279942
Lowrey	226 00 03·6	46 10 02·4	4·432104
Thomas	255 15 56·9	75 26 38·1	4·334257

MOORE.

Seven miles northwest of Ellenburg Depot, Clinton Co., N. Y., 1 mile east of Clinton Mills, in field of James Moore, one-fourth of a mile north of his house. Summit of hill flat.

Permanent mark: A copper bolt, 4 inches long and 1 inch in diameter, sunk in solid rock; top of bolt stamped U. S. G. S., 431, N. Y.

[Latitude, 44° 57' 53''-71. Longitude, 73° 51' 36''-52.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Haseltine.....	20 31 03·6	200 27 59·8	4·212828
Churubusco	78 18 11·1	258 15 08·9	3·762444
West Hill	36 43 00·5	216 38 07·9	4·182583
Dannemora	335 16 43·9	152 22 49·9	4·436154
Lyon	0 31 50·1	180 31 50·5	4·461256

CHURUBUSCO.

Station in center of tower of St. Philominus Catholic Church, Churubusco, Clinton Co., N. Y. Tower is solid masonry. Instrument in belfry about 55 feet above ground.

Permanent mark: A copper bolt let into a timber of floor of belfry, stamped U. S. G. S., 434, N. Y.

[Latitude, 44° 57' 15''-63. Longitude, 73° 55' 15''-03.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Haseltine.....	0 10 13·2	180 10 11·9	4·149718
West Hill	17 14 52·7	197 13 02·6	4·062777
Moore	258 15 08·9	78 18 11·1	3·762444
Lyon	348 56 32·3	168 59 25·9	4·451317

WEST HILL.

Not occupied. In Ellenburg township, $3\frac{1}{2}$ miles west of Ellenburg Center, Clinton Co., N. Y. Station on highest part of flat wooded summit, on land owned by Peter Kent, near a pile of loose rock 4 feet high, 15 feet in diameter.

Permanent mark: Stone monument of usual form. U. S. G. S., 433, N. Y.

[Latitude, $44^{\circ} 51' 18''$.11. Longitude, $73^{\circ} 58' 31''$.08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Moore	216 38 07.9	36 43 00.5	4.182583
Haseltine	312 16 33.6	132 18 22.4	3.660504
Churubusco	197 13 02.6	17 14 52.7	4.062777

HASELTINE.

In Clinton Co., N. Y., $3\frac{1}{2}$ miles southwest of Ellenburg Center, on land owned by heirs of Jon. W. Haseltine, one-half mile south of house of Adin Haseltine. Summit is rounded and clear of timber.

Permanent mark: Stone monument 4 feet long, 6 inches square at top; copper bolt in top stamped U. S. G. S., 432, N. Y.

[Latitude, $44^{\circ} 49' 38''$.34. Longitude, $73^{\circ} 55' 56''$.95.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Upton	237 35 34.6	57 52 30.7	4.572074
Lyon	338 09 06.9	158 12 01.6	4.166817
Moore	200 27 59.8	20 31 03.6	4.212828
Churubusco	180 10 11.9	0 10 13.2	4.149718
West Hill	132 18 22.4	312 16 33.6	3.660504
Covey	208 04 53.1	28 10 50.9	4.372419

DANNEMORA.

Triangulation point of the U. S. C. & G. S. Station on eastern summit of Dannemora Mountain, Clinton Co., N. Y., $1\frac{1}{2}$ miles north-east of village of Dannemora. The broad summit was cleared of timber except to the northwest. Theodolite was elevated on tripod 22 feet high.

Permanent mark: An iron bolt in solid rock 1 foot below surface of ground.

[Latitude, $44^{\circ} 44' 30''$.04. Longitude, $73^{\circ} 42' 57''$.60.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Moore	155 22 49.9	335 16 43.9	4.436154
Covey	168 51 38.1	348 48 25.8	4.489897
Upton	206 07 47.9	26 15 33.6	4.516202
Lyon	70 39 32.1	250 33 18.3	4.093158

UPTON.

Two miles west northwest of Perry Mills, Clinton Co., N. Y., one-half mile north of schoolhouse, where north and south road crosses international boundary line between New York and Canada.

Permanent mark: Iron boundary post projecting $3\frac{1}{2}$ feet above ground.

[Latitude, $45^{\circ} 00' 24''$. Longitude, $73^{\circ} 31' 57''$.65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lyon	38 02 33.5	217 48 33.4	4.628909
Covey	92 30 06.6	272 19 06.8	4.310466
Haseltine.....	57 52 30.7	237 35 34.6	4.572074
Dannemora.....	26 15 33.6	206 07 47.9	4.516202

COVEY.

Not occupied. One mile north of international boundary line between New York and Canada, 2 miles west of Covey Hill. Station on southeast end of ridge, 200 feet lower than summit, 300 yards south of main east and west road, in field 500 feet southeast of house of John Wadell.

Permanent mark: A pole in center of a pile of rocks 5 feet high and 30 feet in diameter.

[Latitude, $45^{\circ} 00' 51''$.89. Longitude, $73^{\circ} 47' 30''$.18.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lyon	9 23 27.7	189 20 25.2	4.542663
Haseltine.....	28 10 50.9	208 04 53.1	4.372419
Upton	272 19 06.8	92 30 06.6	4.310466
Dannemora.....	348 48 25.8	168 51 38.1	4.489807

LYON.

Triangulation station, Mount Lyon (2), of the U. S. C. & G. S. Station on northeast rocky bluff of summit. The broad wooded summit cuts off the view to the southwest. The top was reached by trail from Lyon Mountain station, Clinton Co., N. Y., a distance of $3\frac{1}{2}$ or 4 miles.

Permanent mark: A copper bolt in solid rock, marked V. C., Adirondack Survey, 1876.

[Latitude, $44^{\circ} 42' 16''$.74. Longitude, $73^{\circ} 51' 43''$.74.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Haseltine.....	158 12 01.6	338 09 06.9	4.166817
Churubusco	168 59 25.9	348 56 32.3	4.451317
Moore	180 31 50.5	0 31 59.1	4.461258
Dannemora.....	250 33 18.3	70 39 32.1	4.093158
Upton	217 48 33.4	38 02 33.5	4.628909
Covey.....	189 20 25.2	9 23 27.7	4.542663

BIRCH.

In northwest corner of town of Hebron, Washington Co., N. Y., 8 miles southwest of Granville, 1 mile northwest of North Hebron. Station on land owned by John Brown, living on west side of hill. Summit flat, but cleared of timber.

[Latitude, 43° 20' 18".94. Longitude, 73° 20' 11".01.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rupert	287 06 54.5	107 12 31.1	4.063265
Rascal	32 37 24.3	212 34 36.5	4.010145

RASCAL.

In western part of town of Hebron, Washington Co., N. Y., very close to Argyle line, a cleared summit of ridge, giving a good view in all directions except northwest. Land owned by James A. McNeil, who lives on west side. Station 10 miles from Salem, 4 miles northwest of West Hebron.

[Latitude, 43° 15' 39".49. Longitude, 73° 24' 15".68.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rupert	252 28 52.8	72 37 16.9	4.239952
Jackson	358 56 28.7	178 56 40.0	4.307820
Birch	212 34 36.5	32 37 24.3	4.010145

GREENWICH.

Triangulation station of the U. S. C. & G. S. Station 4½ miles north of village of Greenwich, Washington Co., N. Y. Local name is Bald Mountain. Owner is Dennis Sullivan, who lives north of triangulation point. Summit wooded on east and west sides. A comparatively low hill and not a good station.

Permanent mark: Iron bolt in solid rock.

[Latitude, 43° 07' 35".12. Longitude, 73° 31' 30".61.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Adams	315 06 51.1	135 14 05.0	4.303497
Tilton			4.108687
Jackson	297 40 19.6	117 45 28.1	4.061951
Rafinesque	11 15 46.8	191 12 03.2	4.581978
Rupert	232 32 11.5	52 45 32.8	4.521466

JACKSON.

In central part of town of Jackson, Washington Co., N. Y., 4 miles northwest of Cambridge, from which place it is best reached, 7 miles east of the village of Greenwich. Station on highest cleared summit of ridge, on land owned by Robert Allen, who lives one-fourth of a mile southeast.

[Latitude, 43° 04' 41''-28. Longitude, 73° 23' 59''-08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Tilton	40 32 45.9	220 29 54.4	3.942186
Greenwich	117 45 28.1	297 40 19.6	4.061951
Rascal	178 56 40.0	358 56 28.7	4.307820
Rupert	212 22 47.2	32 30 59.1	4.480633

TILTON.

Seven miles south of Greenwich, Washington Co., N. Y., 1 mile east of Summit railroad station. Mr. Thomas, owner, lives on north side. Leonard Tingue lives on south side. Top is entirely cleared of timber.

[Latitude, 43° 01' 05''-64. Longitude, 73° 28' 10''-40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Adams	283 03 51.0	103 08 41.8	3.996239
Rafinesque	25 16 47.3	205 10 47.6	4.449087
Greenwich .....	.....	.....	4.108687
Jackson	220 29 54.4	40 32 45.9	3.942186

RUPERT.

A bald summit, 4 miles north of Rupert village, Rutland Co., Vt., and 3½ miles south of Pawlet; 10 miles southeast of Granville, via Pawlet; road from Pawlet to Rupert passes just east of station. Land owned by James Jennings, who lives one-third of a mile south of station. Signal: A small tree with tuft of brush at top and white flag below.

[Latitude, 43° 18' 28''-33. Longitude, 73° 12' 00''-46.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Jackson	32 30 59.1	212 22 47.2	4.480633
Greenwich	52 45 32.8	232 32 11.5	4.521466

ADAMS.

In town of White Creek, Washington Co., N. Y.; local name, Mount Tom. James Adams, owner. Sullivan Center lies one-half mile north-

east of station, which is in a cleared field on highest part of summit. Some timber on south end of hill. Best reached from Cambridge.

[Latitude, $42^{\circ} 59' 52'' \cdot 82$. Longitude, $73^{\circ} 21' 04'' \cdot 00$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Rafinesque	43 08 13·3	222 57 23·4	4·501584
Becker	90 45 39·5	270 38 25·4	4·158979
Greenwich	135 14 05·0	315 06 51·1	4·303497
Tilton	103 08 41·8	283 03 51·0	3·996239

BECKER.

In town of Easton, Washington Co., N. Y., 8 miles south of Greenwich, 3 miles west of Summit station. Owner, James E. Becker, living on west side; summit cleared of timber, except a fringe on southern edge.

[Latitude, $42^{\circ} 59' 58'' \cdot 51$. Longitude, $73^{\circ} 31' 40'' \cdot 60$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Adams	270 38 25·4	90 45 39·5	4·158979
Rafinesque			4·382452

RAFINESQUE.

Triangulation station, Mount Rafinesque, of the U. S. C. & G. S., 4 miles northeast of Lansingburg, Rensselaer Co., N. Y.; local name, Bald Mountain. Summit bald. Jacob Hayner lives on south side.

Permanent mark: Hole drilled in rock.

[Latitude, $42^{\circ} 47' 21'' \cdot 15$. Longitude, $73^{\circ} 36' 58'' \cdot 81$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Greenwich	191 12 03·2	11 15 46·8	4·581978
Tilton	205 10 47·6	25 16 47·3	4·449087
Adams	222 57 23·4	43 08 13·3	4·501584
Becker			4·388452

MOUNT MERINO.

Primary triangulation station of the New York State survey and also of the U. S. C. & G. S. Situated in Greenport town, Columbia Co., N. Y., on a high hill 2 miles southwest of Hudson.

Permanent mark: Stone monument.

[Latitude, $42^{\circ} 14' 05'' \cdot 06$. Longitude, $73^{\circ} 49' 03'' \cdot 54$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Powell	167 25 35·3	347 23 42·8	4·244611
Windham	108 26 58·6	288 13 49·8	4·451936

SLIDE.

Not occupied. On the highest peak in the Catskill Mountains in Shandaken town, Ulster Co., N. Y., 8 miles south of Shandaken post-office. Point sighted is an observatory.

[Latitude, $41^{\circ} 59' 56''$.97. Longitude, $74^{\circ} 23' 10''$.94.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Vly.....	170 34 05.6	350 31 52.4	4.443943
Windham	209 42 44.8	29 52 31.9	4.606561

VLY.

A high, flat, heavily-wooded summit, 5 miles west of Lexington, Greene Co., N. Y. Instrument mounted on a large birch tree on south-east side of summit, about 50 feet lower than the highest part of summit. From here can be had a good view in all directions, excepting westward.

Permanent mark: Large birch tree.

[Latitude, $42^{\circ} 14' 45''$.50. Longitude, $74^{\circ} 26' 29''$.60.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pisgah	227 50 09.8	47 58 05.3	4.338470
Windham	252 35 58.1	72 48 00.2	4.410953
Hunter .....	.....	.....	4.279210
Slide.....	350 31 52.4	170 34 05.6	4.443943
Utsayantho.....	144 18 50.3	324 12 50.5	4.321234

HUNTER.

A high, flat, wooded summit, 4 miles by trail south of Hunter, Greene Co., N. Y. An old observatory, 55 feet high, was strengthened and used to mount theodolite on.

[Latitude, $42^{\circ} 10' 39''$.50. Longitude, $74^{\circ} 13' 49''$.31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Vly.....	.....	.....	4.279210
Pisgah.....	176 49 01.9	356 48 25.5	4.347139
Windham	205 10 28.1	25 13 58.6	4.226756

UTSAYANTHO.

Not occupied. Situated in town of Stamford, Delaware Co., N. Y.

Point sighted is the new observatory and probably is some distance from the New York Survey station.

[Latitude, 42° 23' 56''-72. Longitude, 74° 35' 24''-02.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pisgah	274 42 04.4	94 56 00.8	4.454553
Vly	324 12 50.5	144 18 50.3	4.321234

WINDHAM.

Station 7 miles east of Windham Center, Greene Co., N. Y. Best reached by trail, 2 miles long, from house of M. E. Sherman, who lives on west side. An old observatory, 22 feet high, was used to elevate instrument, as the summit of the mountain is flat and heavily wooded.

Permanent mark: Hole drilled in rock with arrowheads cut in rock pointing to center.

[Latitude, 42° 18' 53''-78. Longitude, 74° 08' 36''-22.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Hunter	25 13 58.6	205 10 28.1	4.228756
Pisgah	129 39 04.2	309 34 56.9	4.037701
Rundell	206 04 13.1	26 07 56.1	4.236302
Vly	72 48 00.2	252 35 58.1	4.410953
Powell	250 13 26.5	70 24 43.9	4.388157
Slide	29 52 31.9	209 42 44.8	4.606561

PISGAH.

Seven miles by wagon road north of Windham Center, Greene Co., N. Y., and 7 miles west-southwest of Durham. Summit entirely bare of timber. Instrument set up in front of hotel and angles reduced to center of cupola.

[Latitude, 42° 22' 39''-18. Longitude, 74° 14' 43''-27.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Powell	267 32 25.1	87 47 50.3	4.497277
Mount Merino			4.587360
Windham	309 34 56.9	129 39 04.2	4.037701
Rundell			4.257658
Hunter	356 48 25.5	176 49 01.9	4.347139
Vly	47 58 05.3	227 50 09.8	4.338470
Utsayantho	94 56 00.8	274 42 04.4	4.454553

RUNDELL.

One and a half miles northwest from Westerlo, Albany Co., N. Y. H. H. Rundell lives on southeast side. O. A. Mabey, owner of land, lives on west side.

[Latitude, 42° 27' 15''-27. Longitude, 74° 03' 04''-84.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Windham.....	26 07 56.5	206 04 13.1	4.236302
Pisgah.....	.....	.....	4.257658
Powell.....	295 06 06.3	115 13 41.1	4.231191

POWELL.

Primary triangulation station of the U. S. C. & G. S., situated on a hill in New Baltimore town, Greene Co., N. Y., about 3 miles northwest of West Coxsackie. Point well known by residents near there.

Permanent mark: Iron cone 18 inches below surface. Pile of rocks above cone.

[Latitude, 42° 23' 20''-60. Longitude, 73° 51' 50''-69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Windham.....	70 24 43.9	250 13 26.5	4.388157
Rundell.....	115 13 41.1	295 06 06.3	4.231191
Mount Merino....	347 23 42.8	167 25 35.3	4.244611

SKY TOP TOWER.

Not occupied. The tower standing on most elevated ground near Lake Mohawk, Ulster Co., N. Y., about 15 miles south-southwest of Kingston.

Permanent mark: Center of tower.

[Latitude, 41° 45' 49''-76. Longitude, 74° 09' 23''-64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pink.....	210 55 12.2	30 59 36.8	4.259418
Kingston City Hall...	216 10 16.1	36 16 40.1	4.351719
Boice.....	235 43 33.3	55 56 53.8	4.521707
Lloyd.....	253 57 07.3	74 07 53.3	4.366992

KINGSTON CITY HALL.

City Hall, between Kingston and Rondout, Ulster Co., N. Y. Instrument mounted on tripod, 7 feet high, inside of top of tower.

Permanent mark: Center of tower.

[Latitude, $41^{\circ} 55' 37''\cdot 46$. Longitude, $73^{\circ} 59' 47''\cdot 90$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Boice	267 47 03·4	87 53 55·4	4·152789
Lloyd	322 13 30·2	142 17 53·0	4·171246
Sky Top Tower	36 16 40·1	216 10 16·1	4·351719
Pink	55 12 23·8	235 10 24·2	3·701074

TRAVER.

Triangulation station of the U. S. C. & G. S., on land owned by Mr. Traver, $2\frac{1}{2}$ miles southeast of Rhinebeck village, Dutchess Co., N. Y. Highest hill in the vicinity.

Permanent mark: Iron cone 2 feet below surface.

[Latitude, $41^{\circ} 55' 05''\cdot 04$. Longitude, $73^{\circ} 52' 41''\cdot 44$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Burhans	147 55 31·8	327 52 29·6	4·072213
Upper Red Hook	193 22 23·8	13 23 44·7	4·080424

TERRY.

A triangulation station of the U. S. C. & G. S., in northeast part of city of Kingston, Ulster Co., N. Y., one-fourth of a mile west of river and 309 feet above it, 100 yards from edge of bluff.

Permanent mark: Stone monument 1 foot square projecting 2 feet above ground.

[Latitude, $41^{\circ} 56' 22''\cdot 29$. Longitude, $73^{\circ} 58' 19''\cdot 53$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lloyd	331 44 29·4	151 47 53·7	4·172793
Prospect	354 36 18·5	174 36 38·3	3·861053
Boice	273 56 11·9	94 02 04·9	4·086314

PROSPECT.

Triangulation station of the U. S. C. & G. S., in Ulster Co., N. Y., on a rounded hill, wooded on west side, and cleared on east side, situated 3 miles south of Rondout and east of the northern Esopus ponds. Amaziah Niese, owner of land.

Permanent mark: Iron cone with rock piled around it.

[Latitude, $41^{\circ} 52' 27''\cdot 96$. Longitude, $73^{\circ} 57' 49''\cdot 92$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Terry	174 36 38·3	354 36 18·5	3·861053
Lloyd	312 44 37·6	132 47 41·6	3·937784
Boice	240 54 40·1	61 00 13·0	4·118791
Barnes	309 37 05·2	129 41 38·0	4·088583

BOICE.

In Dutchess Co., N. Y., in southwest corner of town of Milan. Station on high, bare hill, one-half mile north of Enterprise, almost on Rhinebeck town line; 6 miles by road east of Rhinebeck village.

Permanent mark of U. S. C. & G. S. could not be found.

Reference mark: Blazed chestnut tree south $1^{\circ} 15'$ west (true) 109.3 feet.

[Latitude of new station, $41^{\circ} 55' 54'' \cdot 81$. Longitude, $73^{\circ} 49' 31'' \cdot 30$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Prospect.....	61	00	13.0	240	54	40.1	4.118791
Terry.....	94	02	04.9	273	56	11.9	4.086314
Lloyd.....	22	45	13.4	202	42	44.6	4.123825
Kingston City Hall...	87	53	55.4	267	47	03.4	4.152789
Hussey Hill.....	69	59	36.5	249	52	49.4	4.17470
Sky Top Tower.....	55	56	53.8	235	43	38.3	4.521707
Pink.....	79	33	25.4	259	24	33.9	4.270619

LLOYD.

Triangulation station of the U. S. C. & G. S. in Dutchess Co., N. Y., in eastern part of town of Hyde Park, $3\frac{1}{2}$ miles northeast of village, and 8 miles southeast of Staatsburg.

Permanent mark: Iron cone just below surface.

[Latitude, $41^{\circ} 49' 17'' \cdot 24$. Longitude, $73^{\circ} 53' 14'' \cdot 19$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Prospect.....	132	47	41.6	312	44	37.6	3.937784
Boice.....	202	42	44.6	22	45	13.4	4.123825
Terry.....	151	47	53.7	331	44	29.4	4.172733
Kingston City Hall...	142	17	53.0	322	13	30.2	4.171246
Hussey Hill.....	128	42	24.5	308	38	06.6	4.05768
Sky Top Tower.....	74	07	53.3	253	57	07.3	4.366992

PINK.

In town of Hurley, Greene Co., N. Y., one-eighth of a mile southwest of corner of Ulster and Rosendale. Three miles southwest of Kingston, on highest land in vicinity. Summit nearly cleared of timber. J. M. Pink, owner of land.

Permanent mark: Stone monument; copper bolt stamped U. S. G. S., 463, N. Y.

Distance to large chestnut tree southwest, 29 feet; distance to property line southward, 17.7 feet.

[Latitude, $41^{\circ} 54' 64'' \cdot 50$. Longitude, $74^{\circ} 02' 46'' \cdot 89$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Kingston City Hall...	235	10	24.2	55	12	23.8	3.701074
Boice.....	259	24	33.9	79	33	25.4	4.270619
Hussey Hill.....	291	52	47.9	111	54	52.3	3.06550
Sky Top Tower.....	30	59	36.8	210	55	12.2	4.250418

HUSSEY HILL.

Not occupied. In Ulster Co., N. Y., about 2 miles south of Rondout. A high, wooded ridge, with some timber cut down on summit.

Permanent mark: A lone tree in gap in timber.

[Latitude, $41^{\circ} 53' 08''$.54. Longitude, $73^{\circ} 59' 40''$.69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pink	111 54 52.5	291 52 47.9	3.66530
Boice	249 52 49.4	69 59 36.5	4.17470
Lloyd	308 38 06.6	128 42 24.5	4.05768

WOMELSDORF.

Triangulation station of the U. S. C. & G. S. in Lebanon Co., Pa., $4\frac{1}{2}$ miles southwest of Womelsdorf, a station on the Phil. and Reading R. R., Pa. Summit of mountain was covered with a growth of saplings 15 to 20 feet high, some of which were cut down, giving view east and south.

Permanent mark: Bolt in rock.

[Latitude, $40^{\circ} 19' 28''$.25. Longitude, $76^{\circ} 11' 44''$.69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wernersville East Tower	282 42 59.5	102 47 42.5	4.024894
Wernersville West Tower	286 46 46.5	106 50 34.8	3.939816
Black Spot Tower	264 06 01.5	84 17 24.4	4.398460
Port Clinton	209 08 23.76	29 16 21.97	4.5511773

KREUTZER.

A hill 3 miles west-northwest of Allentown, Lehigh Co., Pa. John Kreutzer, owner, lives on north side one-eighth of a mile from station. Summit cleared, except on west end.

Permanent mark: Three blazes near foot of large chestnut tree.

[Latitude, $40^{\circ} 37' 15''$.58. Longitude, $75^{\circ} 31' 42''$.05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Big Rock	309 05 05.7	129 08 37.6	3.994259
Topton	39 22 00.6	219 15 59.0	4.315038

BAKE OVEN.

Triangulation station of the U. S. C. & G. S. in the northern part of Heidelberg Township, Lehigh Co., Pa., on a very prominent peak known as Bake Oven. It is 7 miles west-northwest from Slatington, on

the Lehigh Valley Railroad, and about 4 miles north from Germansville, on the Schuylkill and Lehigh branch of the Reading Railroad. Station is about 6 feet from the edge of the precipice near the highest point of the peak.

Permanent mark: A foxtail bolt driven into the rock in a trench 2 feet below surface. The letters U. S. C. S., 1875, are cut on the rock to south of station, and also an arrow pointing to center.

[Latitude, $40^{\circ} 44' 54'' \cdot 11$. Longitude, $75^{\circ} 44' 02'' \cdot 22$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Port Clinton.....	53 42 39·16	233 32 35·87	4·3513333
Topton	351 48 49·1	171 50 48·9	4·483350
Bears Head.....	111 19 09·8	291 05 36·1	4·495771

TOPTON.

Triangulation station of the U. S. C. & G. S. Station is about 3 miles south of Topton Railroad Station, Berks Co., Pa.; identified by iron bolt in huge bowlder. Nearly all the timber is now cut down (August, 1892).

[Latitude, $40^{\circ} 28' 37'' \cdot 49$. Longitude, $75^{\circ} 40' 58'' \cdot 25$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bake Oven.....	171 50 48·9	351 48 49·1	4·483350
Long	6 39 49·2	186 39 06·7	4·124723
Fancy Hill.....	8 57 50·3	188 56 36·5	4·236914
Big Rock	244 45 03·9	64 54 36·8	4·360514
Kreutzer	219 15 59·0	39 22 00·6	4·315038

BIG ROCK.

Triangulation station of the U. S. C. & G. S. Three and one-half miles south of Allentown, Lehigh Co., Pa. This station was identified by a bolt in solid rock. Summit is now cleared of timber.

[Latitude, $40^{\circ} 33' 53'' \cdot 73$. Longitude, $75^{\circ} 26' 16'' \cdot 42$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Topton	64 54 36·8	244 45 03·9	4·360514
Kreutzer	129 08 37·6	309 05 05·7	3·994259

BLACK SPOT TOWER.

At Reading, Berks Co., Pa. Summit of mountain leveled off and lowered about 10 feet and all marks of U. S. C. & G. S. destroyed. A stone hotel, tower, and other buildings have been erected on summit. Instrument was mounted on roof of stone tower 50 feet above ground.

Permanent mark: Center of tower.

[Latitude, $40^{\circ} 20' 50'' \cdot 32$. Longitude, $75^{\circ} 54' 09'' \cdot 73$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Womelsdorf	84 17 24·4	264 06 01·5	4·398460
Long	266 01 09·8	86 08 59·8	4·234802
Fancy Hill	279 17 43·5	99 25 02·1	4·209785

FANCY HILL.

In southern central part of Earl Township, Berks Co., Pa., 15 miles by road east of Reading. A good view to be had in all directions except east.

Permanent mark: A tall, lone tree on western edge of woods.

[Latitude, $40^{\circ} 19' 24'' \cdot 89$. Longitude, $75^{\circ} 42' 52'' \cdot 13$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Black Spot Tower	99 25 02·1	279 17 43·5	4·209785
Topton	188 56 36·5	8 57 50·3	4·236914

LONG.

A flat ridge in northeast portion of Earl Township, one-fourth of a mile south of Shanesville, Berks Co., Pa. John Kuser lives on south-east side.

Permanent mark: A pile of rocks S. 40° E. (Mag.) 70 feet distant from a large hickory tree.

[Latitude, $40^{\circ} 21' 28'' \cdot 35$. Longitude, $75^{\circ} 42' 03'' \cdot 79$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Black Spot Tower	86 08 59·8	266 01 09·8	4·234802
Topton	186 39 06·7	6 39 49·2	4·124723

MONTOUR.

Triangulation station of the U. S. C. & G. S. Station is on Montour ridge, Northumberland Co., Pa., $3\frac{1}{2}$ miles north of the town of Northumberland.

Permanent mark: A stone monument.

[Latitude, $40^{\circ} 56' 29'' \cdot 82$. Longitude, $76^{\circ} 49' 00'' \cdot 42$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Catawissa	270 23 03	90 38 25	4·517488
Barry	304 32 18	124 47 32	4·600208

WOODRUFF.

On a cleared ridge owned and cultivated by Mr. Woodruff, 2 miles northwest of Elysburg, Northumberland Co., Pa., and 3 miles north of Reeds Station (Reading Railroad). Mr. Woodruff lives on north side of ridge and from his house a wagon can be taken to station.

Permanent mark: A sharp-pointed rock buried in ground, top just above surface.

[Latitude, 40° 52' 45''-62. Longitude, 76° 34' 33''-03.]

To station	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Catawissa	242 17 45	62 23 39	4·154306
Mahanoy (1).....	42 59 36	222 54 00	4·247612
Mahanoy (3).....	4 59 42	184 59 09	4·139748

WHITE HORSE.

Triangulation station of the U. S. C. & G. S. is on the Blue ridge, near the boundary line between Bethel Township, Berks Co., and Washington Township, Schuylkill Co., Pa.; station about 4½ miles south of Rock, a station on the Schuylkill and Susquehanna branch of the Reading railroad.

Permanent mark: A two-quart earthen jar buried base upward 2 feet below surface; 2 inches above jar is a flat stone, 15 by 18 inches, with a hole drilled in upper surface exactly over center of jar; above stone is a monument 2 feet long, which projects 8 inches above ground.

[Latitude, 40° 30' 55''-19. Longitude, 76° 17' 33''-95.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Port Clinton.....	248 47 23·41	68 59 09·65	4·4376100
Governor Dick.....	24 55 46·04	204 49 25·64	4·5175295
Barry.....	155 06 50·0	335 01 32·00	4·4348730

KNOB (2).

Not occupied. A well defined summit in the northeastern corner of Center Township, Columbia Co., Pa. Samuel H. Sitler lives on south side three-fourths of a mile from top.

Permanent mark: A very tall pine trimmed up.

[Latitude, 41° 05' 44''-16. Longitude, 76° 20' 46''-41.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald.....	233 16 20·0	53 39 52	4·792642
Penobscot.....	256 11 39·0	76 30 20	4·611840

WYOMING.

Not occupied. A partly cleared summit 2 miles north of Wyoming, Luzerne Co., Pa., in southwest part of Exeter Township. Land owned by Hannah Whip. John S. Allen lives near triangulation station, 2 miles north of Wyoming and one-half mile southeast of camp ground.

Permanent mark: A pile of rocks.

[Latitude, $41^{\circ} 20' 54''$.16. Longitude, $75^{\circ} 50' 39''$.69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bald	221 15 31	41 19 12	4.071414
Penobscot	7 21 54	187 20 47	4.268823

PORT CLINTON.

Triangulation station of the U. S. C. & G. S. Is on the second of the Blue Ridge Mountains, 5 miles northeast of Port Clinton, Schuylkill Co., Pa., a station on the Philadelphia and Reading Railroad.

Permanent mark: A square-headed bolt wedged between the rocks about 1 foot below the surface. Twelve feet north of station is a precipice; west of station about 200 feet are hemlock trees. Four holes are drilled in neighboring rocks, so that lines joining opposite holes intersect over station.

[Latitude, $40^{\circ} 36' 15''$.05. Longitude, $75^{\circ} 59' 27''$.82.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Black Spot (C. S. Sta.)	345 14 45.21	165 18 11.61	4.4693132
Womelsdorf	29 16 21.97	209 08 23.76	4.5511773
Bake Oven	233 32 35.87	53 42 39.16	4.3313333
White Horse	68 59 09.65	248 47 23.41	4.4376100
Barry	111 58 44.00	291 41 38.00	4.600257
Frackville .....	.....	.....	4.463389
Bears Head	164 40 37.60	344 37 08.90	4.452562

NESCOPECK (2).

On Nescopeck Mountain, Luzerne Co., Pa., 1 mile east of gap where Berwick and Hazleton pike crosses and $7\frac{1}{2}$ miles east of Berwick; summit long and narrow and timbered with oak and hickory.

Permanent mark: Three blazes on trunk of lone hickory tree near ground.

[Latitude, $41^{\circ} 02' 13''$.91. Longitude, $76^{\circ} 05' 03''$.40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Shickshinny	158 16 57	338 14 16	4.189199
Penobscot	227 40 47	47 49 08	4.380321

BROAD.

Not occupied. Station is situated on the highest point of Broad Mountain, Jackson town, Dauphin Co., Pa., about 5 miles southwest of Elizabethville. Station is marked by a pine tree.

[Latitude, 40° 30' 39''·46. Longitude, 76° 46' 13''·86.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Little Mahanoy ..	168 31 17	348 28 52	4·420220
Big Lick.....	234 04 32	54 10 30	4·203452

DAUPHIN.

Triangulation station of the U. S. C. & G. S. on the second Blue Mountain, 2 miles east of the village of Dauphin, Dauphin Co., Pa.

Permanent mark: A bottle 3 feet below surface, a stone over this, and monument on the stone. Four holes are drilled in neighboring rocks, so that lines joining opposite ones intersect over station. Bearings and distance from holes to station are north 43½° east 3·89 feet; north 69½° west 6·46 feet; south 43½° west 10·4 feet; south 69½° east 6·03 feet.

[Latitude, 40° 21' 59''·05. Longitude, 76° 54' 32''·71.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Governor Dick....	288 56 30·03	109 14 05·46	4·6103552
Round Top	2 51 18·42	182 50 38·75	4·465097

BERRIES.

Station on Berries Mountain, about 2 miles southeast of Millersburg, Dauphin Co., Pa., one-third of a mile east of Lovers Rock. A wagon can be taken to triangulation station. Summit, long and narrow; three acres of timber cut down, giving a good view north and south, but not east or west.

Permanent mark: Blazes on three sides of lone tree.

[Latitude, 40° 31' 37''·24. Longitude, 76° 55' 54''·36.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Little Mahanoy....	199 16 15	19 20 08	4·405435
Big Lick.....	254 00 02	74 12 17	4·442001

BIG LICK.

On Big Lick Mountain, just north of Williamstown colliery, Dauphin Co., Pa. The station is on a slight rise of the long, straight, and nearly level mountain top.

Permanent mark: Stump 5 feet high, 6 inches diameter, with rocks piled round it.

[Latitude, $40^{\circ} 35' 42''$.05. Longitude, $76^{\circ} 37' 03''$.20.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Mahanoy (1)	155 21 02	335 19 05	4 311132
Barry	225 16 56	45 24 20	4 351990
Little Mahanoy ..	132 11 30	312 03 06	4 388997
Berries	74 12 17	254 00 02	4 442001

MAHANAY (3).

Not occupied. A knob of the Mahanoy Mountain 3 miles, S. 44° W. (mag.) from Shamokin, Northumberland Co., Pa., and in plain view from the city. About an acre of timber cut down.

Permanent mark: Tree blazed near foot.

[Latitude, $40^{\circ} 45' 20''$.08. Longitude, $76^{\circ} 35' 24''$.24.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Woodruff	184 59 09	4 59 42	4 129748
Catawissa	214 09 39	34 16 06	4 391414

KOCHER.

A high summit of the Alleghany or North Mountain, 3 miles (air line) west of Harvey Lake, in northern central part of Lake Township, Luzerne Co., Pa. Land owned by J. W. Kocher, who lives near Harvey Lake, on west side. Station reached by following a log road from Sylvester Kocher's to edge of summit; thence through woods to station. Timber cut from 2 or 3 acres.

Permanent mark: Rocks piled at foot of tripod near root of tree.

[Latitude, $41^{\circ} 21' 28''$.05. Longitude, $76^{\circ} 07' 04''$.75.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Ricketts	71 16 43	251 09 07	4 229097
Miller	223 26 10	43 32 44	4 303396
Penobscot	313 21 50	133 31 32	4 451850

LITTLE MAHANOY.

Station on high peak at extreme western end of Mahanoy Mountain 3 miles (air line) north of Herndon, Northumberland Co., Pa. Timber cut down, giving a fine view in all directions except eastward. Sides are steep and rocky, making ascent difficult.

Permanent mark: Tree blazed; also a pile of rocks 23 feet east of tree.

[Latitude, 40° 44' 35''-47. Longitude, 76° 49' 56''-57.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Mahanoy (1).....	257 12 18	77 16 45	3-993262
Big Lick.....	312 03 06	132 11 30	4-388997
Berries.....	19 20 08	199 16 15	4-405435

MAHANOY (2).

On the Mahanoy range, 4 miles southeast of Trevorton, Northumberland Co., Pa., and 5 miles southwest of Shamokin, in Coal Township. Station on west end of a long, sharp, and nearly level summit heavily timbered. Charles Kramer lives on southeast side of mountain, one-half mile from triangulation station.

Permanent mark: Blazes on foot of tree.

[Latitude, 40° 45' 28''-87. Longitude, 76° 37' 07''-88.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Mahanoy (1).....	93 36 31	273 32 36	3-926584
Catawissa.....	218 56 35	39 04 09	4-412599

MAHANOY (1).

A prominent knob on the Mahanoy Mountain, 3 miles west southwest of Trevorton, Northumberland Co., Pa. The station can be reached by driving west from Trevorton 2 miles, then turning south up an old wood road, and then walking up the steep mountain side three-fourths of a mile. Summit nearly clear of timber.

Permanent mark: Blaze on foot of tree.

[Latitude, 40° 45' 45''-95. Longitude, 76° 43' 07''-20.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Catawissa.....	231 30 32	51 42 01	4-498371
Barry.....	276 24 18	96 35 40	4-392270
Mahanoy (2).....	273 32 36	93 36 31	3-926584
Little Mahanoy.....	77 16 45	257 12 18	3-993262
Woodruff.....	222 54 00	42 59 36	4-247612
Big Lick.....	335 10 05	155 21 02	4-311132

BARRY.

Triangulation station of the U. S. C. & G. S., on the highest part of the Mahantango Mountain, $6\frac{1}{2}$ miles southwest of Ashland, Schuylkill Co., Pa. Summit flat and partly timbered. Instrument elevated 10 feet.

Permanent mark: Hole drilled in rock 5 by 5 by 36 inches.

[Latitude, $40^{\circ} 44' 15'' \cdot 39$. Longitude, $76^{\circ} 25' 42'' \cdot 12$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Port Clinton.....	291 41 38	111 58 44	4·600257
White Horse.....	335 01 32	155 06 50	4·434873
Mahanoy (1).....	96 35 40	276 24 18	4·392270
Catawissa.....	180 32 26	0 32 32	4·349496
Big Lick.....	45 24 20	225 16 56	4·351990
Montour.....	124 47 32	304 32 18	4·600208
Frackville.....	256 11 37	76 18 18	4·171151

FRACKVILLE.

On the crest of the Broad Mountain $2\frac{1}{2}$ miles southwest of Frackville, Butler Township, Schuylkill Co., Pa. A wagon can be taken within one-fourth of a mile of triangulation point. Tripod, 12 feet high, erected on highest part and 52 feet southwest of partly dead pine tree; summit flat and covered with bushes about 10 feet high.

Permanent mark: Rocks piled up at foot of tree and tree blazed.

[Latitude, $40^{\circ} 46' 09'' \cdot 67$. Longitude, $76^{\circ} 15' 28'' \cdot 06$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Barry.....	76 18 18	256 11 37	4·171151
Bears Head.....	239 00 13	59 07 12	4·243035
Port Clinton.....			4·463389
Buck.....	182 51 34	2 52 02	4·302861

BEARS HEAD.

Triangulation station of the U. S. C. & G. S. In Rush Township, Schuylkill Co., Pa., 1 mile from Delano on Lehigh Valley Railroad. Summit flat and covered with pine trees. Instrument elevated 35 feet.

Permanent mark: Monument, 5 by 14 inches on top, 3 feet long.

[Latitude, $40^{\circ} 51' 01'' \cdot 35$. Longitude, $76^{\circ} 04' 47'' \cdot 85$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Port Clinton.....	344 37 08·9	164 40 37·6	4·452562
Bake Oven.....	291 05 36·1	111 19 09·8	4·495771
Catawissa.....	108 45 38·0	288 32 03·0	4·488122
Buck.....	128 23 43·0	308 17 12·0	4·251213
Shickshinny.....	170 09 41·0	350 06 50·0	4·551844
Frackville.....	59 07 12·0	239 00 13·0	4·243035

CATAWISSA.

Triangulation station of the U. S. C. & G. S. Two miles (air line) southeast of town of Catawissa, Columbia Co., Pa. Summit very broad and much timber still standing. Ascent difficult, as no road runs near triangulation point. Instrument elevated 15 feet.

Permanent mark: Hole drilled in rock.

[Latitude, 40° 56' 20''-28. Longitude, 76° 25' 33''-10.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bears Head	288 32 03	108 45 38	4·488122
Barry	0 32 32	180 32 26	4·349496
Mahanoy (3)	34 16 06	214 09 39	4·391414
Mahanoy (2)	39 04 09	218 56 35	4·412599
Mahanoy (1)	51 42 01	231 30 32	4·498371
Woodruff	62 23 39	242 17 45	4·154306
North	165 40 23	345 35 18	4·639609
Montour	90 38 25	270 23 03	4·517488

BUCK.

Not occupied. In eastern part of Beaver Township, 3 miles east of Beaver Valley, Columbia Co., Pa. Summit flat and round; the edges covered with a scattering growth of pines; a tripod 15 feet high erected near a leaning pine tree on highest part. Abel Smith and Isaac Klingerman (guides) live on northwest side 1½ miles from triangulation point.

Permanent mark: Blaze on foot of tree.

[Latitude, 40° 57' 00''-00. Longitude, 76° 14' 46''-22.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bears Head	308 17 12	128 23 43	4·251213
Frackville	2 52 02	182 51 34	4·302861

NESCOPECK (3).

On the Nescopeck mountain, south of Mifflinville, Columbia Co., Pa., half a mile from field of Jonathan Spaid. From Bloomsburg take Berwick road for 6 miles, crossing river at Stonytown Ferry. Summit narrow and rocky; trees are cut down giving a fine view northward.

Permanent mark: Blazes on tree trunk.

[Latitude, 40° 59' 08''-98. Longitude, 76° 18' 46''-16.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shickshinny	213 50 27	33 56 46	4·383323
Penobscot	239 16 59	59 34 20	4·632961

NESCOPECK (2.)

Not occupied. On the Nescopeck Mountain, Luzerne Co., Pa., about 1 mile east of where Wilkesbarre and Hazleton turnpike crosses and near the corner of Dorrance, Butler, Dennison, and Wright townships.

Permanent mark : A tall pine near eastern end of summit.

[Latitude, $41^{\circ} 05' 04'' \cdot 29$. Longitude, $75^{\circ} 56' 27'' \cdot 47$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Shickshinny.....	117 12 40	297 04 19	4·300080
Penobscot.....	207 44 15	27 46 57	4·089938

SHICKSHINNY.

One and a half miles from the town of Shickshinny, Luzerne Co., Pa., and on the range east of the gap known locally as "The Lookout."

Permanent mark : Hole drilled in rock.

[Latitude, $41^{\circ} 09' 59'' \cdot 40$. Longitude, $76^{\circ} 09' 08'' \cdot 77$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Penobscot.....	265 34 07	85 45 10	4·371794
Bears Head.....	350 06 50	170 09 41	4·551844
Nescopeck (1).....	297 04 19	117 12 40	4·300080
Nescopeck (3).....	33 56 46	213 50 27	4·383323
Glen Summit.....	274 23 47	94 36 03	4·417360

NORTH.

A summit of the North Mountain in western part of Davidson Township, Columbia Co., Pa.; local name, Round Top; 1 mile north of Billy Backbone Mountain. A tripod, with target, was erected by the U. S. & G. S. during 1886 and sighted from Catawissa. Summit about 50 yards across, east and west, and 200 yards long, north and south. It is covered with a scattering growth of bushes and trees from 10 to 20 feet high.

Mark: A + cut in rock.

[Latitude, $41^{\circ} 19' 09'' \cdot 97$. Longitude, $76^{\circ} 33' 17'' \cdot 13$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Ricketts.....	273 16 15	93 25 58	4·313063
Catawissa.....	345 35 18	165 40 23	4·639609

RICKETTS.

Triangulation station of the U. S. C. & G. S. Is very near the southeast corner of Sullivan Co., Pa., on the North Mountain. The station is from one-half to three-fourths mile from the main road, on the high-

est ground within a distance of 2 or more miles. There is a hotel at foot of the mountain, distance by road 2 miles, and one at Ganoga Lake, distance $3\frac{1}{2}$ miles.

Permanent mark: A stone with hole drilled in it.

Reference mark: Azimuth C. & G. S station to tree 119° ; distance, 74.9 feet.

[Latitude, $41^{\circ} 18' 31''$.13. Longitude, $76^{\circ} 18' 34''$.67.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald.....	253 57 27	74 19 34	4.68625
Penobscot.....	290 47 00	111 04 17	4.59340
Koehler.....	251 09 07	71 16 43	4.229097
North.....	93 25 58	273 16 15	4.313063

GLEN SUMMIT.

Not occupied. Station on the high ridge $1\frac{1}{2}$ miles due east (mag.) of Glen Summit, Luzerne Co., Pa. A station on the Lehigh Valley Railroad. Summit rounded with a few scattering trees standing.

Permanent mark: Blazes on tree near foot.

[Latitude, $41^{\circ} 08' 53''$.00. Longitude, $75^{\circ} 50' 30''$.80.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shickshinny.....	94 36 03	274 23 47	4.417360
Penobscot.....	145 54 08	325 52 55	3.664854

PENOBSCOT.

Triangulation station of the U. S. C. & G. S. It is on the Wilkesbarre Mountain, in Luzerne Co., Pa., about 3 miles south of Wilkesbarre and three-fourths of a mile from Fairview Station, on the Lehigh Valley Railroad, and same distance from Solomons Gap, on Lehigh and Susquehanna Railroad. Summit entirely bare.

Permanent mark: Hole drilled in rock.

[Latitude, $41^{\circ} 10' 57''$.14. Longitude, $75^{\circ} 52' 21''$.83.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pimple Hill.....	299 08 05.0	119 22 35.1	4.548991
Knob (C. & G. S.).....	353 26 55.3	173 28 37.9	4.506182
Koehler.....	133 31 32.0	313 21 50.0	4.451850
Wyoming.....	187 20 47.0	7 21 54.0	4.268823
Nescopeck (1).....	27 46 57.0	207 44 15.0	4.089938
Knob (2).....	76 30 20.0	256 11 39.0	4.611840
Glen Summit.....	325 52 55.0	145 54 08.0	3.664854
Nescopeck (3).....	59 34 20.0	239 16 59.0	4.632961
Ricketts.....	111 04 17.0	280 47 00.0	4.59340
Bald Mountain.....	200 23 53.0	20 28 42.0	4.463994
Nescopeck (2).....	47 49 08.0	227 40 47.0	4.380321
Miller.....	168 56 13.0	348 53 03.0	4.540332
Shickshinny.....	85 45 10.0	265 34 07.0	4.371794

MILLER.

Three miles (air line) south of Tunkhannock, Wyoming Co., Pa., and 8 miles by the road. Summit flat, with large trees on southeast side. Permanent mark: Stone with cross cut in top.

[Latitude, 41° 29' 20" .95. Longitude, 75° 59' 08" .86.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald Mountain ...	291 54 08	112 02 07	4.258096
Penobscot	348 53 03	168 56 13	4.540332
Kocher	43 32 44	223 26 10	4.303396

JERMYN.

Not occupied. A bald ridge in southwest corner of Carbondale Township and west of village of Jermyn, Lackawanna Co., Pa. Permanent mark: A lone pine tree.

[Latitude, 41° 32' 29" .01. Longitude, 75° 34' 28" .58.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald Mountain ...	49 37 20	229 30 19	4.287687
Elk	183 22 15	3 22 48	4.285792

SALEM.

Triangulation station of the U. S. C. & G. S. on the top of the mountain, 2½ miles east of Carbondale. Summit entirely bare.

[Latitude, 41° 33' 01" .48. Longitude, 75° 27' 26" .00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald Mountain ...	61 09 36	240 57 54	4.448229
Elk	154 43 14	334 39 07	4.305702

BALD MOUNTAIN.

Triangulation station of the U. S. C. & G. S. on the summit of Bald Mountain.

Permanent mark: Cross marks cut in boulders.

[Latitude, 41° 25' 41" .24. Longitude, 75° 45' 04" .92.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Panther	335 42 02	155 46 35	4.369701
Penobscot	20 28 42	200 23 53	4.463994
Bald (3)	230 13 54	50 26 48	4.54596
Miller	112 02 07	291 54 08	4.258096
Elk	206 26 04	26 33 39	4.551398
Ricketts	74 19 34	253 57 27	4.68625
Salem	240 57 54	61 09 36	4.448229
Jermyn	229 30 19	49 37 20	4.287687

BALD (3).

Not occupied. In Wayne Co., Pa. On a bald summit of the mountain, about 3 miles north of Fairview, a station on the gravity railroad, in the western central part of Clinton Township.

Permanent mark: A tall, dead tree.

[Latitude, $41^{\circ} 37' 48''$.3. Longitude, $75^{\circ} 25' 37''$.6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bald Mountain ...	50 26 48	230 13 54	4.54596
Elk	130 16 47	310 11 27	4.16426

ELK.

In southwest corner of Herrick Township, Susquehanna Co., Pa., 4 miles from Union Dale. Norris Burdick lives on eastern side of mountain three-fourths of a mile from triangulation station.

Permanent mark: A rock sunk in ground and cross cut in top.

[Latitude, $41^{\circ} 42' 53''$.84. Longitude, $75^{\circ} 33' 39''$.44.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Moosic	349 15 19	169 17 55	4.466890
Bald Mountain ...	26 33 39	206 26 04	4.551398
Bald (3)	310 11 27	130 16 47	4.164260
Salem	334 39 07	154 43 14	4.305702
Jermyn	30 22 48	183 22 15	4.285702

SOUTHERN APPALACHIAN REGION.

METHODS OF WORK.

Portions of Virginia, West Virginia, and Maryland lying north of latitude 39° and between longitudes 78° and 80° were controlled by triangulation in 1884 by W. T. Griswold, assisted by L. C. Fletcher. This work was based upon the line Fork-Marshall of the U. S. Coast and Geodetic Survey. Angles were measured with a Schilling 6-inch theodolite, reading by vernier to 10 seconds.

Triangulation in the southwestern portion of Virginia was commenced in 1883 by Prof. J. H. Gore, assisted by G. F. Wakefield. A series of triangles and quadrilaterals was started at the line Paint-Ivy of the U. S. Coast and Geodetic Survey in Fayette County, W. Va., and extended southwestward for 100 miles through Scott, Wise, Dickinson, Buchanan, and Tazewell counties, Virginia, to the line Chimney-Holston in eastern Tennessee, previously established by triangulation party No. 1 of the Geological Survey.

The instrument used in this work was a Kübel 6-inch theodolite, reading by verniers to 10 seconds.

Two stations of this belt were used for extending triangulation into eastern Kentucky. This was done during 1884 by G. F. Wakefield, using a 6-inch theodolite, reading by verniers to 10 seconds.

All that portion of Virginia lying north and west of the Blue Ridge and west of the peaks of Otter which was without control was triangulated during 1885 and 1886 by S. S. Gannett, using a Fauth 7-inch theodolite, reading by verniers to 10 seconds.

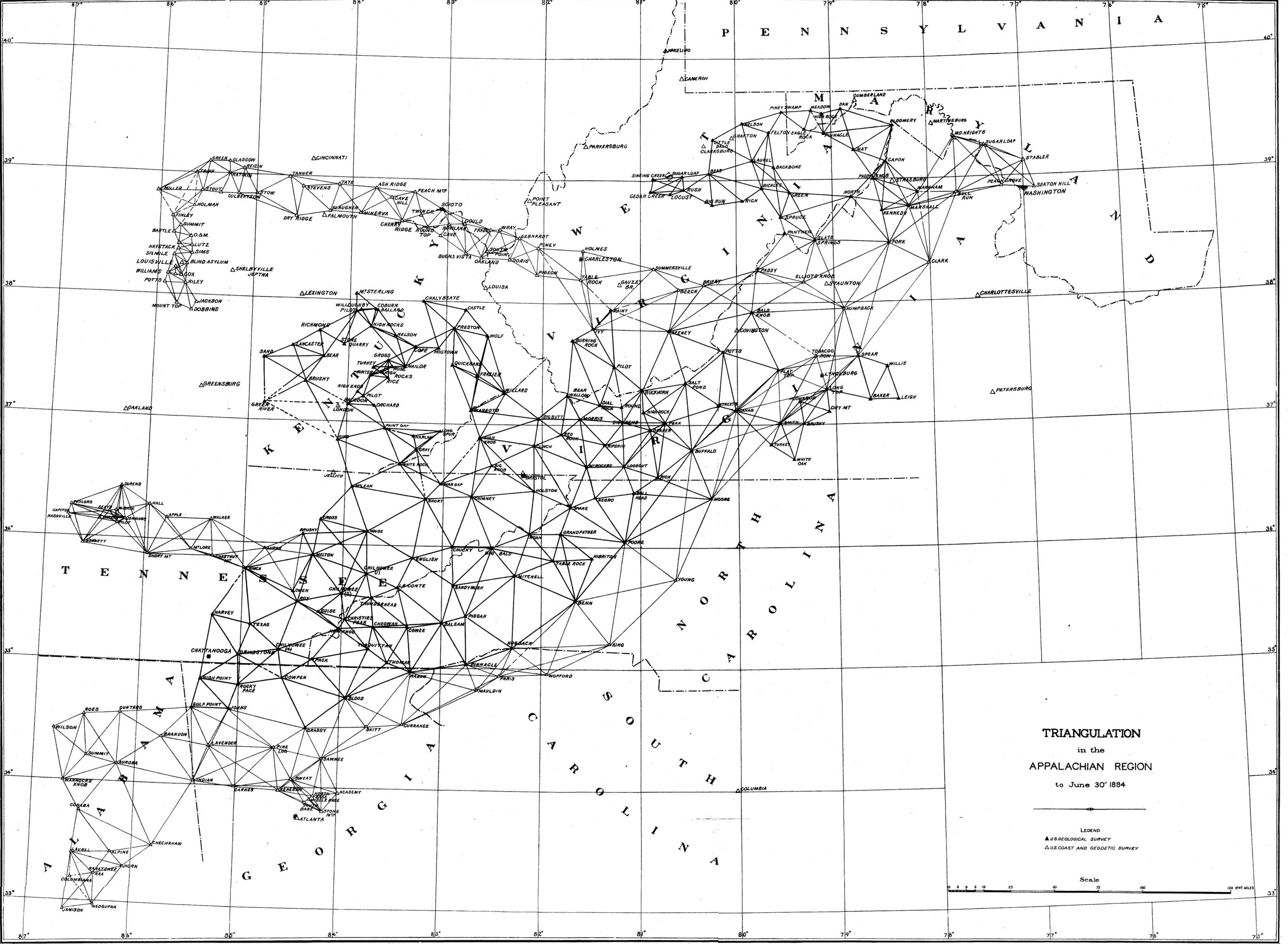
In 1888 portions of the counties of Prince Edward and Buckingham were controlled by F. J. Knight, the work being based upon the U. S. Coast and Geodetic Survey line Smith-Long.

In 1889 Pittsylvania and Campbell counties were triangulated by C. M. Yeates, using a Fauth 7-inch theodolite, reading by verniers to 10 seconds.

In addition to the work previously mentioned as having been done in Kentucky, several stations were located in Harlan and Bell counties during 1885 by F. J. Knight, based upon stations of the Geological Survey, White Rocks-War Gap.

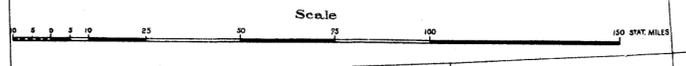
In 1888 and 1890 C. M. Yeates extended triangulation over that portion of Kentucky lying between the parallels of 37° and 38° and between the meridians of 83° and 85° .

The nature of this country made this work most difficult, the hills being of the same height and heavily timbered. Much time was spent



TRIANGULATION
in the
APPALACHIAN REGION
to June 30 1884

LEGEND
 ▲ U.S. GEOLOGICAL SURVEY
 △ U.S. COAST AND GEODETIC SURVEY



U.S. GEOLOGICAL SURVEY

in selecting stations and clearing them of timber, and even then only short lines of sight could be obtained.

A Fauth 7-inch (vernier) theodolite was used during the field season of 1888, and an 8-inch (micrometer) theodolite during 1890.

Triangulation was extended over the mountainous portion of western North Carolina and eastern Tennessee, between the Blue Ridge and the escarpment of the Cumberland Plateau during the field seasons of 1882, 1883, 1884, and 1885. This work was begun by Prof. W. C. Kerr at stations Benn and Poore of the U. S. Coast and Geodetic Survey in October, 1882. It was extended during 1883 by Prof. Kerr, assisted by S. S. Gannett, and further extended by the latter during 1884 and 1885.

A Kübel 6-inch (vernier) theodolite was used at first, which was replaced later by a Fauth 7-inch (vernier) theodolite.

In all of the work in the Appalachian Mountain region a lone tree has been commonly used as a signal. Most of the summits were found to be wooded. All trees obstructing the view were usually cut away. A tall symmetrical tree standing on the highest part of the summit was trimmed up and left as signal and mark. On bald summits a signal was usually made of saplings fastened together a few feet from the top and raised in form of a tripod.

In nearly all of the Appalachian triangulation a least square station and figure adjustment has been made.

DESCRIPTIONS AND POSITIONS OF STATIONS.

SINKING CREEK.

In Gilmer Co., W. Va., about 10 miles northwest of Glenville, at the head of Sinking Creek. Summit nearly cleared.

Permanent mark: Oak tree.

[Latitude, $39^{\circ} 01' 17''\cdot6$. Longitude, $80^{\circ} 51' 56''\cdot8$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Sugar Loaf	266 51 20	87 02 45	4·41807
Rush	291 16 25	111 28 31	4·47475

MEADOWS, MD.

On summit.

[Latitude, $39^{\circ} 34' 13''\cdot03$. Longitude, $79^{\circ} 12' 24''\cdot65$.]

NAT, W. VA.

Lone tree on summit.

[Latitude, $39^{\circ} 14' 42''\cdot41$. Longitude, $78^{\circ} 46' 09''\cdot03$.]

BLOOMERY, W. VA.

Signal built on summit.

[Latitude, 39° 26' 19''-00. Longitude, 78° 21' 01''-63.]

KENNEDY, VA.

On summit.

[Latitude, 38° 44' 30''-93. Longitude, 78° 29' 16''-37.]

DAN, MD.

[Latitude, 39° 34' 52''-64. Longitude, 78° 53' 49''-69.]

HIGH ROCK, MD.

[Latitude, 39° 32' 38''-57. Longitude, 79° 05' 46''-38.]

PINNACLE, W. VA.

On summit.

[Latitude, 39° 22' 54''-22. Longitude, 79° 04' 40''-90.]

SUGAR LOAF.

In Lewis Co., W. Va., 10 miles southwest of Weston, at the head of Mullins Creek. Summit cleared on southern edge and wooded on northern edge.

Permanent mark: Oak tree.

[Latitude, 39° 02' 02''-75. Longitude, 80° 33' 49''-7.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	Meters.
Bear Knob.....	263 48 06	83 58 27	4 377395
Rush.....	352 30 09	172 30 51	4 09247
Cedar Creek.....	64 22 45	244 10 08	4 50714
Locust.....	33 34 43	213 30 08	4 27965
Sinking Creek....	87 02 45	266 51 20	4 41807

BEAR KNOB.

Seven miles northwest of Buckhannon, in Upshur Co., W. Va. Sharp knob and a good point. Nearly all timber was cut down.

Permanent mark: Small tree.

[Latitude, 39° 03' 25''-1. Longitude, 80° 17' 23''-7.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	Meters.
Laurel.....	253 55 06.5	74 12 34.3	4 618122

LITTLE BALD.

In Harrison Co., W. Va., 7 miles northeast of Clarksburg and 4 miles north of Bridgeport. Summit entirely bald. Other knobs within 3 miles, of same height.

Permanent mark: None.

[Latitude, 39° 20' 09"·1. Longitude, 80° 14' 22"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bear Knob.....	8 00 05·8	187 58 11·4	4·495046
Nelson.....	241 16 54·2	61 28 30·1	4·475479
Laurel.....	298 44 03·7	118 59 40·1	4·607755

LAUREL.

Knob on Laurel hills, 15 miles east of Philippi, in Tucker and Barbour counties, W. Va., by very rough road.

Permanent mark: Tall dead tree standing alone.

[Latitude, 39° 09' 34"·7. Longitude, 79° 49' 42"·5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Little Bald.....	118 59 40·1	298 44 03·7	4·607755
Nelson.....	164 51 12·4	344 47 09·3	4·545381
Felton.....	210 47 31·9	30 54 14·2	4·472863
Green.....	310 59 41·7	131 14 14·8	4·646077
Bickles.....	341 27 56·0	161 31 35·4	4·421288
Bear Knob.....	74 12 34·3	253 55 06·5	4·618122

NELSON.

Twelve miles northeast of Grafton by rough road, at south point of Monongalia Co., W. Va.

Permanent mark: Chestnut tree, trimmed up.

[Latitude, 39° 27' 53"·3. Longitude, 79° 56' 06"·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Little Bald.....	61 28 30·1	241 16 54·2	4·475479
Felton.....	288 52 24·2	109 03 11·51	4·411222
Laurel.....	344 47 09·3	164 51 12·4	4·545381

FELTON.

On Briery Mountain, 5 miles north of Rowlesburg, on Baltimore and Ohio Railroad, Preston Co., W. Va. Summit partly cleared.

Permanent mark: Locust tree.

[Latitude, 39° 23' 21"·7. Longitude, 79° 39' 07"·1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Nelson.....	109 03 11·5	288 52 24·2	4·411222
Bickles.....	7 48 01·3	187 44 59·8	4·707488
Laurel.....	30 54 14·2	210 47 31·9	4·472863

PADDY KNOB.

Rounded knob on North Mountain, above Van Buren furnace on boundary between Shenandoah Co., Va., and Hardy Co., W. Va.
Permanent mark: Pine tree on State line.

[Latitude, 39° 00' 24".4. Longitude, 78° 33' 47".7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Capon	216 16 29.8	36 21 22.2	4.274894
Kennedy	347 26 18.2	167 29 07.8	4.478791
Mount Marshall..	309 12 27.5	129 26 02.1	4.606572

CAPON.

On the line between Hampshire Co., W. Va., and Frederick Co., Va.
On North Capon Mountain, on the Virginia and West Virginia State line. Point known as "Pinnacle," near Capon Springs.
Permanent mark: U. S. G. S., cut in rock.

[Latitude, 39° 08' 36".4. Longitude, 78° 26' 3".7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kennedy	5 57 47.0	185 55 45.2	4.651401
Mount Marshall..	333 43 47.0	153 52 31.0	4.657576
Paddy Knob.....	36 21 22.2	216 16 29.8	4.274894

SUGAR LOAF.

A triangulation station of the U. S. C. & G. S. on the well known mountain in Frederick Co., Md.

[Latitude, 39° 15' 44".55. Longitude, 77° 23' 36".83.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bull Run	32 29 22.17	212 17 38.93	4.6995519
Md. Heights.....	107 29 59.85	287 17 43.18	4.4654339
Stabler	293 45 40.15	114 01 09.32	4.5865133
Peach Grove.....	339 28 31.78	159 34 43.88	4.6079571

MARYLAND HEIGHTS.

A triangulation station of the U. S. C. & G. S. on the Blue Ridge, north of Harpers Ferry, in Washington Co., Md.

[Latitude, 39° 20' 27".69. Longitude, 77° 42' 59".91.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sugar Loaf	287 17 43.18	107 29 59.85	4.4654339
Bull Run	358 43 10.10	178 43 39.95	4.7077533

PEACH GROVE.

A triangulation station of the U. S. C. & G. S. in Fauquier Co., Va.

[Latitude, 38° 55' 12''-74. Longitude, 77° 13' 46''-77.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bull Run	84 11 21·12	263 53 29·89	4·6162546

BULL RUN.

A triangulation station of the U. S. C. & G. S., on line between Fauquier and Prince William counties, Va.

[Latitude, 38° 52' 53''-58. Longitude, 77° 42' 12''-61.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Md. Heights.....	178 43 30·95	358 43 10·10	4·7077533
Clark	22 30 41·44	202 19 28·39	4·8354456
Sugar Loaf.....	212 17 38·93	32 29 22·17	4·6995519
Peach Grove.....	263 53 29·89	84 11 21·12	4·6162546

MOUNT MARSHALL.

A triangulation station of the U. S. C. & G. S. on Blue Ridge, above Brownstown, on line between Warren and Rappahannock counties, Va.
Permanent mark: Copper bolt.

[Latitude, 38° 46' 33''-82. Longitude, 78° 12' 10''-28.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Fork	29 26 43·21	209 18 44·29	4·5778087
Kennedy	81 24 03·30	261 13 20·80	4·3990680
Paddy Knob.....	129 26 02·10	309 12 27·50	4·6065720
Capon	153 52 31·00	333 43 47·00	4·6575760
High Top (C. S.)..	212 38 03·00	32 41 28·00	4·1640430
Clark.....	341 17 17·50	161 24 45·39	4·7358815
North	100 02 58·10	279 40 17·90	4·7253930

CLARK.

A triangulation station of the U. S. C. & G. S. in Orange Co., Va.

[Latitude, 38° 18' 41''-11. Longitude, 78° 00' 11''-49.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Marshall..	161 24 45·39	341 17 17·50	4·7358815
Bull Run.....	202 19 28·39	22 30 41·44	4·8354456

FORK.

A triangulation station of the U. S. C. & G. S. in Madison Co., Va., on Blue Ridge, about 5 miles south of crossing of road from Marksville to Criglersville, Va.

Permanent mark : Copper bolt.

[Latitude, 38° 28' 44''·81. Longitude, 78° 24' 57''·47.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kennedy	167 54 00·82	347 5 19·20	4·4748290
Mount Marshall.....	209 18 44·29	29 26 43·21	4·5778087
North	141 14 38·10	321 00 01·60	4·7326430
Rogers (Elliott Knob).....	66 26 43·28	245 53 17·98	4·9338746
Slate Springs.....	93 09 32·89	272 40 51·08	4·8268669

NORTH.

On the line between Hardy Co., W. Va., and Shenandoah Co., Va., on North Mountain, 200 yards south of road crossing from Orkney Springs to Lost River post-office.

Permanent mark : Lone pine tree.

[Latitude, 38° 51' 28''·9. Longitude, 78° 48' 20''·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Marshall..	279 40 17·9	100 02 58·1	4·725393
Fork.....	321 00 01·6	141 14 38·1	4·732643
Spruce.....	75 41 13·5	254 13 53·0	4·817057
Green.....	94 43 04·3	274 19 03·3	4·744391
Slate Springs.....	40 34 29·3	220 20 17·1	4·705744

RICH.

In Randolph Co., W. Va., on Rich Mountain, about 2 miles south of turnpike from Beverly to Buckhannon. Scaffold erected on trees, but partially destroyed by lightning.

[Latitude, 38° 50' 01''·85. Longitude, 79° 56' 22''·6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bear.....	129 18 34	309 05 21	4·593183
Bickles.....	238 12 29	58 20 19	4·326353
Big Run.....	81 14 19	261 02 20	4·447491

BIG RUN.

In Upshur Co., W. Va., about 3½ miles (air line) southwest of Alton, on West Virginia and Pittsburg Railroad, at head of Big Run. Instrument on platform 93 feet high.

Permanent mark: Hickory tree.

[Latitude, 38° 47' 41"·9. Longitude, 80° 15' 30"·15.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bear	174 38 13	354 37 02	4·465596
Rich	261 02 20	81 14 19	4·447491
Rush	119 55 48	299 45 00	4·457860

RUSH.

In Lewis Co., W. Va., about 5 miles west of Roanoke (a station on the West Virginia and Pittsburg Railroad), at head of Canoe Run. Summit covered with trees, with gaps cut toward triangulation stations.

Permanent mark: Tree with scaffold around it.

[Latitude, 38° 55' 25"·0. Longitude, 80° 32' 42"·6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bear	236 07 01	56 16 39	4·425104
Big Run	299 45 00	119 55 48	4·457860
Cedar Creek	86 57 21	266 44 03	4·486370
Locust	73 30 40	253 25 23	4·102730
Sinking Creek	111 28 31	291 16 25	4·474750
Sugarloaf	172 30 51	352 30 09	4·002490

LOCUST.

In Gilmer Co., W. Va., sometimes called Hickory Knob, about 5 miles northeast of Stout Mills on Little Kanawha River at head of Sliding Hill Creek. Summit covered with timber. Scaffold was erected around tall tree and occupied as a secondary station.

Permanent mark: Tree.

[Latitude, 38° 53' 28"·15. Longitude, 80° 41' 06"·65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sugarloaf	213 30 08	33 34 43	4·27965
Rush	253 25 23	73 30 40	4·10273

CEDAR CREEK.

In Gilmer Co., W. Va., about 10 miles west of Glenville, at the head of Paddy Run, of Cedar Creek, and Spring Fork of Grassy Creek. Summit timbered, with gaps cut through toward triangulation stations.

Permanent mark: Tree with scaffold around it.

[Latitude, 38° 54' 30"·3. Longitude, 80° 53' 52"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sugarloaf	244 10 08	64 22 45	4·56714
Rush	266 44 03	86 57 21	4·48637

GREEN.

On line between Randolph and Pendleton counties, W. Va., on main chain of Alleghany Mountains, near head of Seneca River. Summit a long ridge, heavily timbered with spruce and hemlock. Thomas, on West Virginia Central Railroad, is the nearest railroad station.

Permanent mark: Spruce tree on south end.

[Latitude, 38° 53' 50". Longitude, 79° 26' 36".]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Bickles	99	22	54.7	279	12	02.4	4.403926
Laurel	131	14	14.8	310	59	41.7	4.646077
North	274	19	03.3	94	43	04.3	4.744391
Spruce	19	35	56.3	199	32	33.7	4.367376
Panther	7	02	33.1	187	00	34.7	4.572369
Slate Springs	332	16	28.7	152	26	11.8	4.686270

BICKLES.

On Bickles Knob, on Cheat Mountain, in the northern central part of Randolph Co., W. Va. Philippi, 30 miles northwest, is nearest railroad station. Summit well cleared.

Permanent mark: Oak tree.

[Latitude, 38° 56' 03". Longitude, 79° 43' 54".]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Bear Knob	105	54	26.0	285	33	21.6	4.701012
Laurel	161	31	35.4	341	27	56.0	4.421288
Felton	187	44	59.8	7	48	01.3	4.707488
Rich.	58	20	19.0	238	12	29.0	4.326353
Green	279	12	02.4	99	22	54.7	4.403926
Spruce	326	25	45.0	146	33	13.1	4.494699

SPRUCE.

On Spruce Mountain, a long, barren, rocky ridge, 4 miles by rough trail from Circleville, Pendleton Co., W. Va.

Permanent mark: None.

[Latitude, 38° 41' 58". Longitude, 79° 31' 59".]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Bickles	146	33	13.1	326	25	45.0	4.494699
Green	199	32	33.7	19	35	56.3	4.367376
North	254	13	53.0	74	41	13.5	4.817057
Panther	347	52	02.0	167	53	25.8	4.189382
Slate Springs	304	36	56.9	124	50	00.5	4.567880

PANTHER.

On Panther Knob, at southwest corner of Pendleton Co., W. Va., near Highland County line.

Permanent mark: Small tree.

[Latitude, 38° 33' 48".3. Longitude, 79° 29' 45".3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Spruce.....	167 53 25.8	347 52 02.0	4.189382
Green.....	187 00 34.7	7 02 33.1	4.572309
Slate Springs	282 14 11.5	102 25 50.3	4.444144
Paddy.....	38 32 05.1	218 20 53.4	4.625148

SLATE SPRINGS.

A triangulation station of the U. S. C. & G. S. on Shenandoah Mountain, 10 miles from Rawley Springs, Rockingham Co., Va.

Permanent mark: Marble block, 6 by 6 by 30 inches.

[Latitude, 38° 30' 35".71. Longitude, 79° 11' 03".66.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Panther.....	102 25 50.30	282 14 11.50	4.4441440
Spruce.....	124 50 00.50	304 36 56.90	4.5678800
Green.....	152 26 11.80	332 16 28.70	4.6862700
North.....	220 20 17.10	40 34 29.30	4.7075440
Fork.....	272 40 51.08	93 09 32.89	4.8268669
Paddy.....	63 18 23.51	242 55 35.71	4.7776704

ROGERS (ELLIOTT KNOB).

A triangulation station of the U. S. C. & G. S. in Augusta Co., Va.

[Latitude, 38° 09' 59".36. Longitude, 79° 18' 51".30]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Fork.....	245 53 17.98	66 26 43.28	4.9338746
Humpback.....	303 25 22.43	123 40 43.46	4.6405399

PADDY.

A triangulation station of the U. S. C. & G. S. on Alleghany range, at the corner of Bath and Highland counties, Va., and Pocahontas Co., W. Va.

Permanent mark: Marble block 6 by 6 by 30 inches.

[Latitude, 38° 15' 56".77. Longitude, 79° 47' 46".29.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
State Springs.....	242 55 35.71	63 18 23.51	4.7776704
Panther.....	218 20 53.40	38 32 05.10	4.6251480
Bald Knob.....	7 19 03.00	187 17 00.60	4.5803674

HOLMES.

A triangulation station of the U. S. C. & G. S. in Kanawha Co., W. Va. It is on the ridge dividing the waters flowing into Cooper Creek and thence into Elk River, and those by Two Mile Creek into the Kanawha River. Station on land owned by Mr. S. W. Gibson, is about $8\frac{1}{2}$ miles from Charleston and about one-half mile northeast of Holmes' house.

Permanent mark: A bottle set in cement, and over this a stone block 6 by 6 by 30 inches. The top of the block is marked U. S. C. S. Four blocks, each 6 by 6 by 30 inches, placed north, south, east, and west. North block is 6.94 feet from center, south block 6.60 feet, east block 6.95 feet, west block 6.69 feet.

[Latitude, $38^{\circ} 25' 40''$.87. Longitude, $81^{\circ} 35' 34''$.31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Table Rock.....	4 07 37.3	184 06 48.4	4.4258038
Elk.....	17 54 57.0	197 54 06.0	3.8120110
Creed.....	311 56 47.0	131 58 01.0	3.5886000

SUMMERSVILLE.

A triangulation station of the U. S. C. & G. S. in Nicholas Co., W. Va. Station is on a ridge 1 mile from Nicholas C. H. belfry and bearing 6° north of west. A large tree left standing is visible for 40 miles. A spike is driven into this tree, and station bears $354^{\circ} 40'$, distant 15.4 feet from this spike. Nearest railroad station is Kanawha Falls, on Chesapeake and Ohio Railroad, 32 miles distant.

Permanent mark: Bottle set into a hole with sandstone block placed over it, 6 by 6 by 30 inches, and cross cut on top. Reference marks, four sandstone blocks set north, south, east, and west, with arrow cut on top pointing to center. Distance, north block, 7.02 feet; south block, 7 feet; east block, 7.29 feet; west block, 6.90 feet.

[Latitude, $38^{\circ} 16' 55''$.42. Longitude, $80^{\circ} 52' 07''$.65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Beech.....	309 07 25.1	129 17 18.8	4.4741174
Ivy.....	45 04 22.9	224 41 22.4	4.8889444

BEECH.

A triangulation station of the U. S. C. & G. S. Station on Beech knob about 4 miles north of Mr. Albert G. Williams's house in Greenbrier Co., W. Va., and 11 miles northeast of Snow Hill post-office. Station on the highest part of Beech knob.

Permanent mark: A rough sandstone block 24 by 6 by 6 inches, with four other similar blocks north, south, east, and west. Distance

from center to north block, 6·90 feet; to south block, 6·98 feet; to east block, 6·81 feet; to west block, 7·09 feet.

[Latitude, 38° 06' 44"·63. Longitude, 80° 36' 18"·88.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Briery	261 06 01·7	81 15 41·1	4·3641965
Keeney	13 11 44·6	193 08 03·1	4·5868151
Summersville.....	129 17 18·8	309 07 25·1	4·4741174

BRIERY.

A triangulation station of the U. S. C. & G. S. in Pocahontas Co., W. Va., on the divide between Greenbrier and Gauley rivers. The station is on a knob about 4 miles west of Hillsboro, at the headwaters of Spring Creek. It is at the eastern end of knob about 50 yards west of a bunch of live pines.

Permanent mark: Copper bolt in solid rock, with cross on top, above which is placed a marble slab 6 by 6 by 30 inches, top marked U. S. C. S. North, iron bolt in rock, 7·02 feet distance; south, iron bolt in rock, 7·06 feet; east, marble block, 6·98 feet; west, marble block, 7·02 feet.

[Latitude, 38° 08' 39"·65. Longitude, 80° 20' 40"·40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bald Knob.....	299 06 43·0	119 24 57·1	4·6958141
Keeney	37 43 22·1	217 30 03·3	4·7155703
Beech.....	81 15 41·1	261 06 01·7	4·3641965

TABLE ROCK.

A triangulation station of the U. S. C. & G. S. in Kanawha Co., W. Va. Station on the range of hills lying between the two forks of Lens Creek, which flows into the Kanawha River at Brownstown, and is near the headwaters of the creek, about 7 miles from Brownstown station, on a long, very narrow, and steep ridge, cleared of trees.

Permanent mark: A small bottle set in cement 30 inches below surface, and on top is a sandstone block 6 by 6 by 30 inches, top marked U. S. C. S. Four other blocks are placed north, south, east, and west, with tops cut with cross and arrows pointing to center. North block 30 inches long; distance, 7·01 feet. South block 30 inches long; distance, 6·97 feet. East block 30 inches long; distance, 7·05 feet. West block 30 inches long; distance, 6·98 feet.

[Latitude, 38° 11' 18"·56. Longitude, 81° 36' 53"·13.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Ivy.....	346 14 43·2	166 19 17·1	4·6607764
Holmes	184 06 48·4	4 07 37·3	4·4258038
Creed.....	191 18 19·0	11 20 22·0	4·3886600

MOUNT STERLING.

Station on old Fort Hill, on edge of town of Mount Sterling, Montgomery Co., Ky. Summit cleared of timber.

Permanent mark: Tripod with tin cone.

[Latitude, $38^{\circ} 03' 28''\cdot 4$. Longitude, $83^{\circ} 55' 50''\cdot 9$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Coburn	308 06 18	128 13 46	4·35341
Pilot	1 16 15	181 16 06	4·20986

HUMPBAC.

A triangulation station of the U. S. C. & G. S. on boundary between Augusta and Nelson counties, Va.

[Latitude, $37^{\circ} 56' 55''\cdot 91$. Longitude, $78^{\circ} 53' 57''\cdot 24$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Peters	249 45 46·02	70 08 25·64	4·7579991
Fork	215 34 15·22	35 52 11·46	4·8603035
Spears	344 20 09·02	164 25 09·40	4·6492787

BALD KNOB.

A triangulation station of the U. S. C. & G. S., in Bath Co., Va., on Warm Springs Mountain, about 3 miles (air line) south of Healing Springs, 1,000 feet north of highest summit, and 20 feet lower. Millboro depot and Covington, nearest railroad stations.

Permanent mark: Copper bolt in large flat rock.

[Latitude, $37^{\circ} 55' 32''\cdot 64$. Longitude, $79^{\circ} 51' 04''\cdot 72$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Paddy	187 17 00·6	7 19 03·0	4·5803674
Flat Top	335 40 48·5	155 50 39·8	4·760975
Potts	35 49 53·1	215 39 03·8	4·647075
Keeney	77 36 00·0	257 04 33·3	4·8866970
Briery	119 24 57·1	299 06 43·0	4·6958141

PAINT.

Sharp knob near Paint Creek, Fayette Co., W. Va.

Permanent mark: Lone tree.

[Latitude, $37^{\circ} 56' 50''\cdot 8$. Longitude, $81^{\circ} 18' 28''\cdot 8$.]

KEENEY.

A triangulation station of the U. S. C. & G. S. in Summers Co., W. Va., on highest part of Keeney Mountain, 8 miles by road and trail northwest of Alderson, W. Va.

Permanent mark: Marble block 6 by 6 by 30 inches.

[Latitude, 37° 46' 24''-92. Longitude, 80° 42' 19''-11.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Bald Knob.....	257	04	33·3	77	36	00·0	4·8866970
Potts.....	201	03	48·1	111	24	19·4	4·723811
Salt Pond.....	342	26	41·9	162	32	50·0	4·692562
Buckhorn.....	24	34	15·4	204	24	12·9	4·768306
Beech.....	193	08	03·1	13	11	44·6	4·5868151
Briery.....	217	30	03·3	37	43	25·1	4·7155703

DRY MOUNTAIN.

On a small hill in Campbell Co., Va., about 200 feet above surrounding country, 13 miles from Brook Neal. Summit flat and timbered, with exception of small clearing. Instrument mounted on scaffold 35 feet high.

Permanent mark: Pine tree.

[Latitude, 37° 06' 22''-90. Longitude, 79° 03' 47''-99.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Johnson.....	109	54	13	289	43	24	4·450035
Long Top.....	174	21	08	354	29	18	4·813741
Brushy.....	65	44	01	245	34	27	4·412498

LONG TOP.

A triangulation station of the U. S. C. & G. S., in Campbell Co., Va.

[Latitude, 37° 17' 27''-65. Longitude, 79° 05' 10''-24.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Dry Mountain.....	354	20	18·00	174	21	08·00	4·313741
Johnson.....	65	59	05·00	245	49	04·00	4·428030
Smith.....	54	21	55·00	234	04	32·17	4·7203317
Brushy.....	34	40	48·00	214	32	02·00	4·578031

BAKER.

On a wooded hill but little higher than the surrounding country in southwestern part of Prince Edward Co., Va., about 6 miles south of

Pamplin City, on Norfolk and Western Railroad. Lanes were cut from signal tree toward Leigh, Willis, Spear, and Long stations.

Permanent mark: A tall pine.

[Latitude, 37° 12' 09''-57. Longitude, 78° 38' 39''-19.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Long Top	104	10	23·00	233	54	20·00	4·606598
Spear	165	15	37·00	345	11	18·00	4·615267
Willis	207	52	51·00	27	59	23·00	4·530945
Leigh	269	35	25·27	89	45	45·83	4·403301

LEIGH.

On a hill about 150 feet high, about 6 miles northwest of Burkeville (the crossing of the Norfolk and Western and Richmond and Danville railroads), and 8 miles southwest of Farmville, Prince Edward Co., Va. Timber cut from summit.

Permanent mark: A tall leaning pine.

[Latitude, 37° 12' 14''-21. Longitude, 78° 21' 32''-82.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Baker	89	45	45·83	269	35	25·27	4·403301
Willis	162	37	59·22	342	34	08·68	4·495407

WILLIS.

On a hill in eastern part of Buckingham Co., Va. Summit bare and rocky. Altitude above the surrounding country about 900 feet.

Permanent mark: Bolt in solid rock.

[Latitude, 37° 28' 22''-76. Longitude, 78° 27' 52''-93.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Baker	27	59	23·00	207	52	51·00	4·530945
Spear	110	36	46·00	290	25	52·00	4·449553
Leigh	342	34	08·68	162	37	59·22	4·495407

SPEAR.

A triangulation station of the U. S. C. & G. S. in Buckingham Co., Va.

[Latitude, 37° 33' 42''-91. Longitude, 78° 45' 46''-66.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Humpback	164	25	09·40	344	20	09·02	4·6492787
Peters	213	41	29·41	33	59	02·17	4·8770536
Willis	290	25	52·00	110	36	46·00	4·449553
Baker	345	11	18·00	165	15	37·00	4·615267

TOBACCO ROW.

A triangulation station of the U. S. C. & G. S., in Amherst Co., Va.

[Latitude, 37° 33' 55''-76. Longitude, 79° 11' 26''-17.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Spear	270 28 12·87	90 43 51·43	4·5773224
Humpback	211 01 08·58	31 11 50·86	4·6963346

FLAT TOP.

A triangulation station of the U. S. C. & G. S., on line between Boteourt and Bedford counties, Va., 10 miles northwest of Liberty, Bedford Co., Va. Rough wagon road to within one-fourth of a mile of station.

Permanent mark: Marble block, 6 by 6 by 30 inches.

[Latitude, 37° 27' 06''-85. Longitude, 70° 34' 58''-40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Potts	108 32 37·90	288 12 03·40	4·719626
Bald Knob	155 50 39·80	335 40 48·50	4·760975
Smith	358 12 27·78	178 13 04·97	4·6865204
Cahas	46 04 20·04	225 48 36·09	4·7276606

POTTS.

On line between Craig and Alleghany counties, Va. On a rounded knob on Potts Mountain east of Fincastle and Sweet Springs, 12 miles by road and trail north of Newcastle, Craig Co.

Permanent mark: Rock cairn.

[Latitude, 37° 36' 02''-9. Longitude, 80° 08' 45''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Keeney	111 24 19·4	291 03 48·1	4·723811
Bald Knob	215 39 03·8	35 49 53·1	4·647675
Flat Top	288 12 03·4	108 32 37·9	4·719626
Salt Pond	51 22 13·4	231 07 55·8	4·647707
Cahas	347 50 23·3	167 55 07·5	4·739539
Streets	4 53 56·7	184 52 14·1	4·688312

JOHNSON.

On boundary between Bedford and Campbell counties, Va., 7 miles from Lynch Station on Virginia Midland Railroad. Summit sharp and about 600 feet above surrounding country. Timber cut down.

Permanent mark: Lone tree.

[Latitude, 37° 11' 32''-78. Longitude, 79° 21' 42''-56.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Smith	42 35 34	222 28 11	4 428534
Long Top.....	245 49 04	65 59 05	4 428030
Dry Mountain....	289 43 24	109 54 13	4 450035

BRUSHY.

Sharp peak on big ridge in Pittsylvania Co., Va., 2 miles from Sycamore Station, Virginia Midland Railroad. Timber cut down.

Permanent mark: Lone tree.

[Latitude, 37° 00' 37''-16. Longitude, 79° 19' 41''-32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Smith.....	91 16 15	271 07 40	4 325442
Long Top.....	214 32 02	34 40 48	4 578031
Dry Mountain....	245 34 27	65 44 01	4 412498

SMITH.

A triangulation station of the U. S. C. & G. S., in Pittsylvania Co., Va.

[Latitude, 37° 00' 51''-53. Longitude, 79° 33' 56''-93.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Flat Top.....	178 13 04.97	358 12 27.78	4 6865204
Long Top.....	234 04 32.17	54 21 55.00	4 7203317
Johnson.....	222 28 11.00	42 35 34.00	4 428534
Brushy.....	271 07 40.00	96 16 15.00	4 325442

WASEOTO.

In Letcher Co., Ky., near Virginia and Kentucky State line, at the junction of Black and Cumberland mountains, at the head of Poor Fork of Cumberland and Pond Fork of Big Sandy, 7 miles east of Whitesburg, Letcher Co., Ky.

Permanent mark: Chestnut tree.

[Latitude, 37° 08' 44''-8. Longitude, 82° 43' 54''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Quicksand.....	157 01 47.9	336 54 36.3	4 651632
Frazier.....	189 57 17.2	9 59 35.4	4 511800
Willard.....	242 01 51.2	62 14 29.2	4 543945
Big Butt.....	275 55 06.5	96 20 17.5	4 794159
High Knob.....	339 31 42.5	159 35 23.9	4 415766

CARR.

Not occupied. Situated in Perry Co., Ky., at head of Stacy Branch of Carr Fork of Kentucky River, about 7 miles from its mouth.
Permanent mark: Medium sized pine tree trimmed up.

[Latitude, 37° 14' 29''-2. Longitude, 83° 05' 33''-5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Long Spur	352 18 06	172 19 56	4-529005
Harlan	27 47 28	207 39 20	4-633374

WILLARD.

On Pine Mountain on the line between Dickinson Co., Va., and Pike Co., Ky., 4 miles west of "the Breaks" of Russell Fork of Sandy River, and south-southeast of Fish Trap post-office.

Permanent mark: Two small trees.

[Latitude, 37° 15' 35''-3. Longitude, 82° 22' 59''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Frazier	121 52 25-4	301 42 03-4	4-472873
Wolf	162 08 53-3	342 01 58-8	4-735622
Waseoto	62 14 29-2	242 01 51-2	4-543945

FRAZIER.

In Floyd Co., Ky., on end of spur, near head of Mud and Frazier creeks, ten miles (air line) southwest of Pikeville, Ky.

Permanent mark: Tall hickory tree.

[Latitude, 37° 24' 02''-9. Longitude, 82° 40' 05''-6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Quicksand	111 54 23-0	291 44 51-1	4-396315
Preston	152 23 43-8	332 14 31-1	4-679871
Wolf	193 09 13-7	13 12 43-8	4-569316
Willard	331 42 03-4	121 52 25-4	4-472873
Waseoto	9 59 35-4	189 57 17-2	4-511800

QUICKSAND.

On line between Floyd and Knott counties, Ky., at the head of Licking River. Nearest town is Hindman, in Knott Co.

Bull. 122—6

Permanent mark: Large pine tree.

[Latitude, $37^{\circ} 29' 03''$. Longitude, $82^{\circ} 55' 46''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Preston.....	181 27 41.1	1 28 02.2	4.520126
Waseoto.....	336 54 36.3	157 01 47.9	4.651632
Frazier.....	201 44 51.1	111 54 23.0	4.396315

HOGTOWN.

On divide between Quicksand and Licking rivers on line between Magoffin and Breathitt counties, Ky.; 12 to 15 miles south of Salyersville. Summit cleared of timber.

Permanent mark: A chestnut oak, shaped like a pine.

[Latitude, $37^{\circ} 37' 01''$. Longitude, $83^{\circ} 04' 28''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nailor.....	60 40 38	240 28 09	4.539877
Cope.....	92 09 43	272 00 57	4.325746

WOLF.

On sharp ridge at head of Wolf Creek, Martin Co., Ky., 12 miles (air line) southwest of Warfield on Tug Fork of Sandy River.

Permanent mark: Large chestnut tree.

[Latitude, $37^{\circ} 43' 34''$. Longitude, $82^{\circ} 34' 20''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Castle.....	138 37 03.8	378 28 31.8	4.489071
Preston.....	101 39 08.3	281 26 22.5	4.494856
Frazier.....	13 12 43.8	193 09 13.7	4.569316
Willard.....	342 01 58.8	162 08 53.3	4.735622

PRESTON.

On northeast end of Long Knob at head of Barnett and Jennie and Little Paint creeks, in Johnson Co., Ky., 7 miles southwest of Paintsville.

[Latitude, $37^{\circ} 46' 57''$. Longitude, $82^{\circ} 55' 11''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wolf.....	281 26 22.5	101 39 08.3	4.494856
Quicksand.....	1 28 02.2	181 27 41.1	4.520126
Frazier.....	332 14 31.1	152 23 43.8	4.679871

BEAR WALLOW.

On Sandy Ridge, near State boundary between McDowell Co., W. Va., and Buchanan and Tazewell counties, Va.

Permanent mark: Tall tree.

[Latitude, 37° 14' 38". Longitude, 81° 44' 50".2.]

DIAL ROCK.

On East River Mountain, 10 miles west of Graham, Tazewell Co., Va.; summit rounded, with timber mostly cut down.

Permanent mark: Rock cairn.

[Latitude, 37° 09' 68". Longitude, 81° 25' 00".3.]

BIG BEND.

On line between Wythe and Bland counties, Va., on Walker Mountain, east of Wythe and Tazewell road gap, 12 miles northwest of Wytheville, Va. Summit is barren and rocky. All timber cut down.

Permanent mark: Small dead tree on highest part.

[Latitude, 37° 01' 37". Longitude, 81° 10' 56".4.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Draper	284	59	45.4	105	10	01.0	4.418229
Lookout	358	05	57.5	178	06	29.4	4.600876
Peak	270	35	37.3	90	51	17.9	4.586716
Morris	93	45	57.0	273	30	14.3	4.588357
Ripshin	37	36	57.5	217	30	32.1	4.415592

BUCKHORN.

At Doubles of East River Mountain, on State line between Giles Co., Va., and Mercer Co., W. Va. Oakvale, on New River branch of Norfolk and Western Railroad, is nearest railroad station; distant, 4 miles. Station on sharp rock, half way between tree trunks.

Permanent mark: Hole drilled in rock.

[Latitude, 37° 17' 33". Longitude, 80° 58' 49".3.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Keeney	204	24	12.9	24	34	15.4	4.708306
Salt Pond	260	36	50.6	80	52	57.0	4.599484
Peak	325	24	28.0	145	32	52.3	4.560481

PILOT.

On line between Mercer and Wyoming counties, W. Va., on Flat Top Mountain, a few miles from Peters Gap,

Permanent mark: Stump on highest point.

[Latitude, 37° 29' 04"·3. Longitude, 81° 16' 18"·8.]

BURNING ROCK.

On Huff Mountain, 4 miles west of Oceana, Wyoming Co., W. Va.

Permanent mark: Lone tree.

[Latitude, 37° 41' 38"·0. Longitude, 81° 41' 51"·6.]

SALT POND.

On Salt Pond Mountain, one-fourth of a mile by trail above Mountain Lake Post-office and hotel, Giles Co., Va. Staytide is nearest railroad station. Station is on highest part of flat ledge of rocks.

Permanent mark: Three holes drilled in rock, with arrows cut in rock pointing to center.

[Latitude, 37° 21' 00"·8. Longitude, 80° 32' 15"·3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Keeney	162 32 50·0	342 26 41·9	4·692562
Potts	231 07 55·8	51 22 13·4	4·647707
Streets	304 06 24·2	124 18 55·7	4·568130
Buffalo	355 00 55·7	175 03 06·1	4·790414
Buckhorn	80 52 57·0	260 36 50·6	4·599484
Peak	27 19 26·7	207 11 47·9	4·611519

STREETS.

In Montgomery Co., Va., Streets Entry, a part of Poore's Mountain on Blue Ridge, 5 miles south of Big Springs Depot, Va., by good trail.

Permanent mark: Large oak tree.

[Latitude, 37° 09' 46"·1. Longitude, 80° 11' 33"·9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Potts	184 52 14·1	4 53 56·7	4·688312
Caahas	287 47 07·7	107 53 32·4	4·218064
Buffalo	32 00 56·7	211 50 40·0	4·680703
Salt Pond	124 18 55·7	304 06 24·2	4·563130
Peak	72 42 25·2	252 22 18·7	4·714273

CAHAS.

A triangulation station of the U. S. C. & G. S., in Franklin Co., Va. Rocky Mount is the nearest railroad station on south, and Salem and Roanoke nearest ones on north.

Permanent mark: Marble block 6 by 6 by 30 inches.

[Latitude, 37° 07' 01"·95. Longitude, 80° 00' 56"·64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Potts	167 55 07·5	347 50 23·3	4·739539
Flat Top (C. & G. S.)	225 48 36·09	46 04 20·04	4·7276606
Streets	107 53 32·4	287 47 07·7	4·218064
Turkey Cock	314 14 55·0	134 27 50·0	4·649021

BIG BUTT.

On Sandy Ridge, between Russell and Buchanan counties, Va.
Permanent mark: Tall tree.

[Latitude, 37° 03' 09". Longitude, 82° 02' 08".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Morris.....	270 25 33.5	90 40 41.1	4.570827
Red Rock.....	305 13 51.0	125 22 07.9	4.398423
Waseoto.....	96 20 17.5	275 55 06.5	4.794159
High Knob.....	71 36 52.2	251 15 26.3	4.746547
Clinch.....	8 58 16.1	188 56 41.1	4.539896

MORRIS.

In Tazewell Co., Va., on Morris Knob, about 10 miles from Tazewell,
Va. Summit level for some distance, and cleared of large timber.
Permanent mark: Rock cairn.

[Latitude, 37° 02' 57". Longitude, 81° 37' 01".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Big Bend.....	273 30 14.3	93 45 57.0	4.588357
Ripshin.....	315 13 20.5	135 22 35.7	4.511802
Red Rock.....	50 05 22.9	229 58 33.5	4.341566

PEAK.

In Pulaski Co., Va., on Peak Creek Knob, 3 miles southeast of
Pulaski City, on Norfolk and Western Railroad.

Permanent mark: Long-leaved pine on edge of cliff, with blaze on
southeast side of foot.

[Latitude, 37° 01' 22". Longitude, 80° 44' 54".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Draper.....	64 39 03.3	244 33 38.9	4.168954
Big Bend.....	90 51 17.9	270 35 37.3	4.586716
Buckhorn.....	145 32 52.3	325 24 28.0	4.560481
Salt Pond.....	207 11 47.9	27 19 26.7	4.611519
Streets.....	252 22 18.7	72 42 25.2	4.714273
Buffalo.....	316 04 45.7	136 14 31.5	4.542365

STONE QUARRY.

In Estill Co., Ky., 7 miles south of Irvine; west of station Camp
Creek. Summit cleared on north side. Lanes cut through timber on
other sides.

Permanent mark: Oak tree, east of summit.

[Latitude, 37° 37' 56''-2. Longitude, 84° 02' 33''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pilot (2).....	196 57 38	17 01 35	4·51120
High Rocks	233 14 05	53 23 50	4·46560
Richmond	118 10 05	298 00 37	4·411876

BEAR.

In Madison Co., Ky., 5 miles east of Berea, on Louisville and Nashville Railroad. Wagon road within 300 yards of station; all timber cut down. Permanent mark: Chestnut oak stump, 5 feet high.

[Latitude, 37° 32' 08''-9. Longitude, 84° 15' 21''-3.]

To stations.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Richmond	170 11 41·0	350 10 03·0	4·365480
Pilot (2).....	214 02 34·0	34 14 21·0	4·702669
Lancaster	108 09 36·0	287 57 47·0	4·477008
Brushy.....	34 47 27·0	214 41 04·0	4·34232

LANCASTER.

Station on top of court-house, Lancaster, Garrard Co., Ky.
Permanent mark: Center of cupola.

[Latitude, 37° 37' 10''-5. Longitude, 84° 34' 43''-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Richmond	240 58 15	61 08 27	4·447482
Bear.....	287 57 47	108 09 36	4·477008
Sand.....	66 48 27	246 37 49	4·446153
Brushy	337 29 52	157 35 16	4·534883

SAND.

In Casey Co., Ky., near corner of Casey, Lincoln, and Boyle counties, 6 miles southwest of Junction City. Wagon road to station. Summit cleared of timber.

Permanent mark: Charred stump of tree, 15 feet high.

[Latitude, 37° 31' 12''-4. Longitude, 84° 52' 08''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lancaster	246 37 49	66 48 27	4·446153
Brushy	297 49 39	118 05 38	4·642653
Green River.....	356 59 50	177 00 42	4·609318

BRUSHY.

In Rockcastle Co., Ky., at head of Brushy Creek, 7 miles southwest of Mount Vernon, Rockcastle Co. Summit cleared of timber.

Permanent mark: Tripod of saplings.

[Latitude, 37° 20' 04"·5. Longitude, 84° 25' 51"·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lancaster.....	157 35 16	337 29 52	4 534383
Bear.....	214 41 04	34 47 27	4 434232
Sand.....	118 05 38	297 49 39	4 642653
Green River.....	61 32 39	241 17 36	4 621760

GREEN RIVER.

Not occupied. In Casey Co., Ky., near Pulaski Co. line, 15 miles west of Somerset. Houses near by. Summit cleared on south side, field full of dead trees on north side.

Permanent mark: Lone dead tree.

[Latitude, 37° 09' 14"·9. Longitude, 84° 50' 42"·5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sand.....	177 00 42	356 59 50	4 609318
Brushy.....	241 17 36	61 32 39	4 621760

RICHMOND.

In Madison Co., Ky. Station on main building of Richmond University. Instrument set on chimney and angles reduced to flagstaff. Connection made with astronomical station U. S. C. & G. S.

Permanent mark: Flagstaff.

[Latitude, 37° 44' 30"·4. Longitude, 84° 18' 02"·64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pilot(2).....	239 30 48	59 44 16	4 572089
Stone Quarry.....	298 00 37	118 10 05	4 411878
Bear.....	350 10 03	170 11 41	4 365480
Lancaster.....	61 08 27	240 58 15	4 447482

WILLOUGHBY.

In Montgomery Co., Ky., 10 miles south of Mount Sterling. Station on the north side of summit in a field full of dead trees; south side

entirely cleared. Mr. Willoughby lives about one-half mile from the summit.

Permanent mark: Small oak tree.

[Latitude, $37^{\circ} 55' 39''$.8. Longitude, $83^{\circ} 53' 07''$.6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Ballard.....	272 19 44	92 26 20	4 19743
High Rocks.....	328 02 21	148 06 21	4 25704

RACCOON.

In Laurel Co., Ky., 6 or 7 miles east of London. Lafayette McDaniel lives near station. Summit cleared of timber.

Permanent mark: A dead chestnut tree.

[Latitude, $37^{\circ} 09' 04''$.3. Longitude, $83^{\circ} 59' 29''$.6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
King.....	15 07 57	195 04 18	4 539352
Paint Gap.....	302 32 21	122 46 11	4 606811
High Knob.....	217 32 55	37 36 20	4 137989
Hunter.....	216 38 35	36 46 33	4 512155
Pilot (1).....	242 59 12	63 04 52	4 193329
Orchard.....	272 10 32	92 19 50	4 358185

ORCHARD.

Station in peach orchard belonging to Gen. Garrard, 4 miles from Manchester, Clay Co., Ky. Summit entirely cleared.

Permanent mark: Scaffold 40 feet high.

[Latitude, $37^{\circ} 08' 35''$.2. Longitude, $83^{\circ} 44' 05''$.8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Paint Gap.....	331 44 57	151 49 31	4 375560
Raccoon.....	92 19 50	272 10 32	4 358185
Pilot (1).....	131 58 16	311 54 38	4 076677

PILOT (1).

At head of Rudder Creek, Clay Co., Ky., 8 miles northwest of Manchester. All timber cut down except three small trees, middle one of which is the signal.

Permanent mark: Small tree.

[Latitude, 37° 12' 53''-8. Longitude, 83° 50' 05''-6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Orchard	311 54 38	131 58 16	4-076677
Raccoon	63 04 52	242 59 12	4-193329
Rice	231 06 12	51 15 01	4-440279
High Knob	124 37 12	304 34 57	3-826928
Hunter	196 14 54	16 17 10	4-296360

PILOT (2).

Three miles north of Clay, Powell Co., Ky., near head of Black Creek.

[Latitude, 37° 51' 42''-68. Longitude, 83° 56' 05''-64.]

To station	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Richmond	59 44 16	239 30 48	-----
Stone Quarry	17 01 35	196 57 38	4-511200
Bear	34 14 21	214 02 34	4-702669
Mount Sterling	181 16 06	1 16 15	4-209860

HIGH KNOB.

Near corner of Jackson, Owsley, Clay, and Laurel counties, Ky., near head of Sexton Creek, 14 miles northwest of Manchester Summit. Cleared of timber.

Permanent mark: Oak tree.

[Latitude, 37° 14' 57''-6. Longitude, 83° 53' 49''-7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Raccoon	37 36 20-0	217 32 55-0	4-137989
Pilot	304 34 57-0	124 37 12-0	3-826928

HUNTER.

At head of Island Creek, Owsley Co., Ky., three-fourths of a mile north of Island Creek Knob, 15 miles southwest of Booneville Summit, cleared.

Permanent mark: White oak tree.

[Latitude, 37° 23' 10''-0. Longitude, 83° 46' 26''-6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pilot (1)	16 17 10	196 14 54	4-296360
Raccoon	36 46 33	216 38 35	4-512155
Gross	229 27 41	49 34 15	4-321085
Rose	246 37 16	66 45 12	4-322187
Rice	276 06 10	96 12 42	4-204182

RICE.

On divide at head of Indian and Buffalo creeks, in Owsley Co., Ky. Is best reached from Booneville by road up Indian Creek. Wagon road runs within 1 mile of station. Summit partly cleared.

Permanent mark: Scaffold built on eight white oak trees.

[Latitude, 37° 22' 14"·3. Longitude, 83° 35' 33"·9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pilot (1)	51 15 01	231 06 12	4·440279
Hunter	96 12 42	276 06 10	4·204182
Gross	189 07 54	00 07 55	4·185112

TURKEY.

Near head of Buck Creek, 5 miles southwest of Booneville, Owsley Co., Ky. Summit not cleared on the west side. Wagon road to Mr. Brandenburg's, one-half mile from summit.

Permanent mark: A slender hickory tree.

[Latitude, 37° 27' 16"·3. Longitude, 83° 44' 26"·8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gross	245 20 58	65 26 23	4·159544
Rose	267 25 41	87 32 29	4·217351

ROSE.

On line between Owsley and Breathitt counties, Ky. On divide between Meadow and Turkey creeks, 9 miles east of Booneville. Wagon road runs one-half mile north of station. John Terry lives 1½ miles east of station. Observations were made from a 20-foot platform.

Permanent mark: A chestnut oak tree.

[Latitude, 37°, 27', 39"·7. Longitude, 83°, 33', 16"·3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hunter	66 45 12	246 37 16	4·322187
Gross	147 41 30	327 40 07	3·796433
Nailor	268 32 58	88 38 01	4·088108
Turkey	87 32 29	267 25 41	4·217351

NAILOR.

In Breathitt Co., Ky., at head of Cane Creek and Canoe Fork, 9 miles south of Jackson. A high bare rock. Roger Spicer lives one-half mile from station on Canoe Fork.

Permanent mark: A scrubby chestnut tree.

[Latitude, 37° 27' 49"·5. Longitude, 83° 24' 58"·0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rose	88 38 01	268 32 58	4·088108
Gross	107 47 46	287 51 20	4·213942
Nelson	162 29 08	342 25 24	4·475289
High Rocks	138 44 18	318 31 05	4·682865
Hogtown	240 28 09	60 40 38	4·539877
Cope	206 49 01	26 52 45	4·300015

GROSS.

At head of north fork of Meadow Creek, on line between Owsley and Breathitt counties, Ky., 8 miles northeast of Boonville. Col. Wm. Wilson lives near station. Not cleared on highest summit. Clearing 100 yards southwest and 40 feet lower than highest summit.

Permanent mark : Chestnut oak.

[Latitude, 37° 30' 31''-1. Longitude, 83° 35' 32''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rice	00 07 55	180 07 54	4 185112
Hunter	49 34 15	229 27 41	4 321085
Cope	242 22 44	62 32 55	4 442788
Nailor	287 41 20	107 47 46	4 213942
Rose	327 40 07	147 41 30	3 796433
Turkey	65 26 23	245 20 58	4 159544

COPE.

At head of Frozen Creek, branch of Cope's Fork, in Breathitt Co., Ky. Capt. Cope lives 2 miles from station. Summit cleared except on north side.

Permanent mark : Hickory tree.

[Latitude, 37° 37' 26''-9. Longitude, 83° 18' 51''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nailor	26 52 45	206 49 01	4 300015
Gross	62 32 55	242 22 44	4 442788
Nelson	120 45 31	300 38 02	4 320641
High Rocks	114 21 47	294 04 46	4 650713
Hogtown	272 00 57	92 09 43	4 325746

NELSON.

Two miles southeast of Campton, Wolf Co., Ky., on divide between Stillwater, Swift Camp, and Upper Devil creeks. Summit cleared on south and west ends. Instrument on 45-foot scaffold.

[Latitude, 37° 43' 13''-4. Longitude, 83° 31' 05''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cope	300 38 02	120 45 31	4 320641
Nailor	342 25 24	162 29 08	4 475289
Ballard	143 29 24	323 22 28	4 444551

HIGH ROCKS.

In Powell Co., Ky., near Estill Co. line, 4 miles east of Estill furnace. Summit a bare rock.

Permanent mark: Pine tree trimmed up.

[Latitude, 37° 47' 22".3. Longitude, 83° 46' 36".7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cope.....	294 04 46	114 21 47	4·650713
Nailor.....	318 31 05	138 44 18	4·682865
Ballard.....	202 51 47	22 54 23	4·20244
Coburn.....	194 54 31	14 56 17	4·21478
Willoughby.....	148 06 21	328 02 21	4·25704
Stone Quarry.....	53 23 50	233 14 05	4·46560

BALLARD.

In Menifee Co., Ky., on west end of Ballard Knob. Dick Powell (guide) lives 1½ miles southeast of Rothwell Station, on coal road. Instrument on 25-foot platform.

Permanent mark: 25-foot stump.

[Latitude, 37° 55' 18".4. Longitude, 83° 42' 23".1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nelson.....	323 22 28	143 29 24	4·444551
High Rocks.....	22 54 23	202 51 47	4·20244
Coburn.....	120 28 25	300 27 35	3·35970
Willoughby.....	92 28 20	272 19 44	4·19743

COBURN.

Two miles south of Rothwell Station on coal railroad, Menifee Co., Ky. Dick Powell (guide) lives at foot. Timber all cut down.

Permanent mark: Large pine tree trimmed up.

[Latitude 37° 55' 56".2. Longitude 83° 43' 43".9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ballard.....	300 27 35	120 28 25	3·35970
High Rocks.....	14 56 17	194 54 31	4·21478
Mount Sterling...	128 13 46	308 06 18	4·35341

SHORT.

In Hawkins Co., Tenn. On highest part of Short Mountain, 16 miles northeast of Morristown, Tenn. Summit is flat, requiring much chopping.

Permanent mark: Large oak tree standing alone on highest part.

[Latitude, 36° 22' 52".6. Longitude, 83° 10' 45".8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
House.....	60 39 14·1	240 18 24·1	4·782893
McLean.....	93 44 41·8	278 17 58·2	4·832847
White Rock.....	142 24 47·5	322 15 05·7	4·599886
War Gap.....	224 59 04·6	45 04 29·9	4·285132
Chucky.....	329 08 24·4	149 18 28·7	4·693762
English.....	11 20 20·8	191 16 09·7	4·734850

WAR GAP.

In Hawkins Co., Tenn., on Clinch Mountain, one-fourth of a mile west of gap of same name. There is a wagon road to within one-fourth of a mile of station; the remaining distance has to be traversed on foot. Rogersville, Tenn., 11 miles distant, is nearest railroad station.

Permanent mark: Small cedar tree.

[Latitude, $36^{\circ} 30' 14''$.7. Longitude, $83^{\circ} 01' 38''$.0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
White Rock	115 22 11.1	295 07 01.9	4.622433
Short	45 04 29.9	224 59 04.6	4.285132
Grays Knob	143 16 41.0	323 07 15.0	4.594655

DRAPER.

In Wythe Co., Va., on knob at west end of Draper Mountain, 12 miles by road and trail east of Wytheville, Va. Summit cleared.

Permanent mark: Tall chestnut left standing on summit.

[Latitude, $36^{\circ} 57' 56''$.7. Longitude, $80^{\circ} 53' 53''$.5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Buffalo	296 31 07.1	116 46 16.1	4.622859
Rich	351 25 20.7	171 27 57.3	4.639612
Lookout	56 06 02.8	215 56 21.7	4.611367

CLINCH.

On Clinch Mountain, north of Little Moccasin Gap and 13 miles northwest of Abingdon, Va., on county line between Russell and Washington counties, Va. Summit nearly level for one-eighth of a mile.

Permanent mark: Large sugar maple tree.

[Latitude, $36^{\circ} 49' 44''$.5. Longitude, $82^{\circ} 04' 46''$.0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Big Butt	188 56 41.1	8 58 16.1	4.399896
Red Rock	246 55 06.6	67 04 57.1	4.422822
Holston	359 44 24.8	179 44 29.3	4.615067
High Knob	98 20 19.3	278 00 31.5	4.695063

RED ROCK.

In Smyth Co., Va., 5 miles northwest of Saltville. This town, on branch of Norfolk and Western Railroad, is the nearest railroad station.

Permanent mark: Dead tree on northern edge of summit.

[Latitude, 36° 55' 20''-0. Longitude, 81° 48' 22''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Morris.....	229 58 33.5	50 05 22.9	4.341566
Ripshin.....	282 37 16.0	102 53 18.8	4.609925
Rogers.....	321 13 35.1	141 22 58.1	4.571462
Clinch.....	67 04 57.1	246 55 06.6	4.422822

RIPSHIN.

In Smyth Co., Va., on Ripshin Mountain, east of Marion, Va. Summit a long, wooded ridge. Much timber still standing back from signal. Permanent mark: Oak tree on east end of ridge.

[Latitude, 36° 50' 28''-3. Longitude, 81° 21' 37''-8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Big Bend.....	217 30 32.1	37 36 57.5	4.415592
Lookout.....	318 04 45.4	138 11 41.1	4.411971
Rogers.....	39 23 32.0	219 16 54.6	4.414834
Red Rock.....	102 53 18.8	282 37 16.0	4.609925

BUFFALO.

A triangulation station of the U. S. C. & G. S. in Floyd Co., Va., on a rocky ridge, about 150 yards long, with no trees on the top. This ridge has two rocky elevations, one at the west end and the other at the east end of the ridge. The station is at the west end.

Permanent mark: Copper bolt driven into the solid rock.

[Latitude, 36° 47' 46''-26. Longitude, 80° 28' 39''-05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Moore (C. & G. S.)	338 26 35.5	158 33 32.7	4.6763536
Rich.....	52 05 47.1	231 53 18.6	4.596347
Draper.....	116 46 16.1	296 31 07.1	4.622859
Poore.....	36 25 06.9	216 00 55.1	5.0132543

LOOKOUT.

In Grayson Co., Va., 3 miles by road and trail north of Independence, Va., and 28 miles south of Wytheville, Va. Station on bluff of western summit. Top is nearly level and heavily timbered,

Permanent mark: Oak tree.

[Latitude, 36° 40' 04''·5. Longitude, 81° 10' 03''·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rich	288 07 25·3	108 19 39·8	4·507986
Bullhead	339 46 04·1	159 49 40·0	4·416687
Draper	215 56 21·7	36 06 02·8	4·611367
Ripshin	138 11 41·1	318 04 45·4	4·511971
Negro	42 09 07·5	221 58 33·2	4·597278
Rogers	88 37 51·8	268 24 20·4	4·528367

ROGERS.

On Mount Rogers, Balsam Mountains, Grayson Co., Va. Marion, Va., is nearest railroad station, 25 miles distant. Summit is very flat and covered with balsam timber, through which lines of sight were cut to other stations.

Permanent mark: Balsam tree on highest part.

[Latitude, 36° 39' 36''·1. Longitude, 81° 32' 42''·0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ripshin	219 16 54·6	39 23 32·0	4·414834
Lookout	268 24 20·4	88 37 51·8	4·528367
Negro	345 36 45·9	165 39 40·6	4·408604
Red Rock	141 22 58·1	321 13 35·1	4·571462
Snake	21 49 15·4	201 43 26·8	4·594754

WHITE TOP.

On mountain of same name, near corner of Washington, Smyth, and Grayson counties, Va. Marion, 25 miles distant, is the nearest railroad station. The summit is very flat and covered with balsam timber.

Permanent mark: Lone tree on edge of cliff on eastern end of summit.

[Latitude, 36° 38' 21''·76. Longitude, 81° 36' 12''·48.]

MOORE.

A triangulation station of the U. S. C. & G. S., on Moore Knob, 7 miles by road and trail west of Danbury, Stokes Co., N. C.

[Latitude, 36° 23' 53''·60. Longitude, 80° 16' 59''·24.]

Station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Young	24 13 35·34	204 00 42·94	4·9049408
Buffalo	158 33 32·74	338 26 35·52	4·6763536
Rich	112 22 41·40	292 03 20·20	4·7201740
Bullhead	94 38 57·10	274 11 01·80	4·8481660
Poore	63 50 32·92	243 19 34·44	4·9430262

TURKEY COCK.

Sixteen miles west of Chatham and near Calland, near county line of Franklin, Henry, and Pittsylvania counties, Va. Summit cleared of timber.

Permanent mark: A lone chestnut oak.

[Latitude, $36^{\circ} 50' 11''$. Longitude, $79^{\circ} 39' 28''$.25.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cahas.....	134 27 50	314 14 55	4.649021
Smith.....	202 31 56	22 35 15	4.329907
White Oak.....	303 10 14	123 18 33	4.392873

WHITE OAK.

Nine miles south of Chatham, 7 miles northwest of Danville, in Pittsylvania Co., Va. Summit cleared on north end. Mr. Johnson lives on summit.

Permanent mark: Chestnut oak tree.

[Latitude, $36^{\circ} 42' 51''$.8. Longitude, $79^{\circ} 25' 34''$.9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Turkey Cock.....	123 18 33	303 10 14	4.392873
Smith.....	159 33 18	339 28 17	4.550606

RICH.

On Blue Ridge 12 miles north of Fisher Peak, in Patrick Co., Va. Summit flat and timbered.

Permanent mark: Oak tree.

[Latitude, $36^{\circ} 34' 37$.6. Longitude, $80^{\circ} 49' 31''$.9.]

To station.	Azimuth.	Black azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Buffalo.....	231 53 18.6	52 05 47.1	4.596347
Moore.....	292 03 20.2	112 22 41.4	4.720174
Draper.....	171 27 57.3	351 25 20.7	4.639612
Lookout.....	108 19 39.8	288 07 25.3	4.507986
Bullhead.....	56 21 41.2	236 13 04.3	4.414766

BULLHEAD.

On Blue Ridge on the boundary between Alleghany and Wilkes counties, N. C., a few miles southeast of Sparta.

Permanent mark: A few small trees standing together.

[Latitude, $36^{\circ} 26' 49''$.7. Longitude, $81^{\circ} 04' 00''$.7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rich.....	236 13 04.3	56 21 41.2	4.414766
Moore.....	274 11 01.8	94 38 57.1	4.848166
Lookout.....	159 49 40.0	339 46 04.1	4.416687
Negro.....	82 18 58.2	262 04 50.3	4.555147
Poore.....	10 19 40.6	190 16 29.3	4.654910

NEGRO.

Two miles south of Jefferson, Ashe Co., N. C. There is a trail part way up the mountain, but last half mile is very steep and rocky and must be walked.

Permanent mark: Small tree on highest point.

[Latitude, 36° 24' 11"·6. Longitude, 81° 27' 48"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rogers	165 39 40·6	345 36 45·9	4·468604
Lookout	221 58 33·2	42 09 07·5	4·597278
Bullhead	262 04 50·3	82 18 58·2	4·555147
Snake	69 57 38·3	249 48 56·8	4·368287
Pooro	325 02 01·2	145 12 53·9	4·683388

SNAKE.

Station is in Watauga Co., N. C., very near Tennessee line. Abingdon, Va., is perhaps the most convenient railroad station, but is about 45 miles distant. Summit is a long, barren, rocky ridge. A guide and accommodations can be had at Lionsville, at the head of Cove Creek, 5 miles from station.

Permanent mark: Hole drilled in rock.

[Latitude, 36° 19' 51"·1. Longitude, 81° 42' 28"·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rogers	201 43 26·8	21 49 15·4	4·594754
Negro	249 48 56·8	69 57 38·3	4·368287
Pooro	302 18 29·7	122 38 01·1	4·769059
Grandfather	20 45 23·1	200 41 45·2	4·415328
Roan	56 09 16·3	235 54 34·5	4·652679
Holston	113 05 39·5	292 52 30·3	4·556433

HOLSTON.

In Carter and Sullivan counties, Tenn., on range of same name, 16 miles by road southeast of Bristol, Tenn.

Permanent mark: Large oak tree.

[Latitude, 36° 27' 27"·3. Longitude, 82° 04' 38"·5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
High Knob	134 31 23·4	314 11 36·2	4·839025
Chinch	179 44 29·3	359 44 24·8	4·615067
Snake	292 52 30·3	113 05 39·5	4·556433
Roan	5 54 31·1	185 52 55·2	4·505290
Chimney Top	84 57 09·8	264 14 44·2	4·753608

HIGH KNOB.

On Powell Mountain, at the head of Stony Creek, and on the line between Scott and Wise counties, Va., 22 miles north of Gate City.

Permanent mark: Lone tree.

[Latitude, $36^{\circ} 53' 33''$. Longitude, $82^{\circ} 37' 46''$.1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Big Butt.....	251 15 26.3	71 36 52.2	4.746547
Clinch.....	278 00 31.5	98 20 19.3	4.695063
Chimney Top.....	7 20 44.0	187 17 57.9	4.734033
Holston.....	314 11 36.2	134 31 23.4	4.839025

LONG SPUR.

In Harlan Co., Ky., on Black Mountain, near the mouth of Clover Lick Creek, branch of Poor Fork of the Cumberland River.

Permanent mark: Large bushy oak $2\frac{1}{2}$ feet in diameter.

[Latitude, $36^{\circ} 56' 22''$.4. Longitude, $83^{\circ} 02' 30''$.5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gray.....	52 53 11	232 44 14	4.444875
Paint Gap.....	92 03 39	271 43 12	4.703587
Harlan.....	79 35 10	259 25 14	4.397712

GRAY.

In Harlan Co., Ky., on Little Black Mountain, 6 miles by road south of Harlan. Knob is sharp and top is well cleared.

Permanent mark: Double oak tree.

[Latitude, $36^{\circ} 47' 16''$.2. Longitude, $83^{\circ} 17' 26''$.4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
War Gap.....	323 07 15	143 16 41	4.594655
White Rocks.....	46 29 55	226 24 10	4.295623
Long Spur.....	232 44 14	52 53 11	4.444875
Harlan.....	168 57 46	348 56 48	4.097454
Paint Gap.....	123 12 27	303 01 00	4.529809

HARLAN.

In Harlan Co., Ky., on Pine Mountain, 3 miles north of the town of Harlan. Trail from Harlan to Hazard passes near station.

Permanent mark: White oak 2 feet in diameter.

[Latitude $36^{\circ} 53' 54''$.7. Longitude $83^{\circ} 19' 03''$.1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Long Spur.....	259 25 14	79 35 10	4.397712
Gray.....	348 56 48	168 57 46	4.097454

PAINT GAP.

At the head of Goose Creek, branch of South Fork of Kentucky River and Stinking Creek, of Cumberland River. On boundary between Clay and Knox counties, Ky., 20 miles by road north-north-east of Pineville. Knob is well cleared.

Permanent mark: Large oak tree to northwest of summit.

[Latitude, 36° 57' 16"·5. Longitude, 83° 36' 31"·8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gray	303 01 00	123 12 27	4·529809
White Rocks	336 15 36	156 21 17	4·544900
Long Spur.....	271 43 12	92 03 39	4·703587

MCLEAN.

In Claiborne Co., Tenn., on Cumberland Mountain, 20 miles southwest of Cumberland Gap. Caryville, Tenn., on Kanawha and Ohio Railroad, is the nearest railroad station, distant 20 miles.

Permanent mark: Dead chestnut tree, 80 feet north of cliff.

[Latitude, 36° 28' 19"·8. Longitude, 83° 55' 47"·5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
House	339 48 23·4	159 54 11·3	4·629186
White Rocks.....	243 18 36·3	63 35 43·5	4·680563
Short	278 17 58·2	98 44 41·8	4·832847
King.....	160 52 57·0	340 47 07·0	4·647229
Cross.....	41 48 22·1	221 37 39·3	4·609123

WHITE ROCKS.

In Lee Co., Va., and Harlan Co., Ky., on Cumberland Mountain, 12 miles northeast of Cumberland Gap, and on the Kentucky and Virginia State line.

Permanent mark: Lone, dead, chestnut tree.

[Latitude, 36° 39' 54"·7. Longitude, 83° 27' 03"·3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
McLean	63 35 43·5	243 18 36·3	4·680563
War Gap	295 07 01·9	115 22 11·1	4·622433
Short	322 15 05·7	142 24 47·5	4·599886
Gray	226 24 10·0	46 29 55·0	4·295623
Paint Gap.....	156 21 17·0	336 15 36·0	4·544900
King	109 52 31·0	289 29 28·0	4·784457

KING.

In Whitley Co., Ky., 2 miles from Brummett Station, on Louisville and Nashville Railroad. Summit cleared of timber.

Permanent mark: Hickory tree.

[Latitude, $36^{\circ} 59' 59''$. Longitude, $84^{\circ} 05' 34''$.4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
White Rocks	289 29 28	109 52 31	4·784457
McLean	340 47 07	160. 52 57	4·647229
Paint Gap	254 47 58	75 05 24	4·650120

ROAN.

On the summit of Roan Mountain in Mitchell Co., N. C., and Carter Co., Tenn., on State line. Reached from Roan Mountain station, on East Tennessee and Western North Carolina Railroad, by regular stage line in summer, distant 12 miles. Station locally known as "High Knob."

Permanent mark: "B" cut in rock on highest point.

[Latitude, $36^{\circ} 06' 16''$.4. Longitude, $82^{\circ} 07' 20''$.6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mitchell	18 54 52·4	198 49 50·8	4·600175
Big Bald	69 06 27·5	248 53 28·2	4·550354
Chimney Top.....	122 50 21·7	302 29 37·7	4·795078
Holston	185 52 55·2	5 54 31·1	4·595299
Snake	235 54 34·5	56 09 16·3	4·652679
Table Rock.....	317 36 15·2	137 44 41·6	4·505777
Grandfather.....	268 19 43·8	88 30 46·0	4·448944

CHIMNEY TOP.

In Sullivan, Greene, and Hawkins counties, Tenn., on a spur of Bays Mountain, 16 miles northwest of Jonesboro, Tenn. A road and trail lead to eastern end of summit; the rest of the distance is very steep and rocky, and can not be ridden over.

Permanent mark: Pine tree just below summit.

[Latitude, $36^{\circ} 24' 28''$.9. Longitude, $82^{\circ} 42' 24''$.2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
High Knob.....	187 17 57·9	7 20 44·0	4·734033
Holston.....	264 14 44·2	84 37 09·8	4·753608
Big Bald.....	337 10 27·8	157 18 08·1	4·701716
Roan	302 29 37·7	122 50 21·7	4·795078

CROSS.

In Campbell and Anderson counties, Tenn., on Cross Mountain, 6 miles from Coal Creek station, on the Knoxville and Ohio Railroad. Summit is flat, bald in center, but heavily timbered around the edge.

Permanent mark: Large oak tree, from which lines of sight were cut out.

[Latitude, $36^{\circ} 11' 55'' \cdot 2$. Longitude, $84^{\circ} 13' 52'' \cdot 3$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
McLean	221 37 39·3	41 48 22·1	4·609123
House	282 49 46·2	103 06 12·9	4·632455
Melton	11 45 21·6	191 42 45·0	4·515224

HOUSE.

In Knox Co., Tenn., on House Mountain, 12 miles by road northeast of Knoxville, Tenn. Summit is sparsely timbered with pine; timber near the station has been cut down.

Permanent mark: Bolt in rock, set by the U. S. C. & G. S.

[Latitude, $36^{\circ} 06' 42'' \cdot 9$. Longitude, $83^{\circ} 45' 59'' \cdot 9$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
English.....	298 47 11·1	119 03 43·7	4·684020
Chilhowee (1).....	358 53 11·2	178 53 28·7	4·585295
Melton	65 20 59·9	245 02 00·1	4·728210
McLean	159 54 11·3	339 48 23·4	4·629186
Short.....	240 18 24·1	60 39 14·1	4·782893
Cross	103 06 12·9	282 49 46·2	4·632455

POORE.

A triangulation station of the U. S. C. & G. S. in Alexander and Wilkes counties, N. C., on Poore Knob, of Brushy Mountain, 9 miles south-southeast of Wilkesboro, N. C., and 35 miles northwest of Statesville, on railroad. Moravian Falls is a good place to stop, from which there is a road and trail to station, a distance of 5 miles.

Permanent mark: Marble block 6 by 6 by 30 inches.

[Latitude, $36^{\circ} 02' 47'' \cdot 66$. Longitude, $81^{\circ} 09' 24'' \cdot 25$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Negro	145 12 53·9	325 02 01·2	4·683388
Bull Head	190 16 29·3	10 19 40·6	4·654910
Buffalo	216 00 55·17	36 25 06·97	5·0132543
Moore	243 19 34·44	63 50 32·92	4·9430292
Young.....	306 34 59·21	126 52 53·88	4·7580426
Bem	40 35 53·13	220 18 12·26	4·8461656
Snake	122 38 01·1	302 18 29·70	4·769059
Grandfather.....	97 10 24·1	276 47 18·6	4·773093

GRANDFATHER.

This station is the highest point anywhere on the Blue Ridge, being nearly 6,000 feet high. It is at the corner of Caldwell, Watauga, and

Mitchell counties, N. C. The nearest railroad stations are Lenoir to southeast and Cranberry to the northwest. The last 1,500 feet of ascent is very difficult and can not be made on horseback.

Permanent mark: A balsam tree.

[Latitude, 36° 06' 41''-5. Longitude, 81° 48' 36''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Roan	88 30 46·0	268 19 43·8	4·448944
Snake	200 41 45·2	20 45 23·1	4·415328
Poore	276 47 18·6	97 10 24·1	4·773093
Benn	347 21 59·0	167 27 14·8	4·793092
Table Rock	15 02 31·7	194 59 57·6	4·403691
Hibriten	308 02 44·3	128 14 02·7	4·565110

TABLE ROCK.

In Burke Co., N. C. This station is on a lofty spur of the Blue Ridge. It can be reached from Morganton, N. C., by good road, 16 miles. The last 600 feet is very steep and rocky and must be walked.

Permanent mark: Cross cut in rock on highest part.

[Latitude, 35° 53' 27''-7. Longitude, 81° 52' 59''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mitchell	68 02 55·9	247 49 30·8	4·571149
Roan	137 44 41·6	317 36 15·2	4·505777
Grandfather	194 59 57·6	15 02 31·7	4·403691
Benn	330 48 04·5	150 55 52·5	4·616723

HIBRITEN.

In Caldwell Co., N. C. This station is on Brushy Mountain, a few miles east of Lenoir.

Permanent mark: A large hickory tree near southwest end of summit.

[Latitude, 35° 54' 25''-4. Longitude, 81° 29' 22''-7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Benn	22 13 11·4	202 07 12·3	4·612200
Grandfather	128 14 02·7	308 02 44·3	4·565110

YOUNG.

A triangulation station of the U. S. C. & G. S. in Rowan Co., N. C.

[Latitude, 35° 44' 14''-49. Longitude, 80° 38' 51''-17.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Poore	126 52 53·88	306 34 59·21	·7586426
Moore	204 00 42·94	24 13 35·34	4·9049408

BENN.

A station of the U. S. C. & G. S. in Cleveland, Burke Co., N. C., on South Mountain, 18 miles south of Morganton.

Permanent mark: A marble block 6 by 6 by 30 inches with U. S. C. S. cut on top.

[Latitude, 35° 33' 55"·06. Longitude, 81° 39' 37"·56.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Hogback	52 44 45·02	232 22 51·79	4·8581240
Mitchell	112 11 53·80	291 50 44·60	4·7713100
Table Rock	150 55 52·50	330 48 04·50	4·6167230
Grandfather	167 27 14·80	347 21 59·00	4·7930920
Poore	220 18 12·26	40 35 53·13	4·8461656
Wofford	20 28 12·08	200 18 41·01	4·8559012
Hibriten	202 07 12·30	22 13 11·40	4·6122000
King	321 21 36·22	141 33 41·23	4·7051366

KING.

A triangulation station of the U. S. C. & G. S. in Gaston Co., N. C.

[Latitude, 35° 12' 27"·87. Longitude, 81° 18' 45"·59.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Benn	141 33 41·23	321 21 36·22	4·7051366
Young	225 34 52·15	45 58 01·68	4·9255300

ENGLISH.

In Jefferson and Cocke counties, Tenn. On highest part of English Mountain, 10 miles southwest of Newport, Tenn. Mountain is flat and nearly level for a long distance. It is heavily wooded and is not a good station.

Permanent mark: A tall oak tree, from which lines of sights were cut in the directions of the other stations.

[Latitude, 35° 54' 04"·9. Longitude, 83° 17' 51"·5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Chilhowee (1)	70 10 49·9	249 54 38·9	4·646266
House	119 03 43·7	298 47 11·1	4·684020
Short	191 16 09·7	11 20 20·8	4·734850
Chucky	254 01 41·9	74 15 52·6	4·576996

CHUCKY.

In Greene Co., Tenn., on an outlying range of bald mountains, 15 miles south-southeast of Greenville, Tenn.

Permanent mark: Small tree just below summit.

[Latitude, 35° 59' 39".5. Longitude, 82° 53' 42".3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
English	74 15 52.6	254 01 41.9	4.576996
Short	149 18 28.7	329 08 24.4	4.698762

BIG BALD.

On State line, at the corner of Unicoi Co., Tenn., and Madison and Yancey counties, N. C. Jonesboro, Tenn., is nearest railroad station. No trees on summit and no permanent mark.

[Latitude, 35° 59' 23".5. Longitude, 82° 29' 25".0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Chimney Top.....	157 18 08.1	337 10 27.8	4.701716
Sandymush.....	45 54 47.0	225 40 57.8	4.695401
Mitchell.....	320 46 10.4	140 54 05.4	4.507746
Roan.....	248 53 28.2	69 06 27.5	4.550354

MITCHELL.

In Yancey Co., N. C. The highest summit of Black Mountain and the highest peak east of the Rocky Mountains. The nearest railroad station is Black Mountain station on Western North Carolina Railroad. From there a road and trail lead to the summit, 18 miles distant. Very little timber obstructs the view from this station.

No permanent mark.

[Latitude, 35° 45' 53".6. Longitude, 82° 15' 54".5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hogback	2 01 02.1	182 00 08.8	4.819174
Pisgah.....	49 57 35.4	229 04 25.1	4.765870
Sandymush.....	80 26 03.2	260 04 20.0	4.754281
Big Bald.....	140 54 05.4	320 46 10.4	4.507746
Benn.....	291 50 44.6	112 11 53.8	4.771310
Table Rock.....	247 49 30.8	68 02 55.9	4.571149
Roan.....	198 49 50.8	18 54 52.4	4.600175

BALSAM.

In Jackson and Haywood counties, N. C., on Balsam Mountain, 12 miles by road and trail south of Waynesville, N. C. Horses can be ridden to within 2 miles of the summit, but the remaining distance must be walked on account of fallen timber.

Permanent mark: Lone balsam tree.

[Latitude, 35° 22' 02".1. Longitude, 82° 59' 24".7.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	c	'	"	o	'	"	
Sandymush.....	195	36	18.2	15	40	00.9	4.554261
Pisgah.....	252	55	22.4	73	03	29.0	4.345752
Rabun.....	32	24	58.9	212	14	17.1	4.722187
Pinnacle.....	328	29	12.1	148	37	47.9	4.637371
Cowee.....	82	10	14.9	261	58	14.6	4.501722

PISGAH.

In the southwest corner of Buncombe and Haywood counties, N. C. It is best reached from Asheville. Summit is very sharp and rocky. The instrument was set on the highest point and no signal was used or permanent mark left.

[Latitude, 35° 25' 32".5. Longitude, 82° 45' 24".6.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Sandymush.....	157	42	50.3	337	38	24.7	4.481298
Mitchell.....	229	40	25.1	49	57	35.4	4.765870
Balsam.....	73	03	29.0	252	55	22.4	4.345752
Pinnacle.....	358	19	37.2	178	11	08.7	4.638736
Hogback.....	303	38	20.9	123	54	30.7	4.707685

SANDYMUSH.

In Buncombe, Haywood, and Madison counties, N. C., on Newfound range, distant 26½ miles from Asheville, N. C. There is a good road and trail from Thomas Ferguson's house, 3½ miles from station.

Permanent mark: Chestnut tree, trimmed.

[Latitude, 35° 40' 41".7. Longitude, 82° 53' 01".4.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Big Bald.....	225	40	57.8	45	54	47.0	4.695401
Mitchell.....	260	04	20.0	80	26	00.2	4.754281
Pisgah.....	337	38	24.7	157	42	50.3	4.481298
Balsam.....	15	40	00.9	195	36	18.2	4.554261

THUNDERHEAD.

On the Great Smoky Mountains on the boundary between Swain Co., N. C., and Blount Co., Tenn. Bryson, N. C., is the nearest railroad station on the North Carolina side, and Marysville on the Tennessee side. The nearest settlement on the south side is Mr. Hall's, from which there is a good trail to station, 6 miles distant.

Permanent mark: Clump of laurel bushes on highest summit.

[Latitude, 35° 34' 06"·8. Longitude, 83° 42' 22"·5.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Chilhowee (2).....	96	31	53·6	276	21	22·0	4·439392
Chilhowee (1).....	167	48	44·2	347	46	54·8	4·348599
Cowee.....	308	22	32·4	128	35	25·2	4·632765
Cheowah.....	355	04	54·3	175	05	47·5	4·432219
Christie Peak.....	49	46	32·3	229	37	22·3	4·495836

CHILHOWEE (2).

In Blount Co., Tenn., on Chilhowee range, 6 miles by road and trail southwest of Montvale Springs Hotel. Marysville, Tenn., is the nearest railroad station, 15 miles distant.

Permanent mark: Pine tree.

[Latitude, 35° 35' 46"·9. Longitude, 84° 00' 28"·0.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Guide.....	49	59	05·4	229	51	11·6	4·429081
Roy Knob.....	78	45	33·6	258	30	15·7	4·607927
Melton.....	142	21	38·5	322	11	13·1	4·642955
Thunderhead.....	276	21	22·0	96	31	53·6	4·439392
Chilhowee (1).....	230	15	40·5	50	24	24·2	4·467369

CHILHOWEE (1).

In Blount Co., Tenn., on Chilhowee range, 1 mile southwest of Millstone Gap. Marysville, Tenn., is nearest railroad station, 16 miles distant.

Permanent mark: One chestnut and one hickory tree standing together.

[Latitude, 35° 45' 54"·5. Longitude, 83° 45' 30"·1.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Chilhowee (2).....	50	24	24·2	230	15	40·5	4·467369
Melton.....	108	08	44·8	287	49	32·3	4·715486
House.....	178	53	28·7	358	53	11·2	4·585295
English.....	249	54	38·9	70	10	49·9	4·646266
Thunderhead.....	347	46	54·8	167	48	44·2	4·348599

MELTON.

A triangulation station of the U. S. C. & G. S., Roane Co., Tenn. Nearest railroad station is Lenoir, about 12 miles distant. Summit is long, flat, and heavily timbered.

Permanent mark: Marble block 6 by 6 by 30 inches.

[Latitude, 35° 54' 34''·8. Longitude, 84° 18' 18''·4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cross	191 42 45·0	11 45 21·6	4·515224
House	245 02 00·1	65 20 59·9	4·728210
Chilhowee (1).....	287 49 32·3	108 08 44·8	4·715486
Chilhowee (2).....	322 11 13·1	142 21 38·5	4·642955
Boy Knob	16 40 03·5	196 35 07·0	4·649520
Hinch	77 01 58·5	256 38 18·7	4·795756

COWEE.

In Macon, Jackson, and Swain counties, N. C. This station is on Cowee Ridge, 9 miles west of Webster, N. C. House of James Buchanan, on Green Creek, 6 miles from Webster and 3 miles from the triangulation station, is a convenient stopping place.

Permanent mark: Small oak tree.

[Latitude, 35° 19' 39''·9. Longitude, 83° 20' 10''·0]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Thomas Bald	29 36 26·3	209 29 27·5	4·571563
Cheowah	89 39 45·8	269 27 48·4	4·496055
Thunderhead	128 35 25·2	308 22 32·4	4·632765
Balsam	261 58 14·6	82 10 14·9	4·501722
Rabun	355 16 54·5	175 18 09·8	4·605596

HOGBACK.

A triangulation station of the U. S. C. & G. S. in Greenville Co., S. C. A summit of the Blue Ridge, 10 miles southeast of Saluda, N. C. This is a very flat mountain, but nearly all the timber has been cut.

Permanent mark: Marble block 6 by 6 by 30 inches.

[Latitude, 35° 10' 12''·25. Longitude, 82° 17' 26''·34.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pinnacle	69 54 49·28	249 39 15·61	4·6416975
Pisgah	123 54 30·70	303 38 20·30	4·7070850
Paris	23 27 52·72	203 23 43·61	4·4415437
Benn	232 22 51·79	52 44 45·02	4·8581240
Mitchell	182 00 08·80	2 01 02·10	4·8197740

PINNACLE.

In Pickens Co., S. C., on a spur of the Blue Ridge. Greenville is the nearest railroad station.

Permanent mark: A marble block 6 by 6 by 30 inches, placed there by the U. S. C. & G. S.

[Latitude, 35° 02' 00"·85. Longitude, 82° 44' 30"·02.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Rabun	81	43	40·71	261	24	28·30	4·7118767
Balsam	148	37	47·90	328	29	12·10	4·6387310
Pisgah	178	11	08·70	358	10	37·20	4·6387360
Mauldin	337	23	21·00	157	27	01·39	4·4055863
Hogback	249	39	15·61	69	54	49·28	4·6416975

THOMAS BALD.

Also called Standing Indian Mountain, in Macon Co., N. C., and near the Georgia State line, at head of Nantahalal River, North Carolina, and Tallulah River, Georgia. Tallulah Falls, Ga., is nearest railroad station. Summit is a long, barren, rocky ridge.

Permanent mark: Rock cairn.

[Latitude, 35° 02' 07"·3. Longitude, 83° 32' 16"·8.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Blood	48	09	33·5	227	55	51·9	4·6906119
Tusquittah	125	22	42·6	305	16	12·6	4·323497
Cheowah	158	02	57·7	337	58	01·6	4·540647
Rabun	289	33	19·3	109	41	31·1	4·363354
Cowee	209	29	27·5	29	36	26·3	4·571563

PACK.

On highest part of Pack Mountain, Cherokee Co., N. C., 21 miles west of Murphy by road and trail; easy of ascent.

Permanent mark: Two trees standing together.

[Latitude, 35° 03' 00"·9. Longitude, 84° 17' 10"·0.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Haw Knob	219	21	31·9	39	30	30·4	4·570986
Tusquittah	258	10	54·9	78	30	13·4	4·716895
Blood	317	05	02·1	137	17	01·1	4·671646
Cowpen	55	59	46·7	235	49	52·6	4·501706
Chilhowee (4)	104	59	45·6	284	48	12·3	4·499915

GRINDSTONE.

In James and Bradley counties, Tenn. On the Grindstone Mountains, 3 miles east of Ooltewah and 11 miles west of Cleveland, Tenn. Summit very flat, but mostly cleared.

Permanent mark: Tall oak tree.

[Latitude, 35° 04' 18"·0. Longitude, 85° 01' 18"·6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Chilhowee (4).....	260 56 17·0	81 10 06·4	4·568029
Rocky Face.....	7 19 24·1	177 19 53·1	4·439467
High Point.....	55 50 16·2	235 37 31·6	4·612271

TUSQUITTAH.

On highest part of Tusquittah Mountains, Clay Co., N. C. The Summit is nearly bald. It is reached from Valleytown by a good road and trail.

[Latitude, 35° 08' 42"·5. Longitude, 83° 43' 35"·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Haw Knob.....	123 48 43·8	303 38 20·8	4·516385
Cheowah.....	191 43 13·3	11 44 53·2	4·310650
Blood.....	23 13 14·0	203 05 59·8	4·689405
Thomas Bald.....	305 16 12·6	125 22 42·6	4·323497
Pack.....	78 30 13·4	258 10 54·9	4·716895

CHILHOWEE (4).

Knob at south end of Beans Mountain, Polk Co., Tenn., 6 miles by road and trail south-southeast of Benton, Tenn. Cleveland is nearest railroad station, 21 miles distant.

Permanent mark: Tall oak tree.

[Latitude, 35° 07' 24"·7. Longitude, 84° 37' 16"·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Haw Knob.....	248 58 13·8	69 18 48·4	4·763014
Pack.....	284 48 12·3	104 59 45·6	4·499915
Cowpen.....	350 33 47·4	170 35 24·7	4·419569
Roy Knob.....	199 38 00·3	19 44 04·4	4·674199
Texas.....	130 26 56·9	310 16 55·7	4·538978
Grindstone.....	81 10 06·4	260 56 17·0	4·568029

TEXAS.

In Meigs Co., Tenn., highest of Texas Knobs, 14 miles by road north of Cleveland, Tenn. Summit wooded, but all obstructing timber has been cut down, except on east end.

Permanent mark: Chestnut tree.

[Latitude, 35° 19' 31"·7. Longitude, 84° 54' 38"·4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Harvey.....	102 06 36·1	281 53 13·7	4·553740
Hinch.....	173 04 49·4	353 02 27·3	4·707236
Roy Knob.....	242 15 06·1	62 31 15·3	4·677625
Chilhowee (4).....	310 16 55·7	130 26 56·9	4·538978

HARVEY.

In Sequatchie Co., Tenn, on west side of Walden Ridge, between Henson and Alexander Gaps, near Raven Cliff. It can be reached from Dunlap, in the Sequatchie Valley, or from Rathburn (Soddy Iron Works) on the Cincinnati, New Orleans and Texas Pacific Railroad. It is the highest summit on ridge, and is flat and heavily timbered.

Permanent mark: Oak tree.

[Latitude, 35° 23' 33"·1. Longitude, 85° 17' 44"·9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Hinch	213 35 13·2	33 46 17·8	4·714751
Texas	281 53 13·7	102 06 36·1	4·553740

HAW KNOB.

On the boundary line between Monroe Co., Tenn., and Graham Co., N. C. It can be reached from Murphy, N. C., by road and trail; distance 24 miles. Summit is flat and covered with huckleberry bushes 20 feet high.

Permanent mark: Clump of saplings on highest part.

[Latitude, 35° 18' 34"·2. Longitude, 84° 01' 35"·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Christie Peak	211 23 38·1	31 25 36·8	3·997389
Tusquittah	303 38 20·8	123 48 43·8	4·516385
Cheowah	266 38 41·4	86 50 40·9	4·498134
Pack	39 30 30·4	219 21 31·9	4·570986
Chilhowee (4)	69 18 48·4	248 58 13·8	4·763014

CHRISTIE PEAK.

In Graham Co., N. C., about three miles from the Tennessee boundary. Can be reached by going up Little Santeetla Creek, thence by rough trail to station.

Permanent mark: Small clump of birch trees on highest part of summit.

[Latitude, 35° 23' 09"·4. Longitude, 83° 58' 10"·1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Thunderhead	229 37 22·3	49 46 32·3	4·495836
Cheowah	284 13 47·3	104 23 48·7	4·432687
Haw Knob	31 25 36·8	211 23 38·1	3·997389

GUIDE.

Also known as Peaked Top, in Monroe Co., Tenn. Sweetwater, Tenn., is the nearest railroad station, 22 miles distant. Madiscville is 10 miles northwest.

Permanent mark: Dead chestnut tree.

[Latitude, 35° 26' 25''·8. Longitude, 84° 14' 03''·6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Roy Knob	115 52 38·8	295 45 16·1	4·329587
Chilhowee (2).....	229 51 11·6	49 59 05·4	4·429081

ROY KNOB.

In Monroe Co., Tenn., on Roy Knob, 8 miles by road south of Sweetwater, Tenn.

Permanent mark: Large oak tree.

[Latitude, 35° 31' 27''·6. Longitude, 84° 26' 46''·3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Melton	196 35 07·0	16 40 03·5	4·649520
Chilhowee (4).....	19 44 04·4	199 38 00·3	4·674199
Chilhowee (2).....	258 30 15·7	78 45 33·6	4·607927
Guide	295 45 16·1	115 52 38·8	4·329587
Texas	62 31 15·3	242 15 06·1	4·677625

HINCH.

In Cumberland Co., Tenn. This station of the U. S. C. & G. S. is 12 miles northwest of Spring City, Tenn., and 3 miles west of Jewett, on Narrow Gauge Railroad. The summit is flat and wooded.

Permanent mark: U. S. C. & G. S. mark + in rock.

[Latitude, 35° 46' 53''·1. Longitude, 84° 58' 42''·8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Melton	256 38 18·7	77 01 58·5	4·795756
Texas	353 02 27·3	173 04 49·4	4·707236
Harvey.....	33 46 17·8	213 35 13·2	4·714751

CHEOWAH.

The highest summit of Cheowah Mountains, Graham Co., N. C. It is entirely bald. The railroad passes within a few miles of station.

Permanent mark: Rock cairn.

[Latitude, 35° 19' 32''·2. Longitude, 83° 40' 50''·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Haw Knob.....	86 50 40·9	266 38 41·4	4·492134
Christie Peak	164 23 48·7	284 13 47·3	4·432687
Thunderhead.....	175 05 47·5	355 04 54·3	4·432219
Cowee.....	269 27 48·4	89 39 45·8	4·490065
Thomas Bald.....	337 58 01·3	158 02 57·7	4·540647
Tusquittah.....	11 44 53·2	191 43 18·3	4·310650

WOFFORD.

Primary triangulation station of the U. S. C. & G. S. in Spartanburg Co., S. C.

[Latitude, 34° 57' 32''-31. Longitude, 81° 56' 06''-73.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
King	243 53 48-85	64 15 17-00	4-8002103
Benn	200 18 41-01	20 28 12-08	4-6359012

PARIS.

A triangulation station of the U. S. C. & G. S. in Greenville Co., S. C.

[Latitude, 34° 56' 29''-27. Longitude, 82° 24' 40''-05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hogback	203 23 43-61	23 27 52-72	4-4415437
Wofford	267 18 17-75	87 34 39-25	4-6386551

MAULDIN.

A triangulation station of the U. S. C. & G. S. in Pickens Co., S. C.

[Latitude, 34° 49' 18''-46. Longitude, 82° 38' 05''-09.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pinnacle.....	157 27 01-39	337 23 21-00	4-4055863
Paris	236 56 15-41	57 03 55-80	4-3869655

RABUN.

A triangulation station of the U. S. C. & G. S. on Blue Ridge, Rabun Co., Ga., at head of Little Tennessee River. The summit is sharp, rocky, and barren. Walhalla, S. C., is the nearest railroad station.

Permanent mark of the U. S. C. & G. S. could not be identified.

[Latitude, 34° 57' 55''-75. Longitude 83° 17' 59''-27.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Blood.....	66 55 55-20	246 34 04-20	4-8022677
Thomas Bald.....	109 41 31-10	289 33 19-30	4-363354
Cowee	175 18 09-80	355 16 54-50	4-605596
Balsam	212 14 17-10	32 24 58-90	4-722187
Curraheo	8 13 04-00	188 19 27-80	4-6892851
Pinnacle.....	261 24 28-30	81 43 40-70	4-7118767

INDIAN.

A triangulation station of the U. S. C. & G. S. in Cherokee Co., Ala.

[Latitude, 34° 01' 49''-94. Longitude, 85° 25' 31''-10.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lavender	201 16 30·8	21 21 07·6	4·5405243
Carnes.....	276 05 35·7	96 19 24·2	4·5823753

LAVENDER.

A triangulation station of the U. S. C. & G. S. Station on highest peak of Lavender range, in Floyd Co., Ga., about 12 miles west of Rome.
Permanent mark: Granite post.

[Latitude, 34° 19' 19''-58. Longitude, 85° 17' 18''-39.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine Log.....	269 51 12·99	90 13 15·05	4·7777508
Carnes.....	325 09 30·87	145 18 45·80	4·6473879
Johns.....	207 33 58·84	27 40 26·35	4·5761765

PINE LOG.

A triangulation station of the U. S. C. & G. S. in Bartow Co., Ga.

[Latitude, 34° 19' 18''-31. Longitude, 84° 38' 13''-66.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sawnee	282 00 16·00	102 16 21·90	4·6519200
Grassy	236 55 18·70	57 05 40·60	4·5252408
Johns	128 24 22·93	308 08 43·29	4·7321290

SWEAT.

A triangulation station of the U. S. C. & G. S. in Cobb Co., Ga.

[Latitude, 34° 04' 01''-44. Longitude, 84° 27' 21''-54.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine Log.....	149 27 57·15	329 21 50·66	4·5160840
Sawnee.....	235 15 58·91	55 25 55·50	4·5197394

SAWNEE.

A triangulation station of the U. S. C. & G. S. in Forsyth Co., Ga.

[Latitude, $34^{\circ} 14' 12''$. Longitude, $84^{\circ} 09' 38''$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Grassy	150	29	49.72	330	24	03.05	<i>Meters.</i> 4.5027518
Skitt	233	23	19.17	53	38	10.60	4.7005389

GULF POINT.

A triangulation station of the U. S. C. & G. S. in Walker Co., Ga., on Lookout Mountain, near "The Gulf," 33 miles by road and trail south of Chattanooga, Tenn. Summit is flat except east of station. All large timber cut down.

Permanent mark: Marble block 6 by 6 by 30 inches of the U. S. C. & G. S.

[Latitude, $34^{\circ} 37' 32''$. Longitude, $85^{\circ} 28' 02''$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
High Point	194	32	12.07	14	34	45.8	4.436212
Johns	270	21	38.30	90	34	13.30	4.5295379
Brandon	44	41	02.50	224	31	18.9	4.5731889
Gunter	84	36	45.60	264	12	44.6	4.812768

JOHNS.

A triangulation station of the U. S. C. & G. S. in Walker Co., Ga., 1 mile south of north end of Johns Mountain, 21 miles south of Ringgold, 3 miles south of Villanow.

Permanent mark: Marble block of U. S. C. & G. S., 6 by 6 by 30 inches.

[Latitude, $34^{\circ} 37' 23''$. Longitude, $85^{\circ} 05' 53''$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Gulf Point	90	34	13.30	270	21	38.30	<i>Meters.</i> 4.5295379
High Point	134	50	00.20	314	39	56.70	4.578956
Rocky Face	200	22	30.60	20	25	36.10	4.376078
Pine Log	308	08	43.29	128	24	22.93	4.7321290
Lavender	27	40	26.35	207	33	58.84	4.5761765

BRANDON.

A triangulation station of the U. S. C. & G. S. in DeKalb Co., Ala.

[Latitude, $34^{\circ} 23' 07''$. Longitude, $85^{\circ} 45' 12''$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Indian	322	21	48.3	142	32	52.6	<i>Meters.</i> 4.6958379
Gulf Point	224	31	18.9	44	41	02.5	4.5731889

GUNTER.

A triangulation station of the U. S. C. & G. S. in Madison Co., Ala.

[Latitude, 34° 34' 06"·83. Longitude, 86° 10' 20"·30.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gulf Point.....	264 12 44·6	84 36 45·6	4·812768
Aurora.....	1 16 13·0	181 15 50·1	4·070381

HIGH POINT.

A triangulation station of U. S. C. & G. S. in Walker Co., Ga., on Lookout Mountain, south of Nickajack Gap, 13 miles south-southwest of Chattanooga, Tenn. Summit is barren and rocky; all timber cut down.

Permanent mark: Hole drilled in rock, with arrow.

[Latitude, 34° 51' 49"·8. Longitude, 85° 23' 32"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Grindstone.....	235 37 31·60	55 50 16·20	4·612271
Rocky Face.....	277 03 05·20	97 16 16·20	4·549672
Gulf.....	14 34 45·80	194 32 12·07	4·436212
Johns.....	314 39 56·70	134 50 00·20	4·578956

ROCKY FACE.

A triangulation station of the U. S. C. & G. S. in Whitfield Co., Ga. It is a rounded knob on Rocky Face Mountain, 3 miles east of Tunnel Hill, Ga., and about 6 miles northwest of Dalton, Ga.

Permanent mark: Small lone tree.

[Latitude, 34° 49' 26"·3. Longitude, 85° 00' 28"·10.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Grindstone.....	177 19 53·1	7 19 24·1	4·439467
Cowpen.....	259 26 13·3	79 41 05·8	4·605691
Johns.....	20 25 36·1	200 22 30·6	4·376078
High Point.....	97 16 16·2	277 03 05·2	4·549672

GRASSY.

A triangulation station of the U. S. C. & G. S. in Lumpkin Co., Ga.

[Latitude, 34° 29' 10"·58. Longitude, 84° 19' 53"·05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Blood.....	232 01 29·60	52 14 56·10	4·6610442
Sawnee.....	330 24 03·05	150 29 49·72	4·5027518
Pine Log.....	57 05 40·60	236 55 18·70	4·5252408

SKITT.

A triangulation station of the U. S. C. & G. S. in Hall Co., Ga.

[Latitude, 34° 30' 20''-56. Longitude, 83° 43' 19''-84.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Blood.....	142 52 20·69	322 45 01·27	4·5131465
Currahee.....	265 12 57·37	85 24 43·72	4·5038010

CURRAHEE.

A triangulation station of the U. S. C. & G. S. in Habersham Co., Ga.

[Latitude, 34° 31' 45''-13. Longitude, 83° 22' 33''-32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Rabun.....	188 10 27·80	8 13 04·00	4·6892851
Mauldin.....	244 15 00·38	64 40 18·43	4·8767020

BLOOD.

A triangulation station of the U. S. C. & G. S. on Blue Ridge, in Lumpkin and Union counties, Ga. Clarksville is nearest railroad station. Summit barren and rocky.

Permanent mark: Copper bolt in solid rock.

[Latitude, 34° 44' 23''-24. Longitude, 83° 56' 13''-23.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Grassy.....	52 14 56·10	232 01 29·60	4·6610442
Cowpen.....	106 07 23·00	285 45 33·70	4·7825770
Pack.....	137 17 01·10	317 05 02·10	4·6716460
Tusquittah.....	203 05 59·80	23 13 14·00	4·6894050
Skitt.....	322 45 01·27	142 52 20·69	4·5131465
Rabun.....	246 34 04·20	66 55 55·20	4·8022877
Thomas Bald.....	227 55 51·90	48 09 33·50	4·6906190

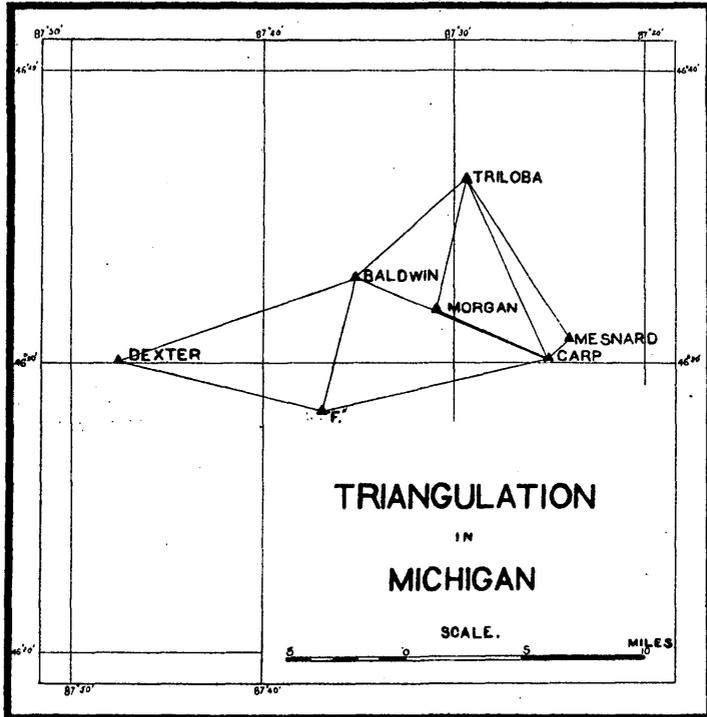
COWPEN.

Highest summit of Cohutta Mountain, Fannin Co., Ga., 7 miles by trail from nearest road on south side. Summit flat and timbered on north end.

Permanent mark: Rock cairn.

[Latitude, 34° 53' 23''-5. Longitude, 84° 34' 26''-5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Chilhowee (4).....	170 35 24·7	350 33 47·4	4·419569
Pack.....	235 49 52·6	55 59 46·7	4·501706
Blood.....	285 45 33·7	106 07 23·0	4·782577
Rocky Face.....	79 41 05·8	259 26 13·3	4·605691



MICHIGAN.

METHODS OF WORK.

A narrow belt of triangulation was extended westward from Marquette in 1889. It rested upon two stations of the U. S. Lake Survey, Mesnard-Triloba. Angles were measured with a Schilling 6½-inch theodolite by F. J. Knight. Stations were selected on rocky knobs on either side of the railroad.

DESCRIPTIONS AND POSITIONS OF STATIONS.

MESNARD.

A U. S. Lake Survey station in Marquette Co., Mich., 2 miles south of Marquette. Height of ground at station is 522 feet above Lake Superior.

Permanent mark: A cross cut in solid rock, which is about 3 feet below surface soil.

[Latitude, 46° 30' 48"·34. Longitude, 87° 23' 59"·23.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Triloba	146 00 24·0	325 56 29·8	4·089203
Carp.....	47 50 48·0	227 50 00·0	3·28232

F.

Station on high, rocky knob, 3 miles southeast of Ishpeming, in Marquette Co., Mich., and 1½ miles northeast of the highest hill of the range.

Permanent mark: A cross cut in solid rock.

[Latitude, 46° 28' 18"·28. Longitude, 87° 36' 55"·47.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Baldwin	195 12 54	15 14 14	3·95166
Carp.....	257 27 22	77 35 57	4·19038
Dexter.....	103 22 16	283 14 33	4·14590

BALDWIN.

On a granite ridge, about 4 miles north of Negaunee, in Marquette Co., Mich., one-half mile west of gap through which passed the old charcoal tramway to Morgan Furnace.

Permanent mark: Cross cut on small, firm boulder projecting a few inches above ground.

[Latitude, $46^{\circ} 32' 57''$.85. Longitude, $87^{\circ} 35' 05''$.25.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Triloba.....	229 46 13	49 50 22	3.98107
Carp.....	292 24 44	112 31 59	4.14069
Dexter.....	71 20 23	251 11 20	4.22661
F.....	15 14 14	195 12 54	3.95166

DEXTER.

On quartzite knob, south of the Dexter mine, one-half mile south of Golden Station, on Chicago and Northwestern Railroad, in Marquette Co., Mich., on highest point on north end of rock outcrop.

Permanent mark: Cross cut in solid rock.

[Latitude, $46^{\circ} 30' 02''$.57. Longitude, $87^{\circ} 47' 33''$.91.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Baldwin.....	251 11 20	71 20 23	4.22661
F.....	283 14 33	103 22 16	4.14590

CARP.

A wooded hill 3 miles southwest of Marquette; in Marquette Co., Mich. Part of timber has been cut down.

Permanent mark: A small evergreen tree on highest part.

[Latitude, $46^{\circ} 30' 06''$.70. Longitude, $87^{\circ} 25' 05''$.84.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Morgan.....	112 51 46	292 47 32	3.90759
F.....	77 35 57	257 27 22	4.19038
Baldwin.....	112 31 59	292 24 44	4.14069
Mesnard.....	227 50 00	47 50 48	3.28232

MORGAN.

A steep hill about 1 mile north of old Morgan furnace, in Marquette Co., Mich. Station on high rock on south side of summit. Highest point not occupied because of a tree in line with Baldwin signal about half way between them.

Permanent mark: Cross cut in rock.

[Latitude, 46° 31' 48''-26. Longitude, 87° 30' 55''-32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Triloba.....	193 26 16	13 27 34	3-93258
Carp.....	292 47 32	112 51 46	3-90759

TRILOBA.

U. S. Lake Survey Station, 7 miles northwest of Marquette, on Mount Crissy, or Crispy, in Marquette Co., Mich. It is a bald granite knob about 3 miles southwest of Granite Point. Height of station above Lake Superior, 635 feet.

Permanent mark: A brass frustum leaded into the solid rock.

[Latitude, 46° 36' 17''-94. Longitude, 87° 29' 21''-83.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Carp.....	334 31 57-0	154 35 03-0	4-103610
Baldwin.....	49 50 22-0	229 46 13-0	3-981070
Morgan.....	13 27 34-0	193 26 16-0	3-932580
Mesnard.....	325 56 29-8	146 00 24-0	4-089203

ARKANSAS.

METHODS OF WORK.

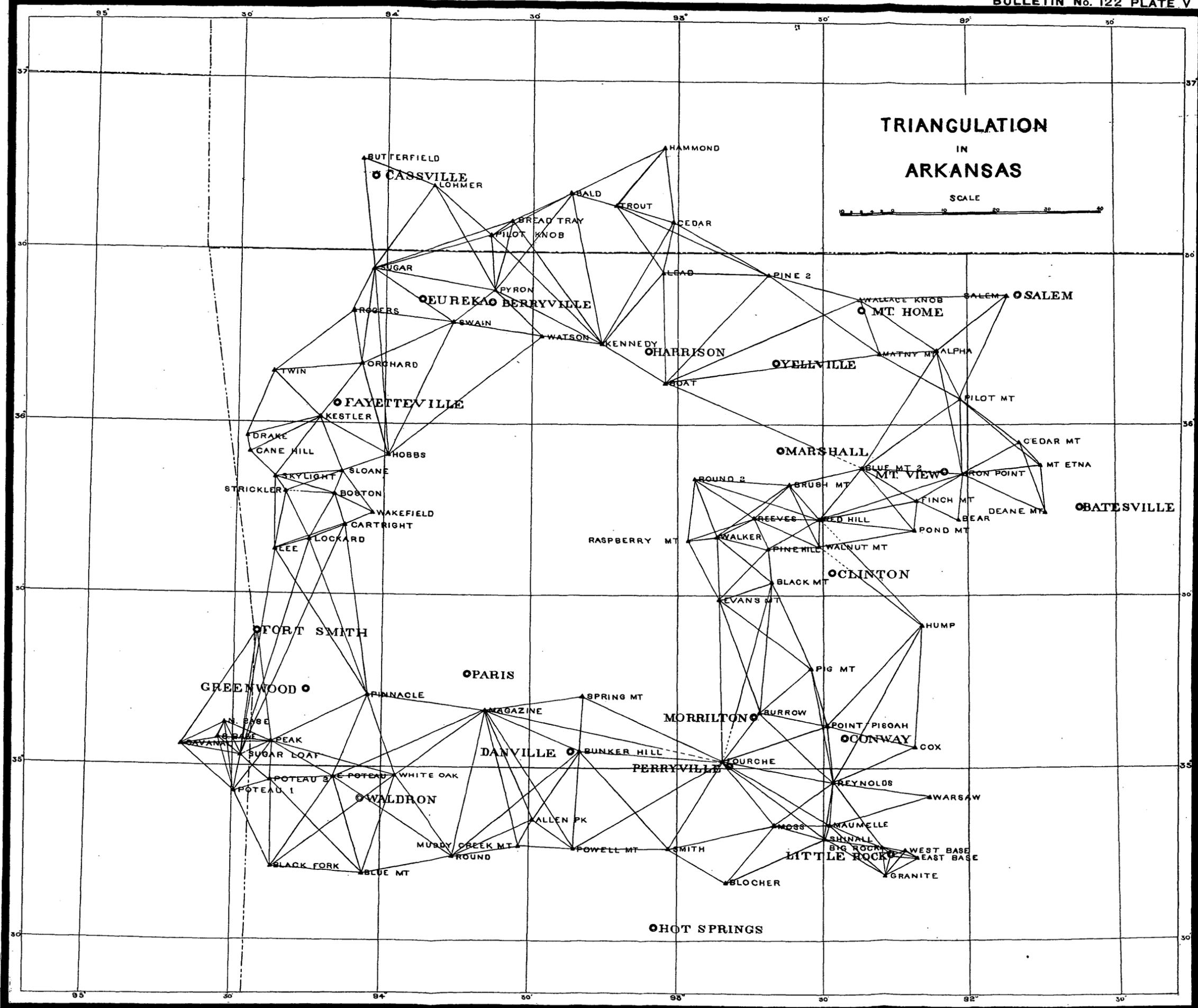
The triangulation in Arkansas starts from a base located just west of the State line in the Indian Territory and connected with the astronomical station of the U. S. Coast and Geodetic Survey at Fort Smith. It extends eastward along the thirty-fifth parallel of latitude to Little Rock, near which city a check base was measured. Difficulty was experienced in finding a favorable location for the initial base, but the site finally selected was in an open prairie bordered by several mountain ranges over 2,000 feet high, which furnished good points for expansion.

The initial base was measured at night with a 300-foot steel tape, on the roadbed of the St. Louis and San Francisco Railroad, beginning at Cameron, and was 2.84 miles in length. It was divided into sections of 1,200 feet, or 4 tape lengths, each section being measured three times. The tape was stretched under a tension of 20 pounds and the temperature noted at each tape length. A wye level was used to determine the relative elevations of stations. The base near Little Rock was measured twice on a cloudy day, its length being 3.72 miles. The azimuth of each base was determined by observations on Polaris near elongation.

The axial length of the belt of triangulation connecting the two bases is 135 miles; number of stations occupied, twenty-seven. This work was commenced in 1887 by S. S. Gannett, assisted by G. T. Hawkins, and finished in 1888. The angles at most of the stations were measured with a Fauth 7-inch (vernier) theodolite, but at the stations in the expansion of the Little Rock base a new Fauth 8-inch (micrometer) theodolite was used. The computation included a complete least square station and figure adjustment.

A belt of triangulation was extended during 1889, 1890, and 1891 from Fourche-Reynolds, stations of the initial belt near Morrilton, northward to Missouri; thence westward along the southern border of that State for about 60 miles; thence southward, joining the initial belt at the line Pinnacle-Sugarloaf, 20 miles southeast of Fort Smith. Angles at stations in this belt were measured with a Fauth 8-inch (micrometer) theodolite by George T. Hawkins. Azimuths were observed at intervals of about 50 miles.

Triangulation in this State was conducted generally in a manner similar to that pursued in the Appalachian Mountain region; that is,



rounded, wooded summits were selected as stations, cleared of timber, and one tree trimmed up and left as a signal and mark. In a few instances, where it was impracticable to cut off the timber, scaffolds were erected.

DESCRIPTIONS AND POSITIONS OF STATIONS.

CAVANAL.

High, flat mountain, 12 miles west of Cameron, in the Choctaw Nation, Ind. T. Station in tree top.

Permanent mark: Tree blazed near foot.

[Latitude, 35° 04' 11" 43. Longitude, 94° 40' 46" 16.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sugarloaf.....	284 18 30.16	104 25 46.09	4.297986
Peak	269 10 57.02	89 21 30.97	4.446473

NORTH BASE.

About 800 feet north of Cameron station, Choctaw Nation, Ind. T.

Permanent mark: Stone 6 by 6 by 30 inches set flush with surface of the ground.

[Latitude, 35° 07' 59" 47. Longitude, 94° 32' 01" 38.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Peak	294 26 05.63	114 31 38.31	4.206813
Sugarloaf.....	333 34 24.91	153 36 39.60	4.125449

SOUTH BASE.

Two and one-half miles south of Cameron Station, Choctaw Nation, Ind. T., on St. Louis and San Francisco Railroad, 50 feet east of railroad.

Permanent mark: Stone 6 by 6 by 30 inches set flush with surface of ground.

[Latitude, 35° 05' 47" 52. Longitude, 94° 33' 23" 98.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sugarloaf.....	314 27 54.85	134 30 56.92	4.051474
Peak	278 47 20.48	98 53 40.54	4.229148

SUGARLOAF.

On Sugarloaf Mountain, 7 miles southeast of Cameron station, in the Choctaw Nation, Ind. T.; has all the timber cleared from summit.

Permanent mark: Lone tree with spikes.

[Latitude, 35° 01' 31"-49. Longitude, 94° 28' 07"-04.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Poteau (2)	309 38 29-34	129 41 41-88	4-043759
Peak	238 45 47-12	58 49 04-79	4-008536
Fort Smith	184 50 17-23	4 51 34-89	4-605344
Poteau (1)	10 18 45-54	190 17 59-02	4-060919
North Base	153 36 39-60	333 34 24-91	4-125449
South Base	134 30 56-92	314 27 54-85	4-051474
Cavanal	104 25 46-09	284 18 30-16	4-297986

FORT SMITH.

Sebastian Co., Ark. Station on top of Col. Leflore's house at southwest corner of old fort about 50 feet from U. S. C. & G. S. astronomical station which was used as initial point by U. S. G. S.

Permanent mark: Stone monument.

[Latitude, 35° 23' 14"-65. Longitude, 94° 25' 52"-35.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Peak	351 20 45-80	171 22 46-66	4-547466
Sugarloaf	4 51 34-89	184 50 17-23	4-605344

POTEAU (1).

High mountain in Choctaw Nation, Ind T., 15 miles south of Cameron station on the St. Louis and San Francisco Railroad; has about 3 acres of timber chopped down; a good deal still standing on east and west ends.

Permanent mark: Lone oak tree.

[Latitude, 34° 55' 24"-14. Longitude, 94° 29' 28"-19.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Sugarloaf	190 17 59-02	10 18 45-54	4-060919
Poteau (2)	248 01 48-53	68 05 47-28	4-057047

POTEAU (2).

High round point on Poteau range, 2 miles south of Hartford, Sebastian Co., Ark.; has about 6 acres of timber cut down on top.

Permanent mark: Lone oak tree.

[Latitude, 34° 57' 42"-39. Longitude, 94° 22' 31"-33.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Peak	180 59 47·13	0 59 51·99	4·091545
East Poteau	265 28 50·94	85 36 18·68	4·298333
Sugarloaf	129 41 41·88	309 38 29·34	4·043759
Poteau (1)	68 05 47·28	248 01 48·53	4·057047
Black Fork	358 38 27·23	178 38 42·24	4·444388

BLACK FORK.

Hump on Black Fork range, on line between Scott and Polk counties, Ark., about 4 miles west of Eagle gap on the road between Waldron and Dallas.

Permanent mark: Lone tree.

[Latitude, 34° 42' 39"-78. Longitude, 94° 22' 05"-39.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
East Poteau	213 06 24·02	33 13 35·50	4·544975
Poteau (2)	178 38 42·24	358 38 27·23	4·444388

PEAK.

Sharp peak on Sugarloaf Mountain, about 25 miles south of Fort Smith, Sebastian Co., Ark.

Permanent mark: A pile of rocks.

[Latitude, 35° 04' 22"-98. Longitude, 94° 22' 22"-85.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
East Poteau	298 48 33·09	118 55 56·58	4·349626
Pinnacle	241 54 15·25	62 05 17·48	4·518284
Poteau (2)	0 59 51·99	180 59 47·13	4·091545
Sugarloaf	58 49 04·79	238 45 47·12	4·008536
Fort Smith	171 22 46·66	351 20 45·80	4·547466
South Base	98 53 40·54	278 47 20·48	4·229148
Cavanal	89 21 30·97	269 10 57·02	4·446473
North Base	114 31 38·31	294 26 05·63	4·206813

EAST POTEAU.

At east end of Poteau range, about 10 miles northwest of Waldron, Scott Co., Ark. Has most of the timber cleared from the summit.

Permanent mark: Lone oak tree.

[Latitude, 34° 58' 32"-51. Longitude, 94° 09' 30"-16.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
White Oak	269 09 28·38	89 16 49·26	4·296232
Pinnacle	199 58 08·28	20 01 45·45	4·446743
Peak	118 55 56·58	298 48 33·09	4·349626
Poteau (2)	85 36 18·68	265 28 50·94	4·298333
Blue Mountain	342 34 49·11	162 38 35·83	4·528324
Black Fork	33 13 35·50	213 06 24·02	4·544975

PINNACLE.

Knob on ridge about 5 miles south of Charleston, Franklin Co., Ark. Has all timber cleared from summit. It was also used as an azimuth station.

Permanent mark: Lone tree, blazed near foot.

[Latitude, 35° 12' 45''-51. Longitude, 94° 03' 12''-44.]

To station.	Azimuth.	Back azimuth	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
White Oak.....	339 06 55·10	159 10 40·11	4·444739
Magazine.....	277 47 44·40	98 01 51·99	4·574789
East Poteau.....	20 01 45·45	199 58 08·28	4·446743
Peak.....	62 05 17·48	241 54 15·25	4·518284

BLUE MOUNTAIN.

Station on a high peak about 5 miles southwest of Buck Knob post-office, Scott Co., Ark. Summit entirely cleared of brush.

Permanent mark: Stump of tree on highest part.

[Latitude, 34° 41' 07''-21. Longitude, 94° 02' 53''-18.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
East Poteau.....	162 38 35·83	342 34 49·11	4·528324
White Oak.....	196 12 02·72	16 15 35·23	4·529249

WHITE OAK.

High mountain about 12 miles northeast of Waldron, Scott Co., Ark. Has all timber cleared off the summit, though there is still some large timber standing on the north side.

Permanent mark: Post-oak tree.

[Latitude, 34° 58' 41''-14. Longitude, 93° 56' 41''-10.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Round.....	326 29 52·59	146 36 35·80	4·5120745
Magazine.....	232 35 32·38	52 45 52·63	4·5363977
Pinnacle.....	159 10 40·11	339 06 55·10	4·4447392
East Poteau.....	89 16 49·26	269 09 28·38	4·290232
Blue Mountain...	16 15 35·23	196 12 02·72	4·5292490

MAGAZINE.

Station on middle hump of Magazine Mountain, in Logan Co., Ark. Has about 5 acres of timber cut down and has still a great deal of large timber standing.

Permanent mark: Large oak tree trimmed up. The platform for observing was built around this tree, 44 feet from the ground.

[Latitude, 35° 09' 57''-68. Longitude, 93° 38' 41''-72.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Powell.....	328	14	19.05	148	24	35.83	4.7159107
Bunker Hill	293	32	16.10	113	43	07.95	4.4959055
Muddy Creek Mountain ..	346	53	14.98	166	57	06.48	4.6558448
Round	11	12	53.87	191	09	19.66	4.6893775
White Oak.....	52	45	52.03	232	35	32.38	4.5363977
Pinnacle.....	98	01	51.99	277	47	44.40	4.5747892

ROUND.

Peak just west of "Old Missouri road" near head waters of Cedar Creek in Montgomery Co., Ark. Has all timber cleared off the summit. Permanent mark: Post-oak tree.

[Latitude, 34° 44' 00''-72. Longitude, 93° 44' 55''-63.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Muddy Creek Mountain ..	258	50	32.68	78	57	56.07	4.3044880
Magazine.....	191	09	19.66	11	12	53.87	4.6893775
White Oak.....	146	36	35.80	326	29	52.59	4.5120745

MUDDY CREEK MOUNTAIN.

Knob on ridge 6 or 7 miles south of Onyx, Yell Co., Ark. Has most of timber cleared off the summit.

Permanent mark: Pine tree.

[Latitude, 34° 46' 06''-63. Longitude, 93° 31' 57''-82.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Magazine.....	166	57	06.48	346	53	14.98	4.6558448
Powell.....	270	26	03.47	90	32	26.84	4.2328765
Round.....	78	57	56.07	258	50	32.68	4.3044880

ALLEN PEAK.

High peak 3 miles northwest of Onyx, Yell Co., Ark. Has all timber chopped down on top.

Permanent mark: Post-oak tree.

[Latitude, 34° 51' 06''-10. Longitude, 93° 28' 14''-79]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Powell.....	309	20	57.86	129	25	14.29	4.1694563
Bunker Hill.....	209	53	28.04	29	58	18.13	4.4107648

POWELL.

High peak of Fourche range, in Garland Co., Ark., 30 miles northwest of Hot Springs.

Permanent mark: Black oak tree.

[Latitude, 34° 46' 01"·91. Longitude, 95° 20' 45"·57.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Smith.....	269	20	00·07	89	30	48·24	4·4609414
Bunker Hill.....	182	37	01·07	2	37	33·78	4·5013612
Magazine.....	148	24	35·83	328	14	19·05	4·7159107
Muddy Creek Mountain..	90	32	26·84	270	26	03·47	4·2328765
Allen Peak.....	129	25	14·29	309	20	57·86	4·1694563

BUNKER HILL.

Highest knob near Danville, Yell Co., Ark. All timber has been chopped off the summit.

Permanent mark: Post oak tree.

[Latitude, 35° 03' 10"·25. Longitude, 93° 19' 48"·41.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Fourche.....	275	00	52·92	95	17	28·01	4·6445536
Smith.....	318	48	11·64	138	58	29·43	4·6198532
Powell.....	2	37	33·78	182	37	01·07	4·5313612
Magazine.....	113	42	07·95	293	32	16·10	4·4959055
Spring Mountain.....	180	58	37·00	0	58	44·00	4·2465800
Allen Peak.....	29	58	18·13	209	53	28·04	4·4107648

SPRING MOUNTAIN.

High, flat mountain on line between Yell and Logan counties, about 15 miles southwest of Dardanelle, Ark. Lines of sight have been cut out to different stations.

Permanent mark: Stump of pine tree 20 feet high, about 10 feet north of signal, with observing platform built around it. The instrument was mounted on this stump.

[Latitude, 35° 12' 42"·00. Longitude, 93° 19' 36"·80.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Fourche.....	296	13	11	116	29	41	4·68706
Bunker Hill.....	0	58	44	180	58	37	4·24658

SMITH.

High mountain in Saline Co., Ark., 18 miles north of Hot Springs. All timber has been cleared from top except one black oak tree.

Permanent mark: Black oak tree.

[Latitude, 34° 46' 11''-34. Longitude, 93° 01' 49''-01.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Blocher.....	302 38 07·21	122 44 32·65	4·3108946
Moss.....	258 09 06·03	78 21 25·50	4·5268175
Fourche.....	211 07 39·04	31 13 53·11	4·5060766
Bunker Hill.....	138 53 29·43	318 48 11·64	4·6198532
Powell.....	89 30 48·24	269 20 00·07	4·4609414

BLOCHER.

Low wooded ridge, 3 miles east of Blocher, Saline Co., Ark.
Permanent mark: Lone pine tree.

[Latitude, 34° 40' 12''-75. Longitude, 92° 50' 32''-26.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Smith.....	122 44 32·65	302 38 07·21	4·3108946
Moss.....	221 16 53·51	41 22 46·25	4·3772020

MOSS.

A sharp rocky peak, 20 miles west of Little Rock, in Saline Co., Ark.
Permanent mark: Lone pine tree just below summit.

[Latitude, 34° 49' 53''-56. Longitude, 92° 40' 13''-42.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shinall.....	283 16 36·51	103 22 32·66	4·2119800
Reynolds.....	228 47 19·08	45 54 08·65	4·3826270
Fourche.....	141 42 15·37	321 36 07·97	4·4191024
Smith.....	78 21 25·50	258 09 06·03	4·5268175
Blocher.....	41 22 46·25	221 16 53·51	4·3772020

SHINALL.

A high, flat mountain, 15 miles northwest of Little Rock, Pulaski Co., Ark. About 8 acres of timber have been cut down. Some timber is still standing on east and west ends. Station can be reached on horseback from Mat Brown's on south side, and also from north side.

Permanent mark: Tall oak trimmed up.

[Latitude, 34° 47' 51''-69. Longitude, 92° 29' 49''-62.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Granite.....	303 13 42·79	123 20 44·03	4·352013
Big Rock.....	278 59 21·57	99 06 09·00	4·264459
Reynolds.....	186 46 27·27	366 47 19·87	4·296198
Moss.....	103 22 32·66	283 16 36·51	4·211980

BIG ROCK.

Station on top of cupola, situated on bluff of Big Rock, 2½ miles northwest of Little Rock, Pulaski Co., Ark.

Permanent mark: Flag pole on cupola of hotel.

[Latitude, 34° 46' 17"·88. Longitude, 92° 17' 55"·49.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
West Base.....	285 10 50·05	105 13 19·54	3·8393960
Granite.....	356 09 03·15	176 09 17·39	3·9765670
Shinall.....	99 06 09·00	278 59 21·57	4·2644590
Reynolds.....	145 00 13·52	324 54 17·76	4·4396040
Maumelle.....	114 01 36·67	293 55 11·78	4·2731768

WEST BASE.

Near Little Rock, Ark., 2½ miles east of Argenta, Pulaski Co., Ark., on land owned by J. J. Martin, on prolongation of tangent of the Althimer branch of St. Louis, Arkansas and Texas Railway.

Permanent mark: Rock 5 by 7 by 48 inches, top just flush with surface, cross cut on iron bolt sunk in stone. Reference, rock 9·7 feet north, another 10·1 feet west, and another 9·5 feet south. All have arrows pointing to center.

[Latitude, 34° 45' 19"·09. Longitude, 92° 13' 33"·32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Post-office.....	77 35 52·76	257 34 14·69	3·6513178
East Base.....	294 10 39·62	114 12 27·11	3·7208870
Granite.....	38 18 58·59	218 16 43·49	3·9884370
Big Rock.....	105 13 19·54	285 10 50·05	3·8393960

EAST BASE.

Near Little Rock, Ark., 6 miles east of Argenta, Pulaski Co., Ark., close to track of Althimer branch of St. Louis, Arkansas and Texas Railway.

Permanent mark: Rock sunk in swampy soil 15·5 feet north of center of track. Iron bolt sunk in stone and cross cut on bolt. Rock sunk in center of track, top flush with roadbed, arrowhead pointing to center.

[Latitude, 34° 44' 09"·15. Longitude, 92° 10' 24"·73.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Post-office.....	97 25 51·31	277 22 25·79	3·966162
West Base.....	114 12 27·11	294 10 39·62	3·720887

GRANITE.

Also called Fourche Mountain, $4\frac{1}{2}$ miles south of Little Rock, Pulaski Co., Ark. A long, nearly level ridge, heavily timbered. A wagon road runs nearly to station. Instrument mounted on stump of tree nearly 12 feet high. Lines of sight were cut through the timber.

Permanent mark: Stump 12 feet high.

[Latitude, $34^{\circ} 41' 11''-10$. Longitude, $92^{\circ} 17' 30''-50$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
West Base.....	218 16 43·49	38 18 58·59	3·988437
Post-office.....	193 55 58·39	13 56 35·49	3·837660
Big Rock.....	176 09 17·39	356 09 03·15	3·976567
Shinall.....	123 20 44·03	303 13 42·79	4·352013

POST-OFFICE.

Station on public building, Little Rock, Pulaski Co., Ark. Instrument set on roof, near flag pole, to which all the angles are reduced.

Permanent mark: U. S. C. & G. S. astronomical station in post-office grounds. Stone post underground.

[Latitude, $34^{\circ} 44' 47''-83$. Longitude, $92^{\circ} 16' 25''-36$.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	Meters.
West Base.....	257 34 14·69	77 35 52·76	3·651318
East Base.....	277 22 25·79	97 25 51·31	3·966162
Granite.....	13 56 35·49	193 55 58·39	3·837660

MAUMELLE.

A high, steep, rocky pinnacle, 12 miles west of north from Little Rock, Pulaski Co., Ark. The top is barren and covered with loose rock; sides very precipitous.

Permanent mark: Hole drilled in rock.

[Latitude, $34^{\circ} 50' 25''-22$. Longitude, $92^{\circ} 29' 09''-79$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Big Rock.....	293 55 11·78	114 01 36·67	4·2731768
Reynolds.....	185 04 12·92	5 04 42·76	4·1750859
Warsaw.....	249 44 55·92	69 56 32·46	4·5176680

REYNOLDS.

A hump on a ridge, $2\frac{1}{2}$ miles west of Mayflower, Faulkner Co., Ark. Has all the timber cut on south and west sides; timber is yet standing on north and east sides.

Permanent mark: Stump sawed off 4 feet from ground about 18 feet north of signal.

[Latitude, 34° 58' 28''-05. Longitude, 92° 28' 17''-66.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Maumelle.....	5 04 42.76	185 04 12.92	4.1750859
Big Rock.....	324 54 17.76	145 00 13.52	4.4396040
Shinall.....	6 47 19.87	186 46 27.27	4.2961380
Moss.....	48 54 08.65	228 47 19.08	4.3826270
Fourche.....	97 53 35.54	277 40 36.96	4.5408876
Burrow.....	131 33 04.59	311 24 21.22	4.4886580
Point Pisgah.....	174 52 56.54	254 52 22.81	4.2232200
Hump.....	209 17 29.04	29 26 07.43	4.6671490
Cox.....	243 57 30.20	64 05 09.91	4.3539590
Warsaw.....	276 46 09.11	96 57 16.94	4.4739880

FOURCHE.

Highest point on range, 3 miles northwest of Perryville, Perry Co., Ark. Summit cleared of timber.

Permanent mark: Oak tree standing alone.

[Latitude, 35° 01' 01''-68. Longitude, 92° 50' 55''-13.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bunker Hill.....	95 17 28.01	275 00 52.92	4.6445536
Burrow.....	215 44 06.77	35 48 23.43	4.2866586
Point Pisgah.....	249 56 20.88	70 08 47.00	4.5440928
Reynolds.....	277 40 36.96	97 53 35.54	4.5408816
Moss.....	321 36 07.97	141 42 16.37	4.4191624
Smith.....	31 13 53.12	211 07 39.04	4.5060766
Spring Mountain.	116 29 41.00	296 13 11.00	4.6870600

WARSAW.

Warsaw is a small, round, sharp peak one-half mile south of Warsaw, Pulaski Co., Ark., and 7 miles northwest of Jacksonville, on land owned by John See.

Permanent mark: Lone tree.

[Latitude, 34° 56' 33''-48. Longitude, 92° 08' 52''-12.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Maumelle.....	69 56 32.46	249 44 55.92	4.517668
Reynolds.....	96 57 16.94	276 46 09.11	4.473988

BURROW.

On heavily timbered knob one-half mile northeast of Morrilton, Conway Co., Ark. Instrument elevated 60 feet.

Permanent mark: Stone marked with cross.

[Latitude, 35° 09' 31"-11. Longitude, 92° 43' 28"-65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Fourche	35 48 23.43	215 44 06.77	4.2866586
Reynolds	311 24 21.22	131 33 04.59	4.4886580
Point Pisgah	279 48 06.21	99 56 15.76	4.3403042
Pig Mountain	228 06 11.43	48 12 35.94	4.3546568
Black Mountain ..	185 25 18.98	5 26 52.53	4.6344878
Evans Mountain ..	.....	.....	4.5873924

COX.

Cox is on the highest part of a ridge 10 miles east of Conway and 3 miles southwest of Vilonia, Faulkner Co., Ark., on land owned by Mr. Cox, and is 3 miles south of Senator Donaway's residence.

Permanent mark: Black-oak tree.

[Latitude, 35° 03' 50"-10. Longitude, 92° 14' 56"-57.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Point Pisgah	107 18 03.84	287 09 49.40	4.358075
Reynolds	64 05 09.91	243 57 30.20	4.353959

POINT PISGAH.

Hump on ridge 4 miles northwest of Conway, Faulkner Co., Ark.

Permanent mark: Oak tree.

[Latitude, 35° 07' 29"-37. Longitude, 92° 29' 16"-62.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Reynolds	354 52 22.00	174 52 56.60	4.2232259
Fourche	70 08 47.00	249 56 20.88	4.5440928
Burrow	99 56 15.76	279 48 06.21	4.3403042
Pig Mountain	166 02 30.45	346 00 43.54	4.2883132
Hump	225 24 36.33	45 33 49.68	4.531645
Cox	287 09 49.40	107 18 03.84	4.358075

HUMP.

Hump is an isolated hill about 300 feet above the surrounding country 1½ miles northeast of Enders, Faulkner Co., Ark., and 3 miles south of Quitman. Is about one-fourth mile long east and west and was very heavily timbered. The eastern half of the hill was cleared of timber except one tree.

Permanent mark: Loue tree.

[Latitude, 35° 20' 23"-13. Longitude, 92° 13' 17"-40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Point Pisgah	45 33 49.68	225 24 36.33	4.531645
Reynolds	29 26 07.43	209 17 29.04	4.667149

PIG MOUNTAIN.

High ridge 3 miles northeast of Springfield, Conway Co., Ark.
Permanent mark: Wooden post under tripod.

[Latitude, 35° 17' 40''-98. Longitude, 92° 32' 22''-09.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Point Pisgah	346	00	43.54	166	02	30.45	4.2883132
Burrow	48	12	35.94	228	06	11.43	4.3546478
Black Mountain ..	155	25	58.75	335	21	06.11	4.4855891
Evans Mountain ..	127	12	04.80	307	01	06.37	4.5560437

BLACK MOUNTAIN.

High knob 5 miles northwest of Scotland, Van Buren Co., Ark.
Timber chopped off the top excepting one black-oak tree.
Permanent mark: Black-oak tree standing alone.

[Latitude, 35° 32' 43''-48. Longitude, 92° 40' 47''-05.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Burrow	5	26	52.53	185	25	18.98	4.6344878
Pig Mountain	335	21	06.11	155	25	58.75	4.4855891
Evans Mountain ..	69	04	46.56	248	58	39.39	4.2318370
Pine Hill	175	10	38.18	355	10	18.73	4.0000234
Walker							4.3347268

EVANS MOUNTAIN.

Highest part of flat top mountain in Pope Co., Ark., 10 miles northwest of Cleveland. Lines of sight cut out to different primary points.
Permanent mark: Oak tree.

[Latitude, 35° 29' 25''-31. Longitude, 92° 51' 19''-02.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Pig Mountain	307	01	06.37	127	12	04.80	4.5560437
Burrow	342	04	23.05	162	08	54.98	4.5873924
Black Mountain ..	248	58	39.39	69	04	46.56	4.2318370
Pine Hill	223	07	20.99	43	13	09.12	4.3430697
Walker	178	03	11.43	358	02	55.73	4.3004644
Raspberry Mountain	152	43	16.64	332	39	29.57	4.3308122

PINE HILL.

Highest knoll near Alread, Van Buren Co., Ark. It has all the timber cleared off but one tree.

Permanent mark: Spike in stump 21 feet north of lone black-oak tree.

[Latitude, 35° 38' 06"·80. Longitude, 92° 41' 20"·52.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Black Mountain.....	355	10	18·73	175	10	38·18	4·000234
Evans Mountain.....	43	13	09·12	223	07	20·99	4·3430697
Walker.....	103	56	55·14	283	50	50·52	4·2098001
Reeves.....	156	01	52·89	336	00	09·54	4·0399253
Walnut Mountain.....	263	19	35·95	83	25	55·01	4·2168164
Red Hill.....							4·2678041

WALKER.

High knoll near head of Illinois Bayou, Pope Co., Ark. Timber all cleared off except one black-oak tree.

Permanent mark: Black-oak tree.

[Latitude, 35° 40' 13"·08. Longitude, 92° 51' 46"·06.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Evans Mountain.....	358	02	55·73	178	03	11·43	4·3004644
Pine Hill.....	283	50	50·52	103	56	55·14	4·2098001
Raspberry Mountain.	84	12	58·86	264	09	27·02	3·9630864
Round (2).....	159	47	28·65	339	44	46·59	4·3042510
Reeves.....	241	27	14·69	61	31	36·31	4·1081476
Black Mountain.....							4·3347268

RASPBERRY MOUNTAIN.

High point on the old mountain road in Pope Co., Ark., about 10 miles southwest of Witts Springs. All the timber was cut off except one white-oak tree.

Permanent mark: White-oak tree.

[Latitude, 35° 39' 42"·89. Longitude, 92° 57' 49"·34.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Evans Mountain.....	332	39	29·57	152	43	16·64	4·3308122
Walker.....	264	09	27·02	84	12	58·86	3·9630864
Round (2).....	186	12	26·54	6	13	16·77	4·3000109

ROUND (2).

High knob about 8 miles northwest of Witts Springs, Searcy Co., Ark. All timber chopped off the top, and an observing platform, 25 feet high, built around the trunk of a tree.

Permanent mark: White-oak tree.

[Latitude, 35° 50' 26"·51. Longitude, 92° 56' 23"·41.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Raspberry Mountain.	6	13	16·77	186	12	26·54	4·3000109
Walker.....	339	44	46·59	159	47	28·65	4·3042510

WALNUT MOUNTAIN.

High knob 10 miles northwest of Clinton, Van Buren Co., Ark., on the north bank of Archies Fork of Red River. Has all timber chopped off the top except one white-oak tree. Instrument elevated 20 feet.

Permanent mark: White-oak tree.

[Latitude, 35° 39' 08''·44. Longitude, 92° 30' 30''·08.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Pine Hill	83	25	55·01	263	19	35·95	4·2168164
Reeves	111	22	27·75	291	14	24·90	4·3490447
Red Hill	174	45	15·45	354	44	58·25	3·9086639
Pond Mountain	261	09	06·78	81	20	13·95	4·4634886

REEVES.

High knob in Searcy Co., Ark., 7 miles northwest of Copeland and one-half mile from Dr. Reeves's residence. Has all the timber cleared off the top.

Permanent mark: Black-oak tree.

[Latitude, 35° 43' 31''·74. Longitude, 92° 44' 17''·74.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Walker	61	31	36·31	241	27	14·60	4·1081476
Pine Hill	336	00	09·54	156	01	52·89	4·0399253
Walnut Mountain	291	14	24·90	111	22	27·75	4·3490447
Red Hill	270	04	16·74	90	12	02·81	4·3023494
Brush Mountain	227	35	32·89	47	39	53·41	4·1805321

BRUSH MOUNTAIN.

High knob 6½ miles southeast of Marshall, Searcy Co., Ark. Has all timber cleared off the top except one white-oak tree.

Permanent mark: Wooden post set 3 feet in ground.

[Latitude, 35° 49' 03''·11. Longitude, 92° 36' 52''·05.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Reeves	47	39	53·41	227	35	32·89	4·1805321
Red Hill	319	10	53·78	159	14	19·82	4·1320095
Blue Mountain (2)	255	16	36·82	75	25	24·38	4·3686265

RED HILL.

Midway between Clinton, Van Buren Co., Ark., and Marshall, and right on the road; the highest point in that neighborhood. Has all timber chopped off the top except one black-oak tree.

Permanent mark: Wooden post with spike in top.

[Latitude, 35° 43' 30"-27. Longitude, 92° 30' 59"-57.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Reeves	90 12 02·81	270 04 16·74	4·3023494
Walnut Mountain.....	354 44 58·25	174 45 15·45	3·9006639
Brush Mountain	139 14 19·82	319 10 53·78	4·1320095
Pond Mountain.....	276 57 19·91	97 08 44·00	4·4725741
Blue Mountain(2).....	220 22 33·70	40 27 54·52	4·3271528
Pine Hill.....	.....	.....	4·2678041

BLUE MOUNTAIN (2).

Highest point in the neighborhood of Alço, Stone Co., Ark., and 1½ miles south of post-office. Has all the timber cleared off the top except one white-oak tree.

Permanent mark: Cross cut on stone and pile of rocks over marked stone.

[Latitude, 35° 52' 14"-86. Longitude, 92° 21' 51"-18.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Brush Mountain.....	75 25 24·38	255 16 36·82	4·3686265
Red Hill	40 27 46·26	220 22 25·46	4·3271528
Pond Mountain.....	321 37 18·33	141 43 22·98	4·4023817
Irons Point.....	272 23 46·92	92 35 57·36	4·4956724
Finch Mountain.....	302 08 34·35	122 15 05·48	4·2971750
Pilot Mountain.....	231 20 11·12	51 32 15·03	4·5963290
Alpha	210 22 32·57	30 31 23·60	4·6491082

FINCH MOUNTAIN.

Mound on flat top mountain 6 miles southwest of Mountain View, Stone Co., Ark. Has lines cut out to different primary stations.

Permanent mark: Post 15·3 feet northeast of lone hickory tree.

[Latitude, 35° 46' 32"-23. Longitude, 92° 10' 42"-94.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Blue Mountain (2).....	122 15 05·48	302 08 34·35	4·2971750
Pond Mountain.....	6 54 45·04	186 54 18·99	3·9693555
Irons Point.....	237 36 07·68	57 41 46·20	4·2352699

POND MOUNTAIN.

Flat top mountain in Cleburne Co., Ark., 6 miles east of Rushing. All timber cleared to west and north and line cut out eastward.

Permanent mark: White oak tree.

[Latitude, 35° 41' 32"-08. Longitude, 92° 11' 27"-52.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Red Hill.....	97 08 35·76	276 57 11·67	4·4725741
Blue Mountain (2).....	141 43 22·98	321 37 18·33	4·4023817
Walnut Mountain.....	81 20 13·05	261 09 06·78	4·4634886
Finch Mountain.....	186 54 18·99	6 54 45·04	3·9693555

IRONS POINT.

Flat top spur of the Blue range 6 miles east of Mountain View, Stone Co., Ark. Has a large amount of timber cut and an observing platform, 15 feet high, built around the trunk of a tree.

Permanent mark: Trunk of tree 38 feet east of oak tree used as signal.

[Latitude, 35° 51' 30''-69. Longitude, 92° 01' 04''-50.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Finch Mountain.....	57	41	46.20	237	36	07.68	4.2352699
Blue Mountain (2)....	92	35	57.36	272	23	46.92	4.4956724
Pilot Mountain.....	179	11	33.16	359	11	24.57	4.4145606
Cedar Mountain.....	242	08	54.76	62	15	45.00	4.2973891
Deane Mountain.....	296	59	00.58	117	08	45.53	4.4501907
Mount Etna.....	265	21	27.66	85	30	48.47	4.3818364

DEANE MOUNTAIN.

High spur of the Blue range just south of White River and 6 miles southwest from Batesville, Independence Co., Ark. Has timber cleared off except one tree just below the summit.

Permanent mark: Cross cut on large rock about 10 feet east of the signal tree.

[Latitude, 35° 44' 34''-43. Longitude, 91° 44' 24''-55.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Irons Point.....	117	08	46.53	296	59	00.58	4.4501907
Mount Etna.....	165	50	08.20	355	49	43.16	4.1698300

MOUNT ETNA.

High, cleared, open field one-fourth of a mile north of Cushman, Independence Co., Ark.

Permanent mark: Wooden post set under a painted tripod signal.

[Latitude, 35° 52' 32''-89. Longitude, 91° 45' 07''-36.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Pilot Mountain.....	134	44	13.03	314	34	42.04	4.5343414
Irons Point.....	85	30	48.47	265	21	27.66	4.3818364
Deane Mountain.....	355	49	43.16	165	50	08.20	4.1698300

CEDAR MOUNTAIN.

Highest knob within 5 miles of Barren Fork, Iazard Co., Ark., 4 miles southwest of post-office. Has all timber chopped off the top except one pine tree.

Permanent mark: × cut in solid sandstone rock 11.5 feet northeast of signal tree.

[Latitude, 35° 56' 30''-75. Longitude, 91° 49' 24''-90.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Irons Point.....	62 15 45.00	242 08 54.76	4.2973891
Pilot Mountain.....	133 08 12.61	313 01 12.61	4.3889303

PILOT MOUNTAIN.

High knob 6 miles west of Melbourne, Izard Co., Ark. All timber has been chopped off except one tree.

Permanent mark: Lone tree.

[Latitude, 36° 05' 33''-37. Longitude, 92° 01' 19''-18.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Irons Point.....	359 11 24.57	179 11 33.16	4.4145606
Blue Mountain (2) ...	51 32 15.03	231 20 11.12	4.5963290
Mount Etna.....	314 34 42.04	134 44 13.03	4.5343414
Cedar Mountain.....	313 01 12.61	133 08 12.51	4.3889303
Alpha.....	149 13 15.94	329 10 01.45	4.2065745
Matny Mountain.....	115 22 14.83	295 11 50.55	4.4662655
Salem.....	204 13 15.47	24 18 50.89	4.5375408

ALPHA.

High knoll 3 miles north of Pineville, Izard Co. Ark. All timber has been cleared off but one tree.

Permanent mark: Cross cut in solid rock.

[Latitude, 36° 13' 01''-65. Longitude, 92° 06' 48''-75.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pilot Mountain.....	329 10 01.45	149 13 15.94	4.2065745
Blue Mountain (2) ...	30 31 23.60	210 22 32.57	4.6491082
Matny Mountain.....	85 54 02.87	265 46 52.42	4.2612358
Salem.....	231 43 58.44	51 52 49.51	4.4545699
Wallace Knob.....	123 14 01.47	303 04 39.95	4.451507

SALEM.

High knoll 3 miles west of Salem, Fulton Co., Ark. All the timber was cleared off the knoll.

Permanent mark: Cross cut in stone about 10 feet southeast of signal and large pile of stones.

[Latitude, 36° 22' 33''-15. Longitude, 91° 51' 51''-75.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Alpha.....	51 52 49.51	231 43 58.44	4.4545699
Pilot Mountain....	24 18 50.89	204 13 15.47	4.5375408

WALLACE KNOB.

Wallace Knob is 2 miles northeast of Mountain Home, Baxter Co., Ark., in plain view of the town. It is about 500 feet above the surrounding country; is nearly round, with about 1 acre on top, which is cleared of timber, except one tree.

Permanent mark: Lone tree.

[Latitude, 36° 21' 23"·63. Longitude, 92° 22' 37"·71.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Alpha	303	04	39·95	123	14	01·47	4·451507
Matny Mountain..	341	51	44·65	161	53	54·93	4·247176
Pine (2).....	103	10	06·42	282	59	22·92	4·443375

MATNY MOUNTAIN.

High knob just south of White River and 15 miles south of Mountain Home, Baxter Co., Ark.; has most of the timber chopped off the top.

Permanent mark: Lone tree with spike in trunk.

[Latitude, 36° 12' 18"·70. Longitude, 92° 18' 57"·43.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Pilot Mountain.....	295	11	50·55	115	22	14·83	4·4662655
Alpha.....	265	46	52·42	85	54	02·87	4·2612358
Boat.....	82	28	38·80	262	03	09·28	4·815415
Pine (2).....	125	25	58·26	305	13	05·54	4·601004
Wallace Knob.....	161	53	54·93	341	51	44·65	4·247176

PINE (2).

Just south of White River, 20 miles northwest of Mountain Home, and 1 mile northwest of Stone, Marion Co., Ark., on a hogback ridge running northeast and southwest, about 1,000 feet long, which is entirely cleared of timber.

Permanent mark: Lone tree.

[Latitude, 36° 24' 47"·43. Longitude, 92° 40' 42"·55.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Matny Mountain	305	13	05·54	125	25	58·26	4·601004
Wallace Knob	282	59	22·92	103	10	06·42	4·443376
Lead.....	93	49	03·92	273	37	05·62	4·480227
Boat.....	45	19	37·48	225	06	56·22	4·655610

LEAD.

A bald knob about 400 feet above the surrounding country, 6 miles due west from Lead Hill, Boone Co., Ark. There was a small honey-

locust tree on top, which was used for signal. The top is flat, covered with rocks, and is about 2 acres in extent.

Permanent mark: Cross cut on solid rock, 10 inches below surface, 10·3 feet northeast of signal tree.

[Latitude, 36° 25' 50"-96. Longitude, 93° 00' 52"-38.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine (2).....	273 37 05·62	93 49 03·92	4·480227
Boat.....	3 15 34·18	183 14 48·59	4·530009
Trout.....	149 14 09·46	329 09 26·59	4·363505
Kennedy.....	41 51 48·43	221 44 18·81	4·453208
Cedar.....	192 11 53·38	12 13 06·98	4·163281

BOAT.

A very sharp peak at north end of Boat Mountain, in the northeast corner of Newton Co., Ark., 9 miles southeast of Harrison and 3 miles southwest of Valley Springs, Ark. Has timber cleared from top.

Permanent mark: Lone tree.

[Latitude, 36° 07' 33"-17. Longitude, 93° 02' 09"-29.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Matny Mountain..	262 03 09·28	82 28 38·80	4·815415
Pine (2).....	225 06 56·22	45 19 37·48	4·655610
Kennedy.....	126 40 51·62	306 34 09·11	4·326916
Lead.....	183 14 48·59	3 15 34·18	4·530009

KENNEDY.

On land owned by Mr. Kennedy and sometimes known by the name of Pilot. It is 6 miles west of Harrison and 1 mile south of Batavia, Boone Co., Ark. It is a bald rock about 700 feet above the surrounding country.

Permanent mark: U. S. G. S. cross cut in rock.

[Latitude, 36° 14' 24"-06. Longitude, 93° 13' 31"-11.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Boat.....	306 34 09·11	126 40 51·62	4·326916
Lead.....	221 44 18·81	41 51 48·43	4·453203
Cedar.....	211 46 42·22	31 55 25·96	4·619886
Pyron.....	121 27 09·76	301 16 08·01	4·513776
Bald.....	172 10 42·33	352 08 11·46	4·666043
Watson.....	92 55 55·06	272 47 08·63	4·3475122

CEDAR.

A sharp peak entirely bald on side and cleared of timber on top. It is 2 miles southeast from Cedar Creek and 15 miles southeast from Forsyth, Taney Co., Mo.

Permanent mark: Lone tree.

[Latitude, 36° 33' 32''-76. Longitude, 92° 58' 48''-69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kennedy.....	31 55 25·96	211 46 43·22	4·619886
Lead.....	12 13 06·98	192 11 53·38	4·163281
Hammond.....	175 30 16·17	355 29 33·87	4·350669
Bald.....	110 30 46·48	290 19 28·75	4·479139
Trout.....	110 39 45·71	290 33 48·66	4·201744

HAMMOND.

Located about 5 miles north of Taney City, Taney Co., Mo., and about 1 mile east of Taney City and Springfield road, on a small, sharp knob known as Hammond Knob.

Permanent mark: Lone tree.

[Latitude, 36° 45' 37''-92. Longitude, 92° 59' 59''-53.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald.....	65 58 32·92	245 47 55·99	4·462055
Cedar.....	355 29 33·87	175 30 16·17	4·350669

TROUT.

A low, flat hill 1 mile southeast from Kirbyville, Taney Co., Mo. Has most of the timber cleared from the top.

Permanent mark: Lone tree.

[Latitude, 36° 36' 34''-49. Longitude, 93° 08' 47''-74.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cedar.....	290. 33 48·66	110 39 45·71	4·201744
Lead.....	329 09 26·59	149 14 09·46	4·363505

BALD.

On north side of White River, in Stone Co., Mo. It is about 11 miles west of Kirbyville, Taney Co., Mo., from which place it is plainly visible. It is reached by crossing White River at the north of Turkey Creek. Is almost entirely bald on the side and has all timber cleared from top.

Permanent mark: Lone tree.

[Latitude, 36° 39' 13''-89. Longitude, 93° 17' 45''-27.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kennedy.....	352 08 11·46	172 10 42·33	4·666043
Cedar.....	290 19 28·75	110 30 46·48	4·479139
Pilot Knob.....	62 00 05·78	241 51 08·48	4·404577
Pyron.....	36 40 05·00	216 31 31·14	4·556682
Bread Tray.....	63 22 02·76	243 15 27·92	4·265078
Hammond.....	245 47 55·99	65 28 32·92	4·462055

BREAD TRAY.

Bread Tray Mountain, Barry Co., Mo., is 5 miles northwest of Pilot Knob. It is about one-eighth mile long and quite narrow. Has all timber cleared from summit except one tree.

Permanent mark: Lone tree.

[Latitude, 36° 34' 45''-63. Longitude, 93° 28' 47''-28.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald.....	243 15 27·92	63 22 02·76	4·265078
Pyron.....	13 39 30·16	193 37 30·38	4·327532

PILOT KNOB.

Pilot Knob is about 15 miles north of Berryville, Ark., and 2 miles south of Viola, Stone Co., Mo. It is a sharp knob about 400 feet above surrounding country. It has all timber cleared from summit except one tree, left for signal.

Permanent mark: Lone tree.

[Latitude, 36° 32' 46''-34. Longitude, 93° 32' 46''-49.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pyron.....	356 49 39·26	176 50 01·71	4·230640
Bald.....	241 51 08·48	62 00 05·78	4·404577
Lohmer.....	132 19 52·09	312 14 02·66	4·294134
Sugar.....	73 10 31·27	252 58 00·89	4·516058

LOHMER.

Station on a ridge north of the Cassville and Shell Knob road, about 11 miles southeast of Cassville, Barry Co., Mo., and 1 mile east of Judge Lohmer's house. A 48-foot scaffold was built around a large black-oak tree, which is trimmed up.

Permanent mark: Black-oak tree.

[Latitude, 36° 39' 56''-00. Longitude, 93° 42' 32''-43.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pilot Knob.....	312 14 02·66	132 19 52·09	4·294134
Sugar.....	36 26 08·01	216 19 25·65	4·452058
Butterfield.....	111 05 11·98	290 57 51·92	4·291899

BUTTERFIELD.

On edge of the right of way of the St. Louis and San Francisco Railroad, about halfway between stations Butterfield and Exeter, Barry Co., Mo. Signal scaffold 68 feet high built around a large black-oak tree and projecting above the top of the tree.

Permanent mark: Black-oak tree.

[Latitude, 36° 43' 43''-96. Longitude, 93° 54' 48''-91.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lohmer.....	290 57 51.92	111 05 11.98	4.291899
Sugar.....	357 05 13.28	177 05 49.62	4.475142

SUGAR.

Station on Sugar Mountain, Benton Co., Ark., which is 5 miles southeast of Seligman, Mo., on the Seligman and Eureka Springs road and just west of the road.

Permanent mark: Lone tree.

[Latitude, 36° 27' 36''-37. Longitude, 93° 53' 48''-00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pilot Knob.....	252 58 00.89	73 10 31.27	4.5160580
Pyron.....	282 49 05.60	103 01 57.05	4.5212040
Butterfield.....	177 05 49.62	357 05 13.28	4.4751420
Lohmer.....	216 19 25.65	36 26 08.01	4.4520580
Orchard.....	26 20 06.78	206 13 45.00	4.5601507

PYRON.

Pyron Mountain is about 2 miles northeast of Berryville, Carroll Co., Ark., and is about 800 feet above the town. Has about 2 acres on top and is cleared of timber, except one tree left for signal.

Permanent mark: Lone tree.

[Latitude, 36° 23' 35''-29. Longitude, 93° 32' 08''-61.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kennedy.....	301 16 08.01	121 27 09.76	4.5137760
Bald.....	216 31 31.14	36 40 05.00	4.5566820
Pilot Knob.....	176 50 01.71	356 49 39.26	4.2306400
Swain.....	60 52 49.66	240 44 41.98	4.3711983
Sugar.....	103 01 57.05	282 49 05.60	4.5212040
Bread Tray.....	193 37 30.38	13 39 30.16	4.3275320
Watson.....	340 21 31.29	160 23 45.71	4.2267538

WATSON.

About 15 miles southeast of Berryville, Ark., on divide between Piney and Osage Creeks, and 2 miles north of Piney, Carroll Co., Ark., on public land. It is rather a sharp peak and has all the timber cleared from summit except one tree left for a signal.

Permanent mark: Lone tree.

[Latitude, 36° 15' 00''-09. Longitude, 93° 28' 21''-56.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Swain	99	38	46.03	279	28	24.91	4.4244809
Pyron	160	23	45.71	340	21	31.29	4.42267538
Hobbs	50	30	37.87	230	12	18.30	4.7830238
Kennedy	272	47	08.63	92	55	53.06	4.3475122

SWAIN.

About 10 miles south of Eureka Springs, Madison Co., Ark., about one-eighth mile west of the road between Eureka Springs and Hinds-ville, Ark. On a flat-top mountain, from which all the timber was cleared except one tree.

Permanent mark: Lone tree.

[Latitude, 36° 17' 23''-38. Longitude, 93° 45' 52''-65.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Pyron	240	44	41.98	60	52	49.66	4.3711983
Watson	279	28	24.91	99	38	46.03	4.4244656
Hobbs	25	26	05.55	205	18	03.99	4.6787670
Rogers	98	30	53.60	278	18	32.60	4.4991011
Orchard	64	03	14.03	243	52	11.63	4.4934958

ROGERS.

In the town of Rogers, Benton Co., Ark., 2 blocks east and 1 block north of railway depot, over center of water tower; elevated 20 feet above the top of the tower, which is 73 feet high and stands in the middle of the street.

Permanent mark: Center of water tower.

[Latitude, 36° 19' 53''-30. Longitude, 94° 06' 43''-29.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Orchard	349	53	02.26	169	54	19.47	4.2690330
Swain	278	18	32.60	98	30	53.60	4.4991011
Twin	49	15	48.63	229	06	21.91	4.500107

ORCHARD.

About 3 miles east of Springdale and 8 miles northeast of Fayetteville, Washington Co., Ark., on a flat-top hill which has an orchard growing on it.

Permanent mark: Stone marked $\begin{array}{c} U \\ \hline G \end{array} \begin{array}{c} S \\ \hline S \end{array}$ set in ground.

[Latitude, $36^{\circ} 09' 59'' \cdot 74$. Longitude, $94^{\circ} 04' 32'' \cdot 59$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Swain	243	52	11.63	64	03	14.03	4.4934958
Sugar	206	13	45.00	26	20	06.78	4.5601507
Rogers	169	54	19.47	349	53	02.26	4.2690330
Kestler	38	04	26.53	217	59	20.66	4.323958
Twin	85	05	14.10	264	54	31.46	4.436666
Hobbs	345	30	52.55	165	33	51.01	4.4830712

TWIN.

About 15 miles west of Fayetteville, Washington Co., Ark., on the southern of two round peaks. Has all the timber cleared from the summit except one black-oak tree.

Permanent mark: Tree.

[Latitude, $36^{\circ} 08' 42'' \cdot 54$. Longitude, $94^{\circ} 22' 42'' \cdot 02$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Rogers	229	06	21.91	49	15	48.63	4.500107
Orchard	264	54	31.46	85	05	14.10	4.436666
Drake	32	19	55.01	212	14	52.26	4.382045

KESTLER.

About 5 miles southwest of Fayetteville, Washington Co., Ark., on a flat-topped hill, which was once under cultivation but is now waste land. The small timber was all cleared away, leaving one small white-oak tree, rather toward the south end of the mountain.

Permanent mark: Lone tree.

[Latitude, $36^{\circ} 01' 00'' \cdot 91$. Longitude, $94^{\circ} 13' 11'' \cdot 84$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Orchard	217	59	20.66	38	04	26.53	4.323958
Hobbs	301	51	19.42	121	59	22.47	4.385381
Drake	77	20	08.03	256	09	30.68	4.444916
Cane Hill	61	36	15.84	241	27	38.46	4.399889
Skylight	34	36	53.43	214	31	25.92	4.392649
Sloane	341	27	27.20	161	29	46.10	4.271236

HOBBS.

About 12 miles southeast of Fayetteville and 3 miles south of Durham, Washington Co., Ark., on a northern spur of the Boston range of mountains. There is a cornfield on top of the peak in which a grove was standing. This grove of trees was chopped down, with the excep-

tion of one large black oak, which was reserved for a signal. Instrument elevated 20 feet.

Permanent mark: Black-oak tree.

[Latitude, 35° 54' 04"·07. Longitude, 93° 59' 28"·90.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Watson	230	12	18·30	50	30	37·87	<i>Meters.</i> 4·7830238
Swain	205	18	03·99	25	26	05·55	4·6787670
Kestler	121	59	22·47	301	51	19·42	4·385381
Sloane	71	44	23·92	251	28	40·50	4·189822
Orchard	165	33	51·01	345	30	52·55	4·4830712

SLOANE.

Sloane is about 15 miles south of Fayetteville, Washington Co., Ark., on a spur of the Boston range. About 5 acres of timber was chopped down to clear the top. Instrument was elevated 15 feet.

Permanent mark: Large white-oak tree.

[Latitude, 35° 51' 26"·29. Longitude, 94° 09' 14"·99]

To station.	Azimuth.			Back azimuth.			Log dist.
	°	'	"	°	'	"	
Kestler	161	29	46·10	341	27	27·20	4·271236
Hobbs	251	38	40·50	71	44	23·92	4·189822
Strickler	67	37	14·62	247	30	47·66	4·254126
Skylight	82	37	59·64	262	30	14·16	4·305343
Boston	9	53	35·75	189	53	07·12	3·854295
Wakefield	322	31	04·00	142	35	01·69	4·224813

SKYLIGHT.

About 3 miles west of Strickler, Washington Co., Ark., on a high, round hill, having a house on the highest part. The timber has all been cleared from the top, but has a fringe of trees around the edge, through which lines of sight were cut. The station is just in front of Mr. Donham's house.

Permanent mark: Large black-oak tree.

[Latitude, 35° 50' 02"·13. Longitude, 94° 22' 30"·28.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Kestler	214	31	25·92	34	36	53·43	4·392049
Sloane	262	30	14·16	82	37	59·64	4·305343
Boston	283	16	57·01	103	24	13·51	4·284353
Cane Hill	135	51	52·07	315	48	42·92	4·065343
Strickler	321	39	55·43	141	41	13·71	3·733676
Lee	357	58	54·14	177	59	12·80	4·358365

CANE HILL.

About 5 miles south of Summers, Washington Co., Ark. Station is on the northeast point of a big flat hill, and has lines of sight cut out to other primary points.

Permanent mark: Large white-oak tree.

[Latitude, 35° 54' 32''-67. Longitude, 94° 27' 53''-07.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Skylight.....	315 48 42·92	135 51 52·07	4·065343
Kestler.....	241 27 38·46	61 36 15·84	4·399889

DRAKE.

About 20 miles west of Fayetteville and 1 mile west of Summers, Washington Co., Ark., on a long flat hill, the station being on the west end, and lines of sight chopped out to primary stations.

Permanent mark: Lone white-oak tree.

[Latitude, 35° 57' 41''-53. Longitude, 94° 31' 16''-56.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kestler.....	256 09 30·68	77 20 08·03	4·444916
Twin.....	212 14 52·26	32 19 55·01	4·382045

STRICKLER.

About 1½ miles southwest of Strickler, Washington Co., Ark., just east of the old wire road, running from Fayetteville southwest. Has all the timber cleared from the summit except one tree.

Permanent mark: Large white-oak tree.

[Latitude, 35° 47' 44''-26. Longitude, 94° 20' 16''-53.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Skylight.....	141 41 13·71	321 39 55·43	3·733676
Sloane.....	247 30 47·66	67 37 14·62	4·254126
Lockard.....	332 46 12·72	152 49 11·70	4·226613
Lee.....	7 52 01·94	187 51 02·47	4·272616

BOSTON.

Boston is on the main ridge of the Boston range of mountains and about 1½ miles west of Winslow, Washington Co., Ark., which is at the north end of the tunnel of the St. Louis and San Francisco Railway. Is about 100 feet above the general ridge. Is rather flat on top.

The station is near the north end of the hill and has lines of sight cut through to other primary points. Instrument was elevated 15 feet.

Permanent mark: Large black-oak tree.

[Latitude, 35° 47' 37''-74. Longitude, 94° 10' 03''-95.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Skylight	103 24 13·51	283 16 57·01	4·284353
Sloane	189 53 07·12	9 53 35·75	3·854295
Wakefield	298 43 48·14	118 48 14·24	4·115503
Cartright	349 26 39·11	169 27 24·15	4·024527

WAKEFIELD.

Wakefield, in Franklin Co., Ark., is about 10 miles southeast of Winslow and 10 miles northeast of Chester. Has all timber cleared from summit except one tree.

Permanent mark: Lone tree.

[Latitude, 35° 44' 14''-02. Longitude, 94° 02' 28''-69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Boston	118 48 14·24	298 43 48·14	4·115503
Sloane	142 35 01·69	322 31 04·00	4·224813
Cartright	66 34 46·45	246 31 05·67	4·015411

CARTRIGHT.

Cartright is on a high ridge 3 miles east of Chester, Crawford Co., Ark. The station is the west end of Mr. Cartright's house, which is on the highest ground.

Permanent mark: West end of the comb of the roof.

[Latitude, 35° 42' 00''-22. Longitude, 94° 08' 46''-89.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Boston	169 27 24·15	349 26 39·11	4·024527
Wakefield	246 31 05·67	66 34 46·45	4·015411

LOCKARD.

Lockard is about 5 miles west of Chester, Crawford Co., Ark., on a round hill, which has all the timber cleared from the summit except one tree.

Permanent mark: Tall black-oak tree.

[Latitude, 35° 39' 37''·70. Longitude, 94° 15' 09''·63.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lee.....	70 52 08·76	250 48 10·76	4·036555
Strickler.....	152 49 11·70	332 46 12·72	4·226613

LEE.

Lee is about 13 miles west of Chester and 3 miles south of Lee Creek, Crawford Co., Ark. Is a sharp peak with a small field on top. The station is near the center of the summit. Instrument was elevated 15 feet.

Permanent mark: Large black-oak tree.

[Latitude, 35° 37' 42''·12. Longitude, 94° 21' 58''·45.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Skylight.....	177 59 12·80	357 58 54·14	4·358365
Strickler.....	187 51 02·47	7 52 01·94	4·272616
Lockard.....	250 48 10·76	70 52 08·76	4·036555

KANSAS.

METHODS OF WORK.

The triangulation in Kansas conducted by the Geological Survey is in three detached belts, each of which starts from a line or lines of the transcontinental triangulation of the U. S. Coast and Geodetic Survey.

The southern belt begins with the line Fulton-Hutton Mound some 20 miles east of the Missouri-Kansas line, and proceeds nearly due west until the Arkansas River is reached at Hutchinson. From here the general course of the river is followed as far as Larned, at which point topographic conditions favored a detour to the west and southwest to Dodge, after which the river was again followed to the present terminus near Hartland.

Field work of triangulation was begun in 1885 by R. U. Goode, who continued it as far as Florence. The instrument used was a Gambey 11-inch repeating theodolite with two verniers reading to ten seconds. No azimuth observations were taken at the time, but a subsequent observation at Florence showed only a very small error. In 1889 this belt was continued westward by H. L. Baldwin, jr., as far as Spearville. The instrument used was a Fauth 8-inch theodolite, No. 362, reading with two microscopes to 2 seconds. Azimuths were taken at intervals of about 50 miles in this and all subsequent work.

At Spearville a base line 7.1 miles in length was measured with a 300-foot steel tape under very favorable conditions. The base line was divided into thirteen sections of 3,000 feet each, two complete measures of each section being made. About half of the sections were measured a third time, when work was stopped by an accident. The resulting probable error of the base is 0.39 inch. An astronomical determination of the latitude and longitude of the Spearville end of the base was made in 1889 by Prof. R. S. Woodward, signals being exchanged with St. Louis on three nights.

In 1889 work was resumed at Spearville, and continued by a series of small but well-proportioned quadrilaterals to its present terminus near Hartland. All of the southern belt west of Florence rests upon the Spearville base. The average errors of closure of the triangles for each year's field work, before station adjustment was made, were respectively 7".85, 3".25, and 1".73.

The northeastern belt of triangulation was executed under the direction of Mr. John H. Renshawe in 1886. The angles were measured by Mr. E. T. Perkins, jr., excepting those from a few of the later

stations, which were observed by Mr. George T. Hawkins. The instrument used was the Gambey 11-inch theodolite used during the previous year in the southern belt. The work is based upon the U. S. Coast and Geodetic Survey line Blue Mound-Eckman, near Lawrence; and proceeds in a westerly direction, the axis of triangulation being about parallel to and 20 miles north of the Kansas River.

The northern belt of triangulation, executed by Mr. H. L. Baldwin, jr., in 1890, uses for initial positions three stations of the transcontinental triangulation of the U. S. Coast and Geodetic Survey, Vine Creek-Frey-Wilmer. It first proceeds northward 40 miles, and then takes a general westerly course to its present terminus near Lenora, Kans. The triangulation consists of a series of well-proportioned quadrilaterals of much larger size than in the other two belts, which was rendered possible by more favorable topographic conditions. The instrument used was a Fauth 8-inch theodolite, No. 362, reading by two micrometers to $2''$. Owing to the small errors of closure no figure or station adjustment was necessary. The average error of closure in 60 triangles is $2''\cdot07$.

In all of the Kansas triangulation well-proportioned figures with occasional single triangles were used, since the topography rendered it possible to place stations wherever desirable. Angles were read by the method of directions, both singly and combined, in such manner as to give check observations on each angle which entered into the computations. Adjustments by the method of least squares were made in the earlier work, in which less accurate instruments were used. In the later work the closures were so good as to render least-square adjustments unnecessary.

Nearly all of the stations in this work consisted of tripod signals built of rough lumber. Most of the earlier ones were tripods about 16 feet in height supporting an upright 4 by 4 pole and boarded to near the ground, so as to be readily distinguishable at a distance. In the later work the tripod was left more open and a target similar to that used by the Missouri River Commission, consisting of boards covered with white and black cloth and nailed on the pole at right angles to each other, was employed. In some cases, where it was necessary to elevate the instrument, a higher and larger scaffold was built for the support of the observer and within this a smaller tripod was erected for the support of the instrument.

In connection with the triangulation in Kansas a large number of townships and section corners were located usually by the method of directions and distances from the triangulation stations. These locations were made for the purpose of establishing control for the topographic work, which, in the plains country, is largely based on the land surveys.

A list of these corners with their positions is appended.

DESCRIPTIONS AND POSITIONS OF STATIONS.

CHAPEL HILL.

Triangulation station of the U. S. C. & G. S. in Cass Co., Mo., on land belonging to Dr. Joseph Ragsdale, about 400 feet from his house and about one-fourth mile south-southwest from the village of Chapel Hill. Station is in the NE. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 1, T. 47, R. 29.

Permanent mark: An ale bottle filled with ashes 3 feet below surface. Surface mark, a marble stone with letters U. S. C. S. cut on top. Two witness posts were set 5 feet, respectively, north and south from center of surface mark.

[Latitude, 38° 54' 52''-14. Longitude, 94° 03' 27''-27.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Thornton	62 04 23	241 57 17	4.2677195
Normal	301 29 31	121 41 34	4.5135400

OWLER.

Triangulation station of the U. S. C. & G. S. in Jackson Co., Mo., on a small hill situated about one-third of a mile west of the house of Mr. J. O. Bowler, the owner of the land, and about $2\frac{1}{2}$ miles southwest of the town of Lee Summit, Jackson Co., Mo. It is in the NW. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sec. 18, T. 47, R. 31.

Permanent mark: A bottle of ashes 3 feet below surface and three posts for surface marks. The center one has the letters U. S. C. S. cut on top. The witness posts are set 5 feet, respectively, north and south.

[Latitude, 38° 53' 20''-98. Longitude, 94° 23' 38''-30.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Thornton	294 33 59	114 39 33	4.1498642
Fulton	344 39 22	164 42 33	4.4455354
Independence	175 16 46.3	355 15 57.2	4.357836
Berry	62 31 45	242 25 32	4.2082964

THORNTON.

Triangulation station of the U. S. C. & G. S. in Cass Co., Mo., on land belonging to Mr. Charles T. Thornton, about 4 miles northeast of Pleasant Hill. It is in the NE. $\frac{1}{2}$ of the NW. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 4, T. 46, R. 30, about 10 feet south of the line bounding the section on the north. The north line of the section separates Cass Co. from Jackson Co.

Permanent mark: An ale bottle filled with ashes, $2\frac{3}{8}$ feet below surface. A marble post set flush with the ground, with the letters U. S.

U. S. cut on top, is the surface mark. Two other posts are set, respectively, north and south a distance of 5 feet from center of surface mark.

[Latitude, 38° 50' 10"·25. Longitude, 94° 14' 45"·83.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Baker	298 20 55	118 27 33	4·2404185
Fulton	14 39 00	194 36 37	4·3370185
Bowler	114 39 33	294 33 59	4·1498642
Chapel Hill.....	241 57 17	62 04 23	4·2677195

BAKER.

Triangulation station of the U. S. C. & G. S. in Johnson Co., Mo. The station is on the highest part of a prominent hill, about 1 mile north of the town of Kingsville. It is in Johnson Co., Mo., in the S. $\frac{1}{2}$ of the E. $\frac{1}{2}$ of the SE. $\frac{1}{4}$ of sec. 25, T. 46, R. 29, on land belonging to Mr. Edward Baker, and close to his house.

Permanent mark: An ale bottle filled with ashes, 2 $\frac{1}{4}$ feet below surface. The surface mark, a marble post set flush with surface, with the letters U. S. C. S. cut on top. Two witness posts are set 5 feet, respectively, north and south of the center of surface mark.

[Latitude, 38° 45' 41"·91. Longitude, 94° 04' 11"·78.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Normal.....	270 08 33	90 21 02	4·4608037
Caldwell.....	307 51 53	128 03 40	4·5399884
Hutton Mound...	22 09 45	202 05 37	4·4063201
Fulton.....	58 35 02	238 26 03	4·3875027
Thornton.....	118 27 33	298 20 55	4·2404185

FULTON.

Triangulation station of the U. S. C. & G. S. in Cass Co., Mo., about 2 $\frac{1}{2}$ miles east-southeast of Harrisonville, Mo., on land belonging to Mr. L. G. Fulton. It is in sec. 2, T. 44, R. 31, 168·5 feet from the northwest corner of the northeast quarter of the section and 71·1 feet south of the fence forming the boundary of Mr. Fulton's farm, separating it from the main road, and 71·5 feet east from a small house.

Permanent mark: An ale bottle filled with ashes, 2 $\frac{1}{2}$ feet below surface, and over it a marble post 2·1 feet, the letters U. S. C. S. cut on top. Two sandstone posts, each 2·1 feet long, were set 5 feet north and south, respectively.

[Latitude, 38° 38' 48"·46. Longitude, 94° 18' 33"·07.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hutton Mound....	313 59 26	134 04 16	4·1938480
Baker	238 26 03	58 35 02	4·3875027
Berry	131 54 11	311 44 48	4·4646561
Bowler	164 42 33	344 39 22	4·4455354
Thornton.....	194 36 37	14 39 00	4·3370185

HUTTON MOUND.

Triangulation station on the U. S. C. & G. S. in Cass Co., Mo. This station is on a hill, locally known as "Big Mound," belonging to Mr. Thomas Hutton, about five-eighths of a mile east of his house, and about 14 miles southeast of Harrisonville, in the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 1, T. 43, R. 30.

Permanent mark: An ale bottle filled with ashes, $2\frac{1}{2}$ feet below surface, over this a stone post, set flush with surface, with the letters U. S. C. S. cut on top. Two other posts were set 5 feet, respectively, north and south of station.

[Latitude, $38^{\circ} 32' 56''$.24. Longitude, $94^{\circ} 10' 48''$.82.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Baker.....	202 05 37	22 09 45	4.4063201
Caldwell.....	260 20 22	86 36 14	4.5689069
Fulton.....	134 04 16	313. 59 26	4.1938480

NORTH MOUND.

Triangulation station in Bates Co., Kans., on what is locally known as North Mound, in the SE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 19, T. 40, R. 30, about 7 miles northeast of Butler and 6 miles southeast of Adrian.

Permanent mark: Stone set in the ground, marked with cross and U. S. G. S.

Latitude, $38^{\circ} 20' 51''$.45. Longitude, $94^{\circ} 17' 13''$.20.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Long Mound.....	122 03 05.6	301 50 51.47	4.528461
Wooded Mound...	87 01 37.1	266 49 11.02	4.466131

LONG MOUND.

In Miami Co., Kans., on what is locally known as Long Mound, about 12 miles south of Louisburg and one-eighth mile west of the State line, in the SE. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sec. 2, T. 18, R. 25.

Permanent mark: Stone sunk 18 inches below surface; top flush with surface and marked with cross and U. S. G. S.

[Latitude, $38^{\circ} 30' 30''$.94. Longitude, $94^{\circ} 36' 54''$.35.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Wooded Mound ..	1 32 38.97	181 32 25.59	4.288793
Ellison	65 02 13.67	244 59 25.75	3.858096
North Mound.....	301 50 51.47	122 03 05.6	4.528461

WOODED MOUND.

In Linn Co., Kans., about 8 miles east of La Cygne and 3 miles southwest of West Point, in the SW. $\frac{1}{4}$ of sec. 2, T. 20, R. 25, one-fourth mile west of State line.

Permanent mark: Stone sunk 18 inches in the ground, marked with cross and U. S. G. S.

[Latitude, 38° 20' 00''-55. Longitude, 94° 37' 15''-90.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Ellison	159	50	51.79	339	48	17.59	4.242093
McCook	93	11	51.39	272	59	57.93	4.446725
North Mound.....	266	49	11.02	87	01	37.1	4.466631
Long Mound.....	181	32	25.59	1	32	38.97	4.288793

ELLISON.

In Miami Co., Kans., about 3 miles northeast of Lancaster, in the SE. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sec. 18, T. 18, R. 25.

Permanent mark: Stone, top flush with surface and marked with a cross and U. S. G. S.

[Latitude, 38° 28' 52''-14. Longitude, 94° 41' 24''-12.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Insane Asylum...	99	39	06.00	279	29	48.15	4.342576
McCook	55	51	47.99	235	42	27.19	4.422602
Long Mound.....	244	59	25.75	65	02	13.67	3.858096
Wooded Mound...	339	48	17.59	159	50	51.79	4.242093

M^CCOOK.

In Linn Co., Kans., about 9 miles west of La Cygne and 10 miles south of Osawatomie, on land owned by Mr. McCook, in the SW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 35, T. 19, R. 22, 1,375 feet west and 35 feet north of the southeast corner of the section.

Permanent mark: Stone sunk 18 inches in the ground, top flush with the surface, marked with cross and U. S. G. S.

[Latitude, 38° 20' 49''-60. Longitude, 94° 56' 26''-04.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
White	118	08	59.0	298	04	22.28	4.088773
Insane Asylum...	180	28	43.2	0	28	47.17	4.268103
Wooded Mound...	272	59	57.93	93	11	51.39	4.446725
Ellison	235	42	27.19	55	51	47.99	4.422602

INSANE ASYLUM.

In Miami Co., Kans., at Osawatomic. Station in main cupola of building. In sec. 2, T. 18, R. 22.

Permanent mark: Center of cupola.

[Latitude, 38° 30' 50''-86. Longitude, 94° 56' 19''-64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
White	40 42 40-37	220 37 59-16	4-225875
Wilton	88 45 02-57	268 37 15-33	4-259700
Ellison	279 29 48-15	99 39 06-00	4-342576
McCook	0 28 47-17	180 28 43-20	4-268103

WHITE.

In Franklin Co., Kans., near corner of Franklin, Miami, Linn, and Anderson counties, on land owned by J. H. White, and is in the SW. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 14, T. 19, R. 21, about $5\frac{1}{2}$ miles northeast of Greeley and 5 miles southeast of Lane.

Permanent mark: Stone sunk 18 inches in the ground, top flush with the surface, and marked with a cross and U. S. G. S.

[Latitude, 38° 23' 57''-08. Longitude, 95° 03' 51''-80.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wilton	149 39 39-96	329 36 34-5	4-155446
Dutch College....	74 54 35-7	254 48 55-2	4-139510
Insane Asylum...	220 37 59-16	40 42 40-37	4-225875
McCook	298 04 22-28	118 08 59-0	4-088773

WILTON.

In Franklin Co., Kans., 8 miles east of Princeton, and about 8 miles northwest of Lane. Station is center of the chimney of Mrs. Wilton's house in the SE. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sec. 1, T. 18, R. 20.

Permanent mark: Chimney.

[Latitude, 38° 30' 37''-34. Longitude, 95° 08' 50''-00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Dutch College....	29 51 30-30	200 48 54-80	4-231921
Loamas	77 09 25-30	256 57 48-28	4-444930
White	329 36 34-51	149 39 39-96	4-155446
Insane Asylum...	268 37 15-33	88 45 02-57	4-259700

DUTCH COLLEGE.

In Anderson Co., Kans., about 1 mile southeast of Scipio, on the Kansas Southern Railway, about 6 miles north-northeast of Garnett, in

the cupola of the Dutch Catholic College. In the NE. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 29, T. 19, R. 20.

Permanent mark: Center of cupola.

[Latitude, 38° 22' 00" 30. Longitude, 95° 13' 00" 18.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Loamas	114	46	01·80	294	37	01·31	4·366056
Rock Mound.....	82	44	26·50	262	33	10·07	4·426359
White	254	48	55·2	74	54	35·7	4·139510
Wilton	200	48	54·80	20	51	30·30	4·231921

LOAMAS.

In Franklin Co., Kans., about $1\frac{1}{2}$ miles south of Williamsburg, on land owned by Mr. Loamas, in the center of the SE. $\frac{1}{4}$ of sec. 30, T. 18, R. 18.

Permanent mark: Stone sunk in the ground 18 inches and marked with a cross and U. S. G. S.

[Latitude, 38° 27' 15" 04. Longitude, 95° 27' 30" 12.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Rock Mound.....	22	10	56·01	202	08	39·33	4·151281
Duval	62	12	45·14	242	06	06·46	4·245590
Roky	107	49	11·34	287	41	12·50	4·291917
Dutch College	294	37	01·31	114	46	01·80	4·366056
Wilton	256	57	48·28	77	09	25·30	4·444930

ROCK MOUND.

In Anderson Co., Kans., about 7 miles southeast of Waverly, on the north end of a mound in the SE. $\frac{1}{4}$ of sec. 3, T. 20, R. 17.

Permanent mark: Stone sunk 18 inches in the ground, the top being flush with surface, marked with a cross and U. S. G. S.

[Latitude, 38° 20' 09" 52. Longitude, 95° 31' 10" 36.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Duval	115	37	23·20	295	33	01·70	4·054732
Dutch College.....	262	33	10·07	82	44	26·50	4·426359
Loamas	202	08	39·33	22	10	56·01	4·151281

DUVAL.

In Coffey Co., Kans., about 3 miles southwest of Waverly. Station is the center of the chimney of Duval's house, in the SW. $\frac{1}{4}$ of sec. 22, T. 19, R. 16.

Permanent mark: Chimney.

[Latitude, 38° 22' 48". Longitude, 95° 38' 72.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Roky	167	40	56.96	347	39	36.73	4.162216
Fillmore	125	40	10.36	305	35	03.40	4.168496
Allen	96	36	14.90	276	31	52.96	4.013078
Rock Mound	295	33	01.70	115	37	23.20	4.054732
Loamas	242	06	06.46	62	12	45.14	4.245590

ROKY.

In Osage Co., Kans., 2 miles west of Melverne, on land owned by Mr. Jacob Roky, about 1,000 feet northwest from his house, in the north-west corner of sec. 8, T. 18, R. 16.

Permanent mark: Stone sunk 18 inches in the ground and the top flush with surface, marked with a cross and U. S. G. S.

[Latitude, 38° 30' 28". Longitude, 95° 40' 19".64.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Allen	38	43	55.04	208	40	52.28	4.171384
Fillmore	57	43	57.51	237	40	09.78	4.020929
Plumb	90	27	18.28	270	13	59.09	4.492761
Loamas	287	41	12.50	107	49	11.34	4.291917
Duval	347	39	36.73	167	40	56.26	4.162216

ALLEN.

In Coffey Co., Kans., about 6 miles southeast from Lebo, on land owned by Clinton Allen, in the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 21, T. 19, R. 15, about 300 feet south of section line and 500 feet west of one-half section line.

Permanent mark: Stone sunk 18 inches in the ground, top flush with surface, and marked with a cross and U. S. G. S.

[Latitude, 38° 23' 26".62. Longitude, 95° 45' 13".55.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Calvert	100	43	54.50	280	36	37.71	4.239563
Duval	276	31	52.96	96	36	40.90	4.013078
Roky	208	40	52.28	28	43	55.04	4.171384
Fillmore	166	43	54.34	346	43	09.57	3.881425

FILLMORE.

In Osage Co., Kans., about 5 miles northeast of Lebo and one-half mile south of the Kansas Southern Railway, in sec. 29, T. 18, R. 15, 200 feet north of road on section line. Station is chimney of Fillmore's house.

Permanent mark: Chimney.

[Latitude, 38° 27' 28" 86. Longitude, 95° 46' 25" 60.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Allen.....	346 43 09.57	166 43 54.34	3.881425
Calvert.....	74 44 05.80	254 37 33.47	4.200554
Plumb.....	104 40 51.89	234 31 20.89	4.361402
Duval.....	305 35 03.40	125 40 10.36	4.168496
Roky.....	237 40 09.78	57 43 57.51	4.020929

CALVERT.

In Lyon Co., Kans., 5 miles due west of Lebo and 13 miles east of Emporia, on land owned by Mr. Calvert. About 250 feet southwest of his house, in the NW. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 11, T. 19, R. 13.

Permanent mark: Stone sunk 18 inches in the ground, marked with a cross and U. S. G. S.

[Latitude, 38° 25' 10" 89. Longitude, 95° 56' 58" 69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Plumb.....	145 12 11.14	325 09 12.91	4.085110
Chicago Mound...	54 48 59.01	234 44 30.84	4.108214
Allen.....	280 36 37.71	100 43 54.50	4.239563
Fillmore.....	254 37 33.47	74 44 05.80	4.200554

PLUMB.

In Lyon Co., Kans., on land owned by Senator Plumb, about 12 miles northeast of Emporia and 3 miles southwest of Reading, in the SE. $\frac{1}{4}$ of sec. 1, T. 18, R. 12, 546 feet north and 1,518 feet west from the southeast corner of the section.

Permanent mark: Stone set 18 inches in the ground. Top flush with the surface and marked with a cross and U. S. G. S.

[Latitude, 38° 30' 34" 76. Longitude, 96° 01' 43" 20.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Chicago Mound...	11 28 24.04	191 26 53.71	4.248911
Stubbs.....	82 16 14.70	262 06 01.70	4.381832
Roky.....	270 13 59.09	90 27 18.28	4.492761
Fillmore.....	284 31 20.89	104 40 51.89	4.361402

CHICAGO MOUND.

In Lyon Co., Kans., about 9 miles southeast of Emporia, in the NW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 34, T. 19, R. 12. About 5 miles southwest of Neosho Rapids, on the Missouri, Kansas and Texas Railway.

Permanent mark: Stone sunk 18 inches in the ground. Top flush with surface, marked with a cross and U. S. G. S.

[Latitude, 38° 21' 10''-91. Longitude, 96° 04' 08''-52.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Jacobs Mound....	82 06 35.10	261 54 08.90	4.469905
Stubbs	124 47 16.66	304 38 35.00	4.394046
Plumb.....	191 26 53.71	11 28 24.04	4.248911

STUBBS.

In Lyon Co., Kans., about 5 miles southwest of Americus, in the SE. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 16, R. 9, 406 feet east and 296 feet north from the southwest corner of the section.

Permanent mark: Stone sunk 18 inches in the ground; top flush with the surface, marked with a cross and U. S. G. S.

[Latitude, 38° 28' 48''-56. Longitude, 96° 18' 08''-04.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Baker	90 31 16.10	270 24 54.51	4.172151
Jacobs Mound....	25 52 28.90	205 48 43.09	4.306163
Chicago Mound...	304 38 35.00	124 47 16.66	4.394046
Plumb.....	262 06 01.70	82 16 14.70	4.381832

JACOBS MOUND.

In Chase Co., Kans., in the SE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 15, T. 20., R. 9, about 6 miles south of Safford, on Atchison, Topeka and Santa Fe Railway.

Permanent mark: Stone sunk 18 inches in the ground, top flush with surface, marked with a cross and U. S. G. S.

[Latitude, 38° 18' 57''-82. Longitude, 96° 24' 11''-58.]

To station..	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Baker	161 44 05.89	341 41 30.80	4.285792
Cattle Ranch	126 37 26.57	306 29 27.47	4.367691
Tedro.....	93 22 17.56	273 13 57.41	4.292743
Messer	78 11 33.18	.....	4.393927
Stubbs	205 48 43.09	25 52 28.90	4.306163
Chicago Mound...	261 54 08.90	82 06 35.10	4.469905

BAKER.

In Chase Co., Kans., about 8 miles northwest of Safford, in the SW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 13, T. 18, R. 8, on a mound on land owned by H. L. Baker, and about three-fourths of a mile east of his house.

Permanent mark: Stone sunk 18 inches in the ground, top flush with surface, marked with a cross and U. S. G. S.

[Latitude, 38° 28' 52''-41. Longitude, 96° 28' 21''-28.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cattle Ranch.....	70 41 11·61	250 35 46·94	4·127547
Tedro.....	38 11 07·51	218 05 21·67	4·339938
Jacobs Mound.....	341 41 30·80	161 44 05·89	4·285792
Stubbs.....	270 24 54·51	90 31 16·10	4·172151

CATTLE RANCH.

In Chase Co., Kans., about 5 miles northeast of Elmdale and about 5 miles northwest of Strong, on a ranch owned by the Western Cattle Company, in the SE. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 35, T. 18, R. 7.

Permanent mark: Stone sunk 2 feet in the ground, top flush with surface, and marked with a cross and U. S. G. S.

[Latitude, 38° 26' 28''-24. Longitude, 96° 37' 03''-25.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Tedro.....	3 47 07·30	183 46 45·72	4·160752
Weichaus.....	49 44 00·17	229 39 43·59	4·118647
Baker.....	250 35 46·94	70 41 11·61	4·127547
Jacobs Mound.....	306 29 27·49	126 37 26·57	4·367691

TEDRO.

In Chase Co., Kans., about 5 miles south of Elmdale, on the Atchison, Topeka and Santa Fe Railway, in the NE. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sec. 11, T. 20, R. 7, on an elevation about one-half mile southwest of the house of Reuben Tedro.

Permanent mark: Stone sunk 24 inches in the ground, top being flush with the surface, marked with a cross and U. S. G. S.

[Latitude, 38° 19' 34''-46. Longitude, 96° 37' 38''-01.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Weichaus.....	114 54 11·70	294 50 17·00	4·005410
Messer.....	36 41 00·71	216 39 02·34	3·890538
Cattle Ranch.....	183 46 45·72	3 47 07·30	4·106752
Baker.....	218 05 21·67	38 11 07·51	4·339938
Jacobs Mound.....	273 13 57·41	93 22 17·56	4·292743

MESSER.

In Chase Co., Kans., near the center of sec. 32, T. 20, R. 7, on an elevation about 150 yards west of — Messer's house. It is about 12 miles southwest of Cottonwood Falls and about 5 miles east-southeast of Clements, on the Atchison, Topeka and Santa Fe Railway.

Permanent mark: Earthen jar filled with ashes, 18 inches below surface, and over it a stone marked with a cross and U. S. G. S.

[Latitude, 38° 16' 12"-26. Longitude, 96° 40' 49"-00.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Weichaus	156	34	23·69	336	32	27·57	4·058296
McLane	89	24	27·52	269	15	43·02	4·313610
Tedro	216	39	02·34	36	41	00·70	3·890538
Jacobs Mound				78	11	33·18	4·393927

WEICHAUS.

In Chase Co., Kans., about 5 miles west of Elmdale, on the Atchison, Topeka and Santa Fe Railway. It is in the SW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 26, T. 19, R. 6. On southern crest of ridge, west of Weichaus's house, 1,500 feet west and 195·5 feet north of the southeast corner of section 26.

Permanent mark: Bottle of ashes buried 2 feet below surface, over which is a stone marked with a cross and U. S. G. S.

[Latitude, 38° 21' 52"-57. Longitude, 96° 43' 56"-30.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
McLane	56	14	39·74	236	07	50·80	4·285218
Tedro	294	50	17·00	114	54	11·70	4·005410
Cattle Ranch	229	39	43·59	49	44	00·17	4·118647

NEWHALL.

In Chase Co., Kans., about 6 or 8 miles southeast of the town of Florence, in yard of house owned by Mr. Newhall, and no surrounding objects except a few scattering trees northwest of the signal on flat-topped ridge.

Permanent mark: None.

[Latitude, 38° 10' 30"-13. Longitude, 96° 53' 46"-84.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Herron	123	22	29·2	303	17	46·8	4·123743
St. John	75	22	58·5	255	19	08·9	3·970855
McLane	170	49	23·1	350	48	41·6	4·0093919

MCLANE.

In Chase Co., Kans., in NE. $\frac{1}{4}$ of SE. $\frac{1}{4}$ of sec. 31, R. 5, T. 20, on land owned by Mr. McLane, on high ground about one-half mile northwest from house. Signal, lumber tripod.

Permanent mark: Stone buried flush with surface of ground and marked U. S. G. S. +, and later large wooden plug was placed.

[Latitude, $38^{\circ} 15' 57''$.32. Longitude, $96^{\circ} 54' 53''$.86.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Weichaus	236 07 50.80	56 14 39.74	4.2852176
Messer	269 15 43.02	89 24 27.52	4.3136100
Herron	73 40 26.60	253 56 25.40	3.9944218
Newhall	350 48 41.60	170 49 23.10	4.0093919

HERRON.

In Marion Co., Kans., on a small knoll 5 miles south of Marion on public road a few hundred feet south of section corner.

Permanent mark: None.

[Latitude, $38^{\circ} 14' 27''$.16. Longitude, $97^{\circ} 01' 23''$.46.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Dunkard	81 58 22.1	261 52 58.7	4.108467
St. John	347 55 32.7	167 56 25.2	3.995216
Mc Lane	253 36 25.4	73 40 26.6	3.9944218
Newhall	303 17 46.8	123 22 29.2	4.123743

ST. JOHN.

In Marion Co., Kans., on rolling ridge about 7 miles south of signal Herron, in a large field at present used as a cow pasture.

Permanent mark: None.

[Latitude, $38^{\circ} 09' 13''$.46. Longitude, $96^{\circ} 59' 58''$.46.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Dunkard	118 04 31.1	297 58 15.5	4.223999
Nowt	75 24 04.7	255 16 40.2	4.258168
Herron	167 56 25.2	347 55 32.7	3.995216

DUNKARD.

In Marion Co., Kans., in SW. $\frac{1}{4}$ of sec. 13, T. 21, R. 2 E., 380 feet east and 2,407 feet north of the southwest corner of the section.

Permanent mark: The section corner.

[Latitude, $38^{\circ} 13' 28''$.69. Longitude, $97^{\circ} 10' 06''$.06.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Walton	29 27 27.3	209 25 01.4	4.067905
Bennett	58 05 54.2	238 02 13.3	4.010395
St. John	297 58 15.5	118 04 31.1	4.223999

NEWT.

In Marion Co., Kans., on ridge about 3 miles east of the town of Walton. No close objects of prominence.

Permanent mark: None.

[Latitude, 38° 06' 44''-73. Longitude, 97° 11' 58''-24.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Walton	126 59 50·2	306 58 33·7	3·577161
Township corner ..	63 00 53·4	242 58 32·4	3·795644
St. John	255 16 40·2	75 24 04·7	4·258168

WALTON.

In Harvey Co., Kans., nearly a mile northeast of the town of Walton, and about 1,000 feet southeast of the Atchison, Topeka and Santa Fe Railroad.

Permanent mark: None.

[Latitude, 38° 07' 58''-43. Longitude, 97° 14' 02''-11.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bennett	148 15 26·7	328 14 11·9	3·748530
Township corner ..	26 30 32·4	206 29 27·9	3·756524
Dunkard	209 25 01·4	29 27 27·3	4·067905
Newt	306 68 33·7	126 59 50·2	3·577161

TOWNSHIP CORNER.

In Harvey Co., Kans., in southeast corner of sec. 36, T. 22, R. 1 E., 43 feet west and 235 feet north of township corner, townships 22 and 23, Rs. 1 and 2 E.

Permanent mark: Township corner.

[Latitude, 38° 05' 12''-73. Longitude, 97° 15' 46''-66.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Royer	144 58 22·5	324 55 40	4·047730
Newton	59 58 48·1	239 55 47·2	3·917087
Bennett	177 39 33·5	357 39 23·3	3·994874
Walton	206 29 27·9	26 30 32·4	3·756524
Newt	242 58 32·4	63 00 53·4	3·795644

BENNETT.

In Marion Co., Kans., southeast corner of sec. 36, T. 21, R. 1 E., 546 feet north and 1,461 feet west of the southeast corner of the section, and about 75 feet northeast of Bennett's residence.

Permanent mark: The section corner.

[Latitude, 38° 10' 32"-99. Longitude, 97° 16' 03"-24.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Royer.....	83 01 33.7	262 59 01.2	3.781598
Township corner.	357 39 23.3	177 39 33.5	3.994874
Dunkard.....	238 02 13.3	58 05 54.2	4.010395
Walton.....	328 14 11.9	148 15 26.7	3.748530

ROYER.

In Harvey Co., Kans., on NE. $\frac{1}{4}$ of sec. 5, T. 22, R. 1 E., 12 feet west and 1,564 feet south of the northeast corner of the section.

Permanent mark: The section corner.

[Latitude, 38° 10' 09"-10. Longitude, 97° 20' 09"-84.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hesston.....	69 18 04.2	249 14 41.1	3.932405
Newton.....	3 10 35.3	183 10 16.7	4.123682
Bennett.....	262 59 01.2	83 01 33.7	3.781598
Township corner.	324 55 40	144 58 22.5	4.047736

NEWTON.

In the city of Newton, Harvey Co., Kans., in NW. $\frac{1}{4}$ of sec. 16, T. 23, R. 1 E., 85 feet north and 109 feet west of the center of the section. Center of the cupola of the opera house.

Permanent mark: Same.

[Latitude, 38° 02' 58"-56. Longitude, 97° 20' 40"-06.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hesston.....	144 38 52.3	324 35 48.1	4.099182
Ruth.....	94 19 27.2	274 13 54.3	4.120651
Royer.....	183 10 16.7	3 10 35.3	4.123682
Township corner.	239 55 47.2	59 58 48.1	3.917087

HESSTON.

In Harvey Co., Kans., in NE. $\frac{1}{4}$ of sec. 16, T. 22, R. 1 W., 413 feet west and 869 feet south of the northeast corner of the section.

Permanent mark: The section corner.

[Latitude, 38° 08' 30"-86. Longitude, 97° 25' 38"-62.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Black Kettle.....	93 13 05.6	273 08 06.4	4.072347
Ruth.....	32 26 46.0	212 24 17.0	4.040248
Royer.....	249 14 41.1	69 18 04.2	3.932405
Newton.....	324 35 48.1	144 38 52.3	4.099182

RUTH.

In Harvey Co., Kans., near the center of the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 13, T. 23, R. 2 W.

Permanent mark: The section corner.

[Latitude, 38° 03' 30''-50. Longitude, 97° 29' 40''-05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Black Kettle.....	149 11 11.5	329 08 41.6	4.062483
Dwarf.....	96 27 52.2	276 21 35.4	4.175894
Hesston.....	212 24 17.0	92 26 46.0	4.040248
Newton.....	274 13 54.3	94 19 27.2	4.120651

BLACK KETTLE.

In Harvey Co., Kans., in SE. $\frac{1}{4}$ of sec. 8, T. 22, R. 2 W., 1,186 feet north and 2,063 feet west of the southeast corner of the section.

Permanent mark: The section corner.

[Latitude, 38° 08' 52''-10. Longitude, 97° 33' 43''-00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Leslie.....	88 56 28.9	268 48 05.9	4.297218
Dwarf.....	47 27 49.9	227 24 02.6	4.085725
Hesston.....	273 08 06.4	93 13 05.6	4.072347
Ruth.....	329 08 41.6	149 11 11.5	4.062483

DWARF.

In Harvey Co., Kans., in SW. quarter of sec. 4, T. 23, R. 3 W., 72 feet east and 640 feet north of the southwest corner of the section, on a sand hill.

Permanent mark: The section corner.

[Latitude, 38° 04' 24''-78. Longitude, 97° 39' 51''-21.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Leslie.....	125 54 10.6	305 49 35.5	4.127157
Sheep Ranch.....	88 03 09.5	267 57 41.7	4.112791
Black Kettle.....	227 24 02.6	47 27 49.9	4.085725
Ruth.....	276 21 35.4	96 27 52.2	4.175894

LESLIE.

In Reno Co., Kans., in SW. $\frac{1}{4}$ of sec. 8, T. 22, R. 4 W., 21 feet north and 1,510 feet east of the southwest corner of the section.

Permanent mark: The section corner.

[Latitude, 38° 08' 39"·43. Longitude, 97° 47' 17"·01.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sand Hill.....	97 31 59·3	277 26 07·1	4·146108
Sheep Ranch.....	14 08 27·9	194 07 34·9	3·932558
Black Kettle.....	268 48 05·9	88 56 28·9	4·297218
Dwarf.....	305 49 35·5	125 54 10·6	4·127157

SHEEP RANCH.

In Reno Co., Kans., in the NE. corner of sec. 13, T. 23, R. 5 W., 351 feet west and 4,565 feet north of the southeast corner of the section, on a sand hill on the west side of the road.

Permanent mark: The section corner.

[Latitude, 38° 04' 10"·15. Longitude, 97° 48' 42"·82.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sand Hill.....	130 40 59·9	310 36 01·0	4·191636
Two.....	85 28 11·5	265 20 20·1	4·271868
Leslie.....	194 07 34·9	14 08 27·9	3·932558
Dwarf.....	267 57 41·7	88 03 09·5	4·112791

SAND HILL.

In Reno Co., Kans., in the SW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 2, T. 22, R. 6 W., 6 or 8 miles north and a little west of Hutchinson, on prominent sand dune.

Permanent rank: None.

[Latitude, 38° 09' 38"·57. Longitude, 97° 56' 47"·08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lyons.....	137 24 12·2	317 16 48·6	4·410211
Sterling.....	106 21 51·1	286 12 11·6	4·375840
Leslie.....	277 26 07·1	97 31 59·3	4·146108
Sheep Ranch.....	310 36 01·0	130 40 59·9	4·191636
Two.....	30 28 00·9	210 25 07·8	4·129792

TWO.

In Reno Co., Kans., in NW. $\frac{1}{4}$ of sec. 18, T. 23, R. 7 W., 273 feet south and 1,776 feet east of the northwest corner of the section.

Permanent mark: The section corner.

[Latitude, 38° 03' 21"·56. Longitude, 98° 01' 27"·49.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sand Hill.....	210 25 07·8	30 28 00·9	4·129792
Sterling.....	138 52 55·4	318 46 09·8	4·385499
Sheep Ranch.....	265 20 20·1	85 28 11·5	4·271868

LYONS.

In Rice Co., Kans., in the NE. $\frac{1}{4}$ of sec. 12, T. 20, R. 8 W., 19 feet west and 553 feet south of the northeast corner of the section, several miles east of Lyons.

Permanent mark: The section corner.

[Latitude, 38° 19' 51''-93. Longitude, 98° 08' 43''-70.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Millet	79 37 01.7	259 29 10.8	4.273315
Sterling	23 39 17.3	203 37 00.7	4.126189
Sand Hill	317 16 48.6	137 24 12.2	4.410211

STERLING.

In Rice Co., Kans., in SW. $\frac{1}{4}$ of sec. 16, T. 21, R. 8 W., 286 feet west and 1,464 feet north of the south quarter corner of the section, being center of cupola of Sterling University.

Permanent mark: Same.

[Latitude, 38° 13' 14''-64. Longitude, 98° 12' 24''-26.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Millet.....	124 04 17.6	303 58 43.8	4.198967
Drifting Sand.....	73 01 47.5	252 52 51.5	4.343664
Lyons.....	203 37 00.7	23 39 17.3	4.126189
Sand Hill.....	286 12 11.6	106 21 51.1	4.375840
Two.....	318 46 09.8	138 52 55.4	4.385499

MILLET.

In Rice Co., Kans., in the SW. $\frac{1}{4}$ of the NE. $\frac{1}{4}$ of sec. 18, T. 20, R. 9 W. On north side of the public road.

Permanent mark: The section corner.

[Latitude, 38° 18' 01''-57. Longitude, 98° 21' 23''-26.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Raymond	79 15 40.1	259 13 55.4	3.620867
Drifting Sand.....	27 31 50.9	207 28 28.0	4.237176
Sterling	303 58 43.8	124 04 17.6	4.198967
Lyons	259 29 10.8	79 37 01.7	4.273315

RAYMOND.

In Rice Co., Kans., in the SW. $\frac{1}{4}$ of sec. 23, T. 20, R. 10 W., 668 feet east and 1,336 feet south of the west quarter corner of the section.

Permanent mark: The section corner.

[Latitude, 38° 17' 36''-29. Longitude, 98° 24' 12''-15.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pasture.....	111 41 55.3	291 32 23.8	4.381532
County Line.....	77 30 37.1	257 23 39.4	4.225033
Drifting Sand.....	14 54 28.5	194 52 50.1	4.177247
Millet.....	259 13 55.4	79 15 40.1	3.620867

DRIFTING SAND.

In Reno Co., Kans., in SW. $\frac{1}{4}$ of sec. 8, T. 22, R. 10 W., 1,228 feet east and 3,760 feet south of the northwest corner of the section, on a prominent knoll.

Permanent mark: The section corner.

[Latitude, 38° 09' 44''-89. Longitude, 98° 26' 51''-08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Raymond.....	194 52 50.1	14 54 28.5	4.177247
County Line.....	131 01 00.3	310 55 41.6	4.220210
Millet.....	207 28 28.0	27 31 50.9	4.237176
Sterling.....	252 52 51.5	73 01 47.5	4.343604

COUNTY LINE.

In Kansas, on county line between Stafford and Barton counties, 431 feet west of the southeast corner of sec. 36, T. 20, R. 12 W.

Permanent mark: The section corner.

[Latitude, 38° 15' 37''-99. Longitude, 98° 35' 26''-38.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pasture.....	154 23 26.6	334 20 53.3	4.142455
Mound.....	79 12 30.0	259 05 18.0	4.237523
Drifting Sand.....	310 55 41.6	131 01 00.3	4.220210
Raymond.....	257 23 39.4	77 30 37.1	4.225033

PASTURE.

In Barton Co., Kans., in the NE. $\frac{1}{4}$ of sec. 28, T. 19, R. 12 W., 963 feet south and 1,040 feet east of the northwest corner of the section. Several miles east of Great Bend, and 1 mile north of the Atchison, Topeka and Santa Fe Railroad, in a large cow pasture.

Permanent mark: The section corner.

[Latitude, 38° 22' 23''-95. Longitude, 98° 39' 33''-57.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Cactus.....	100 51 49.0	280 44 01.4	4.269639
Mound.....	34 48 51.4	214 44 12.1	4.283283
Raymond.....	291 32 23.8	111 41 55.3	4.381532
County Line.....	334 20 53.3	154 23 26.6	4.142455

MOUND.

In Stafford Co., Kans., in the NE. $\frac{1}{4}$ of sec. 18, T. 21, R. 13 W., 254 feet west and 196 feet south of the northeast corner of the section. On a small mound.

Permanent mark: The section corner.

[Latitude, $38^{\circ} 13' 52''$.48. Longitude, $98^{\circ} 47' 04''$.24.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pawnee.....	110 29 04.1	290 20 10.9	4.348960
Ackerman.....	24 04 46.3	204 02 29.6	4.120549
Cactus.....	159 08 43.6	339 05 36.1	4.314068
Pasture.....	214 44 12.1	34 48 51.4	4.283283
County line.....	259 05 18.0	79 12 30.0	4.237523

ACKERMAN.

In Stafford Co., Kans., in the SE. $\frac{1}{4}$ of sec. 22, T. 22, R. 14 W., 241 feet east and 273 feet south of the center of section 22.

Permanent mark: The section corner.

[Latitude, $38^{\circ} 07' 21''$.59. Longitude, $98^{\circ} 50' 45''$.32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pawnee.....	141 56 07.7	321 49 31.9	4.401743
Larned.....	93 12 32.7	273 04 26.4	4.283578
Mound.....	204 02 29.6	24 04 46.3	4.120549

CACTUS.

In Barton Co., in the NE. $\frac{1}{4}$ of sec. 16, T. 19, R. 14 W., 21 feet south and 828 feet west of the northwest corner of the section, on public road northwest of Great Bend.

Permanent mark: The section corner.

[Latitude, $38^{\circ} 24' 17''$.00. Longitude, $98^{\circ} 52' 06''$.63.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pawnee.....	49 50 13.10	229 44 26.50	4.249488
Mound.....	339 05 36.10	159 08 43.60	4.314068
Pasture.....	280 44 00.14	100 51 49.00	4.269639

PAWNEE.

In Barton Co., Kans., in the SW. $\frac{1}{4}$ of sec. 19, T. 20, R. 15 W., 533 feet west and 1,027 feet south of the north quarter corner of the section on highest part of rolling ridge.

Permanent mark: The section corner.

[Latitude, 38° 18' 05''-09. Longitude, 99° 01' 25''-25.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Dugout	74	21	27.7	254	13	49.5	4.271204
Larned	10	50	16.5	190	48	45.1	4.281684
Mound	290	20	10.9	110	29	04.1	4.348960
Cactus	229	44	26.5	49	50	13.1	4.249488
Ackerman	321	49	31.9	141	56	07.7	4.401743

LARNED.

In Pawnee Co., Kans., in the SE. $\frac{1}{4}$ of sec. 15, T. 22, R. 16 W., 644 feet north and 2,065 feet west of the southeast corner of the section, several miles south of Larned, on the highest mound in the vicinity.

Permanent mark: The section corner.

[Latitude, 38° 07' 55''-74. Longitude, 99° 03' 52''-94.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Dugout	133	41	20.0	313	35	14.0	4.298871
Garfield	79	49	03.4	259	42	50.7	4.174463
Pawnee	190	48	45.1	10	50	16.5	4.281684
Ackerman	273	04	26.4	93	12	32.7	4.283578

DUGOUT.

In Pawnee Co., Kans., in the NW. $\frac{1}{4}$ of sec. 6, T. 21, R. 17 W., 1,362 feet east, and 1,723 feet south of the southwest corner of sec. 21, T. 20, R. 17. On highest ground near ruins of a sod house.

Permanent mark: The section corner.

[Latitude, 38° 15' 21''-16. Longitude, 99° 13' 44''-80.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Quarry	89	55	03.0	269	47	53.5	4.227045
Garfield	1	00	38.4	181	00	31.1	4.214611
Pawnee	254	13	49.5	74	21	27.7	4.271204
Larned	313	35	14.0	133	41	20.0	4.298871

GARFIELD.

In Pawnee Co., Kans., in the SW. $\frac{1}{4}$ of sec. 30, T. 22, R. 17 W., 22 feet south and 2,047 feet east of the west quarter corner of the section. About 2 miles north of Garfield and one-fourth of a mile east of road.

Permanent mark: The section corner.

[Latitude, 38° 06' 29''-63. Longitude, 99° 13' 56''-68.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Quarry	134 37 34.7	314 30 33.2	4.367248
Burdett	98 36 40.4	278 25 03.0	4.444370
Dugout	181 00 31.1	1 00 38.4	4.214611
Larned	259 42 50.7	79 49 03.4	4.174463

QUARRY.

In Pawnee Co., Kans., in NW. $\frac{1}{4}$ of sec. 5, T. 21, R. 19 W., 635 feet east and 2,275 feet south of the northwest corner of the section.

Permanent mark: Section corner.

[Latitude, 38° 15' 19''-81. Longitude, 99° 25' 18''-54.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Frank	78 05 27.6	257 54 20.7	4.428074
Burdett	41 44 26.2	221 39 49.3	4.214248
Dugout	269 47 53.5	89 55 03.0	4.227045
Garfield	314 30 33.2	134 37 34.7	4.367248

BURDETT.

In Pawnee Co., Kans., in the NW. $\frac{1}{4}$ of sec. 17, T. 22, R. 20 W., 15 feet south and 1,326 feet east of the northwest corner of the section, on public road on ridge crossing it.

Permanent mark: The section corner.

[Latitude, 38° 08' 43''-23. Longitude, 99° 32' 46''-31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Frank	113 31 15.0	293 24 45.7	4.223071
Last Chance	28 23 13.8	208 21 06.3	4.025109
Garfield	278 25 03.0	98 36 40.4	4.444370
Quarry	221 39 49.3	41 44 26.2	4.214248

LAST CHANCE.

In Hodgeman Co., Kans., in SW. $\frac{1}{4}$ of sec. 14, T. 23, R. 21 W., 1,366 feet north and 397 feet east of the southwest corner of the section, a few hundred feet east of a stone dugout.

Permanent mark: The section corner.

[Latitude, 38° 03' 40''-85. Longitude, 99° 36' 12''-94.]

To stations.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Orwell	76 43 25.1	256 35 58.9	4.258737
Cheese factory	45 08 58.8	225 07 26.6	3.711399
Frank	147 12 36.0	327 08 14.7	4.279089
Burdett	208 21 06.3	28 23 13.8	4.025109

CHEESE FACTORY.

In Hodgeman Co., Kans., in SE. $\frac{1}{4}$ of sec. 29, T. 21, R. 23 W., 1,000 feet west and 14.5 feet north of the southeast corner of the section, 1 mile southwest of the cheese factory on public road.

Permanent mark: The section corner.

[Latitude, 38° 01' 43''-15. Longitude, 99° 38' 42''-51.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
First View.....	73	44	52.6	253	37	55.4	4.236135
Spearville.....	25	46	00.3	205	42	02.0	4.338358
Orwell.....	87	46	30.0	267	40	36.1	4.146807
Last Chance.....	225	07	26.6	45	08	58.8	3.711399

FRANK.

In Hodgeman Co., Kans., in the SE. $\frac{1}{4}$ of sec. 22, T. 21, R. 22 W., 566 feet north and 1,440 feet west of the southeast corner of the section.

Permanent mark: The section corner.

[Latitude, 38° 12' 19''-09. Longitude, 99° 43' 16''-18.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Orwell.....	19	59	42.8	199	56	37.2	4.331513
Last Chance.....	327	08	14.7	147	12	36.0	4.279089
Quarry.....	257	54	20.7	78	05	27.6	4.428074
Burdett.....	293	24	45.7	113	31	15.0	4.223071

SPEARVILLE.

In Ford Co., Kans., in town of Spearville, at the northeast end of the base line measured in 1889.

Permanent mark: A cubic yard of concrete underground, with brick pier capped with a heavy slab of sandstone above ground. East end of base line prolonged 50 feet and a large sandstone with copper bolt buried about 18 inches below surface.

[Latitude, 37° 51' 06''-34. Longitude, 99° 45' 10''-05.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Wright.....	57	09	14.70	237	05	13.17	4.059556
First View.....	154	26	15.92	334	23	17.67	4.214979
Hardyville.....	119	30	52.45	299	23	27.49	4.308051

ORWELL.

In Hodgeman Co., Kans., in SW. $\frac{1}{4}$ of sec. 25, T. 23, R. 23 W., 830 feet north and 4,720 feet west of the southeast corner of the section.

Permanent mark: The section corner.

[Latitude, 38° 01' 25"-08. Longitude, 99° 48' 16"-96.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
First View.....	30 27 30.5	210 26 27.0	3.695971
Cheese factory ...	267 40 36.1	87 46 30.0	4.146807
Last Chance.....	256 35 58.9	76 43 25.1	4.258737
Frank.....	199 56 37.2	19 59 42.8	4.331513

FIRST VIEW.

In Hodgeman Co., Kans., in SE. $\frac{1}{4}$ of sec. 3, T. 24 R. 23, W., 3 feet north and 287 feet east of the south quarter corner of the section, in road.

Permanent mark: The section corner.

[Latitude, 37° 59' 06"-27. Longitude, 99° 50' 00"-11.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wright.....	6 53 17.3	186 52 13.6	4.325833
Spearville.....	334 23 21.2	154 26 19.5	4.214979

WRIGHT.

In Ford Co., Kans., at the southwest end of the Spearville base line, on highest ground in sec. 8, T. 26, R. 23 W., and just south of the Atchison, Topeka and Santa Fe Railroad, about 2 miles northeast of Wright.

Permanent mark: A cubical block of sandstone, 16 inches square, sunk 15 inches below the surface. Hole drilled in the top and a copper bolt 1 inch in diameter and 6 inches long inserted. Cross cut in the top of the bolt.

[Latitude, 37° 47' 44"-38. Longitude, 99° 51' 43"-91.]

To station.	Azimuth.	Backazimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Spearville.....	237 05 13.17	57 09 14.70	4.059556
Purdyville.....	153 33 07.03	333 29 44.12	4.258198
Dodge.....	82 26 03.26	262 19 25.23	4.205125
Meridian.....	118 12 50.87	298 07 50.16	4.133663
First View.....	186 52 13.6	6 53 17.3	4.325833

PURDYVILLE.

In Hodgeman Co., Kans., in section 21, near the southeast corner, 54.5 feet north of corner.

Permanent mark: Bottle placed 2 feet below surface, above which is placed a rock, marked thus \triangle , to note the center of the station.

[Latitude, $37^{\circ} 56' 30'' \cdot 51$. Longitude, $99^{\circ} 57' 14'' \cdot 45$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Spearville	299	23	27.49	119	30	52.45	4.308051
Wright	333	29	44.12	153	33	07.03	4.258198
Dodge	23	03	26.15	203	00	10.33	4.299657
Snyder	58	59	07.72	238	53	08.69	4.221898
Meridian	21	44	24.24	201	42	46.08	4.023153

MERIDIAN.

In Ford Co., Kans., near the center of the north side of sec. 30, T. 25, R. 24, and is on flat ground, a little west of the present location of the public road and on the eastern side of a cornfield.

Permanent mark: Bottle 26 inches below surface, above which is a sandstone rock, marked with a cross and U. S. G. S.

[Latitude, $37^{\circ} 51' 12'' \cdot 71$. Longitude, $99^{\circ} 59' 54'' \cdot 26$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Purdyville	201	42	46.08	21	44	24.24	4.023153
Wright	298	07	50.16	118	12	50.87	4.133663

DODGE.

In Ford Co., Kans., on the highest part of a hill in section 22, three-fourths mile west and one-fourth mile south of Soulé College.

Permanent mark: Bottle 2 feet below surface, above which is a rock marked thus \triangle , to note the center of the station.

[Latitude, $37^{\circ} 45' 35'' \cdot 40$. Longitude, $100^{\circ} 02' 33'' \cdot 52$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Purdyville	203	00	10.33	23	03	26.15	4.299657
Wright	262	19	25.23	82	26	03.26	4.205125
Snyder	146	21	47.56	326	19	04.84	4.068561
Grand View	58	58	41.25	238	51	17.51	4.316707

SNYDER.

In Ford Co., Kans., on west side of sec. 19, T. 25, R. 25, a few hundred feet northeast of Joseph Ile's house and on the east side of the public road.

Permanent mark: Bottle $2\frac{1}{2}$ feet below surface, over which is placed a rock marked thus \triangle , to note the center of the station. Instrument elevated 26 feet.

[Latitude, $37^{\circ} 51' 51''$. Longitude, $100^{\circ} 06' 58''$.89.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Purdyville	238 53. 08.69	58 59 07.72	4.221898
Dodge	326 19 04.84	146 21 47.56	4.068561
Grand View	28 51 31.52	208 46 49.89	4.368165
Marble	86 39 52.28	266 33 48.01	4.162381

GRANDVIEW.

In Gray Co., Kans., in the SW. $\frac{1}{4}$ of sec. 23, T. 27, R. 27.

Permanent mark: A bottle 2 feet under ground. A small mound is placed over the bottle. Four square holes act as witness marks to location.

[Latitude, $37^{\circ} 40' 48''$. Longitude, $100^{\circ} 14' 38''$.68.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Dodge	238 51 17.51	58 58 .41.25	4.316707
Snyder	208 46 49.89	28 51 31.52	4.368165
Marble	170 31 39.52	350 30 17.61	4.298094
Cimarron	155 16 24.85	335 13 20.97	4.244532
Ingalls	133 53 40.90	313 45 27.92	4.436316
Ina	105 47 51.95	285 39 25.16	4.324018

MARBLE.

In Gray Co., Kans., near the southwest corner of sec. 22, T. 25, R. 27. Instrument elevated 18 feet.

Permanent mark: A bottle 20 inches below surface and a limestone rock marked \triangle , above the bottle.

[Latitude, $37^{\circ} 51' 23''$. Longitude, $100^{\circ} 16' 52''$.41.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Grandview	350 30 17.61	170 31 39.52	4.298094
Snyder	266 33 48.01	86 39 52.28	4.162381
Cimarron	48 10 44.03	228 09 01.83	3.737785
Ingalls	87 40 31.87	267 33 39.97	4.215472

CIMARRON.

In Gray Co., Kans., in the NE. $\frac{1}{4}$ of sec. 1, T. 26, R. 28.

Permanent mark: Bottle 30 inches below the surface, above which is a rock marked thus \triangle , noting center of the station.

[Latitude, $37^{\circ} 49' 25'' \cdot 42$. Longitude, $100^{\circ} 19' 39'' \cdot 01$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Marble	228	09	01·83	48	10	44·03	3·737785
Grandview	335	13	20·97	155	16	24·85	4·244532

INGALLS.

In Gray Co., Kans., in the NE. $\frac{1}{4}$ of sec. 26, T. 25, R. 29, about $1\frac{3}{4}$ miles northwest of the railroad station.

Permanent mark: Three triangular holes cut in the ground at the apices of an equilateral triangle 20 feet on each side, and at the center of the triangle is a large limestone rock marked with a cross and U. S. G. S., and 27 inches below the surface is a bottle which marks the position of the instrument.

[Latitude, $37^{\circ} 51' 01'' \cdot 57$. Longitude, $100^{\circ} 28' 03'' \cdot 64$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Marble	267	33	39·97	87	40	31·87	4·215472
Grandview	313	45	27·92	133	53	40·90	4·436316
Ina	2	30	50·63	182	30	36·13	4·120838
Pierceville	106	36	11·30	286	30	00·86	4·187146

INA.

In Gray Co., Kans., about 6 miles south of Ingallsville, and in the northeast quarter of section 3.

Permanent mark: Bottle placed 2 feet below surface, and a large limestone rock marked thus \triangle , noting center of station.

[Latitude, $37^{\circ} 43' 53'' \cdot 57$. Longitude, $100^{\circ} 28' 27'' \cdot 30$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Ingalls	182	30	36·13	2	30	50·63	4·120838
Grandview	285	39	28·16	105	47	51·95	4·324018
Pierceville	141	09	11·85	321	03	16·41	4·353848
Desolation	103	07	48·80	282	59	51·04	4·292498

PIERCEVILLE.

In Gray Co., Kans., about one-quarter mile north of the quarter section corner between secs. 8, 17, T. 25, R. 30, 2 miles east and one-half mile north of Pierceville.

Permanent mark: Bottle 18 inches below surface, over which is a limestone rock marked thus \triangle ; 3 small triangular holes placed about

5 feet from the center, occupy the corners of an equilateral triangle as witness to the surface mark.

[Latitude, 37° 53' 23"-74. Longitude, 100° 38' 07"-09.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ina.....	321 03 16.41	141 09 11.85	4.353848
Ingalls.....	286 30 00.86	106 36 11.30	4.187146
Desolation.....	20 28 37.33	200 26 34.32	4.147090
Bullard.....	85 55 45.43	265 46 44.51	4.334122
Mansfield.....	130 40 13.54	310 35 42.47	4.151985

DESOLATION.

In Haskell Co., Kans., in the SE. $\frac{1}{4}$ of sec. 22, T. 26, R. 31. Instrument elevated 16 feet.

Permanent mark: Bottle 18 inches below surface, and above this is a large rock marked thus \triangle , which is flush with surface.

[Latitude, 37° 46' 17"-35. Longitude, 100° 41' 27"-65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ina.....	282 59 51.04	103 07 48.80	4.292498
Pierceville.....	200 26 34.32	20 28 37.33	4.147090
Bullard.....	124 54 23.64	304 47 26.43	4.306967

MANSFIELD.

In Finney Co., Kans., 908 feet from the northeast corner of sec. 18, T. 24, R. 31. True bearing from section corner to the station is south 73° 43' west.

Permanent mark: Center of well distant from signal 100.3 feet. Azimuth from station to the well, 135° 29' 35".

[Latitude, 37° 58' 23"-46. Longitude, 100° 45' 28"-05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bullard.....	44 53 18.86	224 48 48.46	4.182356
Pierceville.....	310 35 42.47	130 40 13.54	4.151985

BULLARD.

In Finney Co., Kans., on highest sand hill in sec. 18, T. 25, R. 32, and a little east of the main road, south from Garden City, and three-eighths mile north 20° east of junction of roads southeast and southwest.

Permanent mark: Bottle 16 inches below surface, over which is a limestone rock marked thus \triangle and flush with surface. A mound of

sand 2 feet high and 4 feet base was made over this rock. The sand taken from 3 pits symmetrically placed about 7 feet from the rock.

[Latitude, 37° 52' 33''-13. Longitude, 100° 52' 48''-00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pierceville.....	265 46 44·51	85 55 45·43	4·334122
Desolation.....	304 47 26·43	124 54 23·64	4·306957
Ada.....	107 38 37·69	287 32 42·22	4·171252
Mansfield.....	224 48 48·46	44 53 18·86	4·182856

COYOTE.

In Finney Co., Kans., on the highest ground in the NE. $\frac{1}{4}$ of sec. 27, T. 23, R. 34.

Permanent mark: Bottle 28 inches below the surface, and over this a large limestone rock marked with a cross and U. S. G. S. Five feet north, 5 feet south 60° east, and five feet south 60° west are triangular holes as witness marks.

[Latitude, 38° 01' 36''-35. Longitude, 101° 02' 05''-96.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bullard.....	320 49 42·15	140 55 25·29	4·334226
Mansfield.....	283 38 26·59	103 48 40·96	4·399038
Lakin.....	84 15 06·15	264 07 42·41	4·247095
Ada.....	2 22 23·50	182 22 10·70	4·089010

ADA.

In Finney Co., Kans., on the northeast end of a sand hill, which is very near to the township line and about one-fourth mile east of the southwest corner of sec. 31, T. 24, R. 34. This sand hill is the highest anywhere near except one-half mile northeast is a prominent sand hill higher than anything else for several miles around.

Permanent mark: Small stake driven in the ground with a nail in the top.

[Latitude 37° 54' 58''-57. Longitude 101° 02' 26''-76.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bullard.....	287 32 42·22	107 38 37·69	4·171252
Coyote.....	182 22 10·70	2 22 23·50	4·089010
Hummock.....	78 21 37·29	258 14 33·50	4·235840

LAKIN.

In Kearny Co., Kans., 2,605 feet south 37° 35' west from the northeast corner of sec. 35, T. 22, R. 36.

Permanent mark: Bottle 18 inches below surface, over which is a stone marked with a cross and U. S. G. S.

[Latitude, 38° 00' 33''-35. Longitude, 101° 14' 06''-41.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Coyote.....	264 07 42·41	84 15 06·15	4·247095
Ada.....	301 27 53·79	121 35 04·18	4·301805
Hummock.....	359 01 17·24	179 01 23·24	4·145136
Hartland.....	51 22 15·51	231 17 03·95	4·199574

HUMMOCK.

In Kearny Co., Kans., a few hundred feet west of the NE. $\frac{1}{4}$, sec. 14, T. 25, R. 36, on high sand hill.

Permanent mark: Bottle 18 inches below surface, above which is a limestone rock marked thus \triangle . Rock is covered with a large mound of sand.

[Latitude, 37° 53' 05''-37. Longitude, 101° 13' 56''-65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ada.....	258 14 33·50	78 21 37·29	4·235840
Lakin.....	179 01 23·24	359 01 17·24	4·145136
Basin.....	55 32 47·76	235 26 50·99	4·236920
Hartland.....	107 56 25·79	287 51 08·68	4·122278

HARTLAND.

In Kearny Co., Kans., 35 feet south and 9 feet east of the west quarter corner of sec. 34, T. 24, R. 37.

Permanent mark: Bottle 18 inches below the surface at station.

[Latitude, 37° 55' 17''-46. Longitude, 101° 22' 32''-83.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lakin.....	231 17 03·95	51 22 15·51	4·199574
Hummock.....	287 51 08·68	107 56 25·79	4·122278
Basin.....	6 35 23·49	186 34 43·37	4·144213

BASIN.

In Kearny Co., Kans., about 6 miles south of Hartland, in the SE. $\frac{1}{4}$ of sec. 8, T. 26, R. 37, on the east end of the highest sand hill in that vicinity.

Permanent mark: Bottle 24 inches below surface, above which is placed a limestone rock marked with a cross. A large mound of sand

covers the rock, and on top of the mound is a large rock not in a central position.

[Latitude, 37° 47' 48"·35. Longitude, 101° 23' 38"·21.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hummock	235 26 50·99	55 32 47·76	4·236920
Hartland	186 34 43·37	6 35 23·49	4·144213

ECKMAN.

A triangulation station of the U. S. C. & G. Survey in Leavenworth Co., Kans., 537 feet southwest of the northeast corner of sec. 6, T. 12, R. 21, near Daisy P. O. Instrument mounted on tripod 50 feet high.

Permanent mark: Marble post.

[Latitude, 39° 02' 37"·37. Longitude, 95° 00' 05"·19.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Blue Mound	45 36 56·00	225 30 07·95	4·3399179
Windmill	103 57 41·22	283 49 48·33	4·2691600
University	65 46 44·07	245 37 35·84	4·3617100

BLUE MOUND.

In Douglas Co., Kans., 6 miles southeast of Lawrence, near center of sec. 22, T. 13, R. 20. Instrument elevated 20 feet.

Permanent mark: Rock marked U. S. C. S.

[Latitude, 38° 54' 20"·72. Longitude, 95° 10' 53"·95.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Eckman	225 30 07·95	45 36 56·00	4·3399179
University	137 33 01·48	317 30 41·74	3·89943

UNIVERSITY.

In Douglas Co., Kans., in SE. $\frac{1}{4}$ of sec. 36, T. 12, R. 19, 43 feet north and 647 feet west of southeast corner of the section on middle tower of the university.

Permanent mark: Middle tower of the university.

[Latitude, 38° 57' 30"·48. Longitude, 95° 14' 36"·32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Eckman	245 37 35·84	65 46 44·07	4·36171
Blue Mound	317 30 41·74	137 33 01·48	3·89943

WINDMILL.

In Jefferson Co., Kans., in NE. $\frac{1}{4}$ sec. 20, T. 11, R. 20, 764 feet north and 1,092 feet west of east quarter corner of the section.

Permanent mark: Rock.

[Latitude, 39° 05' 02''-12. Longitude, 95° 12' 35''-59.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Blue Mound	352	56	25.49	172	57	29.45	4.29948
Eckman	283	49	48.33	103	57	41.22	4.26916
Lecompton	61	48	37.02	241	41	12.22	4.28508

LECOMPTON.

In Douglas Co., Kans., in SW. $\frac{1}{4}$ sec. 15, T. 12, R. 18, 4 feet north and 950 feet east of southwest corner of the section.

Permanent mark: Section corner.

[Latitude, 39° 00' 06''-17. Longitude, 95° 24' 21''-74.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
University	288	45	47.24	108	51	55.51	4.17281
Windmill	241	41	12.22	61	48	37.02	4.28508
Newman	153	14	32.17	333	11	38.71	4.16693

PERRY.

In Jefferson Co., Kans., in NW. $\frac{1}{4}$ of sec. 7, T. 11, R. 19 E., 670 feet south and 885 feet west of north quarter corner of the section. Instrument on platform 14 feet high.

Permanent mark: Rock sunk in the ground marked with cross.

[Latitude, 39° 56' 56''-78. Longitude, 95° 20' 53''-40.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
University	332	31	17.23	152	35	14.74	4.29307
Windmill	286	25	23.13	106	30	40.09	4.09600
Ozawke	191	53	38.77	11	54	14.18	3.81515
Newman	92	15	51.70	272	10	46.57	4.06547

OZAWKE.

In Jefferson Co., Kans., in NE. $\frac{1}{4}$ sec. 19, T. 10, R. 19, 169 feet south 1,115 feet west of the northeast corner of the section.

Instrument on chimney of house. Permanent mark, same.

[Latitude, $39^{\circ} 10' 24'' \cdot 10$. Longitude, $95^{\circ} 19' 57'' \cdot 30$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Newman.....	65 24 57·16	245 19 16·44	4·15406
Perry.....	11 54 14·18	191 53 38·77	3·81515
Meriden.....	97 35 55·37	277 26 37·25	4·33010
Rock Creek.....	122 11 02·11	302 03 52·12	4·28472

NEWMAN.

In Jefferson Co., Kans., in SW. $\frac{1}{4}$ sec. 1, T. 11, R. 17, 188 feet east and 1,104 feet north of southwest corner of the section.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 07' 11'' \cdot 39$. Longitude, $95^{\circ} 28' 57'' \cdot 02$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lecompton.....	333 11 38·71	153 14 32·17	4·16696
Perry.....	272 10 46·57	92 15 51·70	4·06547
Meriden.....	136 41 11·34	316 37 34·35	4·07990
Rock Creek.....	168 15 30·35	348 14 01·67	4·21833
Ozawke.....	245 19 16·44	65 24 57·16	4·15406

MERIDEN.

In Shawnee Co., Kans., in NE. $\frac{1}{4}$ sec. 12, T. 10, R. 16, 496 feet east and 1,025 feet north of the center of the section.

Permanent mark: Section stone.

[Latitude, $39^{\circ} 11' 54'' \cdot 86$. Longitude, $95^{\circ} 34' 40'' \cdot 64$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Newman.....	316 37 34·35	136 41 11·34	4·07990
Ozawke.....	277 26 37·25	97 35 55·37	4·33010
Skimmerhorn.....	110 29 07·89	290 24 41·57	4·03282
Cope.....	165 37 53·60	345 36 47·18	4·00606

ROCK CREEK.

In Jefferson Co., Kans., in SE. $\frac{1}{4}$ sec. 16, T. 9, R. 17, 948 feet south and 1,563 feet west of the east quarter corner of the section.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 15' 56'' \cdot 26$. Longitude, $95^{\circ} 31' 17'' \cdot 35$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Newman.....	348 14 01·67	168 15 30·35	4·21833
Ozawke.....	302 03 52·12	122 11 02·11	4·28472
Cope.....	107 52 17·55	287 49 02·38	3·89003

COPE.

In Jackson Co., Kans., in NW. $\frac{1}{4}$ of sec. 11, T. 9, R. 16, 33 feet east and 1,059 feet south of the northwest corner of the section. Instrument elevated 20 feet.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 17' 13'' 39$. Longitude, $95^{\circ} 36' 25'' 64$.

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Meriden	345 36 47.18	165 37 53.60	4.00606
Rock creek	287 49 02.38	107 52 17.55	3.89003
Cedar	205 57 11.31	25 59 12.16	4.02101
Skimmerhorn	51 24 53.24	231 21 33.12	3.98690
Railroad	114 08 36.93	294 04 34.49	4.00201

CEDAR.

In Jefferson Co., Kans., in NE. $\frac{1}{4}$ of sec. 7, T. 8, R. 17. 15 feet west and 768 feet north of east quarter corner of the section.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 22' 20'' 01$. Longitude, $95^{\circ} 33' 13'' 35$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Cope.....	25 59 12.16	205 57 11.31	4.02101
Railroad.....	68 48 39.00	248 42 34.43	4.16944

RAILROAD.

In Jackson Co., Kans., in NW. $\frac{1}{4}$ of sec. 26, T. 8, R. 15, 806 feet south and 1,497 feet east of the northwest corner of the section. Instrument elevated 20 feet.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 19' 26'' 47$. Longitude, $95^{\circ} 42' 48'' 38$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Cope.....	294 04 34.49	114 08 36.93	4.00201
Skimmerhorn.....	351 04 38.44	171 05 20.54	4.01213
Cedar.....	248 42 34.43	68 48 39.00	4.16944
Agency.....	50 36 29.05	230 31 49.29	4.13703
Pottawatomie	131 11 36.89	311 06 32.52	4.18342

SKIMMERHORN.

In Jackson Co., Kans., in SW., $\frac{1}{4}$ of sec. 25, T. 9, R. 15, 99 feet north and 1,445 feet east of the southwest corner of the section. Instrument on chimney of Skimmerhorn's house.

Permanent mark: Same.

[Latitude, $39^{\circ} 13' 57''$.05. Longitude, $95^{\circ} 41' 41''$.87.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Meriden	290	24	41.57	110	29	07.89	4.03282
Cope	231	21	33.12	51	24	53.24	3.98690
Agency	96	49	59.23	276	44	37.69	4.08909
Railroad	171	05	20.54	351	04	38.44	4.01213

AGENCY.

In Jackson Co., Kans., in NE. $\frac{1}{4}$ of sec. 27, T. 9, R. 14, 294 feet south and 1,163 feet west of the northeast corner of the section. Instrument elevated 12 feet.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 14' 44''$.10. Longitude, $95^{\circ} 50' 10''$.20.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Skimmerhorn	276	44	37.69	96	49	59.23	4.08909
Railroad	230	31	49.29	50	36	29.05	4.13703
St. Marys	98	14	22.08	278	04	11.44	4.36866
Soldier	138	49	35.52	318	44	53.39	4.20952
Pottawatomie	177	13	19.50	357	12	55.40	4.27343

POTTAWATOMIE.

In Jackson Co., Kans., 482 feet east and 2,263 feet south of the south-east corner of sec. 21, T. 7, R. 14.

Permanent mark: Rock marked with cross.

[Latitude, $39^{\circ} 24' 52''$.00. Longitude, $95^{\circ} 50' 48''$.21.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Railroad	311	06	32.52	131	11	36.89	4.18342
Agency	357	12	55.40	177	13	19.50	4.27343
Soldier	56	06	27.06	236	02	08.54	4.07010

SOLDIER.

In Jackson Co., Kans., in NW. $\frac{1}{4}$ of sec. 15, T. 8, R. 13, 77 feet east and 2,639 feet south of the northwest corner of the section.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 21' 19''$.29. Longitude, $95^{\circ} 57' 35''$.63.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Agency	318	44	53.39	138	49	35.52	4.20952
Pottawatomie	236	02	08.54	56	06	27.06	4.07010
Vienna	138	31	43.28	318	27	09.39	4.19241
St. Marys	54	33	32.69	234	28	03.56	4.18421

ST. MARYS.

In Pottawatomie Co., Kans., in NW. $\frac{1}{4}$ of sec. 17, T. 9, R. 12, 194 feet south and 1,591 feet east of the northwest corner of the section.

Permanent mark: The section corner.

[Latitude, 39° 16' 31''-60. Longitude, 96° 06' 15''-10.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Agency.....	278	04	11.44	98	14	22.08	4.36866
Soldier.....	234	28	03.56	54	33	32.69	4.18421
Louisville.....	117	57	17.17	297	48	03.77	4.37407
Blaine.....	142	55	11.67	322	47	01.73	4.48573
Vienna.....	185	51	05.70	5	52	01.53	4.31477

VIENNA.

In Pottawatomie Co., Kans., 14 miles north of St. Marys and 6 miles southeast of Havensville, on highest part of ridge running north and south. Instrument elevated 18 feet.

Permanent mark: Large wooden plug.

[Latitude, 39° 27' 37''-49. Longitude, 96° 04' 47''-07.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Soldier.....	318	27	09.39	138	31	43.28	4.19241
St. Marys.....	5	52	01.53	185	51	05.70	4.31477
Louisville.....	67	42	02.40	247	31	52.03	4.39565
Blaine.....	100	41	56.67	280	32	49.31	4.32050

LOUISVILLE.

In Pottawatomie Co., Kans., in NW. $\frac{1}{4}$ of sec. 7, T. 8, R. 10, 1,092 feet south and 1,238 feet west of the north quarter corner of the section.

Permanent mark: The section corner.

[Latitude, 39° 22' 30''-40. Longitude, 96° 20' 48''-35.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
St. Marys.....	297	48	03.77	117	57	17.17	4.37407
Vienna.....	247	31	52.03	67	42	02.40	4.39565
Stockdale.....	78	34	21.16	258	27	14.46	4.21585
Fostoria.....	143	54	27.83	323	50	41.88	4.15939

BLAINE.

In Pottawatomie Co., Kans., in SE. $\frac{1}{4}$, sec. 29, T. 6, R. 10, 308 feet north and 1,329 feet west of the southeast corner of the section. Instrument elevated 24 feet.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 29' 42''$.52. Longitude, $96^{\circ} 19' 07''$.22.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
St. Marys.....	322 47 01.73	142 55 11.67	4.48573
Vienna	280 32 49.81	100 41 56.67	4.32050
Fostoria	81 21 27.88	261 16 37.35	4.04316

FOSTORIA.

In Pottawatomie Co., Kans., in NE. $\frac{1}{4}$ of sec. 6, T. 7, R. 9, 20 feet south and 273 feet west of the northeast corner of the section.

Permanent mark: The section corner.

[Latitude $39^{\circ} 28' 48''$.46. Longitude, $96^{\circ} 26' 44''$.12.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Blaine	261 16 37.35	81 21 27.88	4.04316
Louisville	323 50 41.88	143 54 27.83	4.15939
Stockdale	26 57 28.45	206 54 07.14	4.22398
Olesburg	62 01 12.24	241 57 22.87	3.99006
Springside	144 57 31.61	324 55 09.14	3.96900

STOCKDALE.

In Pottawatomie Co., Kans., in NW. $\frac{1}{4}$ of sec. 21, T. 8, R. 8, 1,564 feet south and 1,187 feet east of northwest corner of the section.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 20' 44''$.26. Longitude, $96^{\circ} 32' 01''$.20.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Louisville	258 27 14.46	78 34 21.16	4.21585
Fostoria	206 54 07.14	26 57 28.45	4.22398
Leonardville	100 19 44.85	280 10 02.17	4.34929
Olesburg	174 12 40.79	354 12 12.95	4.01684

OLESBURG.

In Pottawatomie Co., Kans., in SW. $\frac{1}{4}$ of sec. 17, T. 7, R. 8, 494 feet east and 684 feet north of the south quarter corner of the section. Instrument elevated 12 feet.

Permanent mark: The section corner.

[Latitude, $39^{\circ} 26' 19''$.60. Longitude, $96^{\circ} 32' 45''$.05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Stockdale.....	354 12 12.95	174 12 40.79	4.01684
Fostoria	241 57 22.87	62 01 12.24	3.99006
Springside.....	194 59 56.80	15 01 23.90	4.10185
Leonardville.....	73 09 37.16	253 00 21.75	4.33999
Randolph.....	121 37 36.39	301 29 59.01	4.30479

SPRINGSIDE.

In Pottawatomie Co., Kans., 9 miles north and 2 miles east of Olesburg, on a prominent mound on east side of the Blue River.

Permanent mark: Stone set 6 inches below the surface; surface mark, wooden stake.

[Latitude, 39° 32' 55''-57. Longitude, 96° 30' 23''-01.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Fostoria	324 55 09·14	144 57 31·61	3·96900
Olesburg	15 01 23·90	194 59 56·80	4·10185

LEONARDVILLE.

In Riley Co., Kans., in SW. $\frac{1}{4}$ of sec. 5, T. 8, R. 6, 609 feet east and 1,112 feet north of the southwest corner of the section.

Permanent mark: The section corner.

[Latitude, 39° 22' 53''-20. Longitude, 96° 47' 10''-91.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Olesburg	253 00 21·75	73 09 37·16	4·33999
Stockdale	280 10 02·17	100 19 44·85	4·34929
Randolph	192 22 51·81	12 24 30·69	4·23879

RANDOLPH.

In Riley Co., Kans., in NW. $\frac{1}{4}$ of sec. 15, T. 6, R. 6, 2 feet west and 1,592 feet south of the north quarter corner of the section.

Permanent mark: The section corner.

[Latitude, 39° 32' 02''-03. Longitude, 96° 44' 44''-33.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Olesburg	301 29 59·01	121 37 36·39	4·30479
Leonardville	12 24 30·69	192 22 51·81	4·23879

FREY.

Triangulation station of the U. S. C. & G. S. in Dickinson Co., Kans., in sec. 11, T. 12, R. 2 E., 725 feet east and 10 feet south of supposed center of the section.

Permanent mark: Rock with cross cut in the top.

[Latitude, 39° 01' 31''-84. Longitude, 97° 10' 24''-56.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wilmer	227 02 55·22	47 07 58·89	4·198968
Taylor	317 26 31·48	137 32 46·92	4·327989
Vine Creek	114 46 07·41	294 37 56·73	4·313964

WILMER.

Triangulation station of the U. S. C. & G. S. in Dickinson Co., Kans., in sec. 1, T. 11, R. 3 E., 1,023 feet north and 689 feet west of the south-east corner of the section.

Permanent mark: Rock with cross cut in the top.

[Latitude $39^{\circ} 07' 20''$.-93. Longitude $77^{\circ} 02' 22''$ -80.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Vine Creek	86 02 24·91	265 49 09·80	4·482266
Frey	47 07 58·89	227 02 55·22	4·198968
Butler	128 18 14·75	308 09 55·01	4·383160

VINE CREEK.

Triangulation station of the U. S. C. & G. S. in Ottawa Co., Kans., on highest point of land in vicinity and just east of the road.

Permanent mark: Rock with cross cut in the top.

[Latitude, $39^{\circ} 06' 11''$ -06. Longitude, $97^{\circ} 23' 23''$ -18.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	<i>Meters.</i>
Wilmer	265 49 09·80	86 02 24·91	4·482266
Frey	294 37 56·73	114 46 07·41	4·313964
Monument	144 43 43·12	324 39 29·09	4·222941
Butler	213 19 51·44	33 24 48·06	4·311482

MONUMENT.

In Ottawa Co., Kans., on east side of sec. 35, T. 9, R. 2 W.. on a rocky hill near a monument of loosely piled rock.

Permanent mark: Cross cut in large solid rock.

[Latitude, $39^{\circ} 13' 33''$ -24. Longitude, $97^{\circ} 30' 05''$ -41.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Butler	260 29 24·18	80 38 35·64	4·326176
Vine Creek	324 39 29·09	144 43 43·12	4·222941
Sulphur Springs ..	177 31 34·34	357 31 10·92	4·311352
Table Mound	243 34 03·83	63 42 35·65	4·335128

BUTLER

In Clay Co., Kans., on east side of sec. 24, T. 9, R. 1 E., on land owned by F. A. Butler.

Permanent mark: Rock with cross cut in the top.

[Latitude, 39° 15' 25''-88. Longitude, 97° 15' 33''-67.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Wilmer.....	308	09	55.01	128	18	14.75	<i>Meters.</i> 4-383160
Vino Creek.....	33	24	48.06	213	19	51.44	4-311482
Monument.....	80	38	35.64	260	29	24.18	4-326176
Table Mound.....	166	08	42.57	346	08	02.59	3-800471

TABLE MOUND.

In Clay Co., Kans., on east side of sec. 35, T. 8, R. 1 E., on land owned by James Kerr.

Permanent mark: Large rock placed in the ground with cross cut in the top.

[Latitude, 39° 18' 44''-74. Longitude, 97° 16' 36''-81.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Butler.....	346	08	02.59	166	08	42.57	3-800471
Monument.....	63	42	35.05	243	34	03.83	4-335128
Sulphur Springs..	118	16	41.14	298	07	44.88	4-361168
Renshawe.....	194	05	28.03	14	08	31.93	4-453124

SULPHUR SPRINGS.

In Cloud Co., Kans., in the SE. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sec. 26, T. 7, R. 2 W., on land owned by Delilah Pearson, on highest mound on the east side of the ridge north of the road.

Permanent mark: Cross cut on top of large rock below surface.

[Latitude, 39° 24' 36''-77. Longitude, 97° 30' 42''-27.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Table Mound.....	298	07	44.88	118	16	41.14	4-361168
Monument.....	357	31	10.92	177	31	34.34	4-311352
Concordia.....	131	54	17.53	311	48	01.06	4-278919
Wayne.....	180	56	51.05	0	57	05.08	4-501595
Renshawe.....	238	19	16.55	58	31	18.32	4-502986

RENSHAWE.

In Clay Co., Kans., near the center of sec. 3, T. 6, R. 2 E., on high, rocky ground.

Permanent mark: Cross cut on top of rock placed below the surface.

[Latitude, 39° 33' 37''-45. Longitude, 97° 11' 47''-30.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Table Mound.....	14	08	31.93	194	05	28.03	4-453124
Sulphur Springs..	58	31	18.32	238	19	16.55	4-502986
Wayne.....	119	40	02.75	299	28	12.85	4-484583

WAYNE.

In Republic Co., Kans., in the NE. $\frac{1}{4}$ of sec. 23, T. 4, R. 2 W. on a high flat ridge in a pasture.

Permanent mark: U. S. G. S. cut in a rock.

[Latitude, 39° 41' 45''-81. Longitude, 97° 30' 20''-34.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Renshawe	299 28 12·85	119 40 02·75	4·484583
Sulphur Springs..	0 57 05·08	130 56 51·05	4·501595
Concordia	37 37 18·92	217 30 47·27	4·380851
Minersville	80 00 05·99	259 52 40·20	4·227801

CONCORDIA.

In Cloud Co., Kans., in the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 20, T. 6, R. 3 W., several miles southwest of Concordia.

Permanent mark: Eighteen inches under ground, a small, flat rock; over this, and just below surface, a large chalk rock with U. S. G. S. and cross cut in the top.

[Latitude, 39° 31' 28''-03. Longitude, 97° 40' 34''-64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wayne	217 30 47·27	37 37 18·92	4·380851
Sulphur Springs..	311 48 01·06	131 54 17·53	4·278919
Scottsville	94 24 35·07	274 13 53·67	4·382625
Jamestown	135 27 10·66	315 20 44·24	4·313936
Minersville	172 55 29·44	352 54 36·00	4·210146

MINERSVILLE.

In Republic Co., Kans., in the NW. $\frac{1}{4}$ of sec. 31, T. 4, R. 3, on the south side of the public road.

Permanent mark: A large rock marked with cross and U. S. G. S. cut in top.

[Latitude, 39° 40' 10''-09. Longitude, 97° 41' 58''-48.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wayne	259 52 40·20	80 00 05·99	4·227801
Concordia	352 54 36·00	172 55 29·44	4·210146
Jamestown	83 30 19·23	263 24 45·73	4·098179

JAMESTOWN.

In Republic Co., Kans., in the SW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 35, T. 4, R. 5, 4 or 5 miles north of Jamestown.

Permanent mark: Stone 18 inches below surface; also a surface stone marked with cross and U. S. G. S. cut in the top.

[Latitude, 39° 39' 23''-77. Longitude, 97° 50' 40''-98.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Minersville.....	263 24 45·73	83 30 19·23	4·098179
Concordia.....	315 20 44·24	135 27 10·66	4·313986
Scottsville.....	36 43 15·66	216 38 59·85	4·204883
Pointed Hill.....	113 12 20·25	293 02 44·42	4·368385

SCOTTSVILLE.

In Mitchell Co., Kans., in town of Scottsville, in the SE. $\frac{1}{4}$ of sec. 11, T. 6, R. 6. Instrument elevated 20 feet.

Permanent mark: Rock with cross and U. S. G. S. cut in the top and a jug buried underneath it.

[Latitude, 39° 32' 26''-99. Longitude, 97° 57' 22''-31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Jamestown.....	216 38 59·85	36 43 15·66	4·204883
Concordia.....	274 13 53·67	94 24 35·07	4·382625
Church.....	30 24 50·66	210 19 17·36	4·394697
Cemetery.....	108 43 27·10	288 35 08·48	4·294904
Pointed Hill.....	151 36 35·25	331 31 16·16	4·398771

POINTED HILL.

In Jewell Co., Kans., in the NE. $\frac{1}{4}$ of the NW. $\frac{1}{4}$ of sec. 3, T. 4, R. 7, 4 miles north and 4 miles east of Jewell City, on the end of Pointed Hill.

Permanent mark: Rock with cross and U. S. G. S. cut in the top.

[Latitude, 39° 44' 21''-20. Longitude, 98° 05' 42''-48.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Scottsville.....	331 31 16·16	151 36 35·25	4·398771
Jamestown.....	293 02 44·42	113 12 20·25	4·368385
Cemetery.....	23 13 13·99	203 10 13·61	4·233009

CHURCH.

In Mitchell Co., Kans., about 1 mile southwest of two churches, 7 miles south of Beloit, near the center of the NE. $\frac{1}{4}$ of sec. 21, T. 8, R. 7.

Permanent mark: Rock with cross and U. S. G. S. cut in the top.

[Latitude, 39° 20' 52''-77. Longitude, 98° 06' 06''-93.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Cemetery.....	167 28 24·32	347 25 40·22	4·453258
Scottsville.....	210 19 17·36	30 24 50·66	4·394697
Blue Hill.....	88 19 13·56	268 11 02·73	4·268287

CEMETERY.

In Jewell Co., Kans., in the SW. $\frac{1}{4}$ of the SW. $\frac{1}{4}$ of sec. 24, T. 5, R. 8, 6 miles south of Jewell City and one-half mile west, on the north side of the road across from the cemetery.

Permanent mark: Rock, bottle underneath.

[Latitude, 39° 35' 51" 53. Longitude, 98° 10' 25" 06.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Scottsville.....	288 35 08.48	108 43 27.10	4.294904
Pointed Hill.....	203 10 13.61	23 13 13.99	4.233009
Church.....	347 25 40.22	167 28 24.32	4.453258
Blue Hill.....	23 36 37.39	203 31 09.34	4.489339
Old Well.....	93 03 20.34	272 48 17.77	4.529181

BLUE HILL.

In Mitchell Co., Kans., on Blue Hill.

Permanent mark: Rock with cross and U. S. G. S. cut in the top.

[Latitude, 39° 20' 34" 43. Longitude, 98° 19' 01" 13.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Cemetery.....	203 31 09.34	23 36 37.39	4.489339
Church.....	268 11 02.73	88 19 13.56	4.268287
Tipton.....	96 08 17.74	276 00 05.38	4.271773
Old Well.....	144 27 23.82	324 17 51.78	4.567271

TIPTON.

In Osborne Co., Kans., on the east side of sec. 15, T. 8, R. 11, on high hill 2 miles west of the town.

Permanent mark: Large limestone rock with cross cut and U. S. G. S. on top. Bottom of bottle placed 2 inches below the rock.

[Latitude, 39° 21' 38" 54. Longitude, 98° 31' 57" 62.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Blue Hill.....	276 00 05.38	96 08 17.74	4.271773
Old Well.....	174 00 48.96	353 59 30.59	4.450081
Lawrence.....	122 38 06.38	302 25 42.34	4.521395

OLD WELL.

In Smith Co., Kans., in the SW. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 16, T. 5, R. 11 and is 42 feet north and 138.75 feet west of the northwest corner of a stone foundation for a building.

Permanent mark: Cross and U. S. G. S. cut in large rock and a bottle top set underneath the rock.

[Latitude, 39° 36' 47"-61. Longitude, 98° 34' 00"-86.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Blue Hill	324 17 51.78	144 27 23.82	4.567271
Cemetery	272 48 17.77	93 03 20.34	4.529188
Tipton	353 59 30.59	174 00 48.96	4.450081
Lawrence	67 58 03.61	247 46 56.08	4.431416
School	111 17 52.44	291 12 22.56	4.421627

SCHOOL.

In Smith Co., Kans., near a schoolhouse on the northeast corner of the yard, and near the corner of the section.

Permanent mark: Stone marked with cross and U. S. G. S.

[Latitude, 39° 39' 23"-13. Longitude, 98° 42' 38"-01.]

To station.	Azimuth.	Backazimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lawrence	40 17 20.06	220 11 41.79	4.292411
Old Well	291 12 22.56	111 17 52.44	4.421627
Engstrom	71 04 28.91	250 53 20.28	4.422513
Hardlee	136 11 47.03	316 02 33.80	4.472943

LAWRENCE.

In Osborne Co., Kans., on a swell of ground near the center of the west side of sec. 23, T. 6, R. 14, and about on highest point.

Permanent mark: Cross and U. S. G. S. cut on top of large flat stone; jug, with cross cut on it, is underneath the flat stone.

[Latitude, 39° 31' 17"-82. Longitude, 98° 51' 28"-82.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Tipton	302 25 42.34	122 38 06.38	4.521395
Old Well	247 46 56.08	67 58 03.61	4.431416
Engstrom	117 13 09.69	297 07 40.01	4.442870
School	220 11 41.79	40 17 20.06	4.292411

HARDLEE.

In Smith Co., Kans., on the highest point of ground in sec. 20, T. 2, R. 14, near the center of the SE. $\frac{1}{4}$.

Permanent mark: White sandstone rock, marked with a cross and U. S. G. S.

[Latitude, 39° 50' 57"-55. Longitude, 98° 57' 03"-13.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Engstrom	8 17 34.11	188 15 36.90	4.482210
School	316 02 33.80	136 11 47.03	4.472943
Blue Mound	86 02 23.31	265 54 30.50	4.245229

ENGSTROM.

In Smith Co., Kans., on the north slope of a hill in the NW. $\frac{1}{4}$ of sec. 34, T. 5, R. 15.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $39^{\circ} 34' 43''$. Longitude, $99^{\circ} 00' 06''$.57.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lawrence.....	297 07 40.01	117 13 09.69	4.142876
School.....	250 53 20.28	71 04 28.91	4.422513
Twin Mound.....	98 33 06.14	278 21 10.20	4.432896
Blue Mound.....	155 24 42.87	335 18 48.60	4.500885
Hardilee.....	188 15 36.90	8 17 34.11	4.482210

BLUE MOUND.

In Phillips Co., Kans., on the highest ground in the NW. $\frac{1}{4}$ of sec. 32, T. 2, R. 16, and about half a mile S. 60° W. of mound of the same name.

Permanent mark: An inverted bottle placed 14 inches under ground and a surface mark of white limestone 18 inches square, marked with a cross and U. S. G. S.

[Latitude, $39^{\circ} 50' 17''$.51. Longitude, $99^{\circ} 09' 21''$.08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Engstrom.....	335 18 48.60	155 24 42.87	4.500885
Hardilee.....	265 54 30.50	86 02 23.31	4.245229
Plaster Mound.....	76 18 23.88	256 04 57.19	4.489504
Twin Mound.....	28 40 22.04	208 34 18.55	4.451406

TWIN MOUND.

In Phillips Co., Kans., a little over 1 mile southwest of mounds of this name. Near the center of the SE. $\frac{1}{4}$ of sec. 14, T. 5, R. 18.

Permanent mark: A bottle 30 inches below the surface and a large sandstone rock flush with surface, upon which is cut a cross.

[Latitude, $39^{\circ} 36' 52''$.73. Longitude, $99^{\circ} 18' 49''$.82.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Engstrom.....	278 21 10.20	98 33 06.14	4.432896
Blue.....	208 34 18.55	28 40 22.04	4.451406
Rock Mound.....	80 56 27.40	260 50 22.45	4.440899
Plaster Mound.....	136 43 01.80	316 35 40.24	4.380216

ROCK MOUND.

In Phillips Co., Kans., near the southwest part of a prominent mound in sec. 28, T. 5, R. 19.

Permanent mark: A bottle 2 feet underground, and a large sandstone rock a few inches above ground on which a cross is cut.

[Latitude, 39° 35' 41''-72. Longitude, 99° 28' 22''-30.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Twin Mound	260 50 22.45	80 56 27.40	4.140899
Plaster Mound	171 48 15.07	351 46 59.16	4.297703
Densmore	88 18 10.65	268 09 34.95	4.285951

PLASTER MOUND.

In Phillips Co., Kans., within a few feet of the stone north of sec. 30, W. $\frac{1}{4}$, T. 3, R. 19. On public road. Instrument elevated 14 feet.

Permanent mark: A bottle 18 inches below the surface and a cross cut on small limestone rock.

[Latitude, 39° 46' 18''-67. Longitude, 99° 30' 21''-19.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Twin Mound	316 35 40.24	136 43 01.80	4.380216
Blue Mound	256 04 57.19	76 18 23.88	4.489504
Stahl	81 03 25.30	260 51 27.71	4.432182
Densmore	39 09 50.51	219 02 29.75	4.416348
Rock Mound.....	351 46 59.16	171 48 15.07	4.297703

DENSMORE.

In Norton Co., Kans., about 5 miles southeast of Densmore, between sections 28 and 33, T. 5, R. 21.

Permanent mark: A broken bottle 20 inches below surface and large surface rock of white limestone with cross cut on top.

[Latitude, 39° 35' 22''-38. Longitude, 99° 41' 51''-48.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rock Mound.....	268 09 34.95	88 18 10.65	4.285951
Plaster Mound.....	219 02 29.75	39 09 59.51	4.416348
Windmill.....	76 17 58.46	256 10 07.79	4.259061
Stahl	147 15 43.17	327 11 07.53	4.279125

STAHL.

In Norton Co., Kans., on highest ground in the NE. $\frac{1}{4}$ of the SE. $\frac{1}{4}$ of sec. 5, T. 4, R. 22., on land owned by Stahl.

Permanent mark: Bottle placed 22 inches below the surface; surface mark, a large white limestone rock on which a cross is cut.

[Latitude, $39^{\circ} 44' 00'' \cdot 81$. Longitude, $99^{\circ} 49' 03'' \cdot 34$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Densmore.....	327 11 07.53	147 15 43.17	4.279125
Plaster Mound.....	260 51 27.71	81 03 25.30	4.432182
Windmill.....	19 50 54.40	199 47 38.54	4.334216
Wakeman.....	78 15 12.86	258 07 46.99	4.229905

WINDMILL.

In Graham Co., Kans., 1 mile S. 70° W. of 2 windmills. which are very prominent landmarks for many miles.

Permanent mark: Rock with cross and U. S. G. S. cut in the top.

[Latitude, $39^{\circ} 33' 02'' \cdot 28$. Longitude, $99^{\circ} 54' 10'' \cdot 34$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Densmore.....	256 10 07.79	76 17 58.46	4.259061
Stahl.....	199 47 38.54	19 50 54.40	4.334216
Lenora.....	104 55 00.15	284 49 56.89	4.070397
Wakeman.....	151 04 00.44	330 59 51.23	4.284254

WAKEMAN.

In Norton Co., Kans., located on summit of gently rolling ridge, about 6 miles north of Lenora.

Permanent mark: Large rock with cross and U. S. G. S. cut on top, and two bottles buried beneath, 12 and 30 inches below surface.

[Latitude, $39^{\circ} 42' 08'' \cdot 15$. Longitude, $100^{\circ} 00' 41'' \cdot 09$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Windmill.....	330 59 51.23	151 04 00.44	4.284254
Stahl.....	258 07 46.99	78 15 12.86	4.229905
Lenora.....	8 23 24.00	188 22 29.53	4.145046

LENORA.

In Norton Co., Kans., located on a prominent, pointed peak, 2 or 3 miles south of Lenora.

Permanent mark: Large rock with cross and U. S. G. S. cut in the top, and two bottles buried beneath, 12 and 30 inches below the surface.

[Latitude, $39^{\circ} 34' 40'' \cdot 17$. Longitude, $100^{\circ} 02' 06'' \cdot 47$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Windmill.....	284 49 56.89	104 55 00.15	4.070397
Wakeman.....	188 22 29.53	8 23 24.00	4.145046

POSITIONS OF TOWNSHIP AND SECTION CORNERS,
SCHOOLHOUSES, CHURCHES, ETC.

Corner Ts. 20 and 21, Rs. 19 and 20, Anderson Co., Kans. Latitude, $38^{\circ} 15' 39'' \cdot 10$. Longitude, $95^{\circ} 14' 54'' \cdot 33$.

Corner T. 19 and 20, R. 19 and 20, Anderson Co., Kans. Latitude, $38^{\circ} 20' 52'' \cdot 61$. Longitude, $95^{\circ} 14' 53'' \cdot 47$.

Northwest corner sec. 28, T. 19, R. 12, Barton Co., Kans. Latitude, $38^{\circ} 22' 33'' \cdot 29$. Longitude, $98^{\circ} 39' 46'' \cdot 92$.

Northeast corner sec. 16, T. 19, R. 14, Barton Co., Kans. Latitude, $38^{\circ} 24' 17'' \cdot 21$. Longitude, $98^{\circ} 51' 56'' \cdot 28$.

Northwest corner sec. 19, T. 20, R. 15, Barton Co., Kans. Latitude, $38^{\circ} 18' 15'' \cdot 26$. Longitude, $99^{\circ} 01' 53'' \cdot 60$.

Southeast corner sec. 36, T. 20, R. 12, Barton and Stafford counties, Kans. Latitude, $38^{\circ} 15' 37'' \cdot 92$. Longitude, $98^{\circ} 35' 22'' \cdot 11$.

Cupola of court-house, Cottonwood Falls, Chase Co., Kans. Latitude, $38^{\circ} 22' 18'' \cdot 47$. Longitude, $96^{\circ} 32' 28'' \cdot 30$.

Corner T. 20 and 21, R. 5 and 6, Chase Co., Kans. Latitude, $38^{\circ} 15' 45'' \cdot 68$. Longitude, $96^{\circ} 49' 07'' \cdot 73$.

Corner T. 20 and 21, R. 6 and 7, Chase Co., Kans. Latitude $38^{\circ} 15' 45'' \cdot 39$. Longitude, $96^{\circ} 42' 29'' \cdot 86$.

Corner T. 19 and 20, R. 7 and 8, Chase Co., Kans. Latitude, $38^{\circ} 20' 57'' \cdot 74$. Longitude, $96^{\circ} 35' 52'' \cdot 40$.

Corner T. 19 and 20, R. 6 and 7, Chase Co., Kans. Latitude, $38^{\circ} 20' 57'' \cdot 83$. Longitude, $96^{\circ} 42' 30'' \cdot 25$.

Corner T. 18 and 19, R. 7 and 8, Chase Co., Kans. Latitude, $38^{\circ} 26' 11'' \cdot 61$. Longitude, $96^{\circ} 35' 50'' \cdot 45$.

Southeast corner sec. 35, T. 8, R. 1 E., Clay Co., Kans. Latitude, $39^{\circ} 18' 29'' \cdot 1$. Longitude, $97^{\circ} 16' 36'' \cdot 7$.

One-quarter corner secs. 24 and 19, T. 9, R. 1 and 2 E., Clay Co., Kans. Latitude, $39^{\circ} 15' 27'' \cdot 02$. Longitude, $97^{\circ} 15' 32'' \cdot 88$.

One-quarter north corner sec. 20, T. 6, R. 3, Cloud Co., Kans. Latitude, $39^{\circ} 31' 34'' \cdot 49$. Longitude, $97^{\circ} 40' 34'' \cdot 29$.

One-quarter south corner sec. 26, T. 7, R. 2, Cloud Co., Kans. Latitude, $39^{\circ} 24' 35'' \cdot 86$. Longitude, $97^{\circ} 30' 43'' \cdot 88$.

Corner T. 18 and 19, R. 13 and 14, Coffey Co., Kans. Latitude, $38^{\circ} 26' 05'' \cdot 58$. Longitude, $95^{\circ} 54' 45'' \cdot 04$.

Corner T. 18 and 19, R. 14 and 15, Coffey Co., Kans. Latitude, $38^{\circ} 26' 05'' \cdot 34$. Longitude, $95^{\circ} 48' 06'' \cdot 91$.

Corner T. 19 and 20, R. 14 and 15, Coffey Co., Kans. Latitude, $38^{\circ} 20' 51'' \cdot 74$. Longitude, $95^{\circ} 48' 07'' \cdot 69$.

Corner T. 19 and 20, R. 16 and 17, Coffey Co., Kans. Latitude, $38^{\circ} 20' 53'' \cdot 15$. Longitude, $95^{\circ} 34' 53'' \cdot 15$.

Schoolhouse, Lebo, Coffey Co., Kans. Latitude, $38^{\circ} 25' 07'' \cdot 59$. Longitude, $95^{\circ} 51' 29'' \cdot 45$.

Center of sec. 11, T. 12, R. 2, Dickinson Co., Kans. Latitude, $39^{\circ} 01' 31''$.75. Longitude, $97^{\circ} 10' 33''$.73.

Southeast corner sec. 1, T. 11, R. 3, Dickinson Co., Kans. Latitude, $39^{\circ} 07' 10''$.80. Longitude, $97^{\circ} 02' 13''$.08.

State line, R. 6, Douglas Co., Kans. Latitude, $39^{\circ} 32' 24''$.73. Longitude, $97^{\circ} 57' 25''$.56.

Southwest corner sec. 22, T. 13, R. 20, Douglas Co., Kans. Latitude, $38^{\circ} 54' 50''$.74. Longitude, $95^{\circ} 11' 08''$.03.

Southeast corner sec. 36, T. 12, R. 19, Douglas Co., Kans. Latitude, $38^{\circ} 57' 30''$.06. Longitude, $95^{\circ} 14' 28''$.13.

Southwest corner sec. 15, T. 12, R. 18, Douglas Co., Kans. Latitude, $39^{\circ} 00' 06''$.13. Longitude, $95^{\circ} 24' 33''$.79.

Garden City, north schoolhouse, Finney Co., Kans. Latitude, $37^{\circ} 58' 19''$.70. Longitude, $100^{\circ} 52' 23''$.70.

Garden City, south schoolhouse, Finney Co., Kans. Latitude, $37^{\circ} 57' 39''$.18. Longitude, $100^{\circ} 52' 14''$.77.

Garden City standpipe, Finney Co., Kans. Latitude, $37^{\circ} 57' 50''$.35. Longitude, $100^{\circ} 52' 41''$.89.

Pierceville schoolhouse, Finney Co., Kans. Latitude, $37^{\circ} 53' 01''$.31. Longitude, $100^{\circ} 40' 19''$.97.

Northeast corner sec. 15, T. 24, R. 34, Finney Co., Kans. Latitude, $37^{\circ} 58' 25''$.84. Longitude, $101^{\circ} 01' 43''$.08.

Northwest corner sec. 15, T. 24, R. 34, Finney Co., Kans. Latitude, $37^{\circ} 58' 25''$.27. Longitude, $101^{\circ} 02' 49''$.03.

Northwest corner sec. 27, T. 23, R. 34, Finney Co., Kans. Latitude, $38^{\circ} 01' 53''$.62. Longitude, $101^{\circ} 02' 47''$.72.

North one-quarter corner sec. 30, T. 25, R. 32, Finney Co., Kans. Latitude $37^{\circ} 51' 29''$.25. Longitude, $100^{\circ} 52' 23''$.63.

Southeast corner sec. 36, T. 26, R. 31, Finney Co., Kans. Latitude, $37^{\circ} 44' 03''$.73. Longitude, $100^{\circ} 39' 10''$.82.

Northeast corner sec. 18, T. 24, R. 31, Finney Co., Kans. Latitude, $37^{\circ} 58' 25''$.98. Longitude, $100^{\circ} 45' 17''$.15.

Northeast corner sec. 22, T. 26, R. 25, Ford Co., Kans. Latitude, $37^{\circ} 46' 46''$.72. Longitude, $100^{\circ} 01' 54''$.87.

North one-quarter corner sec. 30, T. 25, R. 24, Ford Co., Kans. Latitude, $37^{\circ} 51' 41''$.31. Longitude, $99^{\circ} 52' 57''$.20.

Northeast corner sec. 29, T. 25, R. 22, Ford Co., Kans. Latitude, $37^{\circ} 51' 15''$.57. Longitude, $99^{\circ} 45' 06''$.54.

Southwest corner sec. 8, T. 26, R. 23, Ford Co., Kans. Latitude, $37^{\circ} 47' 34''$.78. Longitude, $99^{\circ} 52' 06''$.17.

Corner T. 18 and 19, R. 17 and 18, Franklin Co., Kans. Latitude, $38^{\circ} 26' 06''$.60. Longitude, $95^{\circ} 28' 14''$.58.

Cupola of church, Richmond, Franklin Co., Kans. Latitude, $38^{\circ} 34' 14''$.64. Longitude, $95^{\circ} 15' 10''$.71.

Cross on church, Emerald, Franklin Co., Kans. Latitude, $38^{\circ} 23' 13''$.58. Longitude, $95^{\circ} 27' 09''$.65.

Schoolhouse about 4 miles east of Mausfield, Gray Co., Kans. Latitude, $37^{\circ} 56' 11'' \cdot 52$. Longitude, $100^{\circ} 41' 58'' \cdot 42$.

Cimarron standpipe, Gray Co., Kans. Latitude, $37^{\circ} 49' 00'' \cdot 32$. Longitude, $100^{\circ} 20' 48'' \cdot 05$.

Cimarron schoolhouse, Gray Co., Kans. Latitude, $37^{\circ} 48' 31'' \cdot 02$. Longitude, $100^{\circ} 20' 40'' \cdot 80$.

Grandview schoolhouse, Gray Co., Kans. Latitude, $37^{\circ} 51' 21'' \cdot 97$. Longitude, $100^{\circ} 20' 07'' \cdot 73$.

Pretty Prairie schoolhouse, Gray Co., Kans. Latitude, $37^{\circ} 50' 26'' \cdot 24$. Longitude, $100^{\circ} 15' 47'' \cdot 05$.

Northwest corner sec. 6, T. 27, R. 30, Gray Co., Kans. Latitude, $37^{\circ} 44' 03'' \cdot 73$. Longitude, $100^{\circ} 39' 10'' \cdot 82$.

East quarter corner sec. 26, T. 25, R. 29, Gray Co., Kans. Latitude, $37^{\circ} 50' 56'' \cdot 11$. Longitude, $100^{\circ} 27' 49'' \cdot 80$.

North quarter corner sec. 3, T. 27, R. 29, Gray Co., Kans. Latitude, $37^{\circ} 44' 11'' \cdot 57$. Longitude, $100^{\circ} 28' 40'' \cdot 47$.

Southwest corner sec. 19, T. 25, R. 27, Gray Co., Kans. Latitude, $37^{\circ} 51' 20'' \cdot 61$. Longitude, $100^{\circ} 20' 09'' \cdot 49$.

Southeast corner sec. 27, T. 25, R. 27, Gray Co., Kans. Latitude, $37^{\circ} 50' 27'' \cdot 35$. Longitude, $100^{\circ} 15' 45'' \cdot 94$.

Southwest corner sec. 31, T. 25, R. 27, Gray Co., Kans. Latitude, $37^{\circ} 49' 36'' \cdot 18$. Longitude, $100^{\circ} 20' 09'' \cdot 60$.

Southwest corner sec. 22, T. 25, R. 27, Gray Co., Kans. Latitude, $37^{\circ} 51' 20'' \cdot 10$. Longitude, $100^{\circ} 16' 52'' \cdot 56$.

South quarter corner sec. 23, T. 27, R. 27, Gray Co., Kans. Latitude, $37^{\circ} 40' 42'' \cdot 46$. Longitude, $100^{\circ} 14' 26'' \cdot 80$.

Northwest corner sec. 8, T. 25, R. 30, Gray Co., Kans. Latitude, $37^{\circ} 54' 01'' \cdot 44$. Longitude, $100^{\circ} 38' 42'' \cdot 51$.

Northeast corner sec. 16, T. 22, R. 1 W., Harvey Co., Kans. Latitude, $38^{\circ} 08' 39'' \cdot 46$. Longitude, $97^{\circ} 25' 33'' \cdot 46$.

Southwest corner sec. 33, T. 21, R. 1 E., Harvey Co., Kans. Latitude, $38^{\circ} 10' 24'' \cdot 77$. Longitude, $97^{\circ} 20' 09'' \cdot 69$.

Southeast corner sec. 8, T. 22, R. 2, Harvey Co., Kans. Latitude, $38^{\circ} 08' 40'' \cdot 37$. Longitude, $97^{\circ} 33' 17'' \cdot 20$.

Southeast corner sec. 36, T. 22, R. 1 E. Harvey Co., Kans. Latitude, $38^{\circ} 05' 10'' \cdot 40$. Longitude, $97^{\circ} 15' 46'' \cdot 12$.

Southwest corner sec. 4, T. 23, R. 3 W., Harvey and Reno counties, Kans. Latitude, $38^{\circ} 04' 18'' \cdot 44$. Longitude, $97^{\circ} 39' 50'' \cdot 32$.

Northwest corner sec. 19, T. 25, R. 25, Hodgeman Co., Kans. Latitude, $37^{\circ} 52' 09'' \cdot 59$. Longitude, $100^{\circ} 06' 59'' \cdot 15$.

Southeast corner sec. 21, T. 24, R. 24, Hodgeman Co., Kans. Latitude, $37^{\circ} 56' 29'' \cdot 98$. Longitude, $99^{\circ} 57' 14'' \cdot 34$.

Southeast corner sec. 22, T. 21, R. 22, Hodgeman Co., Kans. Latitude, $38^{\circ} 12' 13'' \cdot 49$. Longitude, $99^{\circ} 42' 58'' \cdot 18$.

Southwest corner sec. 14, T. 23, R. 21, Hodgeman Co., Kans. Latitude, $38^{\circ} 03' 27'' \cdot 33$. Longitude, $99^{\circ} 36' 17'' \cdot 90$.

Southeast corner sec. 29, T. 23, R. 21, Hodgeman Co., Kans. Latitude, $38^{\circ} 01' 42'' \cdot 99$. Longitude, $99^{\circ} 38' 30'' \cdot 01$.

Southeast corner sec. 3, T. 24, R. 23 W., Hodgeman Co., Kans. Latitude, $37^{\circ} 59' 06'' \cdot 21$. Longitude, $99^{\circ} 49' 30'' \cdot 70$.

Southeast corner sec. 25, T. 23, R. 23, Hodgeman Co., Kans. Latitude, $38^{\circ} 01' 16'' \cdot 87$. Longitude, $99^{\circ} 47' 17'' \cdot 96$.

Southeast corner sec. 21, T. 7, R. 14, Jackson Co., Kans. Latitude, $39^{\circ} 25' 15'' \cdot 38$. Longitude, $95^{\circ} 50' 54'' \cdot 35$.

Northwest corner sec. 15, T. 8, R. 13, Jackson Co., Kans. Latitude, $39^{\circ} 21' 45'' \cdot 40$. Longitude, $95^{\circ} 57' 36'' \cdot 61$.

Northwest corner sec. 27, T. 9, R. 14, Jackson Co., Kans. Latitude, $39^{\circ} 14' 47'' \cdot 01$. Longitude, $95^{\circ} 49' 55'' \cdot 40$.

Southwest corner sec. 25, T. 9, R. 15, Jackson Co., Kans. Latitude, $39^{\circ} 13' 56'' \cdot 07$. Longitude, $95^{\circ} 42' 00'' \cdot 24$.

Northwest corner sec. 26, T. 8, R. 15, Jackson Co., Kans. Latitude, $39^{\circ} 19' 34'' \cdot 45$. Longitude, $95^{\circ} 43' 07'' \cdot 45$.

Northwest corner sec. 11, T. 9, R. 16, Jackson Co., Kans. Latitude, $39^{\circ} 17' 23'' \cdot 86$. Longitude, $95^{\circ} 36' 26'' \cdot 06$.

North quarter corner sec. 7, T. 11, R. 19, Jefferson Co., Kans. Latitude, $39^{\circ} 07' 03'' \cdot 40$. Longitude, $95^{\circ} 20' 42'' \cdot 15$.

East quarter corner sec. 20, T. 11, R. 20, Jefferson Co., Kans. Latitude, $39^{\circ} 04' 54'' \cdot 57$. Longitude, $95^{\circ} 12' 21'' \cdot 73$.

Northeast corner sec. 19, T. 19, R. 19, Jefferson Co., Kans. Latitude, $39^{\circ} 10' 25'' \cdot 77$. Longitude, $95^{\circ} 19' 43'' \cdot 14$.

Southwest corner sec. 1, T. 11, R. 17, Jefferson Co., Kans. Latitude, $39^{\circ} 07' 00'' \cdot 46$. Longitude, $95^{\circ} 28' 59'' \cdot 40$.

East quarter corner sec. 16, T. 9, R. 17, Jefferson Co., Kans. Latitude, $39^{\circ} 16' 05'' \cdot 63$. Longitude, $95^{\circ} 30' 57'' \cdot 47$.

East quarter corner sec. 7, T. 8, R. 17, Jefferson Co., Kans. Latitude, $39^{\circ} 22' 12'' \cdot 42$. Longitude, $95^{\circ} 33' 12'' \cdot 80$.

Southwest corner sec. 24, T. 5, R. 8, Jewell Co., Kans. Latitude, $39^{\circ} 35' 51'' \cdot 40$. Longitude, $98^{\circ} 10' 32'' \cdot 90$.

Quarter north corner sec. 3, T. 4, R. 7, Jewell Co., Kans. Latitude, $39^{\circ} 44' 32'' \cdot 04$. Longitude, $98^{\circ} 05' 47'' \cdot 87$.

Hartland schoolhouse, Kearny Co., Kans. Latitude, $37^{\circ} 53' 21'' \cdot 06$. Longitude, $101^{\circ} 22' 03'' \cdot 49$.

Lakin schoolhouse, Kearny Co., Kans. Latitude, $37^{\circ} 56' 30'' \cdot 75$. Longitude, $101^{\circ} 15' 27'' \cdot 00$.

Deerfield schoolhouse, Kearny Co., Kans. Latitude, $37^{\circ} 58' 54'' \cdot 76$. Longitude, $101^{\circ} 08' 06'' \cdot 13$.

West quarter corner sec. 34, T. 24, R. 37, Kearny Co., Kans. Latitude, $37^{\circ} 55' 17'' \cdot 81$. Longitude, $101^{\circ} 22' 32'' \cdot 94$.

Northwest corner sec. 11, T. 25, R. 36, Kearny Co., Kans. Latitude, $37^{\circ} 54' 00'' \cdot 98$. Longitude, $101^{\circ} 14' 53'' \cdot 67$.

Northeast corner sec. 35, T. 22, R. 36, Kearny Co., Kans. Latitude, $38^{\circ} 00' 58'' \cdot 76$. Longitude, $101^{\circ} 13' 46'' \cdot 56$.

Northeast corner sec. 6, T. 12, R. 12, Leavenworth Co., Kans. Latitude, $39^{\circ} 02' 42'' \cdot 60$. Longitude, $95^{\circ} 00' 03'' \cdot 84$.

Corner Towns 19 and 20, Ranges 22 and 23, Linn Co., Kans. Latitude, $38^{\circ} 20' 48'' \cdot 72$. Longitude, $94^{\circ} 55' 02'' \cdot 97$.

Corner Towns 19 and 20, State line, Linn Co., Kans. Latitude, $38^{\circ} 20' 47'' \cdot 52$. Longitude, $94^{\circ} 36' 45'' \cdot 42$.

Corner Towns 19 and 20, Ranges 12 and 13, Lyon Co., Kans. Latitude, $38^{\circ} 20' 54'' \cdot 26$. Longitude, $96^{\circ} 01' 25'' \cdot 50$.

Corner Towns 17 and 18, Ranges 12 and 13, Lyon Co., Kans. Latitude, $38^{\circ} 31' 21'' \cdot 70$. Longitude, $96^{\circ} 01' 24'' \cdot 07$.

Cupola of State normal school, Emporia, Lyon Co., Kans. Latitude, $38^{\circ} 24' 50'' \cdot 96$. Longitude, $96^{\circ} 10' 47'' \cdot 52$.

Southwest corner sec. 13, T. 21, R. 2 E., Marion Co., Kans. Latitude, $38^{\circ} 13' 04'' \cdot 86$. Longitude, $97^{\circ} 10' 10'' \cdot 83$.

Northeast corner sec. 16, T. 23, R. 1 E., Marion Co., Kans. Latitude, $38^{\circ} 02' 57'' \cdot 72$. Longitude, $97^{\circ} 20' 38'' \cdot 70$.

Southeast corner sec. 36, T. 21, R. 1 E., Marion and Harvey counties, Kans. Latitude, $38^{\circ} 10' 27'' \cdot 58$. Longitude, $97^{\circ} 15' 44'' \cdot 98$.

Corner Towns 20 and 21, Ranges 4 and 5, Marion Co., Kans. Latitude, $38^{\circ} 15' 45'' \cdot 45$. Longitude, $96^{\circ} 55' 45'' \cdot 11$.

Corner Towns 17 and 18, Ranges 20 and 21, Miami Co., Kans. Latitude, $38^{\circ} 31' 19'' \cdot 21$. Longitude, $95^{\circ} 08' 15'' \cdot 30$.

Corner Towns 17 and 18, Ranges 22 and 23, Miami Co., Kans. Latitude, $38^{\circ} 31' 16'' \cdot 29$. Longitude, $94^{\circ} 55' 03'' \cdot 33$.

Corner Towns 18 and 19, Ranges 24 and 25, Miami Co., Kans. Latitude, $38^{\circ} 26' 02'' \cdot 63$. Longitude, $94^{\circ} 41' 43'' \cdot 13$.

Southwest corner sec. 15, T. 8, R. 7, Mitchell Co., Kans. Latitude $39^{\circ} 21' 04'' \cdot 73$. Longitude, $98^{\circ} 05' 50'' \cdot 81$.

One quarter south corner sec. 11, T. 6, R. 6, Mitchell Co., Kans. Latitude, $39^{\circ} 32' 24'' \cdot 73$. Longitude, $97^{\circ} 57' 25'' \cdot 56$.

Corner Towns 17 and 18, Ranges 8 and 9, Morris Co., Kans. Latitude, $38^{\circ} 31' 23'' \cdot 60$. Longitude, $96^{\circ} 27' 51'' \cdot 51$.

Southwest corner sec. 33, T. 5, R. 24, Norton Co., Kans. Latitude, $39^{\circ} 34' 05'' \cdot 50$. Longitude, $100^{\circ} 02' 23'' \cdot 00$.

Southeast corner sec. 5, T. 4, R. 22, Norton Co., Kans. Latitude, $39^{\circ} 43' 38'' \cdot 57$. Longitude, $99^{\circ} 48' 55'' \cdot 11$.

Corner Towns 17 and 18, Ranges 15 and 16, Osage Co., Kans. Latitude, $38^{\circ} 31' 23'' \cdot 42$. Longitude, $95^{\circ} 41' 29'' \cdot 02$.

One-quarter east corner sec. 15, T. 8, R. 11, Osborne Co., Kans. Latitude, $39^{\circ} 21' 39'' \cdot 38$. Longitude, $98^{\circ} 31' 38'' \cdot 08$.

One-quarter west corner sec. 23, T. 6, R. 14, Osborne Co., Kans. Latitude, $39^{\circ} 31' 09'' \cdot 68$. Longitude, $98^{\circ} 51' 32'' \cdot 13$.

Southwest corner sec. 36, T. 9, R. 2 W., Ottawa Co., Kans. Latitude, $39^{\circ} 13' 18'' \cdot 8$. Longitude, $97^{\circ} 30' 12'' \cdot 6$.

Northwest corner sec. 13, T. 11, R. 1, Ottawa Co., Kans. Latitude, $39^{\circ} 06' 15'' \cdot 63$. Longitude, $97^{\circ} 23' 23'' \cdot 79$.

Northwest corner sec. 6, T. 21, R. 17, Pawnee Co., Kans. Latitude, $38^{\circ} 15' 38'' \cdot 22$. Longitude, $99^{\circ} 14' 01'' \cdot 82$.

Northwest corner sec. 30, T. 22, R. 17, Pawnee Co., Kans. Latitude, $38^{\circ} 06' 55'' \cdot 99$. Longitude, $99^{\circ} 14' 22'' \cdot 27$.

Northwest corner sec. 5, T. 21, R. 19, Pawnee Co., Kans. Latitude, $38^{\circ} 15' 42'' \cdot 32$. Longitude, $99^{\circ} 25' 26'' \cdot 48$.

Northwest corner sec. 17, T. 22, R. 20, Pawnee Co., Kans. Latitude, $38^{\circ} 08' 43'' \cdot 37$. Longitude, $99^{\circ} 33' 02'' \cdot 88$.

Northwest corner sec. 28, T. 5, R. 19, Phillips Co., Kans. Latitude, $39^{\circ} 35' 52'' \cdot 18$. Longitude, $99^{\circ} 28' 41'' \cdot 34$.

One-quarter south corner sec. 14, T. 5, R. 18, Phillips Co., Kans. Latitude, $39^{\circ} 36' 44'' \cdot 73$. Longitude, $99^{\circ} 19' 06'' \cdot 61$.

One-quarter north corner sec. 32, T. 2, R. 16, Phillips Co., Kans. Latitude, $39^{\circ} 50' 39'' \cdot 66$. Longitude, $99^{\circ} 09' 04'' \cdot 78$.

Northwest corner sec. 21, T. 8, R. 8, Pottawatomie Co. Kans. Latitude, $39^{\circ} 20' 59'' \cdot 72$. Longitude, $96^{\circ} 32' 16'' \cdot 32$.

Southwest corner sec. 5, T. 8, R. 6, Pottawatomie Co., Kans. Latitude $39^{\circ} 22' 47'' \cdot 20$. Longitude, $96^{\circ} 47' 34'' \cdot 08$.

Northeast corner sec. 6, T. 7, R. 9, Pottawatomie Co., Kans. Latitude, $39^{\circ} 28' 48'' \cdot 65$. Longitude, $96^{\circ} 26' 40'' \cdot 66$.

One-quarter south corner sec. 17, T. 7, R. 8, Pottawatomie Co., Kans. Latitude, $39^{\circ} 26' 12'' \cdot 84$. Longitude, $96^{\circ} 32' 51'' \cdot 35$.

Southeast corner sec. 29, T. 6, R. 10, Pottawatomie Co., Kans. Latitude, $39^{\circ} 29' 39'' \cdot 48$. Longitude, $96^{\circ} 18' 50'' \cdot 25$.

One-quarter north corner sec. 7, T. 8, R. 10, Pottawatomie Co., Kans. Latitude, $39^{\circ} 22' 41'' \cdot 20$. Longitude, $96^{\circ} 20' 32'' \cdot 57$.

Northwest corner sec. 17, T. 9, R. 12, Pottawatomie Co., Kans. Latitude, $39^{\circ} 16' 33'' \cdot 52$. Longitude, $96^{\circ} 06' 35'' \cdot 33$.

Northeast corner sec. 13, T. 23, R. 5, Reno Co., Kans. Latitude, $38^{\circ} 03' 24'' \cdot 96$. Longitude, $97^{\circ} 48' 38'' \cdot 43$.

Southwest corner section 8, T. 22, R. 4, Reno Co., Kans. Latitude, $38^{\circ} 08' 39'' \cdot 22$. Longitude, $97^{\circ} 47' 35'' \cdot 89$.

Northwest corner sec. 18, T. 23, R. 7, Reno Co., Kans. Latitude, $38^{\circ} 03' 24'' \cdot 26$. Longitude, $98^{\circ} 01' 49'' \cdot 70$.

Northwest corner sec. 8, T. 22, R. 10, Reno Co., Kans. Latitude, $38^{\circ} 10' 22'' \cdot 12$. Longitude $98^{\circ} 27' 06'' \cdot 43$.

One-quarter south corner sec. 35, T. 5, R. 4, Republic Co., Kans. Latitude, $39^{\circ} 39' 17'' \cdot 65$. Longitude, $97^{\circ} 50' 50'' \cdot 43$.

One-quarter south corner sec. 30, T. 4, R. 3, Republic Co., Kans. Latitude, $39^{\circ} 40' 10'' \cdot 17$. Longitude, $97^{\circ} 41' 50'' \cdot 57$.

Northeast corner sec. 23, T. 4, R. 2 W., Republic Co., Kans. Latitude $39^{\circ} 41' 59'' \cdot 0$. Longitude, $97^{\circ} 29' 46'' \cdot 7$.

Southeast corner section 16, T. 21, R. 8, Rice Co., Kans. Latitude, $38^{\circ} 13' 00'' \cdot 15$. Longitude, $98^{\circ} 12' 53'' \cdot 68$.

Northeast corner section 12, T. 20, R. 8, Rice Co., Kans. Latitude, $38^{\circ} 19' 57'' \cdot 41$. Longitude, $98^{\circ} 08' 43'' \cdot 50$.

Southwest corner section 23, T. 20, R. 10, Rice Co., Kans. Latitude, $38^{\circ} 17' 23'' \cdot 38$. Longitude, $98^{\circ} 24' 20'' \cdot 49$.

One-quarter north corner sec. 15, T. 6, R. 6, Riley Co., Kans. Latitude, $39^{\circ} 32' 17'' \cdot 77$. Longitude, $96^{\circ} 44' 44'' \cdot 30$.

Center of sec. 12, T. 10, R. 16, Shawnee Co., Kans. Latitude, $39^{\circ} 11' 44'' \cdot 71$. Longitude, $95^{\circ} 34' 46'' \cdot 93$.

Southeast corner sec. 16, T. 5, R. 11, Smith Co., Kans. Latitude, $39^{\circ} 36' 44'' \cdot 32$. Longitude, $98^{\circ} 33' 40'' \cdot 50$.

One-quarter west corner sec. 30, T. 2, R. 14, Smith Co., Kans. Latitude, $39^{\circ} 51' 06'' \cdot 93$. Longitude, $98^{\circ} 57' 15'' \cdot 75$.

One-quarter north corner sec. 34, T. 5, R. 15, Smith Co., Kans. Latitude, $39^{\circ} 35' 01'' \cdot 40$. Longitude, $99^{\circ} 00' 03'' \cdot 34$.

Northeast corner sec. 18, T. 21, R. 13, Stafford Co., Kans. Latitude, $38^{\circ} 13' 54'' \cdot 42$. Longitude, $98^{\circ} 47' 01'' \cdot 07$.

Corner Ts. 42 and 43, state line, Bates Co., Mo. Latitude, $38^{\circ} 28' 43'' \cdot 66$. Longitude, $94^{\circ} 36' 44'' \cdot 57$.

Corner Ts. 40 and 41, Rs. 30 and 31, Bates Co., Mo. Latitude, $38^{\circ} 18' 29'' \cdot 52$. Longitude, $94^{\circ} 17' 28'' \cdot 44$.

Corner Ts. 17 and 18, state line, Cass Co., Mo. Latitude, $38^{\circ} 31' 11'' \cdot 86$. Longitude, $94^{\circ} 36' 42'' \cdot 39$.

TEXAS.

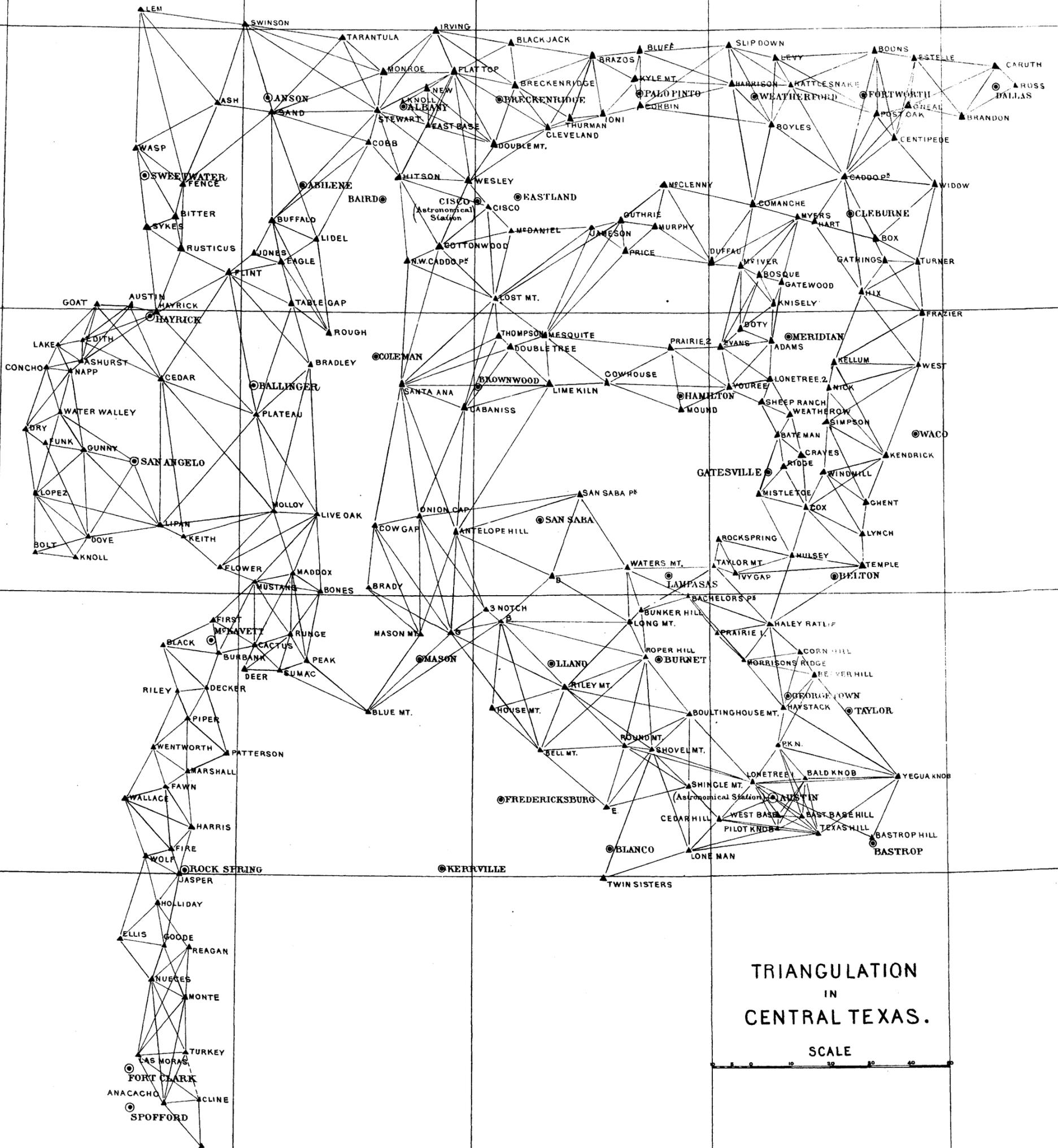
METHODS OF WORK.

Triangulation has been carried on in Texas in two general localities, namely: Middle Texas, or the area between longitude $96^{\circ} 30'$ and 101° , and Transpecos Texas. The work in the latter region extends from the western portion of the State as far eastward as longitude 103° , and covers the territory between the Rio Grande and the New Mexico boundary line. It embraces an area of about 15,000 square miles, and may be described as a belt about 60 miles in width extending from El Paso about 250 miles down the Rio Grande. The triangulation east of the Pecos covers an area of about 50,000 square miles, which is approximately included in a four-sided figure, with Dallas, Roby in Fisher County, Brackettville, and Bastrop at the corners.

Work upon the eastern triangulation was commenced in the vicinity of Austin in the summer of 1884. A base line was measured by E. M. Douglas, assisted by C. H. Fitch, with four meter bars. The location of this base is about ten miles southeast from Austin, near Onion Creek, and its adopted length 10,307.201 meters, or about 6.4 miles. Details relating to the Austin base line can be found in the administrative report of Mr. Henry Gannett contained in the Sixth Annual Report, 1884-'85. The development from this base included the location of a point in Austin, the astronomical position of which had been previously determined by the U. S. Coast and Geodetic Survey, and from this point the geodetic positions of the various triangulation points were derived. The azimuth of the Austin base line was determined by Prof. A. H. Thompson.

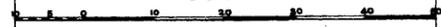
The work in Texas remained for two seasons under charge of Mr. Douglas. He was relieved in 1886 by Mr. R. U. Goode, under whose direction all operations in Texas have since been conducted except a small amount of work around Sierra Blanca in connection with the establishment of the one hundred and fifth meridian, as hereinafter explained. The triangulation was extended year by year northward and westward from Austin, and in 1889 a base line of verification was measured near Albany, partially along a railroad tangent through the town, and new astronomic and azimuth determinations were made.

The Albany base line is about 9 miles in length and was measured twice with a 300-foot steel tape stretched under a tension of 20 pounds. The tape was supported by stakes at intervals of 50 feet,



TRIANGULATION
IN
CENTRAL TEXAS.

SCALE



which were aligned and brought to the grade established by more substantial supports, the latter having been previously set in the ground 300 feet apart, and upon which markings of the extremities of the tape were made. The two direct measurements differed by 0.167 feet, but when temperature corrections were applied the resulting discrepancy was somewhat greater, owing possibly to difficulty experienced at the time of measurement in obtaining the true temperature of the tape. The adopted length of the line after applying the corrections for temperature, length of tape, difference on posts, inclination, sag, and sea level, was 45793.652 feet.

The triangulation was extended from the Albany base eastward 150 miles to Dallas, then southward to Temple, where another check was obtained by joining with distances from Austin base. The work has also been carried 250 miles southward and 100 miles westward from Albany. This work as above was executed principally by Charles F. Urquhart. After the measurement of the Albany base observations for azimuth were obtained each year.

The instruments used in this work were an 8-inch theodolite with verniers reading to 10 seconds in 1884-'85-'86, and afterwards an instrument with an 11-inch Gambey circle reading by microscopes to single seconds. Various methods of observations were used, principally, however, that of directions, and the whole system of triangulation, both east and west of Pecos river, has been divided into convenient figures and adjusted by the method of least squares, while station adjustments by the same method were also made whenever necessary.

Triangulation was commenced in Transpecos Texas, near Sierra Blanca, in the spring of 1890. Prof. R. S. Woodward measured a base line along the Texas and Pacific Railway and determined the astronomical position of a pier at Sierra Blanca, near the western extremity of the base line, and Mr. A. P. Davis developed a small system of triangulation around Sierra Blanca for the purpose of locating on the earth's surface the one hundred and fifth meridian. For a full description of the above operations see Bulletin 70. The work was continued in this locality in 1891 by Mr. R. U. Goode, who extended the system northward and westward, and in 1892 by Mr. Charles F. Urquhart eastward and southward.

The signals used in the middle portions of the State were usually made from sawed lumber, the instruments resting on the ground or elevated as the circumstances required. In the latter cases a scaffold for the support of the observer was always erected around an interior tripod on which the instrument rested. In a few instances when it was not necessary to elevate the instrument above the surface of the ground, trees, when found suitably located, were trimmed and the tops used for signals. In the Transpecos regions the triangulation stations were usually at the summit of sharp and well-defined peaks, and conical piles of stone from 8 to 12 feet in height were used as signals,

POSITIONS AND DESCRIPTIONS OF STATIONS.

ROSS.

In Dallas Co., Tex., about 8 miles east of Dallas; 50 yards west of Mr. Ross's residence and about one-half mile north of the Texas and Pacific Railroad. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $32^{\circ} 47' 19''-39$. Longitude, $96^{\circ} 39' 49''-01$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Branden	63 01 47·88	242 53 37·16	4·423700
Caruth	128 35 33·33	308 31 59·54	4·117911

CARUTH.

In Dallas Co., Tex., about 6 miles north from the city of Dallas, on Mrs. Caruth's residence.

Permanent mark: South chimney of house.

[Latitude, $32^{\circ} 51' 44''-85$. Longitude, $96^{\circ} 46' 23''-42$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Estello	96 44 45·88	276 33 48·45	4·500987
Branden	33 27 29·94	213 22 52·23	4·384618
Ross	308 31 59·54	128 35 33·33	4·117911

BRANDEN.

In Dallas Co., Tex., about 12 miles southwest from Dallas and $2\frac{1}{2}$ miles west of Duncanville, on land owned by Mrs. Brandenburg, and 200 yards southwest from her house. Instrument elevated 24 feet.

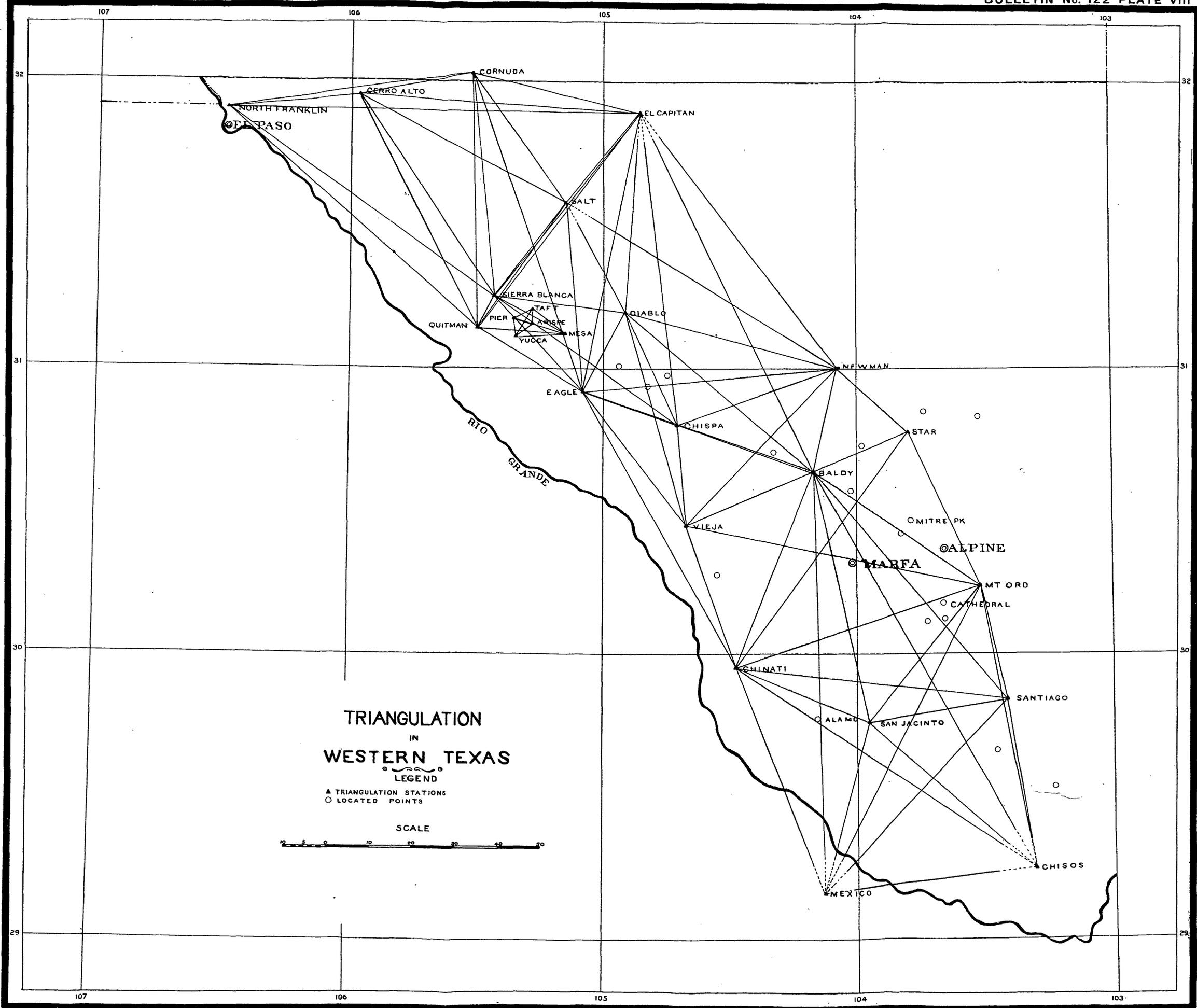
Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $32^{\circ} 40' 47''-93$. Longitude, $96^{\circ} 54' 56''-48$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Estelle	142 49 48·88	322 43 30·99	4·477489
O'Neal	102 46 51·03	282 39 48·04	4·320285
Ross	242 53 37·16	63 01 47·88	4·423700
Caruth	213 22 52·23	33 27 29·94	4·384618

ESTELLE.

In Tarrant Co., Tex., about 5 miles southwest from Grapevine and 1 mile west of the Arlington and Grapevine road, on land owned by the Estelle estate. Instrument elevated 30 feet.



TRIANGULATION
IN
WESTERN TEXAS

LEGEND
▲ TRIANGULATION STATIONS
○ LOCATED POINTS



Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 53' 44"-08. Longitude, 97° 06' 34"-46.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Boons	99 51 50-19	279 46 22-20	4-201987
Post Oak	35 03 08-14	214 57 45-41	4-431753
Caruth	276 33 48-45	96 44 45-88	4-500987
Branden	322 43 30-99	142 49 48-88	4-477489
O'Neal	6 32 18-16	186 31 32-13	4-288511

O'NEAL.

In Tarrant Co., Tex., 3 miles southwest from Arlington, on land owned by Mr. J. J. O'Neal, and about 100 yards north of his residence. Instrument elevated 35 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 43' 17"-38. Longitude, 97° 07' 59"-43.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Estelle	186 31 32-13	6 32 18-16	4-288511
Boons	148 32 25-32	328 27 44-15	4-412058
Branden	282 39 48-04	102 46 51-03	4-320285

POST OAK.

In Tarrant Co., Tex., on land owned by Mr. R. E. Maddox, about 6 miles south of Fort Worth and 1 mile east from the Fort Worth and Mansfield road, on the highest of two timbered knolls. Instrument was elevated 35 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 41' 45"-52. Longitude, 97° 16' 30"-30.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Caddo Peak	27 50 56-64	207 46 39-85	4-425651
Rattlesnake	108 53 29-14	288 41 33-70	4-560725
Centipede	324 34 05-32	144 36 27-24	4-073005
Estelle	214 57 45-41	35 03 08-14	4-431753
Boons	179 31 42-03	359 31 37-76	4-395540

CENTIPEDE.

In Tarrant Co., Tex., about 5 miles southeast of Kennedale and about 1½ miles southwest of the Fort Worth brickyard. On land owned by Mrs. Eliza Turner, and about one-fourth mile east of her residence. Instrument elevated 35 feet.

[Latitude, 32° 36' 32"-51. Longitude, 97° 12' 07"-25.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Post Oak	144 36 27-24	324 34 05-32	4-073005
Caddo Peak	54 14 42-97	234 08 04-97	4-376649

BOONS.

In Tarrant Co., Tex., about 14 miles north of Fort Worth on the middle one of three wooded knolls, one-fourth mile east of Mr. Boon's residence and 3 miles south of Keller. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 55' 12''-22. Longitude, 97° 16' 38''-17.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Rattlesnake	69	04	48·10	248	52	54·76	<i>Meters.</i> 4·563701
Post Oak	359	31	37·76	179	31	42·03	4·395340
O'Neal	328	27	44·15	148	32	25·32	4·412058
Estelle	279	46	22·20	99	51	50·19	4·201987

RATTLESNAKE.

In Parker Co., Tex., in a pasture owned by Mr. Louch, about 12 miles east of Weatherford and 2 miles north of the Weatherford and Fort Worth road.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 48' 05''-84. Longitude, 97° 38' 32''-84.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Levy	149	10	06·50	329	07	54·20	<i>Meters.</i> 4·092315
Harrison	90	58	46·37	270	50	35·84	4·372177
Boons	248	52	54·76	69	04	48·10	4·563701
Post Oak	288	41	33·70	108	53	29·14	4·560725
Caddo Peak	327	56	26·38	148	04	02·60	4·619141
Boyles	27	50	44·85	207	47	56·97	4·238593

LEVY.

In Parker Co., Tex., 10 miles north of Weatherford, on the Weatherford and Springtown road, and 2 miles east of Cartersville, on land owned by Mr. Levy, who lives in Weatherford.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 53' 50''-54. Longitude, 97° 42' 36''-74.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Slipdown	105	57	53·44	285	51	20·46	<i>Meters.</i> 4·290824
Harrison	59	16	35·60	239	10	36·74	4·301491
Rattlesnake	329	07	54·20	149	10	06·50	4·092315

SLIPDOWN.

In Parker Co., Tex., on land owned by Robert Owen. About 4 miles southwest of Poolville, on the Weatherford and Gibtown road, and 7 miles from Gibtown. Known locally as Slipdown Mountain. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 39° 56' 44''-38. Longitude, 97° 54' 39''-80.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Kylo Mountain	70 34 09·86	250 20 52·58	4·607483
Bluff	89 46 20·80	266 33 38·37	4·562188
Levy	285 51 20·46	105 57 53·44	4·290824
Harrison	354 08 29·18	174 09 02·57	4·195368

HARRISON.

In Parker Co., Tex., about 7 miles from Weatherford and one-half mile north from the Weatherford and Palo Pinto road, in small grove of live-oak trees.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 43' 18''-01. Longitude, 97° 53' 38''-28.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Kylo	93 03 56·18	272 50 07·07	4·609462
Slipdown	174 09 02·57	354 08 29·18	4·195368
Boyles	315 19 33·12	135 24 54·85	4·343432
Rattlesnake	270 50 35·84	90 58 46·37	4·372177
Levy	239 10 36·74	59 16 35·60	4·301491

BOYLES.

In Parker Co., Tex., about 7 miles southeast of Weatherford, on land owned by J. W. Boyles, and just south of the railroad at his residence.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 39' 48''-57. Longitude, 97° 43' 43''-31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Harrison	135 24 54·85	315 19 33·12	4·343432
Rattlesnake	207 47 56·97	27 50 44·85	4·238563
Caddo Peak	303 25 05·36	123 35 27·87	4·558347

BLUFF.

In Palo Pinto Co., Tex., about 10 miles north of the town of Palo Pinto, and 1 mile west from the Palo Pinto and Jacksboro road; on the highest part of a ridge and near the bluff.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 55' 35''-49. Longitude, 98° 18' 02''-09.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Kylo	8 33 45·40	188 33 09·50	4·062742
Brazos	83 56 15·45	263 49 40·42	4·278668
Slipdown	266 33 38·37	86 46 20·80	4·562188

KYLE.

In Palo Pinto Co., Tex., on the highest point of Kyle Mountain, about 4 miles north of the town of Palo Pinto.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 49' 24"-60. Longitude, 98° 19' 08"-23.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ioni	42 52 34·36	222 48 05·26	4·279609
Brazos	118 44 20·34	298 38 21·75	4·291895
Slipdown	250 20 52·58	70 34 09·86	4·607483
Harrison	272 50 07·07	93 03 56·18	4·600462
Corbin	349 16 00·77	169 16 41·73	4·024591
Bluff	188 33 09·50	8 33 45·40	4·062742

CORBIN.

In Palo Pinto Co., Tex., about 3 miles south of the town of Palo Pinto, and one-half mile east from the Palo Pinto and Gordon road. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S. near a tree with the limbs cut off.

[Latitude, 32° 43' 47"-07. Longitude, 98° 17' 52"-54.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ioni	76 37 03·48	256 31 53·82	4·185868
Kyle	169 16 41·73	349 16 00·77	4·024591

IONI.

In Palo Pinto Co., Tex., on the highest point of a ridge, 1 mile south of Metcalf's Gap, and 12 miles west from Palo Pinto.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 41' 51"-43. Longitude, 98° 27' 25"-52.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cleveland	77 27 18·73	257 19 44·50	4·351462
Brazos	169 41 35·15	349 40 06·58	4·375572
Corbin	256 31 53·82	76 37 03·48	4·185868
Kyle	222 48 05·26	42 52 34·36	4·279609

BRAZOS.

In Palo Pinto Co., Tex., on the highest point of mountain, about 1 mile north from Randall's store.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 54' 29''-77. Longitude, 98° 30' 09''-01.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cleveland.....	32 01 15.76	211 55 08.74	4.522671
Breckenridge.....	68 57 44.14	248 47 02.42	4.518170
Bluff.....	263 49 40.42	83 56 15.45	4.278668
Kyle.....	298 38 21.75	118 44 20.34	4.291895
Ioni.....	349 40 06.58	169 41 35.15	4.375572
Thurman.....	19 45 51.86	199 42 45.53	4.423297

THURMAN.

In Stevens Co., Tex., near Palo Pinto county line. About 5 miles southeast from Caddo, and one-half mile south from road between Caddo and Gordon. Instrument elevated 20 feet.

Permanent mark: Stone marked with cross and U. S. G. S.

[Latitude, 32° 40' 59''-96. Longitude, 98° 35' 53''-02.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Breckenridge.....	120 56 36.69	300 49 02.98	4.405645
Brazos.....	199 42 45.53	19 45 51.86	4.423297

CLEVELAND.

In Stevens Co., Tex., on school land about 5 miles south from where the Breckenridge and Palo Pinto road crosses Cedar Creek, and about 200 yards east from the road between Cedar Creek and Ranger. On a wooded knoll. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 39' 12''-25. Longitude, 98° 41' 26''-88.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Breckenridge.....	141 16 42.28	321 12 09.25	4.322317
Double Mountain.....	70 32 26.33	250 25 05.18	4.354817
Ioni.....	257 19 44.50	77 27 18.73	4.351462
Brazos.....	211 55 08.74	32 01 15.76	4.522671

BRECKENRIDGE.

In Stevens Co., Tex., on a high, wooded, ridge, about 7 miles from the town of Breckenridge and about 200 yards south from the Breckenridge and Graham road. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 48' 03''-95. Longitude, 98° 49' 51''-89.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Flat Top	103	53	13.47	282	44	39.66	4.404595
Double Mountains	18	50	59.18	198	48	09.91	4.403059
Brazos	248	47	02.42	68	57	44.14	4.518170
Thurman	300	49	02.98	120	56	36.69	4.405645
Black Jack	172	26	09.16	352	25	22.02	4.233842
Cleveland	321	12	09.25	141	16	42.28	4.322317

BLACK JACK.

In Stevens or Young county, Tex., near their boundary line. About 5 miles northeast from Crystal Falls, and a little east from the road between Crystal Falls and Belknap. Instrument elevated 24 feet.

Permanent mark: Rock marked with a cross and U. S. G. S.

[Latitude, 32° 57' 15''-29. Longitude, 98° 51' 18''-72.]

station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Flat Top	64	02	44.01	243	54	56.30	4.396152
Breckenridge	352	25	22.02	172	26	09.16	4.233843

DOUBLE MOUNTAINS.

In Stevens Co., Tex., about 17 miles south of Breckenridge, on eastern of two hills, known as Double Mountains. The Breckenridge and Cisco road passes very near the mountains.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 35' 06''-69. Longitude, 98° 55' 05''-25.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Hitson	72	28	02.10	252	15	15.52	4.591453
Stewart	106	48	24.59	286	32	10.33	4.691354
Breckenridge	198	48	09.91	18	50	59.18	4.403059
Cleveland	250	25	05.18	70	32	26.33	4.354817
New	130	29	23.93	310	20	07.88	4.546872
East Base	106	23	06.91	286	14	01.94	4.438721
Flat Top	151	12	35.41	331	06	52.48	4.534696

FLAT TOP.

On line between Shackelford and Stevens counties, Tex., on the eastern extremity of a hill known as Flat Top mountain. About one-half mile north of the Albany and Crystal Falls road, 14 miles from Breckenridge, 10 miles from Fort Griffin, and 12 miles from Albany.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 51' 20"-75. Longitude, 99° 05' 39"-68.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Stewart.....	62 31 41·97	242 21 07·64	4·530396
Double Mountains	331 06 52·48	151 12 35·41	4·534696
Black Jack.....	243 54 56·30	64 02 44·01	4·390152
Breckenridge.....	283 44 39·66	103 53 13·47	4·404595
New.....	55 08 23·56	235 04 49·36	4·097992
Irving.....	154 26 17·89	334 23 45·90	4·225965
Monroe.....	88 16 49·82	268 06 47·71	4·460537

IRVING.

In Throckmorton Co., Tex., about 5 miles northeast of Fort Griffin and one mile north from road between Fort Griffin and Belknap, on a post-oak ridge. The only post-oak in the country. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 59' 33"-38. Longitude, 99° 10' 19"-31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Monroe.....	53 21 22·07	233 13 50·83	4·429910
Flat Top.....	334 23 45·90	154 26 17·89	4·225965

EAST BASE.

In Shackelford Co., Tex., on land owned by Mr. Henry Palm. On a ridge $7\frac{3}{4}$ miles southeast from Albany, and just east of Hubbard Creek.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 39' 17"-06. Longitude, 99° 11' 56"-21.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
New.....	178 09 53·23	358 09 43·16	4·179927
Double Mountains	286 14 01·94	106 23 06·91	4·438721
Knoll.....	131 01 35·12	310 57 52·34	4·153292

KNOLL.

In Shackelford Co., Tex., on land owned by Mr. Strum, about 1 mile northwest from Albany and one-fourth mile north from the Albany and Haskell road.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 44' 20"-15. Longitude, 99° 18' 48"-62.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
East Base.....	310 57 52·34	131 01 35·12	4·153292
New.....	240 30 51·27	60 34 24·38	4·070818

NEW.

In Shackelford Co., Tex., on vacant land, about 7 miles from Albany. About 1 mile west from the Albany and Crystal Falls road, and just south from a sheep ranch.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 47' 28''-06. Longitude, 99° 12' 14''-84.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Flat Top.....	235 04 49·36	55 08 23·56	4·097992
Double Mountains.....	310 20 07·88	130 29 23·93	4·546872
East Base.....	358 09 43·16	178 09 53·23	4·179927
Knoll.....	60 34 24·38	240 30 51·27	4·070818

MONROE.

In Shackelford Co., Tex., in the Monroe pasture, on a knoll 3½ miles north of a point on the Albany and Haskell road, and about 7 miles from Albany.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 50' 51''-24. Longitude, 99° 24' 09''-62.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Stewart.....	6 05 56·12	186 05' 22·80	4·178596
Flat Top.....	268 06 47·71	88 16 49·82	4·490537
Tarantula.....	131 04 00·21	310 58 27·72	4·523818
Irving.....	233 13 50·83	53 21 22·07	4·429910

STEWART.

In Shackelford Co., Tex., in Charles Stewart's pasture, about 9 miles west from Albany and one-eighth mile north from the point where the Albany and Rising Sun road crosses a high ridge; about 1¼ miles north of George Coates' house.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 42' 44''-26. Longitude, 99° 25' 11''-16.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hitson.....	339 01 52·01	159 05 16·94	4·443369
Double Mountains.....	286 32 10·33	106 48 24·59	4·691354
Cobb.....	14 12 45·00	194 11 39·85	4·107991
Sand.....	88 57 31·73	268 42 40·49	4·633122
Tarantula.....	153 38 29·43	333 33 30·92	4·507755
Monroe.....	186 05 22·80	6 05 56·12	4·178596
Flat Top.....	242 21 07·64	62 31 41·97	4·536396

COBB.

In Shackelford Co., Tex., in a pasture known as the "Old government pasture." About 2 miles south from where the Albany and Abilene road crosses the western most of three benches.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 36' 00"-71. Longitude, 99° 29' 11"-90.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Sand.....	106	17	34.44	286	03	49.70	<i>Meters.</i> 4.617837
Stewart.....	194	11	39.85	14	12	45.00	4.107991
Abilene.....	58.	19	58.60	238	10	35.19	4.507314
Lidel.....	29	20	47.83	209	13	30.08	4.639462
Buffalo.....	51	30	46.05	231	17	22.56	4.699218

TARANTULA.

In Haskell Co., Tex., about one-half mile from the southern edge of Haskell Co., on southernmost of two flat-topped hills. It is 300 yards west from the Albany and Haskell road, at a point 18 miles from Haskell; eighteenth mile-post nearly opposite the hill.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 58' 20"-32. Longitude, 99° 34' 21"-57.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Monroe.....	310	58	27.72	131	04	00.21	4.323818
Stewart.....	333	33	30.92	153	38	29.43	4.507755
Anson.....	51	55	00.79	231	44	30.34	4.584558
Sand.....	43	58	23.97	223	48	28.05	4.615150
Haskell.....	144	18	57.33	324	18	44.49	4.406066
Swinson.....	94	04	46.70	276	51	02.78	4.597397

HASKELL.

In Haskell Co., Tex. Not occupied. The cupola on the court-house in Haskell, county seat of Haskell County.

Permanent mark: Cupola.

[Latitude, 33° 09' 31"-57. Longitude, 99° 43' 54"-96.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Tarantula.....	324	13	44.49	144	18	57.33	4.406066
Swinson.....	56	58	55.12	236	50	22.15	4.463680

SWINSON.

In Stonewall Co., Tex., in the southeast corner of the county, on the eastern edge of Flat Top Mountain, about 2 miles east of the Anson and Rayner road.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 33° 00' 56"-10. Longitude, 99° 59' 34"-60.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Tarantula	276	51	02.78	94	04	46.70	4.597397
Sand	342	35	23.37	162	42	08.06	4.558089
Anson	342	14	03.69	162	17	14.43	4.476653
Ash	18	27	17.17	198	23	37.24	4.522820
Haskell	236	50	22.15	56	58	55.12	4.463688
Lem	97	52	38.12	277	39	27.50	4.621348

SAND.

In Jones Co., Tex., on a sand hill about 2 miles east of the Abilene and Anson road and 3 miles southeast of Anson. All country near the signal covered with thick brush. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 42' 15"-00. Longitude, 99° 52' 40"-50.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Tarantula	223	48	28.05	43	58	23.97	4.615150
Stewart	268	42	40.49	88	57	31.73	4.633122
Abilene	336	12	05.54	156	16	24.36	4.492986
Buffalo	358	53	43.03	178	53	59.97	4.631206
Cobb	286	03	49.70	106	17	34.44	4.617837
Ash	97	46	04.50	277	38	41.67	4.333057
Swinson	162	42	08.06	342	38	23.37	4.558089

ANSON.

In Jones Co., Tex. Not occupied. The cupola on the court-house in Anson, the county seat of Jones County.

Permanent mark: Cupola.

[Latitude, 32° 45' 29"-54. Longitude, 99° 53' 43"-33.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Swinson	162	17	14.43	342	14	03.69	4.476653
Tarantula	231	44	30.34	51	55	00.79	4.584588

ASH.

In Jones Co., Tex., very near the Fisher line, on the highest of two sand hills, about 4 miles north from where Mukel and Newman road crosses Clear Fork of the Brazos River, about 2½ miles north of the pasture fence.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 45' 49"-63. Longitude, 100° 06' 19"-79.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Swinson	198	23	37.24	18	27	17.17	<i>Meters.</i> 4.522820
Sand	277	38	41.67	97	46	04.50	4.333057
Wasp	60	45	09.27	240	34	13.10	4.560635
Fence	22	00	33.83	201	56	09.78	4.533666
Lem	140	22	14.14	320	11	26.93	4.685400

LEM.

In Stonewall Co., Tex., on the easternmost of the Double Mountains, in the Hetson pasture. The Double mountains are well known points.
Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 33° 03' 59"-68. Longitude, 100° 26' 11"-37.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Swinson	277	39	07.50	97	53	38.12	<i>Meters.</i> 4.621348
Ash	320	11	26.93	140	22	14.14	4.685400
Wasp	360	40	08.53	180	39	55.17	4.741118

WASP.

In Fisher Co., Tex., about 6 miles a little west of north from Sweetwater, on highest knoll, about one-half mile west from the Sweetwater and Roby road.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 34' 11"-27. Longitude, 100° 26' 36"-03.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Lem	180	39	55.17	360	40	08.53	<i>Meters.</i> 4.741118
Ash	240	34	13.10	60	45	09.27	4.560635
Sweetwater	342	16	44.21	162	17	55.14	4.053811
Sykes	351	38	24.91	171	39	57.85	4.494010
Bitter	329	17	14.51	149	22	35.58	4.486311
Fence	306	09	14.08	126	15	44.22	4.370810

SWEETWATER.

In Nolan Co., Tex. Not occupied. Cupola of the court-house at Sweetwater.

Permanent mark: Cupola.

[Latitude, 32° 28' 31"-23. Longitude, 100° 24' 24"-09.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Wasp	162	17	55.14	342	16	44.21	<i>Meters.</i> 4.053811
Fence	281	13	25.27	101	18	44.09	4.199196

FENCE.

In Nolan Co., Tex., in northern edge of the county and 10 miles a little south of east from Sweetwater; about 1 mile south of the western edge of mountains and on the highest point. A fence running north and south passes within a few yards of the signal. No road near.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $32^{\circ} 26' 40''$.88. Longitude, $100^{\circ} 14' 30''$.05.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Wasp.....	126	15	44.22	306	09	14.08	<i>Meters.</i> 4.370810
Ash.....	201	56	09.78	22	00	33.83	4.533666
Sweetwater.....	101	18	44.09	281	13	25.27	4.199196
Bitter.....	14	58	10.60	194	57	02.25	4.111270

BITTER.

In Nolan Co., Tex., about 1 mile south from Bitter Creek, on the northern edge of a large mesquite ridge, known as "The divide," about 4 miles northeast from a blacksmith shop on the Sweetwater and Ballinger road, 18 miles from Sweetwater. Instrument elevated 15 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $32^{\circ} 19' 55''$.64. Longitude, $100^{\circ} 16' 37''$.66.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Wasp.....	149	22	35.58	329	17	14.51	<i>Meters.</i> 4.486311
Fence.....	194	57	02.25	14	58	10.60	4.111270
Rusticus.....	350	32	47.53	170	33	33.19	4.134598
Sykes.....	67	58	55.75	247	55	08.54	4.079070

SYKES.

In Nolan Co., Tex., in a pasture owned by Mr. Sykes, about 100 yards east from the old Sweetwater and Hayrick road and $1\frac{1}{2}$ miles south of Mr. Sykes's residence; about 13 miles from Sweetwater. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $32^{\circ} 17' 29''$.43. Longitude, $100^{\circ} 23' 42''$.72.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Wasp.....	171	39	57.85	351	38	24.91	<i>Meters.</i> 4.494016
Bitter.....	247	55	08.54	67	58	55.75	4.079070
Rusticus.....	303	45	16.31	123	49	48.77	4.206340

RUSTICUS.

In Nolan Co., Tex., about 50 yards west from the Sweetwater and Ballinger road, at a point between the twenty-first and twenty-second mileposts from Sweetwater. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 12' 39''-04. Longitude, 100° 15' 12''-15.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sykes.....	123 49 48.77	303 45 16.31	4.206340
Bitter.....	170 33 33.19	350 32 47.53	4.134598

FLINT.

In Taylor Co., Tex., in western part of the county, about 2 miles northwest of Mount Moro P. O. and about 1 mile west from Bluff Creek, on westernmost of two high points on southern edge of ridge. Three knolls at the end of the ridge.

[Latitude, 32° 07' 48''-43. Longitude, 100° 02' 41''-13.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Plateau.....	348 42 49.01	168 46 31.55	4.753889
Hayrick.....	61 47 30.82	241 37 53.52	4.510510

HAYRICK.

In Coke Co., Tex., about 2½ miles a little north of east from the town of Hayrick, county seat of Coke County, on the highest point of ridge, about three-fourths of a mile north from Nipple peak.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 59' 29''-96. Longitude, 100° 20' 48''-70.]

To station.	Azimuth.	Back azimuth.	Dist. log.
	° ' "	° ' "	<i>Meters.</i>
Plateau.....	315 19 25.36	135 32 40.73	4.752501
Cedar.....	355 52 46.50	175 53 24.39	4.419665
Flint.....	241 37 53.52	61 47 30.82	4.510510
Austin.....	101 31 52.52	281 28 17.37	4.036429
Robert Lee.....	50 19 38.93	230 15 16.95	4.228032
Edith.....	70 12 40.32	250 02 35.12	4.504418

AUSTIN.

In Coke Co., Tex., on a high point on a prairie ridge, about 10 miles north from Robert Lee and about 1 mile northeast of Mr. Austin's ranch.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 00' 40''-36. Longitude, 100° 27' 34''-69.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Hayrick	281	28	17.37	101	31	52.52	<i>Meters.</i> 4.036429
Cedar	336	06	04.37	156	10	16.72	4.491870
Ashurst	41	37	49.89	221	31	15.22	4.470706
Edith	56	08	28.93	236	01	58.43	4.368296
Goat	92	01	17.03	271	56	34.51	4.145985
Robert Leo	10	14	32.57	190	13	45.38	4.119880
Lake	61	50	25.53	241	40	40.07	4.518436

GOAT.

In Coke Co., Tex., on the highest point near western end of ridge north of the Colorado River and in the northwest corner of the county, about 3 miles north of the Colorado River.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 00' 56''-09. Longitude, 100° 36' 27''-63.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Austin	271	56	34.51	92	01	17.03	4.145985
Cedar	317	18	24.72	137	27	18.59	4.593599
Ashurst	19	58	00.93	193	50	07.97	4.367062
Edith	21	43	57.96	201	42	08.80	4.162697
Lake	43	09	10.66	223	04	07.13	4.343381

ROBERT LEE.

In Coke Co., Tex., cupola of the court-house at Robert Lee, county seat of Coke Co.

Permanent mark: Cupola.

[Latitude, 31° 53' 39''-29. Longitude, 100° 29' 03''-87.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Austin	190	13	45.38	10	14	32.57	4.119880
Hayrick	230	15	16.95	50	19	38.93	4.228032

EDITH.

In Coke Co., Tex., on the northern side of ridge south of the Colorado River, about 3 or 4 miles west from the discontinued post-office Edith.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 53' 37''-40. Longitude, 100° 39' 52''-57.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Lake	75	05	52.01	255	02	37.24	4.001330
Goat	201	42	08.80	21	43	57.26	4.162697
Austin	236	01	58.43	56	08	28.93	4.368296
Hayrick	250	02	35.12	70	12	40.32	4.504418
Cedar	295	33	58.37	115	44	39.40	4.549806
Ashurst	1	26	54.12	181	26	49.51	3.958473

LAKE.

Near the boundary line between Coke and Tom Green counties, Tex., on a prairie or mesquite ridge; about 8 miles northwest of Ashurst; about 3 miles west of ranch and farm with two windmills near house; about 200 yards north of the Colorado City road.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 52' 13"-50. Longitude, 100° 46' 01"-34.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Goat.....	223	04	07.13	43	09	10.66	4.343381
Austin.....	241	40	40.07	61	50	25.53	4.518436
Edith.....	255	02	37.24	75	05	52.01	4.001330
Ashurst.....	304	27	08.75	124	30	18.65	4.060096
Napp.....	335	20	56.70	155	22	31.87	4.056368
Concho.....	28	47	26.85	208	45	47.18	4.013821

ASHURST.

In Coke Co., Tex., on a high prairie or mesquite ridge, in the western part of Mr. Ashurst's pasture, about three-fourths of a mile west from most western windmill; about 15 miles southwest from Robert Lee, and about 2 miles north from source of Grape Creek.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 48' 42"-42. Longitude, 100° 40' 01"-30.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Napp.....	50	50	35.93	330	49	01.33	3.784802
Concho.....	80	02	14.39	259	57	25.08	4.166284
Laké.....	124	30	18.69	304	27	08.75	4.060096
Mdith.....	181	26	49.51	1	26	54.12	3.958479
Goat.....	193	56	07.97	13	58	00.93	4.367062
Austin.....	221	31	15.22	41	37	49.89	4.470706

NAPP.

In Coke Co., Tex., on prairie or mesquite ridge in the northeast corner of Mr. Napp's pasture, about 4 miles southwest from station Ashurst; about 10 miles north of Water Valley.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 46' 37"-47. Longitude, 100° 43' 00"-86.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Lake.....	155	22	37.24	335	21	02.07	4.0563773
Ashurst.....	230	48	56.00	50	50	30.60	3.7848272
Gunny.....	348	12	31.90	168	14	38.97	4.4953233
Water Valley.....	12	17	43.78	192	16	32.84	4.2228443
Concho.....	97	39	01.86	277	35	47.26	3.9915558

CONCHO.

In Tom Green Co., Tex., on Prairie Mountain, about 6 or 7 miles northwest from Water Valley and about 4 miles north of the Concho river. The Water Valley and Sterling road passes about 2 miles south of the station.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 47' 19''-71. Longitude, 100° 49' 10''-33.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Lako	208	45	47.31	28	47	26.98	4.1383080
Ashurst	259	57	25.08	80	02	14.39	4.1662840
Napp	277	35	47.26	97	39	01.86	3.9915558
Dry	17	07	15.61	197	04	48.59	4.3992513
Water Valley.....	340	40	32.59	160	42	35.83	4.2712291

WATER VALLEY.

In Sterling Co., Tex. Occupied 1893. On central part of flat portion of hill west of North Concho, and about 2½ miles southwest from Water Valley P. O. The hill is west of a low gap in range of hills southwest from Water Valley P. O. The center of station is marked by a 2 by 4 scantling, set vertically in ground and wired out.

A stone marked $\frac{U}{G} \frac{S}{S}$ is permanent mark and is 4.26 feet south 32° 42' west from center of station.

[Latitude, 31° 37' 47''-51. Longitude, 100° 45' 15''-85.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Concho	160	42	35.83	340	40	32.59	4.2712291
Napp	192	16	32.84	12	17	43.78	4.2228443
Dry	64	58	05.45	244	53	35.91	4.1752614
Gunny	325	09	14.13	145	12	31.60	4.2411204
Lopez	16	14	25.40	196	11	23.34	4.5178321

DRY.

In Tom Green Co., Tex., in Funk's pasture, at head of Dry Creek, about 10 miles southwest from Water Valley P. O. The station is in a light grove of mesquite. Signal is at top of 16-foot observing platform. Center is marked by cross on rock sunk in ground and

marked $\frac{U}{G} \frac{S}{S}$

[Latitude, 31° 34' 21''-54. Longitude, 100° 53' 50''-27.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Water Valley.....	244	53	35.91	64	58	05.45	4.1752614
Concho	197	04	48.59	17	07	15.61	4.3992513

FUNK.

In Irion Co., Tex., in Funk's pasture, about 10 or 12 feet east of line of fence, through which road from San Angelo to Kiowa Creek passes, and about 2 miles north of the Kiowa Creek road. The gate through which the road goes is about 2 miles west from first house on right of road after crossing Dry Rocky Creek going westward. Signal is at top of 12-foot observing platform. Center of station is marked by a rock, sunk in ground, on which is cut $\frac{U/S}{G/S}$

[Latitude, 31° 31' 20''-22. Longitude, 100° 48' 47''-32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Gunny.....	278 39 01.43	98 44 09.13	4.1963012
Lopez.....	10 25 13.80	190 24 02.29	4.3018760

GUNNY.

In Irion Co., Tex., on knoll near head of and between two branches of Live Oak Creek and about 4 miles north of the San Angelo and Camp Charlotte road. The road crosses Live Oak Creek about 14 miles west of San Angelo. Signal is at top of 12-foot observing platform. Center is marked by a rock sunk in the ground with $\frac{U/S}{G/S}$ cut on it.

[Latitude, 31° 30' 03''-10. Longitude, 100° 38' 58''-62.]

To station.	Azimuth.	Backazimuth.	Log. dist.
	° ' "	° ' "	Meters.
Napp.....	168 14 38.97	348 12 31.90	4.4953233
Water Valley....	145 12 31.60	325 09 14.13	4.2411204
Dove.....	356 22 33.57	176 23 15.49	4.5282371
Funk.....	98 44 09.13	278 39 01.43	4.1963012
Lopez.....	47 55 55.70	227 49 37.30	4.4123757

LOPEZ.

In Irion Co., Tex., on easternmost of the Lopez peaks, about 6 miles northwest of Sherwood. Road from Sherwood to Komer's ranch passes about one-half mile west of station. Signal: Scantling set in pile of rocks. Rock marking station is 6.04 feet south 62° 58' east from center.

[Latitude, 31° 20' 40''-27. Longitude, 100° 51' 04''-44.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Gunny.....	227 49 37.30	47 55 55.70	4.4123757
Water Valley....	196 11 23.34	16 14 25.40	4.5178321
Bolt.....	358 54 21.07	178 54 29.61	4.3584995
Dove.....	307 24 10.17	127 31 08.76	4.4293467
Funk.....	190 24 02.29	10 25 13.80	4.3018760

BOLT.

In Irion Co., Tex., on northeastern end of high flat ridge, between Dove and Spring creeks, about 8 miles (about 20° south of west) from spring at head of Dove Creek and about 3½ miles north of county line between Irion and Schleicher counties. Signal: Piece of scantling bolted to stump of mesquite tree. Stone marked $\frac{U}{G} \frac{S}{S}$ is 4 feet, south 65° 53' east, from center of station.

[Latitude, 31° 08' 19"·11. Longitude, 100° 50' 47"·98.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Dove	252	44	00·72	72	50	49·55	4·3404490
Lopez	178	54	29·61	358	54	21·07	4·3584995

DOVE.

In Tom Green Co., Tex. Occupied 1893. On flat-topped hill, about 5 miles south from Knickerbocker. The station is near middle of hill, and its center is marked by a rock let in ground and marked $\frac{U}{G} \frac{S}{S}$ Signal at top of 12-foot observing platform.

[Latitude, 31° 11' 49"·51. Longitude, 100° 37' 38"·05.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Lopez	127	31	08·76	307	24	10·17	4·4293467
Gunny	176	23	15·49	356	22	33·57	4·5282371
Bolt	72	50	49·55	252	44	00·72	4·3404490

LIPAN.

In Tom Green Co., Tex., in Keith's pasture on a high mountain, about 4½ miles west from Keith's residence, which is 18 miles from San Angelo, on the San Angelo and Fort McKavett road. A lone peak is about 1 mile east from station.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 21° 14' 17"·14. Longitude, 100° 19' 20"·68.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Plateau	220	50	17·65	41	02	38·66	4·757885
Molloy	262	38	21·50	82	52	52·58	4·651065
San Angelo	156	22	57·66	336	19	21·54	4·437322
Cedar	179	34	19·25	359	34	10·75	4·758451

KEITH.

In Tom Green Co., Tex., in Keith's pasture, about $3\frac{1}{2}$ miles south-east from his residence, and on the highest point of ridge. All of the short trees or brush near the signal have been cut down.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $31^{\circ} 11' 54''$.22. Longitude, $100^{\circ} 13' 44''$.55.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Molloy.....	254 07 15.15	74 18 51.70	4.507360
Flower.....	310 27 46.61	130 32 13.04	4.253929
San Angelo.....	146 04 30.85	325 58 00.10	4.550798

SAN ANGELO.

The point located is the cupola of the court-house at San Angelo, Tom Green Co., Tex., and was not occupied.

Permanent mark: Cupola.

[Latitude, $31^{\circ} 27' 51''$.31. Longitude, $100^{\circ} 26' 16''$.06.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Keith.....	325 58 00.10	146 04 30.85	4.550798
Lipan.....	336 19 21.54	156 22 57.66	4.437322

CEDAR.

In Coke Co., Tex., on northeasternmost part of ridge which forms the divide between the Concho and Colorado rivers; about 1 mile a little north of west from a sharp point known as Margaret Peak.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $31^{\circ} 45' 18''$.85. Longitude, $100^{\circ} 19' 36''$.94.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Plateau.....	290 18 03.76	110 30 38.78	4.606208
Lipan.....	359 34 10.75	179 34 19.25	4.758451
Hayrick.....	175 53 24.39	355 52 76.50	4.752501
Edith.....	115 44 39.40	295 33 58.37	4.549806
Goat.....	137 27 18.59	317 18 24.72	4.593599
Austin.....	156 10 16.72	336 06 04.37	4.491870

FLOWER.

In Menard Co., Tex., near the northwestern corner of the county, on highest point of a ridge $2\frac{1}{2}$ miles due north of Mr. Skudder's windmill.

Bull. 122—15

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $31^{\circ} 05' 35'' 80$. Longitude, $100^{\circ} 05' 09'' 43$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Molloy.....	225	13	43.51	45	20	52.23	<i>Meters.</i> 4 489129
Mustang.....	290	56	37.72	111	01	21.08	4 192866
Keith.....	130	32	13.04	310	27	46.61	4 253929

MOLLOY.

In Concho Co., Tex., in the Molloy pasture; about 16 miles south of Paint Rock; about 6 miles north of Eden; about one-half mile east of the Paint Rock and Eden road; about one-fourth mile south of the Molloy water tank; and about 200 yards west from a grove of live oak trees. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $31^{\circ} 17' 20'' 35$. Longitude, $99^{\circ} 51' 21'' 63$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Plateau.....	169	44	58.29	349	42	43.58	4 582362
Lipan.....	82	52	52.88	262	38	21.50	4 651065
Maddox.....	341	09	21.32	161	12	01.55	4 404850
Live Oak.....	270	22	20.66	90	28	31.20	4 275801
Keith.....	74	18	51.70	254	07	15.15	4 567360
Flower.....	45	20	52.23	220	13	43.51	4 489129
Mustang.....	15	09	37.94	195	07	13.69	4 451199

LIVE OAK.

In Concho Co., Tex., about $1\frac{1}{2}$ miles west of Walupe Gap and on the highest point of the ridge; about 4 miles north of the Eden and Brady road, at the tenth milepost from Eden.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $31^{\circ} 17' 15'' 82$. Longitude, $99^{\circ} 39' 28'' 17$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Plateau.....	145	52	34.27	325	44	07.22	4 659379
Bradley.....	176	57	10.82	356	56	09.25	4 765113
Bones.....	359	28	54.07	179	28	59.53	4 490477
Maddox.....	24	08	19.05	204	04	49.90	4 418098
Molloy.....	90	28	31.23	270	22	20.66	4 275801

PLATEAU.

In Runnels Co., Tex., about $8\frac{1}{2}$ miles south a little east of Ballinger; about 2 miles east of the Ballinger and Paint Rock road. Instrument elevated 12 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 37' 41"-66. Longitude, 99° 55' 39"-75.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Flint	168	46	24·89	348	42	42·31	4·753890
Molloy	349	42	43·58	169	44	58·29	4·582362
Lipan	41	02	38·66	220	50	17·65	4·757885
Cedar	290	18	03·76	110	30	38·78	4·606208
Hayrick	135	32	40·73	315	19	25·36	4·752501
Bradley	227	43	56·72	47	51	25·68	4·482166
Live Oak	325	24	07·22	145	52	34·27	4·659379

BRADLEY.

In Coleman Co., Tex., very near the Runnels line; about 2 miles north of Talpa, a station on the Gulf, Colorado and Santa Fe Railway; about 3 miles south of Pecan Spring; on southern point of a ridge, and in Mr. Bradley's pasture.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 48' 43"-66. Longitude, 99° 41' 25"-84.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Plateau	47	51	25·68	227	43	56·72	4·482166
Table Gap	159	46	29·03	339	43	35·26	4·397060
Live Oak	356	56	09·25	176	57	10·82	4·765113
Ballinger	71	44	28·49	251	36	26·97	4·403896

TABLE GAP.

In Runnels Co., Tex., very near the Taylor County line; about 4 miles west from Content P. O.; on the highest point of ridge, and about 2 miles east from Table Gap.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 01' 23"-63. Longitude, 99° 46' 54"-52.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Eagle	164	50	39·48	344	49	08·44	4·234767
Lidel	200	16	24·37	20	19	39·25	4·442051
Bradley	339	43	35·26	159	46	29·03	4·397060
Flint	115	35	14·05	295	26	51·32	4·439516
Rough	304	53	09·79	124	58	32·58	4·290545
Ballinger	26	10	35·80	206	05	26·44	4·543438

ROUGH.

In Coleman Co., Tex.; highest point on a high ridge south of Rough Creek, about 4 miles north of Glen Cove. All timber cleared from the hill except one tree. (Not occupied.)

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 55' 20''-70. Longitude, 99° 36' 44''-93.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Table Gap	124 58 32.58	304 53 09.79	4.290545
Lidel	170 16 11.38	350 14 02.14	4.576069

EAGLE.

In Taylor Co., Tex., about a mile east of Guion and about a mile west of Bald Eagle Peak, on highest point of the ridge.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 10' 21''-65. Longitude, 99° 49' 45''-86.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Buffalo	166 59 10.13	346 57 53.77	4.220735
Lidel	236 16 57.82	56 21 44.44	4.228386
Jones	105 44 54.65	285 41 12.08	4.055775
Table Gap	344 49 08.44	104 50 39.48	4.234767
Flint	76 58 43.48	256 51 50.88	4.319290

JONES.

In Taylor Co., Tex., about 10 miles from Buffalo Gap and about 50 yards north of the Buffalo Gap and Fort Chadburn road where it crosses the summit of the ridge near the heads of two Elm creeks, one running south and the other northeast.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 12' 01''-65. Longitude, 99° 56' 43''-69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Buffalo	208 42 42.96	28 45 09.59	4.174870
Eagle.....	285 41 12.08	105 44 54.65	4.055775

LIDEL.

In Taylor Co., Tex., near the head of Lidel Creek, about one-half mile north from Buffalo Spring and about one-fourth mile east from the Mountain Abilene and Coleman road where it crosses the mountains about 13 miles south of Abilene.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 15' 26''-24. Longitude, 99° 40' 48''-20.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Buffalo	110 59 02.98	290 52 59.33	4.280402
Cobb	209 13 30.08	29 20 47.83	4.639462
Table Gap	20 19 39.25	200 16 24.37	4.412051
Eagle	56 21 14.44	236 16 57.82	4.228386
Rough.....	350 14 02.14	170 16 11.38	4.576069

BUFFALO.

In Taylor Co., Tex., about 3 miles northwest from Buffalo Gap, on the highest and northernmost part of the mountains, and about 2½ miles west from where the Abilene and Buffalo Gap road crosses Elm Creek.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 19' 07''-47. Longitude, 99° 52' 08''-98.]

To Station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Sand.....	178	53	59.97	358	53	43.03	<i>Meters.</i> 4.631206
Cobb.....	231	17	22.56	51	30	46.05	4.699218
Jones.....	28	45	09.59	208	42	42.96	4.174870
Eagle.....	346	57	53.77	166	59	10.13	4.220735
Lidel.....	290	52	59.33	110	59	02.98	4.280402

ABILENE.

In Taylor Co., Tex.; large iron water-tank on west side of Abilene, county seat of Taylor County. Not occupied.

Permanent mark: Tank.

[Latitude, 32° 26' 51''-39. Longitude, 99° 44' 39''-80.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Sand.....	156	16	24.36	336	12	05.54	<i>Meters.</i> 4.492986
Cobb.....	238	10	35.19	58	19	58.60	4.507314

HITSON.

In Callahan Co., Tex., on westernmost of two hills known as the Hitson Mountains, about 6 miles south from where the Baird and Albany road crosses Hubbard Creek.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 28' 42''-69. Longitude, 99° 18' 50''-74.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Wesly.....	273	42	53.74	93	52	14.51	<i>Meters.</i> 4.436739
Cottonwood.....	331	19	10.65	151	24	21.02	4.500268
Double Mountains	252	15	15.52	72	28	02.10	4.591453
Stewart.....	159	05	16.94	339	01	52.01	4.443369

WESLY.

In Eastland Co., Tex., about 6 miles northwest of Cisco, on a wooded peak about 2 miles west from Cedar Mountain. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 27' 43''-99. Longitude, 99° 01' 26''-22.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Derrick.....	333 10 25·57	153 11 46·46	3·941327
Cottonwood.....	25 06 31·29	205 02 22·75	4·457345
Hitson.....	93 52 14·51	273 42 53·74	4·436739

CISCO.

In Eastland Co., Tex., 3 miles from the town of Cisco, and about 100 yards south of the Cisco and Carbon road. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 22' 04''-81. Longitude, 98° 56' 19''-87.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lost Mountain....	356 22 33·22	176 23 19·31	4·555001
Cottonwood.....	51 55 13·14	231 48 25·05	4·404943

M^cDANIEL.

In Eastman Co., Tex., about 1¼ miles northwest from Carbon, and about three-fourths of a mile west from McDaniel's house. It is in very thick woods, but has a cleared space around it. Instrument elevated 32 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 17' 09''-56. Longitude, 98° 49' 47''-97.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lost Mountain...	16 41 29·05	196 38 46·45	4·445589
Cottonwood.....	77 47 11·09	257 36 54·30	4·490814
Jameson.....	268 11 24·21	88 22 16·05	4·504351

COTTONWOOD.

In Callahan Co., Tex., about 3½ miles from the town of Cottonwood; at the head of Sabana Creek on a flat-topped knoll from which all timber has been cut down except one tree on the northwestern part of the hill.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 13' 41''-10. Longitude, 99° 09' 10''-76.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Wesly.....	205 02 22·75	25 06 31·29	4·457345
Derrick.....	221 30 03·33	41 35 32·26	4·385124
Cisco.....	231 48 25·05	51 55 13·14	4·404943
McDaniel.....	257 36 54·30	77 47 11·09	4·490814
Hitson.....	151 24 21·02	331 19 10·65	4·500268

LOST MOUNTAIN.

In Comanche Co., Tex., in the southwest quarter of section 32, Buffalo, Bayou, Brazos and Colorado Railroad, about 1 mile northwest from Lost Gap.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 02' 41"-87. Longitude, 98° 54' 53"-40.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Thompson.....	352	08	37.80	172	09	15.20	<i>Meters.</i> 4.144092
Santa Anna.....	48	12	28.03	228	00	02.33	4.697444
Cisco.....	176	23	19.31	356	22	33.22	4.555001
McDaniel.....	196	38	46.45	16	41	29.05	4.445589

JAMESON.

In Erath Co., Tex., on mountain known as Jameson Peak, about 3½ miles northeast from Desdemona.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 17' 40"-67. Longitude, 98° 29' 27"-79.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Mesquite.....	24	35	52.27	204	29	19.38	4.668979
McDaniel.....	88	22	16.05	268	11	24.21	4.504351
Guthrie.....	254	09	48.35	74	13	26.97	4.046149
Price.....	305	11	47.63	125	15	58.94	4.178079

GUTHRIE.

In Erath Co., Tex., on prairie knoll one-fourth of a mile north of Mr. Guthrie's house and one-fourth of a mile east of the Dublin and Gordon road, at a point about midway between the two towns. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 19' 19"-02. Longitude, 98° 22' 38"-75.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Price.....	352	08	30.62	172	09	03.64	4.073545
Jameson.....	74	13	26.97	254	09	48.35	4.046149
Murphy.....	275	32	16.28	95	37	15.16	4.167162

PRICE.

In Erath Co., Tex., on a prairie knoll on land owned by Mr. Price. The knoll is the north one of two, one-eighth of a mile east from the Dublin and Gordon road, at a point about 10 miles from Dublin. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 12' 58''-07. Longitude, 98° 21' 36''-91.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Mesquite	43	20	24.77	223	09	42.33	4.665832
Jameson	125	15	58.94	305	11	47.63	4.178679
Duffau	279	58	34.23	100	10	23.80	4.549481
Guthrie	172	09	03.64	352	08	30.62	4.073545
Murphy	231	35	25.12	51	39	50.55	4.220133

MURPHY.

In Erath Co., Tex., on a prairie knoll known as Murphy Peak, about 5 miles north from Stephenville. Instrument elevated 16 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 18' 32''-64. Longitude, 98° 13' 19''-65.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Price	51	39	50.55	231	35	25.12	4.220133
Guthrie	95	37	15.16	275	32	16.28	4.167162
Duffau	306	59	49.76	127	07	15.02	4.437557
McClenny	190	51	16.50	10	52	19.07	4.209652

MCCLENNY.

In Erath Co., Tex., in Mr. Robert McClenny's pasture, on the highest ground in a small cleared place surrounded by timber; about 6 miles, north of Morgan Mill and 1 mile from McClenny's house. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 27' 09''-30. Longitude, 98° 11' 22''-81.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Duffau	329	51	40.11	149	58	03.81	4.573652
Murphy	10	52	19.07	190	51	16.50	4.209652
Comanche	282	43	16.46	102	55	48.97	4.575417

DUFFAU.

In Erath Co., Tex., on ridge of Duffau Mountains, about 1 mile north of Skipper Gap. Lines of sight radiating in five different directions, cut through timber. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 09' 36''-80. Longitude, 97° 59' 24''-87.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Price	100	10	23.80	279	58	34.23	4.549481
Murphy	127	07	15.02	306	59	49.76	4.437557
Comanche	216	39	53.75	36	45	59.93	4.477485
McIver	273	27	44.85	93	32	11.83	4.119548
McClenny	149	58	03.81	329	51	40.11	4.573652

COMANCHE.

In Hood Co., Tex., on Comanche Peak, about 5 miles south of Granbury. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 22' 38''-19. Longitude, 97° 47' 59''-00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Duffau.....	36 45 59.93	218 39 53.75	4.477485
McClenny.....	102 55 48.97	282 43 16.46	4.575417
Hart.....	285 27 11.65	105 35 21.26	4.395014
Myers.....	284 39 48.05	104 45 50.75	4.262942
McIver.....	10 59 11.04	190 57 32.68	4.403730
Bosque.....	355 58 45.55	175 59 25.47	4.440622

MYERS.

In Johnson Co., Tex., on land belonging to David Myers. In pasture on ridge east of Barnard Knob and about 2 miles from same. About one-half mile from Myers' house.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 20' 07''-12. Longitude, 97° 36' 41''-29.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
McIver.....	48 12 09.77	228 04 29.89	4.481422
Comanche.....	104 45 50.75	284 39 48.05	4.262942
Bosque.....	34 13 36.79	214 08 15.24	4.448663
Gatewood.....	13 50 09.91	193 47 59.95	4.428920

HART.

In Johnson Co., Tex., about 11 miles from Cleburne, on the highest point on Kennard and Hart's ranch, about three-fourths of a mile west from the Cleburne and Glenrose road.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 19' 09''-35. Longitude, 97° 32' 52''-02.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Comanche.....	105 35 21.26	285 27 11.65	4.395014
Caddo Peak.....	215 53 57.06	35 58 27.64	4.351907

CADDO PEAK.

In Johnson Co., Tex., on point known as Caddo Peak, 1½ miles north-west from Joshua, on land owned by Dr. D. B. McWilliam.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 29' 00''-39. Longitude, 97° 24' 27''-05.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Boyles.....	123	35	27.87	303	25	05.36	4.558347
Rattlesnake.....	148	04	02.60	327	56	26.38	4.619141
Centipede.....	234	08	04.97	54	14	42.97	4.376649
Hart.....	35	58	27.64	215	53	57.06	4.351907
Post Oak.....	207	46	39.85	27	50	56.64	4.425651
Widow.....	277	48	54.06	98	01	15.84	4.561603

WIDOW.

In Ellis Co., Tex., about 4 miles southwest of Midlothian, on land owned by Mrs. Taylor, and about one-half mile east of her residence. On the highest point in the pasture.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 26' 17''-43. Longitude, 97° 01' 24''-99.]

To station.	Azimuth.			Back azimuth.			Log dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Box.....	50	01	58.11	229	53	39.00	4.503266
Caddo Peak.....	98	01	15.84	277	48	54.06	4.561603
Turner.....	13	22	53.37	193	20	27.15	4.491044

BOX.

In Johnson Co., Tex., on Cleburne and Hillsboro road about 9 miles from Cleburne, on land owned by Mr. Doc Box, about 200 yards south-east of Harrell's cotton gin. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 33° 15' 11''-92. Longitude, 97° 16' 57''-74.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Widow.....	229	53	08.52	50	01	27.57	4.503266
Gathings.....	336	42	50.15	156	44	09.84	3.995976
Turner.....	299	07	53.13	119	13	44.46	4.296028

TURNER.

In Hill Co., Tex., about 3 miles east of Itasca, on the mountain road between Itasca and Hillsboro; on land owned by the Turner heirs, in a cotton field, about 50 yards from where the Hillsboro road turns south. Instrument elevated 15 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 09' 58''-97. Longitude, 97° 05' 58''-61.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Box.....	119	13	44.46	299	07	53.13	4.296028
Widow.....	193	20	27.15	13	22	53.37	4.491044
Hix.....	62	26	32.62	242	19	04.63	4.396790
Gathings.....	92	20	42.36	272	16	11.02	4.125922
Frazier.....	354	16	23.44	174	17	02.67	4.288521

GATHINGS.

In Hill Co., Tex.; about $1\frac{1}{2}$ miles southeast of Covington and about one-half mile east of the Cleburne and Hillsboro road; on land owned by Mr. Philip Gathings.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $32^{\circ} 10' 16''$.44. Longitude, $97^{\circ} 14' 28''$.25.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Box.....	156	44	09.84	336	42	50.15	3.995976
Turner.....	272	16	11.02	92	20	42.36	4.125922
Frazier.....	322	21	37.93	142	26	47.85	4.399367

HIX.

In Hill Co., Tex., about 4 miles south from Blanton, on road between Blanton and Fort Graham, one-fourth mile southeast from the road, on land owned by Mr. C. C. Hicks, of Whitney, on a timbered ridge 1 mile south of Mr. Joe Hardin's house. Instrument elevated 35 feet.

Permanent mark: Stone marked with cross and U. S. G. S.

[Latitude, $32^{\circ} 03' 43''$.68. Longitude, $97^{\circ} 20' 01''$.32.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Turner.....	242	19	04.63	62	26	32.62	4.396790
Frazier.....	287	50	54.26	107	59	00.34	4.402734
Kellum.....	22	28	41.79	202	24	51.52	4.476345

FRAZIER.

In Hill Co., Tex., about $3\frac{1}{2}$ miles southeast of Hillsboro, on a prairie knoll about 200 yards north of the Hillsboro and Hubbard road, on land owned by Mr. Frazier, and about three-quarters of a mile north-east from his residence.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, $31^{\circ} 59' 31''$.22. Longitude, $97^{\circ} 04' 44''$.75.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Gathings.....	142	26	47.85	322	21	37.93	4.399367
Turner.....	174	17	02.67	354	16	23.44	4.288521
Hix.....	107	59	00.34	287	50	54.26	4.402734
West.....	4	34	59.77	184	34	26.58	4.315469
Kellum.....	60	50	19.76	240	38	25.34	4.609780

WEST.

In McLennan Co., Tex., in the town of West, on the Missouri, Kansas and Texas Railroad, on a lot owned by Mr. Zack Davis. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 48' 22"-07. Longitude, 97° 05' 47"-56.]

To stations.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Kellum	01	17	27.69	271	06	08.24	4.530366
Frazier	184	34	26.58	4	34	59.77	4.315469
Kendrick	21	16	45.73	201	12	17.62	4.570035
Nick	75	45	00.34	255	32	50.75	4.575727

KELLUM.

In Bosque Co., Tex., about 50 yards east from the Fort Graham and Valley Mills road, and about 10 miles from Valley Mills, on a narrow strip of land owned by northern people whose names could not be ascertained. Just north of Kellum's sheep ranch, and about a mile northwest of Mr. Jones' residence. Instrument elevated 15 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 48' 45"-07. Longitude, 97° 27' 16"-61.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Hix	202	24	51.52	22	28	41.79	4.476345
Frazier	240	38	25.34	60	50	19.76	4.609780
West	271	06	08.24	91	17	27.69	4.530366
Nick	14	15	24.47	194	14	33.46	4.015289

NICK.

In Bosque Co., Tex., in a pasture owned by Mr. Nicholas Eglehart and about one-half mile east of his residence; about 3½ miles north of Valley Mills, and about 1 mile west from the Fort Graham and Valley Mills road. A group of live oak trees about 200 yards southeast of the station.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 43' 19"-10. Longitude, 97° 28' 53"-50.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Kellum	194	14	33.46	14	15	24.47	4.015289
West	255	32	50.75	75	45	00.34	4.575727
Kendrick	317	34	59.20	137	42	37.79	4.534484
Simpson	3	46	40.55	183	46	23.13	4.123111

SIMPSON.

In McLennan Co., Tex., on the highest point in Mr. Simpson's pasture, about a mile southwest from Patton, on the Gulf, Colorado and Santa Fe Railroad.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 36' 08"-95. Longitude, 97° 29' 26"-69.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nick.....	183 46 23·13	3 46 40·55	4·123111
Kendrick.....	296 38 31·62	116 46 26·80	4·428396
Ghent.....	322 16 53·59	152 22 16·39	4·546010

KENDRICK.

In McLennan Co., Tex., on a bluff about 9 miles southwest of Waco, about one-half mile south of the McGregor and Waco road, on land owned by William Payne, about 1 mile south of William Kendrick's residence. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 29' 37"-62. Longitude, 97° 14' 18"-50.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nick.....	137 42 37·79	317 34 59·20	4·534484
West.....	201 12 17·62	21 16 45·73	4·570035
Ghent.....	21 52 29·31	201 49 58·33	4·313031
Windmill.....	75 08 19·87	255 00 07·30	4·411356
Simpson.....	116 46 26·80	296 38 31·62	4·428396

WINDMILL.

In Coryell Co., Tex., a wind mill in Mr. Arthur Smith's barnyard, about 5 miles west of McGregor and 1 mile north of Oglesby.

Permanent mark: The well.

[Latitude, 31° 26' 01"-94. Longitude, 97° 30' 02"-20.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kendrick.....	255 00 07·30	75 08 19·87	4·411356
Ghent.....	305 42 05·76	125 47 46·27	4·328232
Lynch.....	328 18 43·21	148 23 46·33	4·468136

GHENT.

In McLennan Co., Tex., about 2½ miles northeast of Moody on the Moody and Waco road, on land owned by Mr. James Ghent and about one-fourth of a mile south of his residence.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 19' 18"-01. Longitude, 97° 19' 08"-22.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Simpson.....	152 22 16·39	332 16 53·59	4·546010
Kendrick.....	201 49 58·33	21 52 29·31	4·313031
Windmill.....	125 47 46·27	305 42 05·76	4·328232

LYNCH.

In Bell Co., Tex., about a mile northeast of Pendleton, on land owned by Dr. J. A. Lynch, on a high point one-fourth of a mile south-east from his residence.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 12' 29''-66. Longitude, 97° 20' 19''-08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cox	115 26 06.33	295 18 36.69	4.404397
Windmill	148 23 46.33	328 18 43.21	4.468136

TEMPLE.

In Bell Co., Tex., center of town tank at Temple Junction.

Permanent mark: The tank.

[Latitude, 31° 05' 48''-48. Longitude, 97° 20' 18''-63.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ivy Gap	87 12 45.24	266 56 19.66	4.704689
Haley Ratlif	59 15 24.11	239 03 16.05	4.640355
Cox	135 18 46.73	315 11 20.25	4.510682
Hulsey	97 46 14.13	277 36 46.24	4.468119

HULSEY.

In Bell Co., Tex., on summit of ridge about 4 miles east of Killeen, near the northeast corner of Hulsey's pasture, built close to a post oak tree.

Permanent mark: Stone marked U. S. G. S., 86 and a cross. Distance to station, 6 feet, bearing S. 24° E.

[Latitude, 31° 07' 56''-19. Longitude, 97° 38' 37''-60.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Temple	277 36 46.24	97 46 14.13	4.468119
Haley Ratlif	17 37 02.71	197 34 20.51	4.441289
Ivy Gap	73 10 00.84	253 03 02.45	4.350858
Cox	198 11 09.58	18 13 12.47	4.302982
Mistletoe	151 43 14.63	331 38 59.12	4.439109
Rock Spring	99 19 51.71	297 10 14.21	4.676494

IVY GAP.

Near corner of Coryell, Lampasas, and Bell counties, Tex., 3 miles south of Copperas Cave, about 300 yards south of an old road crossing ridge.

Permanent mark: Stone marked U. S. G. S., 86 and cross placed N. 4° W. 7.33 feet from live oak tree.

[Latitude, 31° 04' 24'' .56. Longitude, 97° 52' 07'' .52.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Haley Ratlif.....	326 25 08.21	146 29 23.10	4.376100
Taylor.....	95 54 38.75	275 51 44.47	3.954102
Temple.....	266 56 19.66	87 12 45.24	4.704689
Hulsey.....	253 03 02.45	73 10 00.34	4.350858
Rock Spring.....	144 24 37.23	324 21 58.87	4.144277

TAYLOR.

In Lampasas Co., Tex., about 2 miles east of Kempner; a flat-topped butte.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 04' 54'' .52. Longitude, 97° 57' 45'' .14.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bachelers Peak...	52 31 31.90	232 27 26.03	4.202526
Waters Mountain.	91 53 21.78	271 41 38.29	4.557870
Haley Ratlif.....	313 07 28.36	133 14 37.11	4.481470
Prairie (1).....	359 18 39.69	179 18 45.57	4.402518
Ivy Gap.....	275 51 44.47	95 54 38.75	3.954102
Rock Spring.....	184 32 39.25	4 32 55.40	4.018845

ROCK SPRING.

Near line between Coryell and Lampasas counties, Tex., on highest part of mound, about 5 miles northwest from Copperas Cave, on Gulf, Colorado and Santa Fe Railroad, and about 2 miles southeast of Rock Spring, on south end of mound.

Permanent mark: Stone marked with cross and letters U. S. G. S.

[Latitude, 31° 10' 32'' .57. Longitude, 97° 57' 13'' .89.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Hulsey.....	279 10 14.21	99 19 51.71	4.676494
Ivy Gap.....	324 21 58.87	144 24 37.23	4.144277
Taylor.....	4 32 55.40	184 32 39.25	4.018845

COX.

In Coryell Co., Tex., on a hill in field belonging to Mr. Cox, about 2½ miles west of The Grove P. O. Station is about 100 yards west of one and 100 yards south of another of two large oak trees in the field.

Permanent mark: Stone marked with cross and letters U. S. G. S.

[Latitude, $31^{\circ} 18' 15''$.89. Longitude, $97^{\circ} 34' 40''$.50.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
							<i>Meters.</i>
Hulsey	18	13	12.47	198	11	09.58	4.302982
Temple	315	11	20.25	135	18	46.73	4.510681
Graves	174	58	29.45	354	57	53.83	4.313900
Ridge	151	16	09.32	331	13	15.43	4.263523
Mistletoe	104	53	39.21	284	47	19.79	4.300152
Lynch	295	18	36.69	115	26	06.33	4.404397

MISTLETOE.

In Coryell Co., Tex., on a small knob near its northwestern edge. The knob is the smaller of two knobs near together, about 7 miles by road southwest of Gatesville and about one-half mile southwest of T. W. Walker's house.

Permanent mark: Stone marked U. S. G. S., '86, and cross is buried 2 inches under center of station.

[Latitude, $31^{\circ} 21' 01''$.89. Longitude, $97^{\circ} 46' 50''$.26.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
							<i>Meters.</i>
Cox	284	47	19.79	104	53	39.21	4.300152
Hulsey	331	38	59.12	151	43	14.63	4.439109
Bateman	200	18	57.40	20	21	44.29	4.385524
Ridge	223	35	44.58	43	39	10.79	4.180557

RIDGE.

In Coryell Co., Tex., near large oak tree, and about 20 feet east of road from Gatesville to Waco, and about 5 miles from Gatesville.

Permanent mark: Stone marked with cross and letters U. S. G. S.

[Latitude, $31^{\circ} 26' 58''$.10. Longitude, $97^{\circ} 40' 14''$.48.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
							<i>Meters.</i>
Mistletoe	43	39	10.79	223	35	44.58	4.180557
Cox	331	13	15.43	151	16	09.32	4.263523
Graves	237	38	30.56	57	40	49.22	3.919014
Bateman	170	22	23.26	350	21	43.55	4.078424

GRAVES.

In Coryell Co., Tex., on high ground about 100 yards southwest from Mr. Graves's house, about 4 miles southeast of Coryell City and 2 miles east of Riddle's wells.

Permanent mark: Stone marked with cross and letters U. S. G. S.
Distance from stone to station, 3.75 feet, bearing S. 45° 54' E.

[Latitude, 31° 29' 22"-24. Longitude, 97° 35' 48"-87].

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ridge.....	57 40 49.22	237 38 30.56	3.919014
Cox.....	354 57 53.83	174 58 29.45	4.313900
Bateman.....	129 18 21.25	309 15 22.67	4.066035
Weatherow.....	162 34 17.09	342 32 42.73	4.200398

BATEMAN.

In Coryell Co., Tex., on prairie ridge, in pasture belonging to Parson Bateman, and about one-fourth mile west from his house and about 10 miles north from Gatesville.

Permanent mark: Stone marked with cross and letters U. S. G. S.

[Latitude, 31° 33' 21"-57. Longitude, 97° 41' 30"-43.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Graves.....	309 15 22.67	129 18 21.25	4.066035
Ridge.....	350 21 43.55	170 22 23.24	4.078424
Mistletoe.....	20 21 44.29	200 18 57.40	4.385524
Weatherow.....	208 41 53.16	388 43 17.64	3.947006
Sheep Ranch.....	152 05 23.06	332 03 03.85	4.174466

WEATHEROW.

In Coryell Co., Tex., on high ground about 40 yards southwest of C. C. Weatherow's house, about 5 miles east of Turnersville.

Permanent mark: Stone with letters U. S. G. S. and cross cut upon it, marking center of station.

[Latitude, 31° 37' 33"-63. Longitude, 97° 38' 49"-16.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bateman.....	388 43 17.64	208 41 53.16	3.947006
Graves.....	342 32 42.73	162 34 17.09	4.200398
Sheep Ranch.....	115 50 45.73	295 47 01.75	4.096662
Lone Tree (2).....	151 19 01.72	331 16 16.95	4.235413

SHEEP RANCH.

In Bosque Co., Tex., on prairie ridge about 4 miles west of Hurst Springs, 0.27 miles N. 54° E. from corners of Hamilton, Bosque, and Coryell counties.

Permanent mark: Stone with the letters U. S. G. S. and a cross cut upon it showing center of station.

[Latitude, 31° 40' 30''-16. Longitude, 97° 45' 56''-14.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Weatherow	295	47	01·75	115	50	45·73	<i>Meters.</i> 4·098662
Bateman	332	03	03·85	152	405	23·06	4·174486
Youree	114	50	31·53	294	46	23·05	4·170851
Lone tree (2).....	197	10	18·30	17	11	17·82	4·003984

YOUREE.

In Hamilton Co., Tex., on ridge about 5 miles south of Cranfill Gap, near Bosque county line, on land belonging to Youree, about 40 yards west of his field and opposite the fiftieth fence post from northwest corner of field.

Permanent mark: Stone with the letters U. S. G. S. cut on it; distance 1·1 feet, bearing north.

[Latitude, 31° 43' 52''-56. Longitude, 97° 54' 27''-00.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Lone tree (2).....	258	10	43·18	78	16	11·56	<i>Meters.</i> 4·224786
Sheep ranch.....	294	46	03·05	114	50	31·53	4·170851
Evans	168	22	29·43	348	21	24·95	4·203178
Mound	65	53	42·52	245	47	07·35	4·338705
Prairie (2).....	123	31	48·90	303	23	51·25	4·456061
Cowhouse							4·702366

LONE TREE (2).

In Bosque Co., Tex., on ridge north of Neil creek, about 4 miles west of Norway Mills and one-half mile north of Hagen's house.

Permanent mark: Stone with the letters U. S. G. S. and a cross cut upon it. Distance to station, 13·1 feet, bearing S. 48° E.

[Latitude, 31° 45' 43''-23. Longitude, 97° 44' 02''-92.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Sheep ranch.....	17	11	17·82	197	10	18·30	<i>Meters.</i> 4·003984
Weatherow.....	331	16	16·95	151	19	01·72	4·235413
Evans	121	56	18·48	301	49	44·96	4·364021
Youree	78	16	11·56	258	10	43·18	4·224786

ADAMS.

In Bosque Co., Tex., one-fourth mile north of the Meridian and Hamilton road, at the fifth mile board from Meridian. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 53' 31"·39. Longitude, 97° 43' 23"·58.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Doty.....	112 06 03·23	292 01 39·92	4·149814
Knisely.....	183 35 41·73	3 35 59·87	4·156671

EVANS.

In Bosque Co., Tex., on ridge at head of middle fork of Meridian Creek, about 1½ miles west of Evans's house and 150 yards west of where the Hico road crosses ridge.

Permanent mark: Stone with letters U. S. G. S. cut on it. Distance to station 2·7 feet, bearing N. 43° E.

[Latitude, 31° 52' 19"·76. Longitude, 97° 56' 29"·40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Youree.....	348 21 24·95	168 22 29·43	4·203178
Lone tree (2).....	301 49 44·96	121 56 18·48	4·364021
Prairie (2).....	90 23 46·54	270 16 52·57	4·314008

DOTY.

In Bosque Co., Tex., 4 miles south, from Iredell, on a flat, bushy topped knoll, one-eighth mile east of point where the Iredell and Cranfill Gap road gets on top of ridge. Instrument elevated 16 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 56' 23"·59. Longitude, 97° 51' 41"·64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bosque.....	200 43 26·70	20 46 04·46	4·343054
Knisely.....	237 08 46·87	57 13 28·82	4·220879
Adams.....	292 01 39·92	112 06 03·23	4·149814

KNISELY.

In Bosque Co., Tex., in Twin Mountain pasture, 1 mile southeast from Walnut, three-fourths mile southeast from a big barn in a pasture, and on the highest point in the pasture. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 01' 16"·18. Longitude, 97° 42' 49"·30.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bosque.....	152 01 35·25	331 59 30·51	4·118170
Gatewood.....	200 08 17·79	20 09 23·74	3·976004
Adams.....	3 35 59·87	183 35 41·73	4·156671
Doty.....	57 13 28·82	237 08 46·87	4·220879

GATEWOOD.

In Bosque Co., Tex., on ridge between Steele and Mustang creeks, about 5 miles northeast from Walnut, about 150 yards from Mr. Gatewood's house, and near the Glenrose and Morgan road.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 06' 04''-59. Longitude, 97° 40' 45''-05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bosque	106 04 21.72	286 01 10.80	3.991109
Myers	193 47 59.95	13 50 09.91	4.428920
Knisely	20 09 23.74	200 08 17.79	3.976004

BOSQUE.

In Bosque Co., Tex., on ridge between Steele Creek and Hill Creek, 5 miles northwest from Walnut, 100 yards west from where road crosses the ridge. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 07' 32''-51. Longitude, 97° 46' 44''-20.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Comanche	175 59 25.47	355 58 45.55	4.446622
Myers	214 08 15.24	34 13 36.79	4.448663
Gatewood	286 01 10.80	106 04 21.72	3.991109
Knisely	331 59 30.51	152 01 35.25	4.118170
Doty	20 46 04.46	200 43 26.70	4.343054

McIVER.

In Somerville Co., Tex., on Lavaca Co. school land, about 9 miles northwest from Walnut and 12 miles north from Iredell, 8 miles southwest from Glenrose, about 200 yards northwest from Mrs. Nannie McIver's house, and one-quarter mile north from Panther Cave signal. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 32° 09' 10''-70. Longitude, 97° 51' 03''-25.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Duffau	93 32 11.83	273 27 44.85	4.119548
Comanche	190 57 32.68	10 59 11.04	4.403730
Myers	228 04 29.89	48 12 09.77	4.481422

PRAIRIE (2).

In Hamilton Co., Tex., on prairie ridge, west of Mesquite creek, about 2 miles west of Hamilton and Hico road, at point about 12 miles

north of Hamilton. It is about one mile northwest of Dr. Myers's house and about one-half mile northwest of smaller house.

Permanent mark: Stone marked U. S. G. S., and cross. Distance to station, 2.25 feet, bearing N. 20° W.

[Latitude, 31° 52' 24''-64. Longitude, 98° 09' 33''-51.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Evans	270 16 52·57	90 23 46·54	4·314008
Youree	303 23 51·25	123 31 48·90	4·456061
Mound	350 38 22·55	170 39 43·71	4·397543
Mesquite	94 55 18·26	274 38 16·71	4·707480
Cowhouse	62 32 45·85	242 23 55·25	4·475028
Limekiln			4·707516

MOUND.

In Hamilton Co., Tex., on a mound about 3½ miles south of Hamilton, on Hamilton and Lampasas road, and 100 yards west of road.

Permanent mark: Stone marked U. S. G. S., and cross. Distance to station, 4.75 feet, bearing S. 79° W.

[Latitude, 31° 39' 04''-46. Longitude, 98° 06' 59''-33.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Youree	245 47 07·35	65 53 42·52	4·336705
Prairie (2)	170 39 43·71	350 38 22·55	4·397543
Cowhouse	109 37 18·53	289 27 08·57	4·511013

COWHOUSE.

In Comanche Co., Tex., on north end of Cowhouse Mountain, which is about 3 miles south from point where Hamilton and Comanche road crosses south fork of Leon River.

Permanent mark: Stone marked with cross and letters U. S. G. S. Distance to station, 2 feet, bearing S. 40° E.

[Latitude, 31° 44' 56''-63. Longitude, 98° 26' 20''-10.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Prairie (2)	242 23 55·25	62 32 45·85	4·475026
Youree			4·702366
Mound	289 27 08·57	109 37 18·53	4·511013
Mesquite	126 34 59·21	306 26 50·33	4·481871
Limekiln	89 04 49·14	268 57 18·94	4·352634

LIMEKILN.

In Comanche Co., Tex., near an old limekiln on main ridge, about 2½ miles south of Mercers Gap, on the highest part of the ridge.

Permanent mark: Stone marked with a cross and letters U. S. G. S.

[Latitude, 31° 44' 44"-11. Longitude, 98° 40' 35"-71.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mesquite	174 11 36.76	354 10 59.13	4.267847
Prairie (2)			4.707516
Cowhouse	268 57 18.94	89 04 49.14	4.352634
Onion Gap			4.869130
Santa Anna			4.776138
Doubletree	132 19 27.20	312 14 06.44	4.335110
Cabaniss	73 44 01.14	253 32 41.39	4.550253

MESQUITE

In Comanche Co., Tex., on north end of high ridge south of what is known as Round Mountain. Station is about 3¼ miles northeast of Logan Gap and about 6 miles west of Comanche.

Permanent mark: Stone marked with cross and letters U. S. G. S. Distance to center of station, 5.25 feet, bearing N. 35° E.

[Latitude, 31° 54' 42"-59. Longitude, 98° 41' 47"-06.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cowhouse	306 26 50.33	126 34 59.21	4.431871
Prairie (2)	274 38 16.71	94 55 18.26	4.797480
Doubletree	74 40 11.67	254 35 27.86	4.165532
Limekiln	354 10 59.13	174 11 36.76	4.267847
Jameson	204 29 19.38	24 35 52.27	4.668979
Price	223 09 42.33	43 20 24.77	4.665832

THOMPSON.

In Brown Co., Tex., at the head of Gap Creek, on most westerly ridge of hills that run north from Salt Mountain, and about 5 miles northwest from Salt Mountain.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 55' 13"-70. Longitude, 98° 53' 40"-90.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Doubletree	316 10 12.29	136 11 45.64	3.826419
Santa Anna	03 35 32.87	243 22 30.24	4.639546
Lost Mountain ...	172 09 15.20	352 08 37.80	4.144092

DOUBLETREE.

In Brown Co., Tex., on hill about three-quarters of a mile west of where Coleman and Comanche road crosses Salt Creek.

Permanent mark: Stone marked with cross and letters U. S. G. S.
Distance to station, 8.75 feet, bearing N. 37° E.

[Latitude, 31° 52' 36''-61. Longitude, 98° 50' 44''-23.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Limekiln	312	14	06.44	132	19	27.20	4.835110
Mesquite	254	35	27.86	74	40	11.67	4.165532
Cabaniss	36	20	10.12	216	14	09.47	4.489744
Santa Anna.....	71	36	08.02	251	21	33.35	4.063325
Thompson.....	136	11	45.64	316	10	12.29	3.826419

CABANISS.

In Brown Co., Tex., in pasture belonging to Cabaniss, about 6 miles southwest of Brownwood and about one-half mile west of the Upper Brownwood and Brady road.

Permanent mark: Stone marked with a cross and letters U. S. G. S. cut on it. Distance to station, 6.25 feet; bearing to station S. 48° E.

[Latitude, 31° 39' 19''-41. Longitude, 99° 02' 09''-28.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Doubletree	216	14	09.47	36	20	10.12	4.483744
Limekiln	253	32	41.39	73	44	01.14	4.550253
Onion Gap.....	23	24	12.92	203	18	12.17	4.663016
Santa Anna.....	111	11	41.75	291	03	09.18	4.439921

SANTA ANNA.

In Coleman Co., Tex., on southern high point of smaller of two peaks overlooking Santa Anna, a station on the Gulf, Colorado and Santa Fe Railroad.

Permanent mark: Stone marked with cross and letters U. S. G. S. cut on it.

[Latitude, 31° 44' 41''-62. Longitude, 99° 18' 24''-72.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Doubletree	251	21	33.35	71	36	08.62	4.663325
Limekiln							4.776138
Cabaniss	291	03	09.18	111	11	41.75	4.439921
Antelope							4.796952
Onion Gap.....	351	47	50.47	171	50	19.07	4.721953
Cow Gap	10	33	35.14	190	30	11.86	4.749595
Lost Mountain	228	00	02.33	48	12	28.03	4.697444
Thompson.....	243	22	30.24	63	35	32.87	4.639546

ONION GAP.

In McCulloch Co., Tex., on hill in pasture, the southwest corner of which is 10½ miles from Brady, on Brownwood and Brady road. Hill

is about $1\frac{1}{2}$ miles from west line of fence and one-fourth mile from south line of fence. Station is on highest point of hill and near the center of top of hill.

Permanent mark: Stone marked with cross and letters U. S. G. S.

[Latitude, $31^{\circ} 16' 27''$.35. Longitude, $99^{\circ} 13' 40''$.39.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Santa Anna	171	50	19.07	351	47	50.47	4.721953
Antelope	292	09	32.02	112	14	30.64	4.216253
Three-Notch							4.656833
G	343	15	29.05	163	20	00.91	4.686601
Brady	36	33	01.02	216	26	29.03	4.528220
Cow Gap	80	19	12.33	260	13	22.87	4.257128
Cabaniss	203	18	12.17	23	24	12.92	4.663016
Limekiln							4.869130

COW GAP.

On ridge between Colorado River and Brady Creek, and about $1\frac{1}{2}$ miles west of Cow Gap. Road from Brady to Coleman goes through Cow Gap.

Permanent mark: Stone with letters U. S. G. S. cut on it and cross marking center of station.

[Latitude, $31^{\circ} 14' 48''$.17. Longitude, $99^{\circ} 24' 53''$.81.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Brady	5	18	28.42	185	17	44.81	4.383405
Mason Mountain							4.678370
G							4.731524
Santa Anna	190	30	11.66	10	33	35.14	4.749585
Onion Gap	260	13	22.87	80	19	12.33	4.257128

ANTELOPE.

On west edge of hill, about 17 miles east of Brady; about one-fourth mile east of northeast corner of large pasture and about 200 yards from fence.

Permanent mark: Stone marked U. S. G. S., '86, center of station.

[Latitude, $31^{\circ} 13' 05''$.49. Longitude, $99^{\circ} 04' 04''$.69.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Three-Notch	336	57	33.99	157	01	39.00	4.507636
G	1	50	34.37	181	50	09.19	4.605837
Mason Mountain							4.632739
Santa Anna							4.796952
Onion Gap	112	14	30.64	292	09	32.02	4.216253

BALLINGER.

The cupola of the court-house in Ballinger, the county seat of Runnels Co., Tex. Not occupied.

Permanent mark: Cupola.

[Latitude, 31° 44' 24''-92. Longitude, 99° 56' 40''-24]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Table Gap	206 05 26-44	26 10 35-80	4-543438
Bradley	251 36 26-97	71 44 28-49	4-403896

BRADY.

In McCulloch Co., Tex., on ridge about 10 miles southwest of Brady; about 4 miles south of Brady and Menardville road, at point about 8 miles from Brady.

Permanent mark: Stone marked with cross and letters U. S. G. S. in center of station.

[Latitude, 31° 01' 46''-47. Longitude, 99° 26' 18''-14.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
G	299 33 56-26	119 44 56-77	4-593743
Mason Mountain .....	.....	.....	4-462056
Onion Gap	216 26 29-03	36 33 01-02	4-528220
Cow Gap	185 17 44-81	5 18 28-42	4-383405

MASON MOUNTAIN.

In Mason Co., Tex., on southeastern part of highest ridge of Mason Mountain, about 1 mile east of Mason and Camp San Saba road, and 5 miles south of Katemcy.

Permanent mark: Stone marked U. S. G. S. '86 and a cross. Distance to station 21 feet, bearing S. 20° W.

[Latitude, 30° 51' 08''-67. Longitude, 99° 12' 55''-59.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
G	268 57 35-23	89 01 42-45	4-107561
Blue Mountain	34 14 49-22	214 07 56-84	4-582486
Brady .....	.....	.....	4-462056
Antelope .....	.....	.....	4-632739
Cow Gap .....	.....	.....	4-678370

G.

In Mason Co., Tex., on a hill 3 miles west of the fourteenth mile post, Mason and Pontotoc road. The mile post is in the Fly Gap.

Permanent mark: A large stone marked with a cross and the letters U. S. G. S., '86 G. Distance to station 5 feet; bearing to station S. 70° W.

[Latitude, 30° 51' 15''-96. Longitude, 99° 04' 53''-53.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Three Notch.....	232	21	37.76	52	26	06.56	4.2441230
Blue Mountain...	47	13	14.22	227	02	15.64	4.6704320
House Mountain..	331	43	49.69	151	48	48.79	4.5176159
B.....	252	05	48.25	72	12	02.82	4.3088710
Brady.....	119	44	56.77	299	33	56.26	4.5937430
Antelope.....	181	50	09.19	1	50	34.37	4.6058370
Onion Gap.....	163	20	00.91	343	15	29.05	4.6866010
Cow Gap.....							4.7315240
Mason Mountain..	89	01	42.45	268	57	35.23	4.1075610

THREE NOTCH.

In Llano Co., Tex., about a mile west of the head of Cold Creek on a round-topped hill.

Permanent mark: U. S. G. S. cut on southernmost of 2 connected stupms. Distance to station 12.6 feet, bearing S. 27° W.

[Latitude, 30° 57' 03''-57. Longitude, 98° 56' 10''-14.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
B.....	309	08	42.88	129	10	28.96	3.849179
Antelope.....	157	01	39.00	336	57	33.99	4.507636
Onion Gap.....							4.656833
G.....	52	26	06.56	232	21	37.76	4.244123

B.

In northwest corner of Llano Co., Tex., on a light-colored gravelly hill, 16½ miles northwest of Llano, and 4 miles northeast of Smoothing-iron Mountain. "The lone oak" is one-fourth of a mile west. There are a few live oak and mesquite trees on the hill. Station is on the highest part of the hill. No trees near the station.

Permanent mark: Stone marked with a cross and U. S. G. S. 1885.

[Latitude, 30° 54' 38''-67. Longitude, 98° 52' 43''-77.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Riley Mountain...	315	37	11.34	135	45	35.78	4.574120
Long Mountain...	271	24	49.85	91	41	33.62	4.715322
Three Notch.....	129	10	28.96	309	08	42.88	3.849179
G.....	72	12	02.82	252	05	48.25	4.308871

D.

In San Saba Co., Tex. A light-colored gravelly hill, about 3 miles west from the twelfth-mile post from San Saba court-house, on the San Saba and Bluffton road north of Cherokee Creek.

Permanent mark: Cross and U. S. G. S. cut in rock, 20 feet N. 44° 14' E. from center of station.

[Latitude, 31° 04' 09''-8. Longitude, 98° 39' 45''-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Waters Mountain.	265 14 30·3	85 24 27·9	4·488397

WATERS MOUNTAIN.

In Lampasas Co., Tex., the southernmost of the knobs northwest of Lampasas; about one-half a mile from the tenth mile post from Lampasas. Local name, Waters or Green Mountain.

Permanent mark: Cross and U. S. G. S. cut in the rock 9·4 feet N. 22° 43' E. from the signal tree.

[Latitude, 31° 05' 31''-20. Longitude, 98° 20' 27''-60.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bunker Hill	344 42 40·22	164 44 09·88	4·243485
Long Mountain...	358 42 56·30	178 43 05·05	4·832659
Bachelor Peak ...	294 42 22·21	114 49 58·90	4·412687
Taylor Mountain.	271 41 38·29	91 53 21·78	4·557870
D.....	85 24 27·90	265 14 30·30	4·488397

BUNKER HILL.

In Burnet Co., Tex., about 200 yards west of the Burnet and San Saba road on the divide near the fourteenth mile post from Burnet. Instrument elevated 16 feet.

Permanent mark: Stone marked with a cross and U. S. G. S., N. 48° 46' E., and distant 7.75 feet from station.

[Latitude, 30° 56' 22''-45. Longitude, 98° 17' 33''-60.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Long Mountain...	41 56 43·81	221 55 23·73	3·791851
Waters Mountain	164 44 09·88	344 42 40·22	4·243485
Bachelor Peak....	252 08 57·18	72 15 03·33	4·297415

LONG MOUNTAIN.

In Llano Co., Tex., a cedar-covered hill 4 miles west of the thirteenth mile post from Burnet, on the Burnet and San Saba road. Station is near the northeast side of the hill. Local name is Long or Biñon Mountain. Instrument elevated 20 feet.

Permanent mark: Stone buried even with surface of ground, marked with a cross and U. S. G. S., S. 51° 36' E., and distant 5.8 feet from the station.

[Latitude, 30° 53' 52''-98. Longitude, 98° 20' 09''-43.]

To station.	Azimuth.			Back azimuth.			Log dist.
	°	'	''	°	'	''	<i>Meters.</i>
B.....	91	41	33.62	271	24	49.85	4.715322
Bunker Hill.....	221	55	23.73	41	56	43.81	3.791851
Roper Hill.....	335	44	31.90	155	46	33.71	4.187025
Riley Mountain ..	45	26	18.69	225	18	02.81	4.558716
Waters Mountain	178	43	05.65	358	42	56.30	4.332659

BACHELOR PEAK.

In Lampasas Co., Tex.; a small butte about 8 miles south of Lampasas. The Georgetown and Lampasas road runs within one-half mile of the station on the west side. Station is S. 42° 56' W. and distant 4.7 feet from the stone.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 59' 39''-33. Longitude, 98° 05' 42''-00.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Waters Mountain.	114	49	58.90	294	42	22.21	4.412687
Bunker Hill.....	72	15	03.33	252	08	57.18	4.297415
Prairie (1).....	320	09	31.40	140	13	42.33	4.306436
Taylor Mountain.	232	27	26.03	52	31	31.90	4.202526

HALEY RATLIF.

In Bell Co., Tex.; sometimes called Post Oak Mountain; a large knob, about 5 miles northeast of Florence post-office, covered with large post-oak trees. Land owned by Haley and Ratlif. Station is N. 75° 21' E. and distant 5 feet from the station. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 53' 41''-15. Longitude, 97° 43' 52''-40]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Taylor.....	133	14	37.11	313	07	28.36	4.481470
Prairie (1).....	78	20	18.60	258	13	17.14	4.347953
Morrison Ridge.....	35	14	18.03	215	10	47.95	4.276423
Haystack.....	352	25	49.56	172	27	17.37	4.540935
Ivy Gap.....	146	29	23.10	326	25	08.21	4.376100
Temple.....	239	03	16.05	59	15	24.11	4.640355
Hulsey.....	197	34	20.51	17	37	02.71	4.441289

PRAIRIE (1).

In Burnet Co., Tex., on a high part of the prairie about 6 miles north from where the Bertram and Florence road crosses the San Gabriel River.

Permanent mark: Stone, marked with a cross and U. S. G. S. '85, buried a few inches under ground.

[Latitude, 30° 51' 14".17. Longitude, 97° 57' 33".71.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Taylor.....	179 18 45.57	359 18 39.69	4.402518
Bachelor Peak....	140 13 42.33	320 09 31.40	4.306436
Haley Ratlif.....	258 13 17.14	78 20 18.60	4.347953
Morrison Ridge....	314 55 06.15	134 58 36.80	4.188928

CORN HILL.

In Williamson Co., Tex., on the open prairie, 800 feet west of Corn Hill post-office, 335 feet south of a barbed wire fence.

Permanent mark: Stone, marked with a cross and U. S. G. S., buried about 2 inches under ground.

[Latitude, 30° 47' 16".37. Longitude, 97° 37' 15".18.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Haystack.....	14 53 09.21	194 51 14.17	4.368848
Beaver Hill.....	328 54 38.69	148 56 22.30	4.018871

MORRISON RIDGE.

In Williamson Co., Tex., about 8 miles northeast of Liberty Hill post-office—sometimes called Long Knob Station—on the west side, near the north end, and on about the highest part of the ridge; about 500 yards south from a well on the west side of the ridge. Land owned by J. C. Morrison. Signal stands near a post-oak tree, which has some limbs cut off on the east side.

Permanent mark: Stone marked with a cross and U. S. G. S. The station is S. 56° 40' W. of stone and distant 5.05 feet.

[Latitude, 30° 45' 19".74. Longitude, 97° 50' 42".37.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Haley Ratlif.....	215 10 47.95	35 14 18.03	4.276423
Prairie (1).....	134 58 36.80	314 55 06.15	4.188928
Beaver Hill.....	281 11 53.88	101 20 29.93	4.437658
Haystack.....	320 47 00.77	140 51 57.52	4.389458

BEAVER HILL.

In Williamson Co., Tex., is a low, wooded hill about 8 miles north-east of Georgetown. Land owned by Henry Beach. About 400 yards east of "the tree in the gap;" west side of the hill.

Permanent mark: Stone marked with a cross and U. S. G. S., buried S. $71^{\circ} 35'$ E. 3.9 feet from center of station.

[Latitude, $30^{\circ} 42' 25''$.88. Longitude, $97^{\circ} 33' 52''$.51.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Morrison Ridge...	101	20	29.93	281	11	53.88	4.437658
Corn Hill	148	56	22.30	328	54	38.69	4.018871
Haystack.....	39	53	27.95	219	49	49.74	4.250056
Yegua.....	318	12	10.83	138	23	37.64	4.733921

HAYSTACK.

In Williamson Co., Tex., on a bare hill about 3 miles south of Georgetown, about one-half mile east of the Georgetown and Round Rock road.

Permanent mark: Stone marked with a cross and U. S. G. S., buried under center of station.

[Latitude, $30^{\circ} 35' 02''$.56. Longitude, $97^{\circ} 41' 00''$.60.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Beaver Hill.....	219	49	49.74	39	53	27.95	4.250056
Morrison Ridge...	140	51	57.52	320	47	00.77	4.389458
Corn Hill.....	194	51	14.17	14	53	09.21	4.368848
Haley Ratlif.....	172	27	17.37	352	25	49.56	4.540935
Yegua.....	299	19	02.35	119	34	04.94	4.736638
P. K. N.....	7	05	23.23	187	04	49.19	4.161075

P. K. N.

In Travis Co., Tex.; on south end of hill known as Pilot Knob, about one mile northwest of Merriltown; about three-fourths of a mile east of junction of the International and Great Northern and Austin and Northwestern railroads, which cross on land owned by W. G. McIntyre.

Permanent mark: Stone marked P. K. N., cross, and U. S. G. S.

[Latitude, $30^{\circ} 27' 15''$.59. Longitude, $97^{\circ} 42' 07''$.84.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Haystack.....	187	04	49.19	7	05	23.23	4.161075
Yegua.....	284	00	55.12	104	16	29.89	4.706842
Texas Hill.....	335	06	04.26	155	11	05.98	4.579975
Lone Tree.....	34	45	45.97	214	42	32.58	4.253165

YEGUA.

In Lee Co., Tex.; is the most northerly of the Yegua knobs, $4\frac{1}{4}$ miles northeast of McDade, about 17 feet from the highest part of the hill.

Permanent mark: U. S. G. S. '84 and \triangle cut in the rock 17 feet N. 1° 15' E. from station.

[Latitude, 30° 20' 31''-99. Longitude, 97° 11' 20''-30.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Haystack.....	119 34 04·94	290 19 02·35	4·736688
Beaver Hill.....	138 23 37·04	318 12 10·83	4·733921
Bastrop Hill.....	26 03 16·94	205 59 37·89	4·423428
Texas Hill.....	56 38 14·43	236 27 45·20	4·602419
P. K. N.....	104 16 29·89	284 00 55·12	4·706342

BASTROP HILL.

In Bastrop Co., Tex., about 1 mile northeast of Bastrop court-house, on the westernmost of the Copperas Mountains.

Permanent mark: None.

[Latitude, 30° 07' 38''-3. Longitude, 97° 18' 35''-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Yegua.....	205 59 37·89	26 03 16·94	4·423428
Lone Tree.....	114 17 16·68	294 02 13·28	4·720986

TEXAS HILL.

A bare, round-topped, gravelly hill, in Travis Co., Tex., about 1 mile south of Garfield post-office, about 15 miles from Austin and one-half mile north of the Upper Bastrop road; station on highest part of hill.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 08' 35''-36. Longitude, 97° 32' 09''-60.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lone Tree.....	127 05 50·40	306 57 36·79	4·516350
Yegua.....	236 27 45·20	56 38 14·43	4·602419
P. K. N.....	155 11 05·98	335 06 94·26	4·579975
Pilot Knob.....	95 53 52·16	275 48 45·17	4·215966
Bald Knob.....	166 18 28·08	346 16 50·41	4·340159
Cedar Hill.....	97 23 15·39	277 10 42·36	4·606632

EAST BASE HILL.

In Travis Co., Tex., on the east side of Onion Creek; a round-topped hill, about 130 feet above low water in the creek, about 1,380 feet east of East Base. The base line was extended by triangulation to this station. The line East Base Hill—West Base, is the line used as a base in the work around Austin. Instrument elevated 20 feet.

Permanent mark: Large stone, buried even with the surface of the ground and marked with the letters U. S. G. S. and copper bolt.

[Latitude, 30° 11' 48''-34. Longitude, 97° 36' 32''-72.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
East Base.....	94 37 26·11	.....	2·625607
West Base.....	94 37 26·11	274 34 12·90	4·013135
Pilot Knob.....	65 24 59·85	245 22 04·88	4·010423
Bald Knob.....	186 52 39·94	6 53 14·81	4·188397
Land Office.....	124 13 40·65	304 09 49·00	4·172615

BALD KNOB.

A round, bare, grassy knob in Travis Co., Tex., near the 11-mile board from Austin, on the Austin and Manor road, between the wagon road and the railroad, about 3 miles from Manor station and on the highest part of the hill.

Permanent mark: Stone marked with a cross.

[Latitude, 30° 20' 05''-87. Longitude, 97° 35' 23''-54.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Texas Hill.....	346 16 50·41	166 18 28·08	4·340159
Pilot.....	29 41 42·49	209 38 12·31	4·352942
East Base Hill....	6 53 14·81	186 52 39·94	4·188397

LAND OFFICE.

In Travis Co., Tex., on the peak of the roof of the land office at Austin, on the south end and just north of the north chimney.

Permanent mark: None.

[Latitude, 30° 16' 19''-93. Longitude, 97° 44' 13''-02.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
East Base Hill...	304 09 49·0	124 13 40·65	4·172615

LONE TREE (1).

A flat-topped hill on the south side of the Colorado River, in Travis Co., Tex., about 5 miles northwest from Austin and about 2½ miles west from Mount Bonnell. All the large trees except one have been cut from the hill. Wood road leading to Austin passes the hill on the south side.

Permanent mark: A 2 by 4 joist spiked to the roots of a tree which

bears S. 15° W. from the center of the station, 8.7 feet distant; has a Δ cut on it.

[Latitude, 30° 19' 17''-54. Longitude, 97° 48' 29''-95.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	<i>Meters.</i>
P. K. N.	214	42	32.58	34	45	45.97	4.253165
Cedar Hill	43	26	06.50	223	21	45.40	4.304545
Bastrop Hill	294	02	13.28	114	17	16.68	4.720986
Shingle	85	55	23.58	265	46	44.41	4.440203
Boultinghouse	134	33	55.67	314	25	23.96	4.577263
Pilot Knob	331	21	57.91	151	25	03.82	4.314154
Texas Hill	306	57	36.79	127	05	50.40	4.516350

WEST BASE.

In Travis Co., Tex., about 5 miles southeast of Austin, in the north corner of a field belonging to T. P. Givens, and about 100 feet south of his house. Instrument elevated 20 feet.

Permanent mark: Large stone buried 6 inches under the surface, 5 feet from fence, marked U. S. G. S., W. B.; center is a copper bolt marked with a cross.

[Latitude, 30° 12' 15''-17. Longitude, 97° 42' 56''-82.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	<i>Meters.</i>
Pilot Knob	349	16	42.70	169	17	00.81	3.714471
East Base Hill.....	274	34	12.90	94	37	26.11	4.013135

PILOT KNOB.

In Travis Co., Tex.; it is the south one of two bare hills known as the Pilot Knobs, about 8 miles south of Austin, on land owned by William (or "Wildcat") Jones.

Permanent mark: Stone monument, about 4 feet high and 5 feet in diameter at the base.

[Latitude, 30° 09' 29''-83. Longitude, 97° 42' 20''-80.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	<i>Meters.</i>
Bald Knob	200	38	12.31	29	41	42.40	4.352942
Texas Hill	275	48	45.17	95	53	52.16	4.215966
Lone Tree	151	25	03.82	331	21	57.91	4.314154
East Base Hill.....	245	22	04.88	65	24	59.85	4.010423
West Base	169	17	00.81	349	16	42.70	3.714471

CEDAR HILL.

In Travis Co., Tex., about 14 miles west of Austin and 2 miles south of Cedar Valley post-office on a wooded hill. Station is on the part of the hill owned by Mr. Fred Willis, and is about the center of the hill. Instrument elevated 31 feet.

Permanent mark: Stone marked Cedar Hill with a cross and U. S. G. S.

[Latitude, 30° 11' 21"·78. Longitude, 97° 57' 08"·14.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Shingle.....	132	52	43·30	312	48	26·18	<i>Meters.</i> 4·269803
Lone Man.....	46	00	13·41	225	56	10·94	4·254805
Texas Hill.....	277	10	42·36	97	23	15·39	4·606632
Lone Tree (1)....	223	21	45·40	43	26	06·50	4·304545

LONE MAN.

In Hays Co., Tex. A small peak 8 miles south of Dripping Springs near the intersection of the Dripping Springs and San Marcos, and the Blanco and Kyle roads. Local name, Lone Man. Station is N. 23° 49' E., and distant 4·9 feet from stone.

Permanent mark: Stone marked with a cross and U. S. G. S., 1884.

[Latitude, 30° 04' 35"·92. Longitude, 98° 05' 11"·12.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Twin Sisters.....	72	53	46·00	.....	.....	.....	<i>Meters.</i>
Cedar Hill.....	225	56	10·94	46	00	13·41	4·254805
Shingle.....	178	19	44·98	358	19	31·17	4·400782

TWIN SISTERS.

In Blanco Co., Tex., the westernmost of two buttes, near Twin Sisters post-office, 6½ miles south of Blanco.

Permanent mark: Stone marked with a cross.

[Latitude, 29° 58' 48"·7. Longitude, 98° 26' 40"·5.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Shovel Mountain.....	20	31	35	<i>Meters.</i> 4·737288
Lone Man.....	72	53	46	.....

SHINGLE.

In Hays Co., Tex. A butte at the west end of Shingle Mountain. The station is near the northwest side of the butte. The Cedar Valley and Round Mountain post-office road runs one-fourth mile east of the station.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 18' 12"·80. Longitude, 98° 05' 38"·58.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Boultinghouse.....	181	00	01·81	1	00	11·26	<i>Meters.</i> 4·454476
Shovel.....	136	22	15·20	316	17	58·36	4·325789
Round Mountain.....	122	27	42·08	302	19	26·84	4·490882
E.....	70	01	39·76	255	51	07·67	4·538560
Lone Man.....	358	19	31·17	178	19	44·98	4·400782
Lone Tree.....	265	46	44·41	85	55	23·58	4·440203
Cedar Hill.....	312	48	26·18	132	52	43·30	4·269803

E.

In Blanco Co., Tex., on a high, round-topped bare hill, about 4 miles south of Johnson City, south side of the Austin and Fredericksburg road.

Permanent mark: Stone marked with a cross and U. S. G. S. '85.

[Latitude, 30° 13' 40"·14. Longitude, 98° 26' 32"·70.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shingle.....	255 51 07·67	76 01 39·76	4·538560
Round Mountain..	196 21 14·29	16 23 33·12	4·415656

SHOVEL.

In Blanco Co., Tex., a high flat-topped butte 6 miles east of Round Mountain post-office, in a pasture owned by Abling Brothers. Local name is Shovel Mountain. Station is S. 58° 33' E., and distant 9 feet from the mark.

Permanent mark: Stone marked with a cross and U. S. G. S. 1885.

[Latitude, 30° 26' 30"·19. Longitude, 98° 14' 46"·10.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Boultinghouse....	228 53 35·34	48 58 22·71	4·301581
Shingle.....	316 17 38·36	136 22 15·20	4·325789
Twin Sisters.....	20 31 35·00	.....	4·737288

BOULTINGHOUSE.

In Burnet Co., Tex., on point of ridge facing west about 3 miles from the Colorado river, 37 miles from Austin on the old Austin and Burnet road, on land owned by Mr. Boultinghouse.

Permanent mark: U. S. G. S. cut in rock near station. Center marked by a duplicate + cut in rock about 4 feet from letters.

[Latitude, 30° 33' 37"·40. Longitude, 98° 05' 19"·93.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Round Mountain..	66 00 29·96	245 52 03·36	4·464533
Roper Hill.....	143 29 41·31	323 24 08·85	4·464468
Shovel.....	48 58 22·71	228 53 35·34	4·301581
Lone Tree.....	314 25 23·96	134 33 55·67	4·577263
Shingle.....	1 00 11·26	181 00 01·81	4·454476

ROUND MOUNTAIN.

In Blanco Co., Tex., a small, round knob 3 miles northwest of Round Mountain post-office. Local name Round Mountain. Station is N. 84° 36' E., distant 6·3 feet from the mark.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 27' 11"·52. Longitude, 98° 21' 57"·88.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Roper Hill.....	194 36 57·44	14 39 53·69	4·561987
E	16 23 33·12	196 21 14·29	4·415656
Bell Mountain....	88 49 41·39	268 39 01·71	4·527442
Riley Mountain....	136 13 37·04	316 06 19·54	4·519961
Shingle.....	302 19 26·84	122 27 42·08	4·490882
Boultinghouse....	245 52 03·36	66 00 29·96	4·464533

ROPER HILL.

In Burnet Co., Tex., on a ridge about 3 miles west of Burnet. The Burnet and Llano road passes near foot of the ridge, distant about one-half mile from the station. Station is near a live oak tree which has had most of the limbs cut off. On highest part of the ridge. There is an old stone quarry about one-half mile from station toward Burnet. Instrument elevated 16 feet. Station is S. 76° 41' W. from stone, distant 5.15 feet.

Permanent mark: Stone marked with a cross and U. S. G. S., 1885.

[Latitude, 30° 46' 17"·52. Longitude, 98° 16' 11"·78.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Riley Mountain ..	70 31 31·88	250 21 15·52	4·532351
Long Mountain....	155 46 33·71	335 44 31·90	4·187025
Boultinghouse....	323 24 08·85	143 29 41·31	4·464468
Round Mountain ..	14 39 53·69	194 36 57·44	4·561987

RILEY MOUNTAIN.

In Llano Co., Tex., on the highest knob near the northeastern end of Riley Mountain, sometimes called Dancer Peak.

Permanent mark: A cross and U. S. G. S. '85 is cut in the rock, N. 7° 52' E., and distant 13 feet from station.

[Latitude, 30° 40' 07"·12. Longitude, 98° 36' 18"·32.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Long Mountain....	225 18 02·81	45 26 18·69	4·558716
B	135 45 35·78	315 37 11·34	4·574120
Bell Mountain....	23 31 49·39	203 28 25·11	4·428989
House	74 26 52·76	254 17 17·14	4·494748
Roper Hill.....	250 21 15·52	70 31 31·88	4·532351
Round Mountain ..	316 06 19·54	136 13 37·04	4·519961

BELL MOUNTAIN.

A high, bare hill, in Gillespie Co., Tex., about 5 miles northwest of Hudson mound. The station is about fifty feet from eastern edge of the hill. Sometimes called Not Mountain.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 26' 47"-45. Longitude, 98° 43' 00"-12.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
House Mountain..	129	54	48·84	309	48	40·15	4·402872
Round.....	268	39	01·71	88	49	41·39	4·527442
Riley Mountain ..	203	28	25·11	23	31	49·39	4·428989

HOUSE MOUNTAIN.

A flat-topped granite butte in Llano Co., Tex., about 20 miles southwest of Llano court-house. Station is near the north edge of the butte and on the highest part.

Permanent mark: Cross and U. S. G. S. cut in the highest rock on the mountain S. 0° 32' W. and 20 feet from center.

[Latitude, 30° 35' 33"-74. Longitude, 98° 55' 08"-09.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Bell Mountain ...	309	48	40·15	129	54	48·84	4·4028720
Riley Mountain ..	254	17	17·14	74	26	52·76	4·4947480
Blue Mountain ...	86	52	49·54	266	36	55·66	4·6993160
G.....	151	48	48·79	331	43	49·69	4·5176159

BLUE MOUNTAIN.

In Kimble Co., Tex., on highest knob of Blue Mountain, 5 miles south of Llano River and about 20 miles west of Mason.

Permanent mark: Stone marked U. S. G. S. 86 and cross. Distance to center, 8·5 feet, bearing N. 29° W.

[Latitude, 30° 34' 01"-56. Longitude, 99° 26' 23"-08.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
House Mountain..	266	36	55·66	86	52	49·54	4·699316
G.....	227	02	15·64	47	13	14·22	4·670432
Mason Mountain..	214	07	56·84	34	14	49·22	4·582486

PEAK.

In Menard Co., Tex. (not occupied), on the eastern of two peaks in the southeast part of the Los Meras ranch, about one-half mile from the eastern fence, in a large cattle pasture.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 45' 21"-64. Longitude, 99° 41' 42"-07.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Cactus.....	106	30	10·20	286	23	01·26	4·366105
Maddox.....	168	27	17·84	348	24	59·09	4·553546

RUNGE.

In Menard Co., Tex. (not occupied), in the Los Meras ranch and about 4 miles south of Menardville, about 3 miles a little north of east from Mr. Runge's residence, on the highest point of, and near the northern edge of the ridge. A large live-oak tree was cut down about 100 yards southeast of signal.

Permanent mark: None.

[Latitude, 30° 51' 35''-49. Longitude, 99° 46' 26''-47.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cactus.....	71 29 36.59	251 24 52.78	4.190867
Mustang.....	143 09 04.19	323 04 09.03	4.404422
Sumac.....	14 15 17.35	194 14 01.99	4.201578

MUSTANG.

In Menard Co., Tex., about 1 mile southeast from Mr. Sim's windmill on the Eden and McKavett road and about 12 miles from Eden. About three-fourths of a mile east of Niggers Gap. All timber cleared away except one mesquite tree.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 02' 34''-52. Longitude, 99° 56' 00''-35.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Molley.....	195 07 13.69	15 09 37.94	4.451199
Maddox.....	258 13 42.43	78 18 45.89	4.202166
Runge.....	323 04 09.03	143 09 04.19	4.404422
Cactus.....	358 46 46.34	178 46 56.74	4.402042
Burbank.....	26 27 14.23	206 22 40.11	4.503129
First.....	45 32 32.77	225 27 24.49	4.348071
Flower.....	111 01 21.08	290 56 37.72	4.192866

BONES.

In Menard Co., Tex., near the McCullough line, about 3 miles north of the Menardville and Brady road, at a point about 8 miles from Menardville, in the southeast corner of Maddox's pasture, on the highest and most northern of three high points.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 00' 31''-31. Longitude, 99° 39' 17''-61.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Maddox.....	122 38 16.96	302 34 43.21	4.115598
Live Oak.....	179 28 59.53	359 28 54.07	4.490477

MADDOX.

In Menard Co., Tex., in a pasture owned by Mr. Maddox, of Austin, 2 or 3 miles south of the Concho line, about 2½ miles east of Eden and Menardville road, and 1 mile a little south of east of the ranch house, about one-fourth of a mile south of the road between Mr. Maddox's two ranches; 9 miles from Eden to Maddox's gate. Instrument elevated 24 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 31° 04' 19"-66. Longitude, 99° 46' 12"-14.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Molloy	161	12	01-55	341	09	21-32	4-404850
Live Oak	204	04	49-90	24	08	19-05	4-418098
Bones	302	34	43-21	122	38	16-96	4-115598
Peak.....	348	24	59-09	168	27	17-84	4-553546
Mustang.....	78	18	45-89	258	13	42-43	4-202166
Cactus.....	27	56	45-59	207	51	53-53	4-508065

FIRST.

In Menard Co., Tex., on western side of the county and about 4 miles a little east of north from Fort McKavett, on the most western of three prominent knolls.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 54' 07"-25. Longitude, 100° 05' 59"-39.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Burbank.....	352	19	34-91	172	20	08-43	4-1146200
Black	64	34	04-58	244	27	42-14	4-3413280
Cactus.....	300	14	47-14	120	20	04-77	4-2799860
Mustang.....	225	27	24-49	45	32	32-77	4-3480710
Fort McKavett..	5	51	34-93	185	51	18-87	3-9110093

BLACK.

In Schleicher Co., Tex., in Mr. Black's pasture, about 12 miles west from Fort McKavett, on high knoll on divide between the north valley and middle valley of the San Saba River. The ranch road running west from Fort McKavett passes about 2 miles north of station.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 49' 00"-64. Longitude, 100° 18' 24"-99.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
First	244	27	42-14	64	34	04-58	4-341328
Burbank.....	279	03	49-03	99	10	44-30	4-339168
Decker	314	51	25-18	134	56	57-96	4-388314
Riley	343	58	50-26	164	00	35-38	4-237740

FORT MCKAVETT.

In Menard Co., Tex. Not occupied. Located in 1891. Tower on old building.

[Latitude, 30° 49' 44"·07. Longitude, 100° 06' 30"·69.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
First	185	51	18·87	5	51	34·93	3·9110093
Burbank.....	331	49	18·89	151	50	08·41	3·7359203

CACTUS.

In Menard Co., Tex., on the Los Meras ranch, owned by Mr. Runge, about 6 miles a little south of west from Mr. Runge's residence. No other house near. The highest point within 4 or 5 miles, about one-half mile south of a fence. Timber all cleared from summit.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 48' 55"·20. Longitude, 99° 55' 40"·13.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Mustang.....	178	46	56·74	358	46	46·34	4·402042
Maddox.....	207	51	53·53	27	56	45·59	4·508065
Burbank.....	77	25	55·64	257	21	12·03	4·178635
First.....	120	20	04·77	300	14	47·14	4·279986
Runge.....	251	24	52·78	71	29	36·59	4·190867
Peak.....	286	23	01·26	106	30	10·20	4·366105
Deer.....	23	01	11·10	202	59	47·96	4·043674
Sumac.....	314	05	23·90	134	08	51·82	4·177721

DEER.

In Menard Co., Tex. Not occupied. About 4 miles west of the Menardville and Junction City road, where road goes off the divide between Los Meras and Bear creeks, on the highest and most southern of several hills at the head of Los Meras Creek.

Permanent mark: None.

[Latitude, 30° 43' 24"·69. Longitude, 99° 58' 22"·66.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Cactus.....	202	59	47·96	23	01	11·10	4·043674
Sumac.....	271	06	26·02	91	11	16·69	4·180165

SUMAC.

In Menard Co., Tex. Not occupied. In the Los Meras pasture about 3 miles east of Menardville and Junction City road, where it goes off the divide between Los Meras and Bear creeks, about 10 miles from

Mr. Runge's house; south, a little east, about 50 yards from the fence on the west side of the pasture. Platform 15 feet high.

[Latitude, 30° 43' 14" 84. Longitude, 99° 48' 53" 68.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Cactus.....	134	08	51.82	314	05	23.90	<i>Meters.</i> 4-177721
Runge.....	194	14	01.99	14	15	17.35	4-201578
Deer.....	91	11	16.69	271	06	26.02	4-180165

BURBANK.

In Mr. Burbank's north pasture on high knoll in the western side of Menard Co., Tex., about 2 miles southwest of Mr. Burbank's residence and 1 mile east from the McKavett and Pecan Spring road, about 3 miles a little east of south from Fort McKavett.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 47' 08" 23. Longitude, 100° 04' 54" 00.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
First.....	172	20	08.43	352	19	34.91	4-114620
Cactus.....	257	21	12.03	77	25	55.64	4-178635
Mustang.....	206	22	40.11	26	27	14.28	4-503129
Black.....	99	10	44.30	279	03	49.03	4-339168
Decker.....	17	08	51.52	197	07	29.82	4-159582
Fort McKavett...	151	50	08.41	331	49	18.89	3-735920

DECKER.

In Sutton Co., Tex., in northeast corner of the county, in a cedar grove about 50 yards south of the McKavett and Pecan Spring road and about 6 miles north from Pecan Spring. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 39' 40" 12. Longitude, 100° 07' 33" 92.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Black.....	134	56	57.96	314	51	25.18	4-388314
Burbank.....	197	07	29.82	17	08	51.52	4-159582
Riley.....	81	18	41.36	261	14	54.30	4-079046
Patterson.....	342	20	42.07	162	23	19.67	4-435987
Piper.....	32	01	19.12	211	58	49.26	4-170156

RILEY.

In Sutton Co., Tex. Cupola on Mr. John Riley's residence, about 12 miles south of Fort McKavett.

Permanent mark: Cupola.

[Latitude, 30° 38' 41"-06. Longitude, 100° 14' 59"-28.,

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Black.....	164	00	35.38	343	58	50.26	4.297740
Decker.....	261	14	54.30	81	18	41.36	4.079046
Piper.....	339	26	12.27	159	27	29.13	4.059128
Wentworth.....	22	02	04.68	201	59	12.26	4.382546

PIPER.

In Sutton Co., Tex., on highest point on mountain about half a mile west from west side of Mr. John Riley's pasture. Old Fort Terrett road is about one-quarter of a mile east of station; about 2 miles a little east of north from Mr. Adams' windmill. Instrument elevated 16 feet.

[Latitude, 30° 32' 52"-64. Longitude, 100° 12' 28"-28.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Riley.....	159	27	29.13	339	26	12.27	4.059128
Decker.....	211	58	49.26	32	01	19.12	4.170156
Patterson.....	309	48	45.88	129	53	52.56	4.322236
Marshall.....	358	21	16.47	178	21	27.72	4.314714
Wentworth.....	48	21	10.11	228	17	01.32	4.243193

WENTWORTH.

Situated in Sutton Co., Tex., on a ridge about 12 miles west from Mr. Wentworth's residence, which is at the head of the running water of the north fork of Llano River, about 2 miles northwest from the 10-mile water hole on North Llano. Several large live-oak trees are near the station. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 26' 34"-59. Longitude, 100° 20' 38"-55.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Piper.....	228	17	01.32	48	21	10.11	4.243193
Marshall.....	303	16	37.70	123	20	57.04	4.214026
Fawn.....	341	25	39.89	161	27	15.90	4.202208
Wallace.....	28	41	44.99	203	33	22.92	4.347510
Riley.....	201	59	12.26	22	02	04.68	4.382546

PATTERSON.

Situated in Kimble Co., Tex., on a high prairie knoll near a fence on the eastern side of Mr. Patterson's pasture, and about 3 miles east of his residence, which is near the head of Maynard Creek, about three-quarters of a mile east of old government road between Fort McKavett and Fort Clark.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 25' 35" .59. Longitude, 100° 02' 23" .80.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Piper.....	129	53	52.56	309	48	45.88	4.322236
Decker.....	162	23	19.67	342	20	42.07	4.435978
Marshall.....	65	16	08.26	245	11	13.66	4.233497

MARSHALL.

Situated in Sutton Co., Tex., on Messrs. Marsh & Taylor's pasture, about one-quarter of a mile east from the west side of the pasture and about 1 mile south from the north side. It is on a very flat ridge which is the divide between the north and south branches of the Llano River, about 3 miles northwest from Marsh & Taylor's ranch. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 21' 42" .64. Longitude, 100° 12' 06" .09.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Piper.....	178	21	27.72	358	21	16.47	4.314714
Patterson.....	245	11	13.66	65	16	08.26	4.233497
Wentworth.....	123	20	57.04	303	16	37.70	4.214026
Fawn.....	54	40	38.91	234	37	55.99	4.023819
Harris.....	354	22	41.15	174	23	20.95	4.333607

FAWN.

Situated in Edwards Co., Tex., on ridge about 2 miles west from the west side of Mr. Wentworth's small pasture, which joins Marsh & Taylor's pasture on the east side; about 1 mile northwest of Mr. Runnels' wind-mill; 1 mile south from the Sutton County line. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 18' 24" .18. Longitude, 100° 17' 28" .67.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Wentworth.....	161	27	15.90	341	25	39.89	4.202208
Marshall.....	234	37	55.99	54	40	38.91	4.023819
Harris.....	324	59	30.77	145	02	52.96	4.272445
Fire.....	353	54	16.74	173	55	05.88	4.391543
Wallace.....	74	20	35.25	254	15	37.83	4.214082

WALLACE.

Situated in Edwards Co., Tex., on a prairie ridge about 4 miles southwest from Mr. Thomas Rand's residence. Road between Mr.

Rand's and Mr. Hagerman's ranches passes about one-half mile north from the station. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 16' 00"·33. Longitude, 100° 27' 18"·40.]

To stations.	Azimuth.			Back azimuth.			Log dist.
	°	'	"	°	'	"	
Wentworth.....	208	38	22·92	28	41	44·99	4·347516
Fawn.....	234	15	37·83	70	20	35·25	4·214082
Harris.....	292	18	26·48	112	26	45·35	4·457398
Fire.....	317	26	41·62	137	32	27·16	4·434878
Wolf.....	339	10	20·77	159	13	03·00	4·385990

HARRIS.

Situated in Edwards Co., Tex., on a ridge about 1½ miles south of Harris post-office. A grove of live oak trees about 100 yards northwest of station. A thicket of small trees on east and west sides of station. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 10' 05"·90. Longitude, 100° 10' 47"·16.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Wallace.....	112	26	45·35	292	18	26·48	4·457398
Fawn.....	145	02	52·96	324	59	30·77	4·272449
Fire.....	41	38	46·35	221	36	13·89	4·087909
Marshall.....	174	23	20·95	354	22	41·18	4·333607
Jasper.....	17	26	49·69	197	25	04·84	4·271688

FIRE.

Situated in Edwards Co., Tex., on a live-oak ridge about 4 miles west from McKenzie Lake and Rock Springs road where the road crosses the divide south of McKenzie Lake. Road from McKenzie Lake to Black Water Hole, at a point 5 miles from McKenzie Lake, passes within 200 yards of the station. Instrument elevated 20 feet.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 30° 05' 08"·67. Longitude, 100° 15' 50"·98.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Wallace.....	137	32	27·16	317	26	41·62	4·434878
Harris.....	221	36	13·85	41	38	46·35	4·087909
Wolf.....	74	44	01·14	254	40	58·45	4·005284
Jasper.....	343	42	21·79	163	43	09·20	3·956438
Fawn.....	173	55	05·88	353	54	16·74	4·391543

WOLF.

Situated in Edwards Co., Tex., on ridge about 2 miles northeast from Mr. Ridley's windmill. Road running west from Rock Spring passes

about 200 yards south of station at a point about 12 miles from Rock Springs. Instrument elevated 20 feet.

Permanent mark: None.

[Latitude, 30° 03' 41''-97. Longitude, 100° 21' 55''-55.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Wallace	159	13	03.00	339	10	20.77	<i>Meters.</i> 4.385990
Fire	254	40	58.45	74	44	01.14	4.005284
Ellis	17	30	16.27	197	27	08.69	4.526210
Jasper	296	00	39.14	116	04	29.01	4.136582
Holliday	344	59	04.03	165	00	31.22	4.256860

JASPER.

Situated in Edwards Co., Tex., on a live-oak ridge about 1 $\frac{3}{4}$ miles west of the town of Rock Springs. Road from Rock Springs to Ford & Holliday's ranch passes one-half mile north of station. Instrument elevated 20 feet.

Permanent mark: None.

[Latitude, 30° 00' 26''-69. Longitude, 100° 14' 16''-28.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Wolf	116	04	29.01	296	00	39.14	<i>Meters.</i> 4.136582
Fire	163	43	09.20	343	42	21.70	3.956438
Harris	197	25	04.84	17	26	49.69	4.271688
Goode	10	00	20.52	189	58	46.87	4.463488
Holliday	33	45	04.62	213	42	42.41	4.138375

HOLLIDAY.

Situated in Edwards Co., Tex., on the highest point on a ridge about 4 miles southwest from Ford & Holliday's ranch. Road from Rock Springs to Blackwater Hole passes about 1 $\frac{1}{2}$ miles north of station, at a point about 10 miles from Rock Springs.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 29° 54' 15''-25. Longitude, 100° 19' 01''-08.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Wolf	165	00	31.22	344	59	04.03	<i>Meters.</i> 4.256860
Jasper	213	42	42.41	33	45	04.62	4.138375
Reagan	324	40	48.88	144	44	34.46	4.323848
Goode	351	23	51.59	171	24	39.74	4.240302
Ellis	45	24	39.03	225	20	05.09	4.317387

ELLIS.

Situated in Edwards Co., Tex., on high point on mountain, about 2 miles a little south of west of Ellis post-office, which is at the residence of Mr. Jerry Ellis.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 29° 46' 21''-43. Longitude, 100° 28' 11''-65.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Wolf.....	197	27	08.69	17	30	16.27	4.526210
Holliday.....	225	20	05.09	45	24	39.03	4.317387
Goode.....	278	28	33.21	98	33	54.55	4.245180
Nueces.....	320	20	14.75	140	24	22.67	4.324095

GOODE.

Situated in Edwards Co., Tex., on a high point on a divide about 7 miles east of Kickapoo Spring, which is on road between Rock Springs and Fort Clark, and about 35 miles from Fort Clark; about 6 miles west of the head of Cedar Creek.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 29° 44' 56''-80. Longitude, 100° 17' 24''-28.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Ellis.....	08	33	54.55	278	28	33.21	4.245180
Holliday.....	171	24	39.74	351	23	51.59	4.240302
Jasper.....	189	58	46.87	10	00	20.52	4.469488
Reagan.....	270	02	27.34	90	05	24.35	3.981609
Monte.....	337	14	57.08	157	17	36.13	4.349757
Nueces.....	16	10	07.36	196	08	54.57	4.152272

REAGAN.

Situated in Edwards Co., Tex., on the most eastern of two high cedar-covered knolls; on the south side and near the head of Cedar Creek.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 29° 44' 56''-45. Longitude, 100° 11' 27''-54.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Goode.....	90	05	24.35	270	02	27.34	3.981609
Holliday.....	144	44	34.46	324	40	48.88	4.323848
Monte.....	2	38	15.53	182	27	58.06	4.314879
Nueces.....	44	51	22.03	224	47	12.55	4.283584

NUECES.

Situated in Edwards Co., Tex., on a large lone mountain, about 3 miles north from Mr. Hillcote's ranch (post-office) and about 3 miles south-east from a spring known as Dobbs Run, on the West Nueces River.

[Latitude, 29° 37' 33''-84. Longitude, 100° 9' 51''-26.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Ellis.....	140	24	22.67	320	20	14.75	4.324095
Goode.....	196	08	54.57	16	10	07.36	4.152272
Reagan.....	224	47	12.55	44	51	22.03	4.283584
Monte.....	299	00	26.41	119	04	17.74	4.158905
Turkey.....	335	14	51.52	155	18	51.52	4.486057
Anacacho.....	354	54	35.34	174	55	54.13	4.689033
Las Moras.....	10	25	48.29	190	24	08.76	4.478883

MONTE.

Situated in Edwards Co., Tex., on a sharp peak in the southern part of Edwards County, near the Kinney County line, about 3½ miles north-east of Whistler post-office. The Whistler and Barksdale road passes about 1 mile west of the station.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 29° 33' 46"-53. Longitude, 100° 12' 02"-84.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nueces	119 04 17.74	299 00 26.41	4.158905
Goode	157 17 36.13	337 14 57.08	4.349757
Turkey	359 28 43.62	179 28 47.08	4.318473
Reagan	182 37 53.06	2 38 15.53	4.314879
Anacacho	11 17 24.35	191 14 53.30	4.628365
Las Moras	38 39 23.45	218 33 53.64	4.461748

TURKEY.

Situated in Kinney Co., Tex., on a lone mountain, about 16 miles a little north of east from Fort Clark. Point is well known.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 29° 22' 30"-25. Longitude, 100° 11' 55"-82.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Las Moras	84 23 45.81	264 18 13.51	4.263989
Monte	179 28 47.08	359 28 43.62	4.318473
Anacacho	22 11 46.58	202 09 12.53	4.352677
Nueces	155 18 45.64	335 14 51.52	4.486057
Fort Clark	70 47 06.90	250 40 38.65	4.354939

LAS MORAS.

Situated in Kinney Co., Tex., on a large, lone mountain, known as Las Moras Peak, about 4 miles northeast of Fort Clark.

Permanent mark: Rock cairn.

[Latitude, 29° 21' 31"-62. Longitude, 100° 23' 13"-43.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nueces	190 24 08.76	10 25 48.29	4.478883
Monte	218 33 53.64	38 39 23.45	4.461748
Turkey	264 18 13.51	84 23 45.81	4.263989
Anacacho	332 46 42.24	152 49 39.56	4.330812
Cline	305 57 05.70	126 04 18.75	4.470519
Spofford	6 01 17.44	186 00 38.68	4.310132

FORT CLARK.

Situated in Kinney Co., Tex.; not occupied.

Permanent mark: Flagstaff.

[Latitude, 29° 18' 27"-65. Longitude, 100° 25' 38"-14.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Turkey.....	250 40 38·65	70 47 06·90	4·354939
Anacacho.....	316 03 08·97	136 07 02·20	4·269139

CLINE.

In Kinney Co., Tex., on the southeast side of the Anacacho Mountains, about 4 miles southwest of Cline post-office; very near the eastern side of the mountains.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 29° 12' 07"-36. Longitude, 100° 08' 23"-00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Anacacho.....	83 15 20·51	263 11 05·51	4·152988
Las Moras.....	126 04 18·75	305 57 05·70	4·470519

ANACACHO.

Situated in Kinney Co., Tex., on a high knoll on the west side of the Anacacho Mountains, about 1 mile south from a station on the Southern Pacific Railroad known as Anacacho, very near the northern side of the mountain.

Permanent mark: Stone marked with a cross and U. S. G. S.

[Latitude, 29° 11' 12"-82. Longitude, 100° 17' 10"-78.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Las Moras.....	152 49 39·56	332 46 42·24	4·330812
Turkey.....	202 09 12·53	22 11 46·58	4·352677
Nueces.....	174 55 54·13	354 54 35·34	4·689033
Monte.....	191 14 53·30	11 17 24·35	4·628365
Cline.....	263 11 05·51	83 15 20·51	4·152988
Spoifford.....	84 00 29·35	263 56 53·88	4·079441
Fort Clark.....	136 07 02·20	316 03 08·97	4·269139

SPOFFORD (WATER TANK).

In Kinney Co., Tex. Not occupied. Water tank. Located in 1891.

[Latitude, 29° 10' 31"-91. Longitude, 100° 24' 32"-72.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Las Moras.....	186 00 38·68	6 01 17·44	4·3101324
Anacacho.....	263 56 53·88	84 00 29·35	4·0794410

CORNUDA.

In Lincoln Co., N. Mex., just north of Texas State line and about 2 miles south from the Cornuda Mountain and Spring, on what is locally known as Wind Mountain.

Permanent mark: Conical pile of rocks 5 or 6 feet in height on highest point of mountain.

[Latitude, 32° 01' 28''-44. Longitude, 105° 30' 57''-65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Salt.....	324 44 31·51	144 56 10·27	4·7822428
Quitman.....	358 54 54·94	178 55 31·28	4·9871645
North Franklin....	81 53 27·32	261 22 24·88	4·9702455
El Capitan.....	283 18 38·13	503 39 26·18	4·8039810
Cerro Alto.....	78 26 22·02	258 11 54·71	4·6424226

NORTH FRANKLIN.

On highest point of Franklin range of mountains in El Paso Co., Tex., about 10 or 12 miles north from town of El Paso.

Permanent mark: Conical pile of stones 7 or 8 feet in height.

[Latitude, 31° 54' 07''-24. Longitude, 106° 29' 35''-83.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Cornuda.....	261 22 24·88	81 53 27·32	4·9702455
Quitman.....	311 09 02·18	131 40 18·08	5·1010737

The Wheeler survey determined location of this point from astronomical station at El Paso and a short base line near El Paso. The coordinates given are: Latitude, 31° 54' 06''-81; longitude, 106° 29' 23''-40.

CERRO ALTO.

On highest point of Cerro Alto Mountain in El Paso Co., Tex., about 40 miles east of town of El Paso.

Permanent mark: Conical pile of rocks.

[Latitude, 31° 56' 39''-90. Longitude, 105° 58' 15''-05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Cornuda.....	258 11 54·71	78 26 22·02	4·6424226
Quitman.....	332 49 48·76	153 04 41·76	4·9956792

EL CAPITAN.

In El Paso Co., Tex., on highest point of Guadalupe Mountains and probably highest point in Texas.

Permanent mark: Conical pile of rocks.

[Latitude, 31° 53' 26"-38. Longitude, 104° 51' 39"-69.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Salt.....	38	09	27.15	218	00	24.34	<i>Meters.</i> 4.6438946
Cornuda.....	103	39	26.18	283	18	38.13	4.8039810

SALT.

In El Paso Co., Tex., on highest point of small isolated range of mountains, known as Sierra Prietta, about 35 miles northeast from Sierra Blanca.

Permanent mark: Top of culminating rock.

[Latitude, 31° 34' 40"-74. Longitude, 105° 08' 51"-69.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Eagle.....	355	20	35.69	175	22	31.67	<i>Meters.</i> 4.8640142
Quitman.....	35	01	10.05	214	50	16.04	4.7634401
Cornuda.....	144	56	10.27	324	44	31.51	4.7822428
El Capitan.....	218	00	24.34	38	09	27.15	4.6438946

SIERRA BLANCA.

In El Paso Co., Tex., on northern of two points of Sierra Blanca Peak.

Permanent mark: Conical pile of rocks about 6 or 8 feet high.

[Latitude, 31° 15' 05"-34. Longitude, 105° 26' 09"-64.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Mesa.....	298	07	27.64	118	16	14.40	<i>Meters.</i> 4.4851764
Quitman.....	27	01	38.84	206	59	45.58	4.1053004
Diablo.....	276	44	59.51	97	01	12.65	4.6393709
Chispa.....	305	39	59.56	125	53	26.69	4.9312553
Eagle.....	317	33	17.14	137	44	08.48	4.6957501

QUITMAN.

In El Paso Co., Tex., on highest point of Quitman Mountains.

Permanent mark: Pile of rocks about 6 feet in height.

[Latitude, 31° 08' 56"-68. Longitude, 105° 29' 48"-26.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Mesa.....	275	17	51.58	95	28	30.60	<i>Meters.</i> 4.5170143
Eagle.....	302	43	14.90	122	55	58.00	4.6694309
North Franklin.....	131	40	18.08	311	09	02.18	5.1010737
Cornuda.....	178	55	31.28	358	54	54.94	4.9871645
Salt.....	214	50	16.04	35	01	10.05	4.7634401
Cerro Alto.....	153	04	41.76	332	49	48.76	4.9956792
Sierra Blanca.....	206	59	45.58	27	01	38.84	4.1053004

DIABLO.

On eastern of two high points in Diablo Mountains, in El Paso Co., Tex., about 3 miles northwest from Hazel silver mines and about 30 miles southeast from Sierra Blanca.

Permanent mark: Conical pile of rocks with cedar tree in center.

[Latitude, 31° 11' 50''-54. Longitude, 104° 54' 52''-40.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Sierra Blanca.....	97	01	12.65	276	44	59.51	4.6993709
Eagle.....	28	03	51.05	207	58	33.98	4.5409601
Chispa.....	335	55	12.13	156	01	31.35	4.6810032
Vieja.....	344	39	12.43	164	46	27.83	4.9327801
Newman.....	285	10	16.73	105	36	09.93	4.9172799

EAGLE.

On highest peak in Eagle Mountains, sometimes called Livermore Peak, in El Paso Co., Tex., about 25 miles southeast from Sierra Blanca.

Permanent mark: Conical pile of rocks.

[Latitude, 30° 55' 14''-41. Longitude, 105° 05' 08''-13.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Sierra Blanca.....	137	44	08.48	317	33	17.14	4.6957501
Diablo.....	207	58	33.38	28	03	51.05	4.5409601
Newman.....	264	32	41.07	85	03	44.82	4.9847437
Chispa.....	289	59	46.68	110	11	20.22	4.5826138
Baldy.....	289	42	54.77	110	10	54.16	4.9677230
Vieja.....	322	59	54.09	143	12	21.96	4.8126761
Salt.....	175	22	31.67	355	20	35.69	4.8640142

CHISPA.

On highest point in mountains, about 4 miles north from Chispa, a station on the Galveston, Harrisburg and San Antonio Railroad, in Jeff Davis Co., Tex.

Permanent mark: Conical pile of rocks.

[Latitude, 30° 48' 07''-73. Longitude, 104° 42' 36''-10.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Eagle.....	110	11	20.22	959	59	46.68	4.5826108
Diablo.....	156	01	31.35	335	55	12.13	4.6810032
Sierra Blanca.....	125	53	26.69	305	30	59.89	4.9312553
Newman.....	249	53	33.71	70	12	59.89	4.8072184
Baldy.....	289	42	39.43	109	59	05.23	4.7371129
Vieja.....	355	32	32.57	175	33	30.34	4.5902392

NEWMAN.

On high point near northwest extremity of Davis Mountains, in Jeff Davis Co., Tex., about 3 or 4 miles northeast from Mr. Newman's

ranch and about three-fourths of a mile north from Antelope Spring.

Permanent mark: Conical pile of rocks with tree in center.

[Latitude, 30° 59' 58"·36. Longitude, 104° 04' 45"·31.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Diablo	105	36	09·93	285	10	16·73	4·9172709
Eagle	85	03	44·82	264	32	41·07	4·9847437
Chispa	70	12	59·89	249	53	33·71	4·8072184
Vieja	43	33	10·13	223	14	47·84	4·9218841
Baldy	12	39	43·39	192	36	48·71	4·6172386
Star	312	08	25·43	132	17	11·67	4·5653822

STAR.

A high detached mountain near northeast corner of Davis Mountains, in Jeff Davis Co., Tex. Mountain is in pasture known as Star Ranch, about 15 miles north from Fort Davis, and about 1 mile west from Lympha Creek, at point on road from Fort Davis to Victoria, 15 miles from former.

Permanent mark: Stone marked $\begin{array}{c} \text{U.} \\ \text{G.} \end{array} \begin{array}{c} | \\ | \\ \text{S.} \\ \text{S.} \end{array}$

[Latitude, 30° 48' 36"·32. Longitude, 103° 47' 40"·23.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Newman	132	17	11·67	312	08	25·43	4·5653822
Baldy	06	42	40·09	246	31	02·55	4·5977449
Chinati	35	53	56·59	215	33	12·62	5·0513069
Mount Ord.	335	42	44·44	155	51	14·20	4·8147622

BALDY.

The highest point of Davis Mountains, a little south of center of range, in Jeff Davis, Co., Tex.; sometimes called Livermore Peak; about 25 miles northwest from Marfa, and about 20 miles a little north of east from Valentine.

Permanent mark: Conical pile of rocks.

[Latitude, 30° 38' 05"·85. Longitude, 104° 10' 26"·27.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Newman	192	36	48·71	12	39	43·39	4·6172386
Chispa	109	59	05·23	289	42	39·43	4·7371129
Eagle	110	10	54·16	289	42	54·77	4·9677230
Vieja	67	24	10·97	247	08	47·88	4·7200918
Chinati	21	13	17·03	201	04	04·78	4·9090391
San Jacinto	347	47	01·94	167	53	37·83	4·9998026
Santiago	320	23	31·31	140	46	24·49	5·0600854
Mount Ord.	304	32	39·98	124	52	40·70	4·8861505
Star	246	31	02·55	66	42	40·09	4·5977449

VIEJA.

The highest point of Vieja range of mountains, in Presidio Co., Tex., about 15 miles southwest from Valentine and about 3 or 4 miles from Rio Grande River.

[Latitude, 30° 27' 07"-33. Longitude, 104° 40' 42"-70.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Eagle.....	143 12 21-96	322 59 54-09	4-8126761
Diablo.....	164 46 27-83	344 39 12-43	4-9327801
Chispa.....	175 33 30-34	355 32 32-57	4-5902892
Newman.....	223 14 47-84	43 33 10-13	4-9218841
Baldy.....	247 08 47-88	67 24 10-97	4-7200918
Mount Ord.....	281 35 28-89	102 10 44-07	5-05709310
Chinati.....	340 43 44-31	160 49 47-34	4-7081425

MARFA.

Cupola Court-House, county seat of Presidio Co., Tex.

[Latitude, 30° 18' 46"-12. Longitude, 104° 01' 20"-08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Chinati.....	47 50 25-38	227 36 41-60	4-7734994
Baldy.....	157 50 42-21	337 46 05-21	4-5862461

MOUNT ORD.

On highest point on Mount Ord, in Brewster Co., Tex., a large mountain about 12 miles a little south of east from Alpine, a station on the Galveston, Harrisburg and San Antonio Railroad.

Permanent mark: Conical pile of rocks.

[Latitude, 30° 14' 23"-04. Longitude, 103° 30' 56"-05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Baldy.....	124 52 40-70	304 32 39-98	4-8861505
Vieja.....	102 10 44-07	281 35 28-89	5-05709310
Chinati.....	71 18 22-53	250 49 25-00	4-9916155
San Jacinto.....	38 19 17-11	218 06 05-66	4-8362994
Santiago.....	347 57 28-02	168 00 26-62	4-6619233
Star.....	155 51 14-20	335 42 44-44	4-8147622
Chisos.....	349 30 09-00	169 36 24-00	5-0495105

CHINATI.

On highest point in the Chinati Mountains, in Presidio Co., Tex., about 45 miles southwest from Marfa, and at the head of Cibolo Creek, about 18 miles west from Shafter silver mines and about 4 miles from Mr. Poole's ranch.

Permanent mark: Conical pile of rocks.

[Latitude, 29° 57' 09''-32. Longitude, 104° 28' 41''-05.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Vieja	160	49	47.34	340	43	44.31	4.7681425
Baldy	201	04	04.78	21	13	17.03	4.9090391
Star	215	33	12.62	35	53	56.59	5.0513072
Mount Ord	250	49	25.00	71	18	22.53	4.9916155
Santiago	277	00	07.31	97	31	52.08	5.0144016
San Jacinto	293	28	08.54	113	43	45.32	4.7413449
Marfa	227	36	41.60	47	50	25.38	4.7734994
Chisos	304	19	09.00	124	53	55.00	5.1399097

SAN JACINTO.

On highest point of San Jacinto Mountain, in Presidio Co., Tex., about 6 miles a little east of south from Alamita, an abandoned post-office, about 50 miles south from Marfa, very near the line between Presidio and Brewster counties.

Permanent mark: Conical pile of rocks.

[Latitude, 29° 45' 12''-59. Longitude, 103° 57' 19''-11.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Chinati	113	43	45.32	293	28	08.54	4.7413449
Baldy	167	53	37.83	347	47	01.94	4.9998026
Mount Ord	218	06	05.66	38	19	17.11	4.8362994
Santiago	260	04	22.01	80	20	25.89	4.7232080

SANTIAGO.

On highest part of Santiago Mountain, in Brewster Co., Tex., a well known mountain about 18 miles a little north of east from Mr. Collinson's ranch.

Permanent mark: Conical pile of rocks.

[Latitude, 29° 50' 04''-66. Longitude, 103° 24' 59''-26]

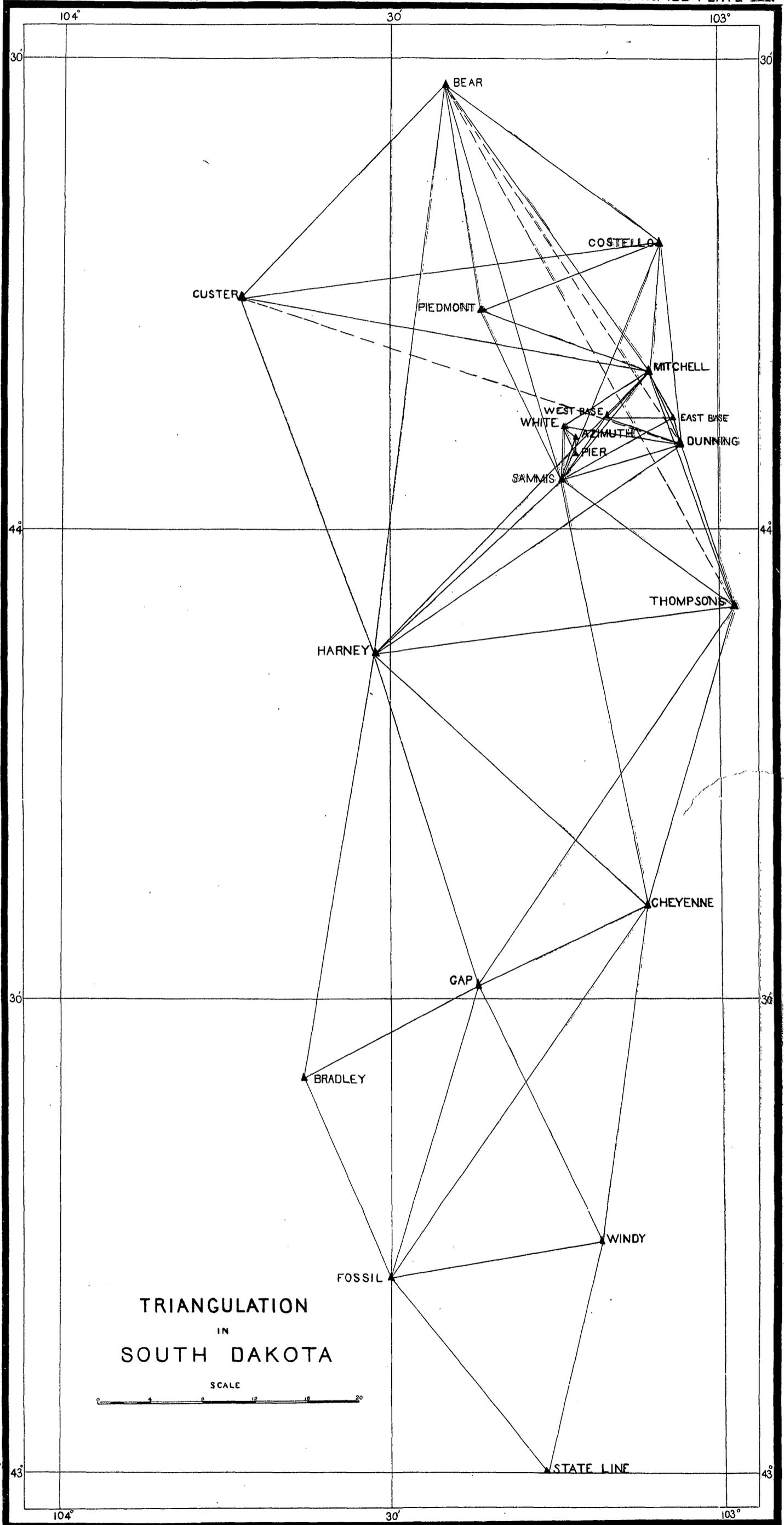
To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Mount Ord	168	00	26.62	347	57	28.02	4.6619233
Baldy	140	46	24.49	320	23	31.31	5.0600854
Chinati	97	31	52.08	277	00	07.31	5.0144016
San Jacinto	80	20	25.89	260	04	22.01	4.7232080

CHISOS.

In southern portion of Foley Co., Tex., near Rio Grande. Highest point in Chisos Mountains. Not occupied.

[Latitude, 29° 14' 43''-36. Longitude, 103° 18' 19''-90.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Mount Ord	169	36	24.00	349	30	09.00	5.0495105
Chinati	124	53	55.00	304	19	09.00	5.1399097



SOUTH DAKOTA.

METHODS OF WORK.

The area actually covered by the work in the Black Hills is about 2,500 square miles, extending from the Nebraska state line, latitude $43^{\circ} 00'$, to latitude $44^{\circ} 30'$.

The work was commenced in 1891 by Mr. C. H. Fitch, who selected a site for a base line of which he made a preliminary measurement. The line is in the valley of Box Elder Creek about 4 miles northeast of Rapid City. Mr. W. S. Post, in the same year, built signals at a few stations of the expansion, but was prevented by bad weather from measuring the final angles.

In the fall of 1893 Mr. E. M. Douglas remeasured the base line and located eighteen stations in its development and in the main system of triangulation, including the connection with the astronomical pier at Rapid City. The base line was measured three times with a 300-foot steel tape; temperature was taken at each tape length; the line was supported at each 50 feet and was under a uniform tension of 20 pounds. The adopted length of the line after making corrections for slope, temperature, reduction to sea level, etc., is 25,796.115 feet (nearly 5 miles), and the probable error of the three measurements is 0.84 inch.

The initial astronomical point on which the triangulation depends is a pier in the county court-house yard in Rapid City, the position of which was determined by Mr. S. S. Gannett, in 1890, by latitudes from zenith distances and longitudes from telegraphic exchange of time with St. Louis observatory. Mr. Gannett at the same time fixed a point on the meridian about 1 mile north. From this meridian the azimuths were computed.

Observations were taken by single and combined directions and the whole scheme of triangulation was divided into blocks of about 5 stations each and adjusted by least squares. The stations and signals consisted of low tripods of lumber with a signal pole in the center, under which the instrument was placed.

DESCRIPTIONS AND POSITIONS OF STATIONS.

BEAR BUTTE.

Very prominent butte about 5 miles northeast of Sturgis, in Meade Co., S. Dak., known to every one within 25 miles.

Permanent mark:

U. S.
+
G. S.

cut on large boulder. Stone projects about 6 inches above surface of ground.

[Latitude, $44^{\circ} 28' 34''$.4. Longitude, $103^{\circ} 25' 08''$.9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Custer.....	43 52 42	223 39 44	4·5515290
Costello	306 08 11	126 21 58	4·5111050

CUSTER PEAK.

Local name for highest peak in Lawrence Co., S. Dak., about 3 miles southwest of Brownsville station, on narrow-gauge railroad from Piedmont to Lead.

Permanent mark: Rock monument about 6 feet high and 5 feet in diameter at the base; 5-inch pine pole in the center.

[Latitude, $44^{\circ} 14' 41''$.4. Longitude, $103^{\circ} 43' 41''$.1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Mitchell.....	279 53 51	100 19 54	4·7036670
Bear Butte	223 39 44	43 52 42	4·5515290

PIEDMONT.

Lone peak, about 2 miles east of Piedmont station, Fremont, Elkhorn and Missouri Valley Railroad, in Meade Co., S. Dak. Local name is Miller's butte.

Permanent mark:

U. S.
+
G. S.

cut on large rock, which projects about 5 inches above the ground.

[Latitude, $44^{\circ} 13' 55''$.8. Longitude, $103^{\circ} 21' 40''$.5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Costello.....	249 43 58	69 55 18	4·3618527
Mitchell.....	289 59 27	110 10 08	4·3376719
Sammis.....	333 43 06	153 48 16	4·3487698

COSTELLO.

On high knoll on summit of ridge north of Elk Creek, in Meade Co., S. Dak., in the SE. $\frac{1}{4}$ of sec. 13, T. 4 N., R. 8 E. The hill breaks off rapidly about 50 yards east and west and 100 yards north, the station being on a spur from the main ridge or divide.

Permanent mark is on a large stone projecting about 4 inches above surface of ground, marked

U. S.
+
G. S.

[Latitude, 44° 18' 12''-9. Longitude, 103° 05' 26''-8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bear Butte.....	126 21 58	306 08 11	4·5111050
Piedmont.....	69 55 18	249 43 58	4·3618527

MITCHELL.

On summit of ridge next north of Box Elder Creek, in Meade Co., S. Dak., in sec. 2, R. 8 E., T. 2 N. Section line is about 440 feet east. There is small board cabin 515 feet northeast.

Station marked by large stone, which projects 10 inches above surface of ground. Stone marked

U. S. G. S.
+

[Latitude, 44° 09' 53''-8. Longitude, 103° 06' 20''-1.]

To station:	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Piedmont.....	110 10·08	289 59 27	4·3376719
Sammis.....	40 12 33	220 07 01	4·2155180
Dunning.....	336 08 42	156 10 38	3·9652013
Custer Peak.....	100 19 54	279 53 51	4·7036670

WEST BASE.

At west end of base line as marked out in 1893, in Pennington Co., S. Dak. In flat in SE. $\frac{1}{4}$ of NW. $\frac{1}{4}$ of sec. 20, R. 8 E., T. 2 N. The quarter corner post (center of sec. 20) is 75·5 feet distant, east of south. Station center marked on a large boulder projecting about 4 inches above ground and marked

U. S. G. S.
+
W. B.

the + being the center of the station. Reference points, 25 feet distant, are placed on the base line east of station, and two at 90 degrees from it, each marked R + P, the arrow pointing toward the station and the + being 25 feet distant from it. The one on the base line is about 6 inches east of the fence line.

[Latitude, 44° 07' 09''-2. Longitude, 103° 10' 29''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Dunning.....	289 53 54	109 58 44	3·9938653
East Base.....	271 06 43	91 11 49	3·8955654

WHITE.

On highest of the foothills, $2\frac{1}{2}$ miles northwest of the court-house, Rapid City, Pennington Co., S. Dak. Station is on eastern slope of hill, about 50 yards north of the highest point.

Permanent mark is U. S. + cut in bed rock (limestone) level with surface of ground. White's ranch is about three-fourths of a mile east. An old wood road from Rapid City goes nearly to the station. This station was used in connecting latitude and longitude station in court-house yard with the main scheme of triangulation.

[Latitude, $44^{\circ} 06' 53''\cdot 7$. Longitude, $103^{\circ} 14' 12''\cdot 0$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sammis.....	000 49 04	180 49 01	3·8447879
Dunning.....	281 23 54	101 31 19	4·1618680

ASTRONOMICAL PIER.

A brick pier in court-house yard, Rapid City, in Pennington Co., S. Dak., about 75 feet west of the southwest corner of the court-house. The pier extends about 3 feet below surface of ground and about 30 inches above; it has a dressed sandstone cap marked U. S. G. S. The position of this point was determined astronomically by S. S. Gannett in 1890.

[Latitude, $44^{\circ} 04' 45''\cdot 24$. Longitude, $103^{\circ} 12' 59''\cdot 28$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Meridian Mark ...	180 00 00	00 00 00	3·3108

SAMMIS.

About 2 miles southwest of Rapid City, on the first knoll at the top of the hill, about 50 yards west of the Rapid City and Rockerville road and telephone line, in Pennington Co., S. Dak. The road reaches the summit of the hill about 100 yards south.

Station marked by a large stone projecting about 10 inches above the ground, marked

U. S.
+
G. S.

[Latitude, $44^{\circ} 03' 07''\cdot 1$. Longitude, $103^{\circ} 14' 16''\cdot 5$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Dunning.....	253 56 21	74 03 49	4·1735420
Mitchell.....	220 07 01	40 12 33	4·2155180
Piedmont.....	153 48 16	333 43 06	4·3487698
Harney Peak.....	48 13 32	228 01 37	4·4894670
White.....	180 49 01	0 49 04	3·8447879

EAST BASE.

On a spur from the main ridge, on the north side of Box Elder Creek in Pennington Co., S. Dak. In the NE. $\frac{1}{4}$ of SW. $\frac{1}{4}$ of sec. 19, T. 2 N., R. 9 E. The station center is a + on a large rock projecting about 4 inches above surface of ground and marked

U. S. G. S.

+

E. B.

Reference stones 25 feet distant, one on the line toward West Base and two at right angles to the line are marked R ∇ P, the arrow pointing toward the station and the + being 25 feet distant therefrom.

[Latitude, 44° 07' 04". Longitude, 103° 04' 35".5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Dunning.....	336 17 40	156 18 24	3·5437858
West Base.....	91 11 49	271 06 43	3·8955654

DUNNING.

On summit of divide between Box Elder and Rapid creeks, in Pennington Co., S. Dak. In sec. 8, T. 1 N., R. 10 E.

Permanent mark: Large round-topped boulder projecting above surface of ground about 8 inches and marked

U. S.

+

G. S.

[Latitude, 44° 05' 20".3. Longitude, 103° 03' 32".3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Thompson Butte	341 08 15	161 11 36	4·3010173
Mitchell	156 10 38	336 08 42	3·9652013
East Base	156 18 24	336 17 40	3·5437858
Sammis	74 03 49	253 56 21	4·1735420
West Base	109 58 44	289 53 54	3·9938653
White	101 31 19	281 23 51	4·1618680

HARNEY PEAK.

Well-known local name for the highest peak of Black Hills, in Pennington Co., S. Dak. There are two summits, the station is on the northern one, and about the center of the highest part as seen from east.

Permanent mark: A three-fourths inch iron bolt leaded into a hole drilled into the rock. Bolt is on the west slope of rock and its top

is about level with the rock 3 inches east. This mark is center of station.

[Latitude, 43° 51' 59''-6. Longitude, 103° 31' 27''-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gap	342 04 07	162 10 37	4·6142306
Cheyenne.....	311 48 16	132 05 21	4·6497967
Bradley.....	8 44 20	188 40 25	4·7015755
Sammis.....	228 01 37	48 13 32	4·4894670
Thompson Butte.	262 17 52	82 40 35	4·6457526

THOMPSON BUTTE.

A prominent and well-known conical-shaped peak, in Pennington Co., S. Dak., about 15 miles southeast of Rapid City and about 5 miles south of Rapid Creek. The station center is about 5 feet south of the highest point. Stone 10 inches square projecting 3 inches above the ground is marked

U. S.
+
G. S.

[Latitude, 43° 55' 07''-0. Longitude, 102° 58' 42''-5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Harney Peak.....	82 40 35	262 17 52	4·6457562
Cheyenne.....	16 51 03	196 45 31	4·5707447
Dunning.....	161 11 36	341 08 15	4·3010173

CHEYENNE.

At highest point of divide, 13 miles northeast of Buffalo Gap, in Custer Co., S. Dak., about 4 miles south of Smith's ranch on French Creek.

Permanent mark:

U. S.
+
G. S.

cut on a boulder that projects about 3 inches above the ground. There has been an old rock pile about 6 feet south.

[Latitude, 43° 35' 52''-6. Longitude, 103° 06' 43''-5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gap	65 49 36	245 39 02	4·3550398
Windy.....	8 21 55	188 18 58	4·6004321
Harney Peak.....	132 05 21	311 48 16	4·6497967
Thompson Butte.....	196 45 31	16 51 03	4·5707447

GAP.

On the highest point of the ridge, about 3 miles northwest of Buffalo Gap town, near the edge of the bluff, in Custer Co., S. Dak. An old

rock pile about 6 feet northeast. Center of station marked by one-half inch brass bolt in bed rock, set with plaster of paris. Projects up above rock one-half inch. U. S. G. S. cut on same rock. Bolt is 11½ inches south of center of last S.

[Latitude, 43° 30' 51" 0. Longitude, 103° 22' 03" 4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bradley.....	62 35 32	242 25 10	4 3597806
Fossil.....	17 26 46	197 21 19	4 5548890
Windy.....	333 34 51	153 42 26	4 5265574
Cheyenne.....	245 39 02	65 49 36	4 3550398
Harney Peak.....	162 10 37	342 04 07	4 6142306

BRADLEY.

On a projecting point of the ridge, on south side of Minnekahta Creek, about 8 miles west of Hot Springs, in Fall River Co., S. Dak. The station is on nearly the highest part of the ridge. The ridge slopes gently toward the south, and is called Bradley's Flat. Jones's sheep ranch is about 3 miles north.

Permanent mark:

U. S.
+
G. S.

cut on the bed rock (soft sandstone), about 2 inches below the surface of the ground. There are two large stones piled on each tripod leg. The leg furthest northeast has one large piece of petrified log on it, and U. S. is cut on the side. There is a hay road from the valley to the top of the flat, running up the side of the hill one-fourth of a mile east of the station.

[Latitude, 43° 25' 08" 5. Longitude, 103° 37' 07" 0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gap.....	242 25 10	62 35 32	4 3597806
Harney Peak.....	188 40 25	8 44 20	4 7015755

FOSSIL.

A knob at the head of Tepee Creek, Fall River Co., S. Dak., at the divide between Tepee and Dry creeks, about 14 miles north of west from Oelrichs.

Permanent mark: + U. S. G. S. cut on the cap rock (brittle limestone); the + is 6 inches northwest of the center of the U.

[Latitude, 43° 12' 21" 52. Longitude, 103° 30' 00" 0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
State Line.....	320 08 41	140 18 13	4 4711761
Gap.....	197 21 19	17 26 46	4 5548890

WINDY.

A butte about 5 miles southeast of Smithwick, in Fall River Co., S. Dak., 5 miles northeast of Oelrichs, and 3 miles south of Codner's Ranch.

Station marked on a piece of limestone about 6 inches thick by 12 inches by 15 inches, buried flush with the ground. Stone is marked U. S. + G. S.

[Latitude, 43° 14' 35''-0. Longitude, 103° 11' 00''-5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
State Line.....	14 18 00	194 14 33	4.4427422
Cheyenne.....	188 18 58	8 21 55	4.6004321
Gap.....	153 42 26	333 34 51	4.5265574

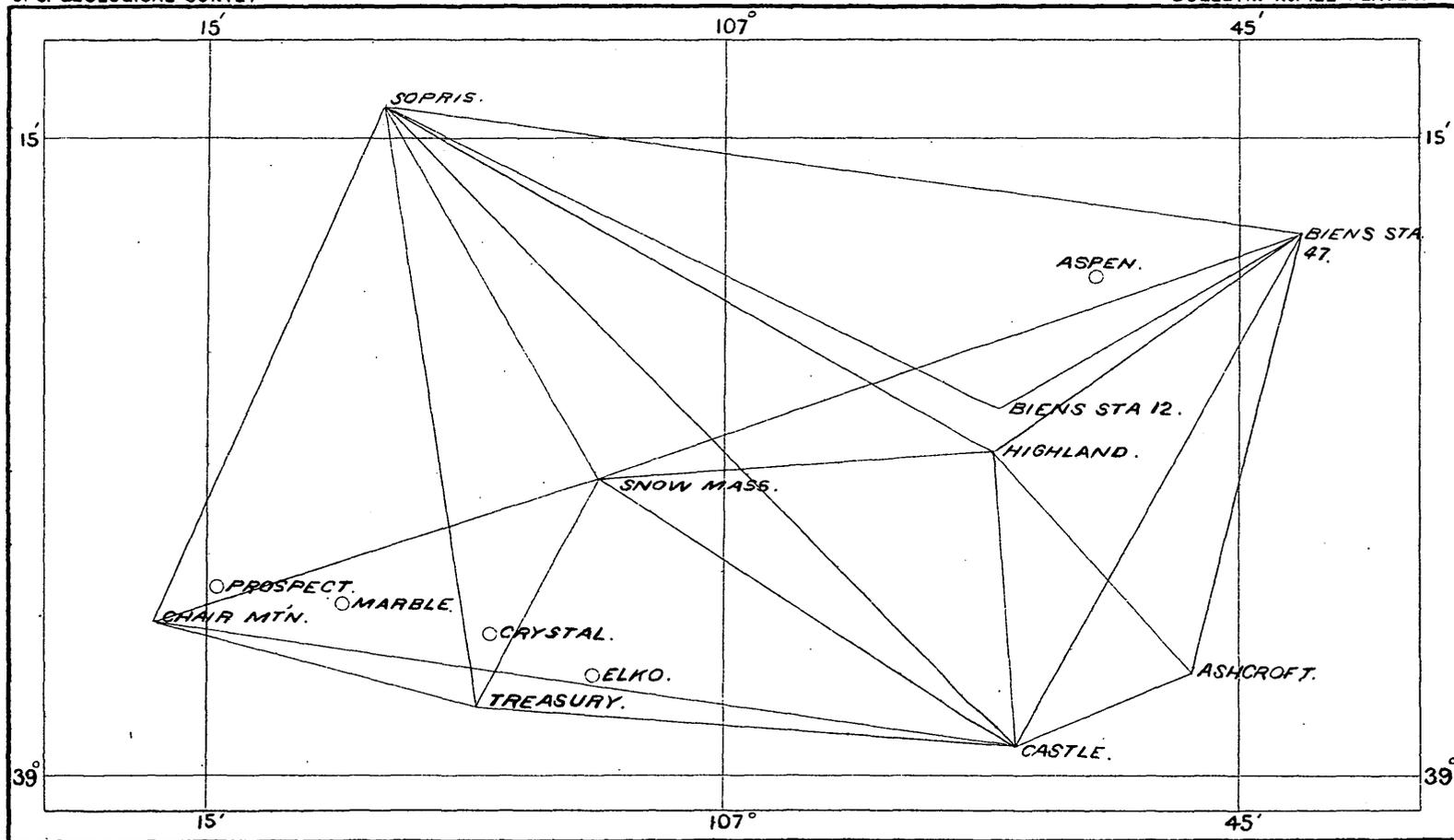
STATE LINE.

About 1½ miles west of the Fremont, Elkhorn and Missouri Valley Railroad track, in Dawes Co., Nebr. On the highest part of a knoll 186.2 feet from the 184½ milepost of the Nebraska-South Dakota State line, as located in 1892-'93 and marked by large stone posts set every half mile. The station is due south of the State line 89½ feet.

Center point of station is a nail in a 2 by 4 stake which projects above ground about 6 inches.

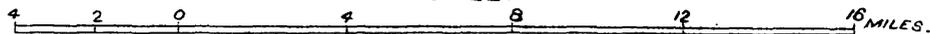
[Latitude, 43° 00' 04''-5. Longitude, 103° 16' 02''-7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Windy.....	194 14 33	14 18 00	4.4427422
Fossil.....	140 18 13	320 08 41	4.4711761



TRIANGULATION OF ASPEN, COLORADO.

SCALE.



THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

ASPEN, COLO.

METHODS OF WORK.

This work was commenced in 1891 by Morris Bien, who measured a base line 1 mile in length along one of the streets of Aspen. This line was expanded and a number of stations located for immediate use in making a large scale map of the mining district. In 1893 the triangulation was extended over an area of about 400 square miles by E. M. Douglas.

An attempt was made to compute a base line for the work from two unclosed triangles of the Hayden survey, but as the two values for the line thus computed differed materially they were both rejected and the line between Bien's station 12 and 47 as computed by him was adopted for a base. It so happened that this distance is nearly the mean of the two determinations from the Hayden angles. The initial latitude and longitude for the work are from the U. S. C. & G. S. position of Treasury Mountain, a station in the transcontinental scheme. The azimuth is from the U. S. C. & G. S. determination at the same point. The positions thus derived differ from the Hayden location about 9 seconds in latitude and 18 seconds in longitude. Angles were measured by the method of repetition in sets of five, using an 8-inch vernier theodolite reading, to 10 seconds. The stations and figures were arbitrarily adjusted, the limited extent of the work not justifying the adjustment by least squares.

DESCRIPTIONS AND POSITIONS OF STATIONS.

SOPRIS.

A well-known peak, about 20 miles west of Aspen, in Pitkin Co., Colo. Station is on the southeast summit.

Permanent mark: A large rock pile, same place as the Hayden Station. A good trail leads from an old sawmill to top of divide, 1 mile south of the peak.

[Latitude, 39° 15' 36".2. Longitude, 107° 09' 57".4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Highland	300 25 43	120 36 38	4 460953
Snow Mass	331 43 59	151 47 43	4 254617
Treasury	348 16 24	168 18 53	4 447570
Chair Mountain	24 15 54	204 11 27	4 398718
Bien's Station (47)	276 26 47	96 43 06	4 572241
Bien's Station (12)	296 58 48	117 09 54	4 453768
Castle Peak	316 41 18	136 52 48	4 583794

BIEN'S STATION (47).

A small blazed pine tree, on a grassy slope, on east or north side of Hunter Creek, in Pitkin Co., Colo., about 5 miles from Aspen. There is an abandoned sawmill about 1 mile west.

[Latitude, $39^{\circ} 13' 17''$.4. Longitude, $106^{\circ} 44' 10''$.5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bien's Station (12).....	53 47 46	233 42 35	4·165618
Sopris	96 43 06	276 26 47	4·572241
Ashcroft	10 25 08	190 23 32	4·308365

BIEN'S STATION (12).

On ridge, about 1 mile north of Highland, in Pitkin Co., Colo.
Permanent mark: A small pine tree, blazed and marked U. S. G. S.

[Latitude, $39^{\circ} 08' 36''$.7. Longitude, $106^{\circ} 52' 22''$.4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sopris	117 09 54·7	296 58 48	4·453768
Bien's Station (47).....	233 42 35·5	53 47 46·3	4·165618

HIGHLAND.

The highest point of the ridge on west side of Castle Creek, at the mouth of Conundrum (or West Castle) Creek and opposite the settlement of Highland, in Pitkin Co., Colo.

Permanent mark: Large rock monument.

[Latitude, $39^{\circ} 07' 40''$.2. Longitude, $106^{\circ} 52' 39''$.9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sopris	120 36 38	300 25 43	4·460953
Snow Mass	86 01 54	265 54 43	4·216278
Ashcroft.....	318 14 44	138 18 28	4·109715

SNOW MASS.

A well-known peak, about 11 miles southwest of Aspen, in Pitkin Co., Colo., about 3 miles east of Crystal post-office and about same distance south of Capitol Peak. Hayden triangulation point.

Permanent mark: A large upright rock on highest part of peak.

[Latitude, $39^{\circ} 07' 02''$.7. Longitude, $107^{\circ} 04' 03''$.2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sopris	151 47 43	331 43 59	4·254617
Highland	265 54 43	86 01 54	4·216278
Treasury	13 41 26	193 40 12	4·077312

ASHCROFT.

On the summit of the ridge southeast of Ashcroft town, in Pitkin Co., Colo. Large stone monument with central pole marks the station.

[Latitude, 39° 02' 28". Longitude, 106° 46' 43".4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Highland	138 18 28	318 14 44	4·109715
Bion's Station (47).	190 23 32	10 25 08	4·308365

CASTLE PEAK.

A well-known peak, about 12 miles south of Aspen, in Pitkin Co., Colo., highest peak within 25 miles. Round top summit about 100 by 30 feet in extent.

Permanent mark: Large rock monument with pole in center.

[Latitude, 39° 00' 29". Longitude, 106° 51' 44".0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Sopris	136 52 48	316 41 18	4·583794

TREASURY.

A round topped peak, about 3 miles south of Crystal Post-Office, in Gunnison Co., Colo., U. S. C. & G. S. Station (primary point for trans-continental triangulation). A mining trail which starts at Elko runs over the summit and within 50 feet of the station.

[Latitude, 39° 00' 46". Longitude, 107° 06' 00".7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Sopris	168 18 53	348 16 24·0	4·447570
Snow Mass.....	193 40 12	13 41 26·0	4·077312
Chair Mountain..	107 06 26	286 59 30·5	4·220116

CHAIR MOUNTAIN.

Well-known point on west side of Rock Creek about 3 miles southwest of Prospect, in Gunnison Co., Colo. Large rock monument on highest point.

[Latitude, 39° 03' 24". Longitude, 107° 17' 00".6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Treasury	286 59 30·5	107 06 26	4·220116
Sopris	204 11 27·5	24 15 54	4·393718

WYOMING.

METHODS OF WORK.

The scheme of triangulation at Laramie, Wyo., depends upon an astronomical station at Laramie determined in 1872 by the U. S. Geographical Surveys west of the one hundredth meridian. The instrument used was a Wurdemann zenith telescope, J. H. Clark being the observer. Telegraphic communication for longitude was made with Salt Lake City, Utah. During September, 1892, Mr. Frank Tweedy, of the U. S. Geological Survey, made a small development from a short base measured along the ties of the Union Pacific Railroad just north of the town of Laramie. Two measurements were made with a 300-foot steel tape during a cloudy day, giving the following results:

	Feet.
First measurement corrected for temperature and inclination	13, 040. 115
Second measurement corrected for temperature and inclination.....	13, 040. 389
Difference	0. 274
Mean base reduced to sea level.....	13, 035. 813

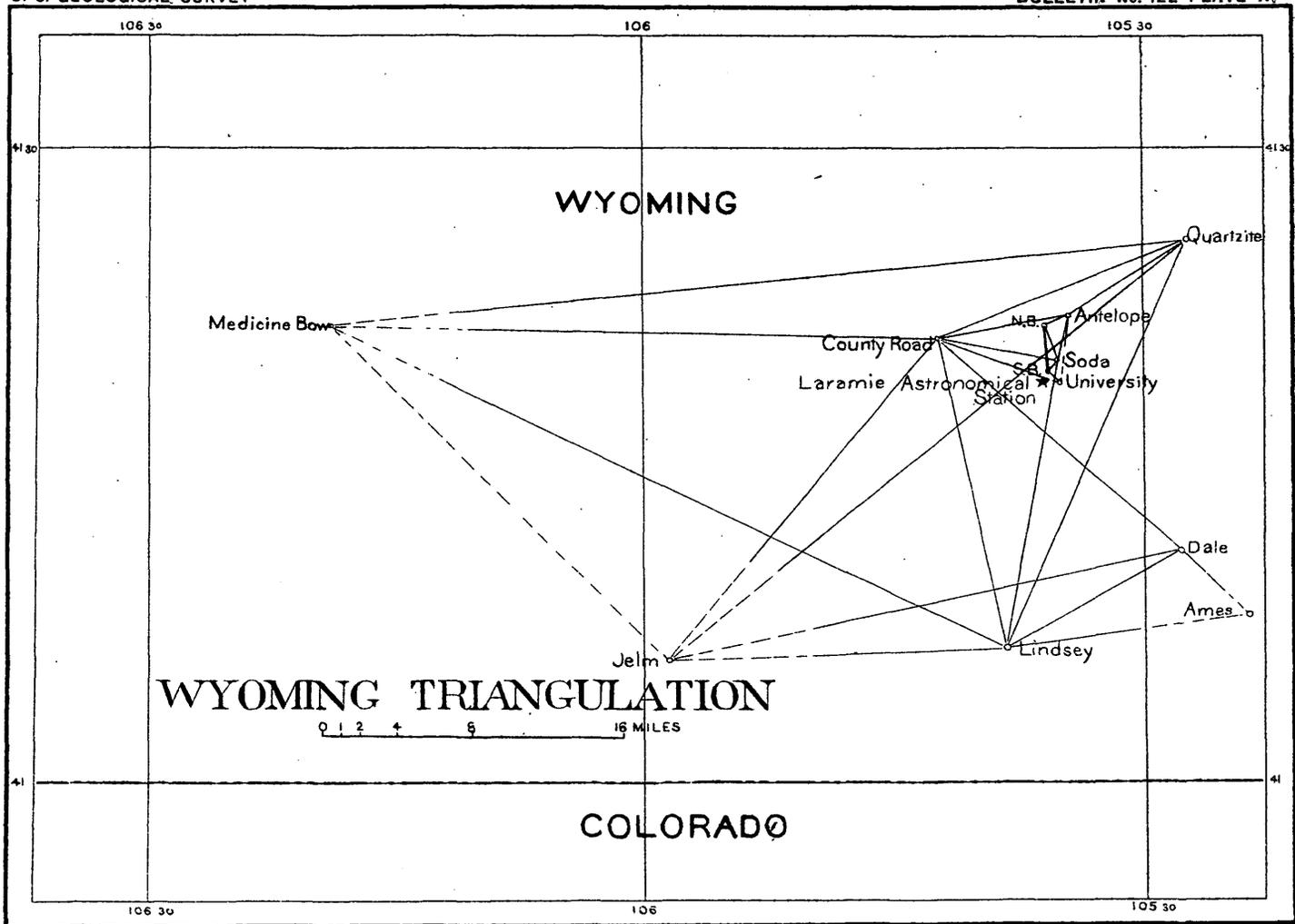
This base was selected and measured hurriedly in order to give the topographic parties immediate control for their work, it being the intention to remeasure it later in the season or to select a new base which would afford a better development, but this plan was not carried out. The ends of the base were not marked permanently but were transferred to two points, Soda and Antelope. The astronomical station was connected with Soda through University and not with the temporary base.

Since the astronomical station was established the city of Laramie has grown up around it, and it is now surrounded by trees and dwellings. The dome of the State University was connected with the station by a series of measurements along the streets of the town with a solar transit and a 300-foot steel tape. The instrument used in this triangulation was an 8-inch Fauth micrometer microscope theodolite. Tripod signals were built on all stations occupied in advance of the angle work. No least square adjustment has been applied to the triangulation.

DESCRIPTIONS AND POSITIONS OF STATIONS.

SODA.

On south edge of Red Mesa, one-half a mile north of Laramie, in Albany Co., Wyo., and two-thirds of a mile east of Soda Mill.



Permanent mark: A piece of 3-inch iron pipe 4 feet long set 3 feet in the ground with cross cut on top.

[Latitude, $41^{\circ} 20' 10''$.28. Longitude, $105^{\circ} 35' 02''$.97.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Antelope	194 03 50	14 04 17	3.5808681
County road	99 11 38	279 06 52	4.0089511
Quartzite	226 32 15	46 37 16	4.1634587
University	355 13 33	175 13 39	3.4108516

UNIVERSITY.

Dome of the State University at Laramie, in Albany Co., Wyo.

[Latitude $41^{\circ} 18' 47''$.09. Longitude, $105^{\circ} 34' 53''$.75.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Soda.....	175 13 39	355 13 33	3.4108516

ASTRONOMICAL PIER.

In block 166 Laramie, in Albany Co., Wyo., between Union Pacific Railroad and Second street and North A street and University avenue. It is in the west end of house lot No. 8 (Hayward). The wooden pier has been removed, but a small depression in the ground is pointed out as the original position of the observing block. Determined by the U. S. Geographical Surveys west of the one hundredth meridian, in 1872.

[Latitude, $41^{\circ} 18' 51''$.80. Longitude, $105^{\circ} 35' 33''$.60.]

ANTELOPE.

On low grassy butte $2\frac{1}{2}$ miles northeast of Soda Mill, at Laramie, in Albany Co., Wyo.

Permanent mark: A piece of 3-inch iron pipe 4 feet long set 3 feet in the ground with cross cut on top.

[Latitude, $41^{\circ} 22' 10''$.06. Longitude, $105^{\circ} 34' 23''$.14.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Soda.....	14 04 17	194 03 50	3.5808681
County Road	79 22 51	259 17 38	4.0490181
Quartzite.....	236 45 17	56 49 51	4.0621799

COUNTY ROAD.

On highest part of grassy prairie, in Albany Co., Wyo., 8 miles northwest of Laramie, on county road. A bluff on north descends to a lake basin.

Permanent mark: A large stone set 2 feet in the ground with cross on lead bolt in center.

[Latitude, $41^{\circ} 21' 02'' \cdot 92$. Longitude, $105^{\circ} 42' 16'' \cdot 45$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lindsey	348 18 12	168 20 52	4·4455596
Dale	312 32 22	132 42 00	4·4429087
Antelope	259 17 38	79 22 51	4·0490181
Soda	279 06 52	99 11 38	4·0089511

QUARTZITE.

On high ridge, 10 miles northeast of Laramie, in Albany Co., Wyo., about $1\frac{1}{2}$ miles south of main wagon-road crossing.

[Latitude, $41^{\circ} 25' 34'' \cdot 91$. Longitude, $105^{\circ} 27' 27'' \cdot 53$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Soda	46 37 16	226 32 15	4·1634587
Lindsey	22 54 35	202 47 29	4·5882876
Medicine Bow	84 29 56	263 55 55	4·8577944
Antelope	56 49 51	236 45 17	4·0621799

DALE.

On timbered ridge 10 miles southeast of Laramie, Albany Co., Wyo. A cross-country road from Laramie to Sherman runs along the side of the ridge about one-eighth of a mile east of station.

[Latitude, $41^{\circ} 10' 54'' \cdot 33$. Longitude, $105^{\circ} 27' 39'' \cdot 88$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
County Road	132 42 00	312 32 22	4·4429087
Ames	315 15 29	135 18 04	3·8923764
Lindsey	60 02 23	239 55 26	4·2325042

AMES.

The Ames monument on the Union Pacific Railroad, at Sherman, in Albany Co., Wyo. Not occupied.

[Latitude, $41^{\circ} 07' 54'' \cdot 55$. Longitude, $105^{\circ} 23' 44'' \cdot 32$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lindsey	81 40 17	261 30 45	4·3119835
Dale	135 18 04	315 15 29	3·8923764

LINDSEY.

On butt of long, bare ridge, running north from high-timbered mesa, 20 miles south of Laramie, in Albany Co., Wyo. One mile north of station are two springs, at a deserted sheep ranch on edge of dry lake.

[Latitude, 41° 06' 17''-33. Longitude, 105° 38' 14''-08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
County Road	168 20 52	348 18 12	4.4455596
Dale	239 55 26	60' 02 23	4.2325042
Ames	261 30 45	81 40 17	4.3119835
Medicine Bow	116 48 46	296 21 58	4.8031279
Jelm	88 32 10	268 18 51	4.4526265
Quartzite	202 47 29	22 54 35	4.5882876

JELM.

Timbered peak, known as Jelm Mountain, in Albany Co., Wyo., 25 miles southwest of Laramie, and 2 miles southeast of Woods Post-Office, on the Big Laramie River. Elevation, 9,676 feet.

Has not been occupied.

[Latitude, 41° 05' 52''-06. Longitude, 105° 58' 28''-70.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lindsey	268 18 51	88 32 10	4.4526265

MEDICINE BOW.

Known as Medicine Bow Peak, the highest point of the Medicine Bow Range, at heads of Little Laramie River and Medicine Bow Creek, about 38 miles west of Laramie, in Albany Co., Wyo. Elevation, 12,085 feet. Location, approximate.

Signal: None. Has not been occupied.

[Latitude, 41° 21' 39''-4. Longitude, 106° 18' 54''-2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Quartzite	263 55 55	84 29 56	4.8577944
Lindsey	296 21 58	116 48 46	4.8031279

MONTANA.

METHODS OF WORK.

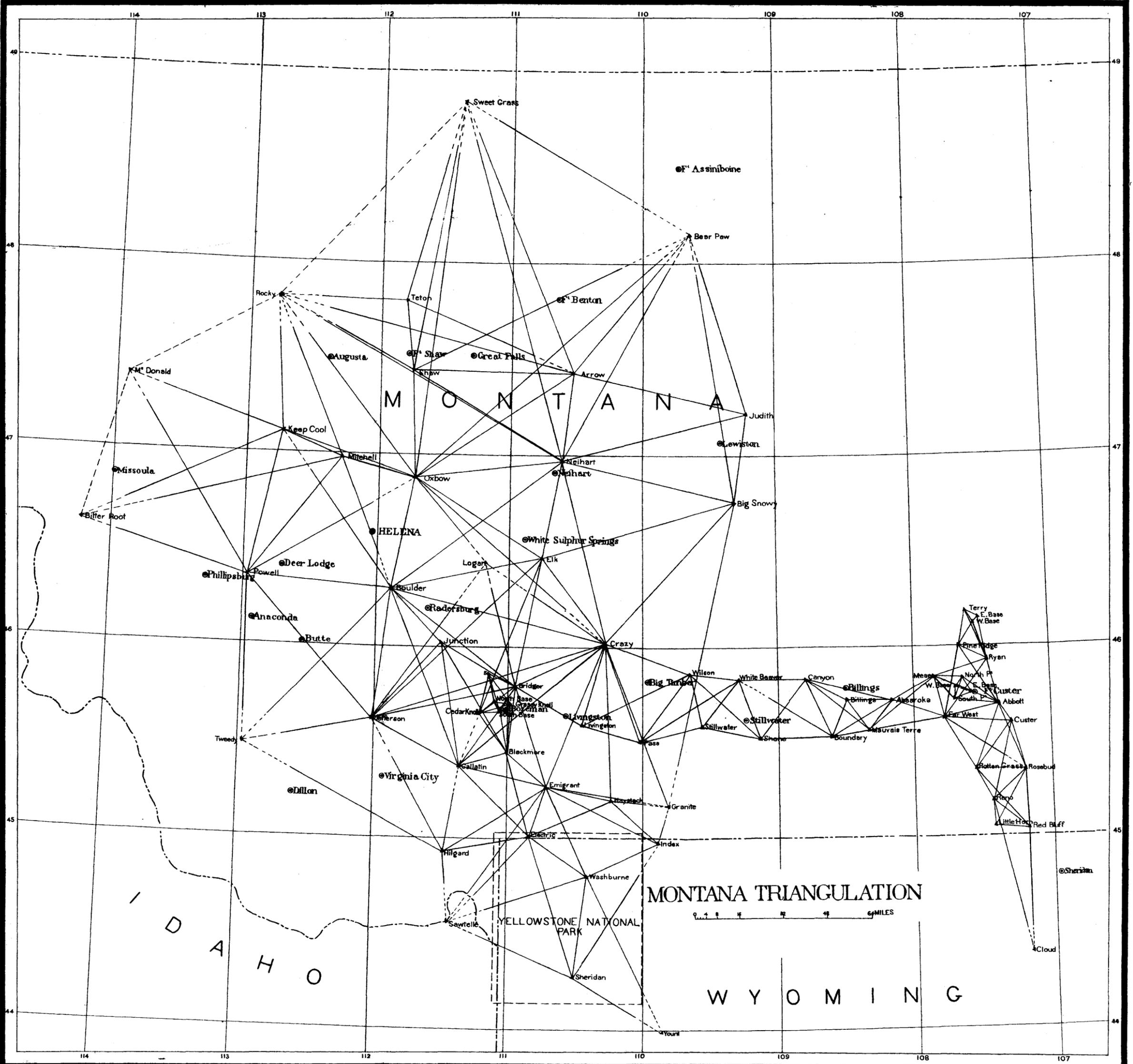
The Montana triangulation covers an area of about 50,000 square miles and is dependent upon a base and astronomical station located near Bozeman, Mont. The astronomical station was established in 1873 by the U. S. geographical surveys west of the one hundredth meridian. The observer at Bozeman was Mr. J. H. Clark and the instrument employed was a Wurdemann zenith telescope of 28 inches focal length. The telegraphic connection with the observatory at Ogden, Utah, was made via Helena, Mont., Dr. F. Kampf being the observer at Ogden. During October, 1877, Lieut. Tillman, of the U. S. Geographical Survey west of the one hundredth meridian, selected the present Bozeman base, which is located just west of the town of Bozeman, and measured it with a steel tape. He also connected it with the astronomical station and determined the azimuth, but carried on no expansion.

In 1883 Mr. J. H. Renshawe, of the U. S. Geological Survey, assisted by Mr. H. S. Chase, remeasured the base with a secondary base apparatus. The whole line was measured once and also computed by triangulation from a second measurement of the middle third with the following result:

	Meters.
Length of base by first measurement.....	7,352.642
Length of base by triangulation from middle third.....	7,352.572
Weighted mean.....	7,352.630
Length of base reduced to sea level.....	7,350.935

Mr. J. H. Renshawe, during 1882, and his assistant, Mr. H. S. Chase, in 1883-'84, connected the base with the astronomical station and carried an expansion southward into the Yellowstone National Park. The instrument used in this triangulation was a 10-inch vernier theodolite reading to 10 seconds. The method of observing angles was generally that of circle readings and repeated angles, establishing conditions for station adjustment.

In 1886 Mr. E. M. Douglas was placed in charge of the triangulation in Montana, and during the field season of 1886-'87-'88 reoccupied many of the stations of 1882-'84 and extended the triangulation through central Montana. Assisted by Mr. C. F. Urquhart, he readjusted by least squares the work of Mr. H. S. Chase, including many new points. The remainder of the triangulation in central Montana has been computed



from arbitrary adjustments, as the character of the work did not warrant a more rigid adjustment, the weather conditions having been very unfavorable for the performance of close work.

The instrument employed was an 8-inch vernier theodolite reading to 10 seconds. Natural points were generally sighted in advance of occupation. The method of reading angles was that of the earlier work of Messrs. Renshawe and Chase. A number of distant outlying points on the north and west have been sighted to, but not occupied.

During 1889 Mr. Frank Tweedy carried a short system of triangulation down the Yellowstone River from Bridger-Crazy as a base and in 1889 extended this work eastward to Fort Custer and southward to the Wyoming line, having reoccupied all his stations of 1889. In this work the instrument used was an 8-inch Fauth micrometer microscope theodolite. In all this work either stone cairns on the higher points or simple wooden tripods 10 to 20 feet high on the lower points were erected in advance of the instrumental work for signals.

At Fort Custer a check base about 5 miles long was selected and marked, but not measured. The stations connecting it with the triangulation were occupied, but the base figure has not been adjusted. Mr. W. S. Post, in 1891, extended a narrow belt of triangles from the stations Red Bluff-Little Horn near the Wyoming line eastward across northern Wyoming to a base at Rapid City, S. Dak., but stormy weather prevented his occupying his stations with sufficient completeness to form a connection between the Bozeman and Rapid City bases. The triangulation of 1891 has a somewhat weak connection with the Bozeman base through the line Bridger-Crazy.

DESCRIPTIONS AND POSITIONS OF STATIONS.

ASTRONOMICAL PIER.

On the western edge of the town of Bozeman, Gallatin Co., Mont., just north of the main east and west street, and is marked by a section of a tree 2 feet in diameter set in the ground and sawed off at top with nail in center. Determined by the U. S. Geographical Surveys west of the one hundredth meridian in 1873.

[Latitude, $45^{\circ} 40' 51'' \cdot 92 \pm 0'' \cdot 06$. Longitude, $111^{\circ} 02' 36'' \cdot 64 \pm 0'' \cdot 53$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
North Base.....	0 " 125 12 44.00	0 " 305 09 59.78	<i>Meters.</i> 3.7835255

NORTH BASE.

On slight grassy rise, 4 miles northwest of Bozeman, Gallatin Co., Mont., marked by a stone pier 1 foot square and 4 feet long, set 3 feet

in the ground. The portion above ground is square, with letters U. S. G. S. cut in on one face and cross cut on top surface.

[Latitude, 45° 42' 45"-29. Longitude, 111° 06' 26"-08.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
South Base	334 54 16	154 55 59	3·8663426
Cedar Knoll	53 44 03	233 38 55	4·0628859
Grassy Knoll	281 17 36	101 22 55	3·9929061
Astronomical Pier....	305 10 00	125 12 44	3·7835255

SOUTH BASE.

In field 1 mile southwest of Bozeman, Gallatin Co., Mont., marked by stone pier 1 foot square (cross section) and 4 feet long, set 3 feet in the ground. The portion above ground is squared, with letters U. S. G. S. cut in on one face and cross cut on top surface.

[Latitude, 45° 39' 09"-64. Longitude, 111° 04' 02"-09.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Point 5	163 33 09	343 29 26	4·3742267
Bridger	212 44 50	32 50 24	4·2701323
Grassy Knoll	234 06 27	54 10 03	3·9065048
Cedar Knoll	89 11 58	269 05 08	4·0947548
North Base	154 55 59	334 54 16	3·8663426

GRASSY KNOLL.

On a grassy knoll $1\frac{1}{2}$ miles north of Fort Ellis and $2\frac{1}{2}$ miles northeast of Bozeman, Gallatin Co., Mont., marked by a cairn of stones 3 feet in height.

[Latitude, 45° 41' 42"-64. Longitude, 110° 59' 00"-18.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Blackmore	3 17 49	183 16 56	4·4419338
Cedar Knoll	75 34 25	256 30 23	4·2920765
Point 5	143 41 54	323 34 35	4·3487350
North Base	101 22 55	281 17 36	3·9929061
South Base	54 10 03	234 06 27	3·9065048

CEDAR KNOLL.

On knoll 200 feet high, in Gallatin Co., Mont., on west side of Gallatin River, about 2 miles west of Matthew's Hot Springs and just north of road from Bozeman to Virginia City.

Permanent mark: Cedar tree trimmed below.

[Latitude, 45° 39' 03"-61. Longitude, 111° 13' 36"-46.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gallatin	19 14 57	199 09 00	4·5188944
Point 5	193 57 30	14 00 39	4·3726260
Bridger	234 45 20	54 57 45	4·4397549
Blackmore	322 25 43	142 35 17	4·4566960
North Base	233 38 55	53 44 03	4·0628859
Grassy Knoll	256 30 23	75 34 25	4·2920765
South Base	269 05 08	89 11 58	4·0947548

POINT 5.

On a grassy bench in Gallatin Co., Mont., about 12 miles northwest of Bozeman, Mont., 1 mile north of East Gallatin River and a quarter of a mile northwest of Reese Creek, near Gum's ranch.

Permanent mark: Cairn of stones 3 feet high.

[Latitude, 45° 51' 24"-87. Longitude, 111° 09' 12"-76.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bridger	292 41 29	112 50 47	4·2599257
Cedar Knoll	14 00 39	193 57 30	4·3726260
Grassy Knoll	323 34 35	143 14 54	4·3487350
South Base	343 29 26	163 33 09	4·3742267

BRIDGER.

A bare, double peak in Gallatin Co., Mont., 9 miles northeast of Bozeman, Mont., on Bridger Range. The station is on the south point and is marked by a stone cairn 5 feet high. Elevation, 9,100 feet.

[Latitude, 45° 47' 36"-8. Longitude, 110° 56' 15"-58.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gallatin	35 32 35	215 14 14	4·7611481
Junction	119 32 27	299 07 50	4·7060882
Boulder	127 06 27	306 24 43	4·9701216
Elk	190 53 58	11 01 56	4·8743200
Crazy	243 35 56	64 04 25	4·7570500
Livingston	300 51 52	121 12 24	4·6383223
Emigrant	342 51 59	163 01 52	4·7884593
Blackmore	7 38 07	187 35 17	4·5899114
South Base	32 50 24	212 44 50	4·2701323
Cedar Knoll	54 57 45	234 45 20	4·4397549
Point 5	112 50 47	292 41 29	4·2599257
Jefferson	76 54 05	256 08 07	4·9331603

JUNCTION.

On high, bare hill in Jefferson Co., Mont., 2 miles west of Missouri River and 7 miles north of Three Forks, Mont., and is marked by small cairn of rocks.

[Latitude, 46° 01' 03"-34. Longitude, 111° 30' 31"-21.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Boulder	135 33 01	315 15 55	4·6383496
Bridger	299 07 50	119 32 27	4·7060882
Gallatin	351 09 17	171 15 25	4·8620898
Jefferson	41 02 13	220 40 44	4·7734316

BOULDER.

A bare double peak, in Jefferson Co., Mont., 12 miles northeast of Boulder Valley and 30 miles south of Helena, 2 miles east of Elkhorn mining camp. Elevation, 9,400 feet.

Permanent mark: Stone monument 8 feet high.

[Latitude, $46^{\circ} 17' 46''$.3. Longitude, $111^{\circ} 54' 14''$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Tweedy	42	43	27	221	57	42	5-087647
Powell	94	40	17	273	53	35	4-919695
Keep Cool	145	22	20	324	45	51	5-047500
Mitchell	159	21	54	339	05	25	4-911482
Ox Bow	190	23	52	10	31	18	4-850460
Neilhart	232	29	24	53	26	00	5-095135
Elk	258	18	57	79	08	54	4-955483
Bridger	306	24	43	127	06	27	4-970121
Crazy	283	07	19	104	17	41	5-111892
Junction	315	15	55	135	33	01	4-638349
Jefferson	6	07	27	186	02	57	4-882453

JEFFERSON.

(Local name Hollow Top or Baldy.) High bare limestone point in Madison Co., Mont., at head of North Fork of North Willow Creek, about 8 miles southwest of Pony. Elevation, 10,740 feet.

Permanent mark: Stone monument 7 feet high.

[Latitude, $45^{\circ} 36' 49''$.38. Longitude, $112^{\circ} 00' 29''$.62.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Tweedy	79	18	33	259	37	42	4-881706
Boulder	186	02	57	6	07	27	4-882453
Junction	220	40	44	41	02	13	4-773431
Crazy	250	48	47	72	03	42	5-152230
Elk	225	38	32	46	32	54	5-129725
Bridger	256	08	07	76	54	05	4-933160
Gallatin	298	04	36	118	32	05	4-756180
Hilgard	330	38	22	151	01	47	4-946576
Logan	214	37	19	35	12	49	5-046238

GALLATIN.

A high, bare, sharp granite peak at head of Hell Roaring Creek (Gallatin drainage), in Madison Co., Mont., about 26 miles southwest of Bozeman, Mont. Elevation, 10,968 feet.

Permanent mark: Small stone monument 4 feet high.

[Latitude, $45^{\circ} 22' 13''$.27. Longitude, $111^{\circ} 21' 56''$.86.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Emigrant	282	31	59	103	00	65	4-7239772
Crazy	229	11	32	49	58	48	5-0470316
Electric	313	58	38	134	21	07	4-7625041
Hilgard	8	21	39	188	17	41	4-7050281
Jefferson	118	32	05	298	04	36	4-7561806
Junction	171	15	25	351	09	17	4-8620898
Point Four	199	09	00	19	14	57	4-5188944
Blackmore	253	12	43	73	28	11	4-4711043
Bridger	215	14	14	35	32	35	4-7611481
Cedar Knoll	199	09	00	19	14	57	4-5188944

BLACKMORE.

A peak about 15 miles south of Bozeman, at head of Cottonwood Creek, in Gallatin Co., Mont. Elevation, 10,196 feet.

Permanent mark: Small stone pile.

[Latitude, 45° 26' 48''-02. Longitude, 111° 00' 13''-40.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Gallatin	73 28 11	253 12 43	4-4711043
Cedar Knoll	142 35 17	322 25 43	4-4566960
Grassy Knoll.....	183 16 56	3 17 49	4-4419338
Bridger	187 35 17	7 38 07	4-5899114
Emigrant.....	310 51 46	131 04 26	4-4883949
Electric	344 58 02	165 05 07	4-7034796

EMIGRANT.

A high volcanic peak in Park Co., Mont., on east side of Yellowstone River, between Emigrant Gulch and Six Mile Creek, 6 miles south-east of Fridley's Ranch. Elevation, 10,968 feet.

Permanent mark: Stone monument 5 feet high.

[Latitude, 45° 15' 54''-13. Longitude, 110° 42' 25''-35.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Electric	19 46 27	199 40 54	4-4829363
Hilgard	57 15 30	236 43 32	4-8488356
Crazy	201 37 56	21 56 57	4-9562002
Granite	278 33 35	99 09 57	4-8552200
Haystack	280 44 46	101 05 27	4-5891581
Index	295 50 10	116 25 16	4-8594787
Washburne.....	337 18 01	157 29 37	4-7483054
Blackmore.....	131 04 26	310 51 46	4-4883949
Gallatin	103 00 05	282 31 59	4-7239772
Bridger	163 01 52	342 51 59	4-7884593
Sawfelle	37 06 05	216 34 50	4-9873343

HAYSTACK.

A peak in Park Co., Mont., on head of East Fork of Main Boulder River, about 2 miles south of Boulder mining camp. Elevation, 10,972 feet.

Permanent mark: Small rock pile 5 feet high.

[Latitude, 45° 11' 55''-89. Longitude, 110° 13' 17''-58.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Electric	66 32 06	246 05 55	4-7237827
Emigrant.....	101 05 27	280 44 46	4-5891581

GRANITE.

A very high, rugged, granite peak on Granite Range in Park Co., Mont., at the head of Rosebud Creek, southwest of Red Lodge and

northeast of Cooke City. Has never been occupied. It is the highest peak in Montana. Elevation, 12,824 feet.

[Latitude, 45° 09' 56". Longitude, 109° 48' 22".]

To station.	Azimuth.	Back azimuth.	Log. dist.
Emigrant.....	° ' "	° ' "	Meters.
	99 09 57	278 33 35	4·85522

INDEX.

A high, rugged, sharp volcanic peak in Big Horn Co., Wyo., about 10 miles southeast of Cooke City, Mont. It is probably inaccessible. Pilot Peak is a lower point 2 miles north. Elevation, 11,740 feet.

Permanent mark: None.

[Latitude, 44° 58' 41"·88. Longitude, 109° 52' 53"·07.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Washburne.....	65 44 29	245 21 05	4·6807340
Electric	92 48 11	272 07 37	4·8777557
Emigrant.....	116 25 16	295 50 10	4·8594787

WASHBURNE.

A round, bare, flat-topped point on Washburne Range in Yellowstone National Park, at head of Antelope Creek. Elevation, 10,000 feet.

Permanent mark: Small rock monument 4 feet high.

[Latitude, 44° 47' 58"·95. Longitude, 110° 26' 01"·85.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Sheridan.....	7 20 28	187 16 27	4·7747361
Sawtelle	72 22 01	251 39 23	4·9255599
Electric	126 03 32	305 46 26	4·5951298
Index	245 21 05	65 44 29	4·6807340
Yount	333 16 43	153 40 33	5·0055609
Emigrant.....	157 29 37	337 18 01	4·7483054

ELECTRIC.

A high volcanic peak in northwest portion of Yellowstone National Park, about one-half mile north of the Montana-Wyoming boundary line. It is 7 miles southwest of Cinnabar, Mont., between heads of Cinnabar and Reese creeks. Elevation, 11,100 feet.

Permanent mark: Small stone monument.

[Latitude, 45° 00' 27"·04. Longitude, 110° 50' 15"·05.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Sawtelle.....	44 34 57	224 09 18	4·8363594
Hilgard.....	78 52 19	258 25 57	4·5790758
Haystack.....	246 05 55	66 32 06	4·7237827
Index.....	272 07 37	92 48 11	4·8777557
Washburne.....	305 46 26	126 03 32	4·5951298
Sheridan.....	343 18 08	163 31 08	4·9330144
Emigrant.....	199 40 54	19 46 27	4·4829363
Gallatin.....	134 21 07	313 58 38	4·7625041
Blackmore.....	165 05 07	344 58 02	4·7034796

HILGARD.

A high, rugged, basaltic peak in Madison Co., Mont., about 15 miles north of the second canyon of the Madison River. Has not been occupied.

Permanent mark: None.

[Latitude, 44° 55' 08"-17. Longitude, 111° 27' 32"-99.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Jefferson	151 01 47	330 38 22	4 9465763
Electric	258 25 57	78 52 19	4 5790758
Gallatin	188 17 41	8 21 39	4 7050281
Emigrant.....	236 43 32	57 15 30	4 8488356

SAWTELLE.

A bare, round-topped point on Continental Divide, on boundary between Montana and Idaho, southwest of Henry Lake. Has not been occupied. Elevation, 10,000 feet.

Permanent mark: None.

[Latitude, 44° 33' 56"-05. Longitude, 111° 26' 40"-33.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Electric	224 09 18	44 34 57	4 8369594
Washburne.....	251 39 23	72 22 01	4 9255599
Sheridan.....	294 03 00	114 41 26	4 9033070
Emigrant.....	216 34 50	37 06 05	4 9873343

SHERIDAN.

Highest peak in Red Mountain Range, Yellowstone National Park, between Heart and Lewis lakes. Elevation, 10,400 feet.

Permanent mark: Small stone monument.

[Latitude, 44° 16' 06"-02. Longitude, 110° 31' 44"-81.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Sawtelle	114 41 26	294 03 00	4 9033070
Washburne	187 16 27	7 20 28	4 7747361
Yount	300 31 55	120 59 36	4 7906195
Electric	163 31 08	343 18 08	4 9530144

YOUNT.

A high volcanic peak, in Big Horn Co., Wyo., at extreme head of Upper Yellowstone River, between alpine forks of that stream, and 1½ miles north of Continental Divide. Has not been occupied as triangulation station. Elevation, 12,130 feet.

Permanent mark: Stone cairn 5 feet high.

[Latitude, $43^{\circ} 59' 02''$.76. Longitude, $109^{\circ} 51' 58''$.28.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Washburne.....	153 40 33	333 16 43	5·0055609
Sheridan.....	120 59 36	300 31 55	4·7906195

POWELL.

Highest point of volcanic range in Deer Lodge Co., Mont., 12 miles southwest of Deer Lodge, between heads of Dempsey and Tin Cup Joe creeks. Elevation, 10,300 feet.

Permanent mark: Stone monument 5 feet high.

[Latitude, $46^{\circ} 21' 07''$.3. Longitude, $112^{\circ} 58' 48''$.6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bitter Root.....	106 24 20	285 30 35	5·007540
McDonald.....	148 22 40	328 01 00	5·132300
Keep Cool.....	192 05 40	12 17 49	4·940526
Mitchell.....	217 05 20	37 36 06	4·945071
Ox Bow.....	235 30 50	56 25 13	5·061306
Tweedy.....	359 19 41	179 20 18	4·985232
Boulder.....	273 53 35	94 40 17	4·919695

TWEEDY.

Highest point of granite range in Beaver Head Co., Mont., at head of Willow Creek, west of Apex Station, Utah and Northern Railroad. Has not been occupied as triangulation station. Elevation, 11,179 feet.

[Latitude, $45^{\circ} 28' 57''$.0. Longitude, $112^{\circ} 57' 56''$.6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Powell.....	179 20 18	359 19 41	4·985232
Boulder.....	221 57 42	42 43 27	5·087647
Jefferson.....	259 37 42	79 18 33	4·881706

BITTER ROOT.

A high peak on the Bitter Root range, in Missoula Co., Mont., 20 miles southwest of Missoula, Mont. Has not been occupied.

[Latitude, $46^{\circ} 36' 12''$.5. Longitude, $114^{\circ} 15' 14''$.5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mitchell.....	253 39 51	75 06 06	5·19415
Powell.....	285 30 35	196 24 20	5·00754

MCDONALD.

A high, rocky peak in Missoula Co., Mont., probably McDonald Peak, about 15 miles northeast of St. Ignatius Mission, in the Flathead Indian Reservation. Has not been occupied.

[Latitude, 47° 23' 11". Longitude, 113° 55' 18".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Keep Cool	287 56 00	108 47 50	4·97464
Powell.....	328 01 00	148 22 40	5·13230

KEEP COOL.

On Keep Cool Peak, in Deer Lodge Co., Mont., 10 miles north of Lincoln Gulch (Big Blackfoot drainage.) Elevation, 9,380 feet.

Permanent mark: Stone monument.

[Latitude, 47° 07' 08". Longitude, 112° 44' 21".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
McDonald	108 47 50	287 56 00	4·974640
Recky	176 35 19	356 32 36	4·889359
Ox Bow.....	284 50 49	105 34 58	4·898867
Mitchell.....	293 26 41	113 45 55	4·579482
Boulder.....	324 45 51	145 22 20	5·047500
Powell.....	12 17 49	192 05 40	4·940526

MITCHELL.

High point on continental divide, 5 miles northwest of Mitchell railroad station, Montana Central Railroad. Grassy ridge. Elevation, 7,800 feet.

Permanent mark: None.

[Latitude, 46° 58' 56". Longitude, 112° 16' 54".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Rocky	157 13 44	336 50 54	5·002574
Ox Bow.....	277 26 34	97 50 36	4·624199
Boulder.....	339 05 25	159 21 54	4·911482
Powell.....	37 36 06	217 05 20	4·945071
Bitter Root.....	75 06 06	253 39 51	5·194150
Keep Cool.....	113 45 55	293 26 41	4·579482

OX BOW (MOORES MOUNTAIN).

At the head of north fork of Beaver Creek, in Meagher Co., Mont., about 10 miles north of York post-office. There are four peaks near the station of nearly the same elevation; the station is one of the highest ones, farthest northwest. Elevation, 8,000 feet.

Permanent mark: Pile of rocks and poles.

[Latitude, $46^{\circ} 55' 54''$.8. Longitude, $111^{\circ} 44' 01''$.1.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Rocky	141	00	08	320	13	01	5·103852
Arrow	238	28	50	59	21	57	5·028724
Neihart	266	42	01	87	31	14	4·934222
Elk	304	54	21	125	37	09	4·963010
Boulder	10	31	18	190	23	52	4·856460
Powell	56	25	13	235	30	50	5·061306
Mitchell	97	50	36	277	26	34	4·624199
Keep Cool	105	34	58	284	50	49	4·898867
Crazy				132	40	31	5·176892

LOGAN.

A high peak on the range between the Missouri and Smith rivers, in Meagher Co., Mont., about 17 miles northeast of Townsend, Mont. Has not been occupied. Elevation, 9,400 feet.

Permanent mark: None.

[Latitude, $46^{\circ} 26' 03''$.5. Longitude, $111^{\circ} 11' 10''$.0.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Crazy	302	55	07	123	34	32	4·923815
Jefferson	35	12	49	214	37	19	5·046238

ELK.

A large outcrop of rocks at the southwest end of a mountain in Meagher Co., Mont., 10 miles southeast of White Sulphur Springs. There is a small stunted pine near the monument. Elevation, 8,600 feet.

Permanent mark: A small cairn of rocks.

[Latitude, $46^{\circ} 27' 17''$.6. Longitude, $110^{\circ} 45' 12''$.3.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	Meters.
Bridger	11	01	56	190	53	58	4·874320
Neihart	191	02	58	11	09	24	4·766779
Big Snowy	252	41	21				5·061627
Crazy	322	31	57				4·783230
Jefferson	46	32	54	225	38	32	5·129725
Boulder	79	08	54	258	18	57	4·955483
Ox Bow	125	37	09	304	54	21	4·963010

CRAZY.

Highest point of Crazy Mountains, in Park Co., Mont., at head of Big Timber Creek. Elevation, 11,178 feet.

Permanent mark: Large pile of rocks.

[Latitude, 46° 01' 13" 1. Longitude, 110° 16' 36" 2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Livingston	16 40 42	196 32 50	4-696314
Boulder	104 17 41	283 07 19	5-111892
Ox Bow	132 40 31	.....	5-178892
Big Snowy	221 55 45	42 37 36	5-041950
Wilson	289 36 22	110 03 16	4-711123
Pass	340 24 49	160 35 53	4-778444
Emigrant	21 56 57	201 27 56	4-956200
Bridger	64 04 25	243 35 56	4-757050
Logan	123 34 22	302 55 07	4-925815
Gallatin	49 58 48	229 11 32	5-047031
Jefferson	72 03 42	250 48 47	5-152230
Neihart .....	.....	346 23 58	5-035800
Elk .....	.....	322 31 57	4-783230

BIG SNOWY.

On highest part of Big Snowy Mountains, in Fergus Co., Mont., south and east of Half Moon Pass. Elevation, 8,600 feet.

Permanent mark: Stone monument 4 feet high.

[Latitude, 46° 45' 12" 3. Longitude, 109° 18' 48" 8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Judith	187 42 20	7 46 24	4-717817
Neihart	104 13 56	283 17 23	5-066122
Crazy	42 37 36	221 55 45	5-041950
Elk .....	.....	252 41 21	5-061627

JUDITH.

Highest peak of the Judith Mountains (local name, North Pacific Peak), in Fergus Co., Mont., about 15 miles northeast of Lewiston, Mont. Elevation, 6,400 feet.

Permanent mark: Rock monument 15 feet high.

[Latitude, 47° 13' 07" 9. Longitude, 109° 13' 15" 6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Arrow	103 40 18	282 42 30	5-005533
Bear Paw	162 54 03	342 35 03	5-035100
Big Snowy	7 46 24	187 42 20	4-717817
Neihart	75 47 10	254 46 19	5-036097

NEIHART.

A large bald mountain in Meagher Co., Mont., about 8 miles west of south from Glendennin Post-Office (Barker Mining Camp). The station is on the highest part of the mountain, west end. Elevation, 9,200 feet.

Permanent mark: Stone monument.

[Latitude, 46° 58' 15". Longitude, 110° 36' 22".5.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Shaw	121	34	22	300	44	01	5·005403
Arrow	186	44	23	6	47	53	4·709051
Bear Paw	208	24	22	-----	-----	-----	5·174812
Judith	254	46	19	75	47	10	5·036097
Big Snowy	283	17	23	104	13	56	5·006122
Crazy	346	23	58	-----	-----	-----	5·035800
Elk	11	09	24	191	02	58	4·766779
Boulder	53	26	00	232	29	24	5·095135
Oxbow	87	31	14	266	42	01	4·934222

ARROW.

On Arrow Peak, in Choteau Co., Mont., the second highest peak of the Highwood Mountains, 5 miles south of east from Highwood Peak, between heads of Highwood and North Arrow creeks. Elevation, 7,420 feet.

Permanent mark: Rock monument.

[Latitude, 47° 25' 40". Longitude, 110° 31' 35".9.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Shaw	91	28	41	270	34	37	4·965291
Teton	114	20	50	-----	-----	-----	5·026110
Sweet Grass	158	33	50	337	56	00	5·230678
Bear Paw	218	53	54	39	32	50	5·016239
Neihart	6	47	53	186	44	23	4·709051
Judith	282	42	30	103	40	18	5·005533
Oxbow	59	21	57	238	28	50	5·028724

SHAW.

A mesa butte in Cascade Co., Mont., 6 miles south of Sun River Post-Office; station on a grassy knoll on the north part of butte. Elevation, 4,700 feet.

Permanent mark: Stone monument 5 feet high.

[Latitude, 47° 26' 29". Longitude, 111° 44' 56".7.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Teton	172	56	30	-----	-----	-----	4·619460
Sweet Grass	190	01	40	10	18	30	5·201000
Bear Paw	242	38	41	-----	-----	-----	5·245893
Neihart	300	44	01	121	34	22	5·005403
Arrow	270	34	37	91	28	41	4·965291

TETON.

On Teton Ridge, in Choteau Co., Mont., 20 miles north of Sun River Post-Office, Mont., at head of Muddy Creek.

[Latitude, 47° 48' 48''-0. Longitude, 111° 49' 02''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
		° ' "	<i>Meters.</i>
Arrow.....		114 20 50	5·026110
Shaw.....		172 56 30	4·619460

ROCKY.

A very high rocky peak on the summit of the range in Choteau Co., Mont., about 30 miles west of Choteau Post-Office. Has not been occupied.

[Latitude, 47° 48' 53''-5. Longitude, 112° 48' 03''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mitchell.....	336 50 54	157 13 44	5·002574
Keep Cool.....	356 32 36	176 35 19	4·889359
Oxbow.....	320 13 01	141 00 08	5·103852

SWEET GRASS.

A cone-shaped butte in the Sweet Grass Hills in Choteau Co., Mont., near the British boundary. Has not been occupied.

[Latitude, 48° 50' 52''-6. Longitude, 111° 22' 21''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Arrow.....	337 56 00	158 33 50	5·230678
Shaw.....	10 18 30	190 01 40	5·201000

BEAR PAW.

A prominent cone, highest point in the Bear Paw mountains in Chouteau Co., Mont., about 25 miles southeast of Fort Assinniboine; not occupied.

[Latitude, 48° 09' 00''. Longitude, 109° 38' 58''.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Arrow.....	39 32 50	218 53 54	5·016239
Judith.....	342 35 03	162 54 03	5·035100
Neihart.....		208 24 22	5·174812
Shaw.....		242 38 41	5·245893

LIVINGSTON.

A high point in Park Co., Mont., 7 miles southeast from town of Livingston, at head of Suce Creek. Elevation, 9,400 feet.

Permanent mark: Rock monument 8 feet high.

[Latitude, 45° 35' 30''-6. Longitude, 110° 27' 33''-6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Wilson	244 02 24	64 37 03	4.8429796
Pass	284 28 33	104 47 25	4.5506913
Bridger	121 12 24	300 51 52	4.6383223
Crazy	196 32 50	16 40 42	4.6963140

PASS.

Near eastern end of high rocky limestone ridge between two main east branches of East Boulder River, in Yellowstone Co., Mont. The southern of these two branches is generally dry and has a trail running up it and over pass at head to Nye City. Elevation, 9,200 feet.

Permanent mark: Rock monument 5 feet high.

[Latitude, 45° 30' 39''-8. Longitude, 110° 01' 08''-4.]

To station.	Azimuth.	Back Azimuth.	Log dist.
	° " "	° ' "	Meters.
Wilson	215 56 40	36 12 23	4.6852485
White Beaver.....	237 01 06	57 31 57	4.8231473
Stillwater	255 34 07	75 53 17	4.5573905
Crazy	160 35 53	340 24 49	4.7784442
Livingston	104 47 25	284 28 33	4.5506913

WILSON.

A small butte on large mesa, in Park Co., Mont., east of Sweet Grass Creek and south of east fork of Sweet Grass Creek. A road passes a few hundred yards north and descends into the head of a canyon one-half mile northwest, where there is a spring.

Permanent mark: Stone monument 7 feet high.

[Latitude, 45° 51' 48''-1. Longitude, 109° 39' 10''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
White Beaver.....	276 29 50	96 45 00	4.4401336
Shane.....	315 55 21	134 17 31	4.7482890
Stillwater	348 06 31	168 10 01	4.4902387
Crazy	110 03 16	289 36 22	4.7111238
Pass	36 12 23	215 56 40	4.6852485
Livingston	64 37 03	244 02 24	4.8429796

STILLWATER.

On bare, grassy hill (limestone), in Yellowstone Co., Mont., 7 miles northwest of junction of Stillwater River and Rosebud Creek. A fourth of a mile east is a small pond, and between it and the station runs a road to the Yellowstone River.

Permanent mark: Tripod of pine-tree trunks, 10 feet high.

[Latitude, 45° 35' 28''-0. Longitude, 109° 34' 16''-2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
White Beaver	217 47 41	37 59 18	4·5355021
Shane	284 15 46	104 34 23	4·5446244
Pass	75 53 17	255 34 07	4·5573305
Wilson	168 10 01	348 06 31	4·4902387

WHITE BEAVER.

On a high, bare hill east of White Beaver Creek, and about 12 miles north of Yellowstone River. From the point the ridge runs easterly, forming divide between Keyser Creek and Lake Basin. The station is on the boundary between Park and Yellowstone counties, Mont.

Permanent mark: A county monument 3 feet east of the station.

[Latitude, 45° 50' 05''-2. Longitude, 109° 18' 01''-8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Canyon	269 54 18	90 16 04	4·5943859
Boundary	302 15 02	122 45 14	4·8129805
Shane	340 18 14	160 25 16	4·5799908
Wilson	96 45 00	276 29 50	4·4401336
Stillwater	37 59 18	217 47 41	4·5355021
Pass	57 31 57	237 01 06	4·8231473

SHANE.

On highest point of a bare, grassy ridge at head of Shane Creek, in Yellowstone Co., Mont., about 12 miles southeast of Stillwater and 5 miles south of Yellowstone River. An old road running between Shane Creek and Red Lodge passes along ridge, 50 feet south of station. Elevation, 4,955 feet.

[Latitude, 45° 30' 45''-3. Longitude, 109° 08' 11''-5.]

Station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Canyon	216 34 01	36 48 42	4·6491423
Boundary	268 37 07	89 00 13	4·6251180
Wilson	134 17 31	313 55 21	4·7482890
White Beaver	160 25 16	340 18 14	4·5799908
Stillwater	104 34 23	284 15 46	4·5446244

CANYON.

On low, small, grassy knoll, in Yellowstone Co., Mont., one-fourth of a mile north of bluff facing south, overlooking basin of Canyon Creek 4 to 5 miles north. Point is about 10 miles east of Coomb's ranch, on

south fork of Canyon Creek. A great grassy flat stretches to the north and west.

[Latitude, 45° 50' 03''-2. Longitude, 108° 47' 40''-9.]

Station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Absaroka	285 01 21	105 29 06	4 7164202
Billings	296 29 56	116 44 22	4 4655250
Mauvais Terre.....	309 38 57	129 58 59	4 6749662
Boundary.....	336 04 41	156 13 11	4 5812607
White Beaver	90 16 04	269 54 18	4 5943859
Shane.....	36 48 42	216 34 01	4 6491423

BILLINGS.

On a bald clay butte in Yellowstone Co., Mont., 2½ miles east of Blue Creek and 6 miles south of Billings and 2 miles southwest of road from Yellowstone ferry to Pryor Creek.

[Latitude, 45° 42' 59''-3. Longitude, 108° 27' 32''-2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Absaroka	271 19 46	91 33 05	4 3826370
Mauvais Terre.....	329 17 20	149 22 57	4 3011815
Canyon.....	116 44 22	296 29 56	4 4655250
Boundary.....	26 19 05	206 13 10	4 3855090

BOUNDARY.

On a high mesa between Pryor Creek and Clark's Ford divide, 7 to 8 miles west of Pryor Creek. It is at the head of Blue Creek, on the west boundary line of the Crow Indian Reservation, in Montana. From the station the mesa drops down abruptly on the south.

Permanent mark: Box elder tree in center of stone monument.

[Latitude, 45° 31' 13''-7. Longitude, 108° 35' 48''-5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Billings	206 13 10	26 19 05	4 3855090
Absaroka	238 36 17	58 55 29	4 6111079
Mauvais Terre.....	257 36 15	77 47 46	4 3320681
White Beaver	122 45 14	302 15 02	4 8129805
Shane	89 00 13	268 37 07	4 6251180
Canyon.....	156 13 11	336 04 41	4 5812607

MAUVAIS TERRE.

On high grassy ridge or mesa in Crow Indian Reservation, Mont., between drainage of Fly Creek and East Fork (dry) of Pryor Creek;

about 4 miles east of Pryor Creek. The station is on the edge of the "Bad Land" bluff overlooking East Fork.

[Latitude, 45° 33' 41"-9. Longitude, 108° 19' 41"-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Absaroka.....	219 59 09	40 10 49	4-3362426
Mesa.....	231 35 54	51 56 32	4-6782773
Far West.....	262 16 35	82 39 53	4-6313331
Boundary.....	77 47 46	257 36 15	4-3320681
Canyon.....	129 58 59	309 38 57	4-6749962
Billings.....	149 22 57	322 17 20	4-3011815

ABSAROKA.

On south end of mesa between Fly and Pryor creeks, in Crow Indian Reservation, Montana, near head of Indian Creek and 5 miles south of Billings, Fort Custer road.

[Latitude, 45° 42' 39"-7. Longitude, 108° 08' 56"-7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mesa.....	241 06 23	61 19 21	4-4279156
Far West.....	291 01 30	111 17 09	4-4838382
Billings.....	91 33 05	271 19 46	4-3826370
Mauvais Terre.....	40 10 49	219 59 09	4-3362426
Boundary.....	58 55 29	238 36 17	4-6111079
Canyon.....	105 29 06	285 01 21	4-7164202

MESA.

On the bare south end of Pine Ridge, in Crow Indian Reservation, Montana, 4 miles north of Billings and Fort Custer road.

[Latitude, 45° 49' 37"-5. Longitude, 107° 50' 50"-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Ryan.....	253 53 04	74 10 06	4-5042215
Abbott.....	294 09 15	114 29 12	4-5980025
Far West.....	348 25 01	168 27 43	4-3371966
Absaroka.....	61 19 22	241 06 23	4-4279156
Mauvais Terre.....	51 56 32	231 35 54	4-6782773
North Point.....	271 51 48	92 00 34	4-2006290
South Point.....	323 16 24	143 22 07	4-2498980

ABBOTT (ABBOTT'S URN).

On northernmost of four buttes, in Crow Indian Reservation, Montana, from 7 to 8 miles north of Crow Indian Agency and 2 to 3 miles southeast of Fort Custer and Fort Keogh road. There is a peculiar shaped sandstone pinnacle on southeast slope.

Permanent mark: Rock monument 6 feet high.

[Latitude, $45^{\circ} 40' 48''$.8. Longitude, $107^{\circ} 22' 59''$.5]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Rotten Grass	21 15 56	201 08 11	4.5927058
Far West	76 32 06	256 14 53	4.5077235
Pine Ridge	147 55 20	327 43 26	4.6056647
Custer	325 33 07	145 37 31	4.1510836
Rosebud	338 07 45	158 15 55	4.6037525
Mesa	114 29 12	294 09 15	4.5080025
South Point	95 24 57	275 10 45	4.4128460
North Point	128 03 24	307 52 13	4.4092320
Ryan	168 00 11	347 57 14	4.4094429

NORTH POINT.

In Crow Indian Reservation, Mont., on first bench, three-fourths of a mile west of Big Horn River and 5 miles below Fort Custer Ferry.

Permanent mark: A steel wagon axle 3 inches in diameter, set 2 feet in the ground and projecting a few inches above, with cross cut on upper surface.

[Latitude, $45^{\circ} 49' 20''$.10. Longitude, $107^{\circ} 38' 35''$.41.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Abbott	307 52 13	128 03 24	4.409232
East Base	336 51 34	156 54 04	4.063616
South Point	22 21 49	202 18 52	4.160826
West Base	28 19 54	208 17 48	3.903846
Mesa	92 60 34	271 51 48	4.200629

SOUTH POINT.

In Crow Indian Reservation, Mont., on a small butte 8 miles southwest of Fort Custer and 3 miles south of Billings and Fort Custer road.

Permanent mark: A steel wagon axle 3 inches in diameter, set 2 feet in the ground and projecting a few inches above, with cross cut on upper surface.

[Latitude, $45^{\circ} 42' 06''$.21. Longitude, $107^{\circ} 42' 50''$.11.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Mesa	143 22 07	323 16 24	4.239808
West Base	195 01 21	15 02 17	3.817202
North Point	202 18 52	22 21 49	4.160826
East Base	254 40 37	74 46 10	3.818203
Abbott	275 10 45	95 24 57	4.412846

EAST BASE.

In Crow Indian Reservation, Mont., about 100 yards from west bank of Big Horn River, opposite Fort Custer, and three-fourths of a mile above Fort Custer Ferry.

Permanent mark: A 4-inch cast-iron pipe with cap, set 3 feet in the ground and projecting about 1 foot above, with cross cut on upper surface of cap.

[Latitude, 45° 43' 35''-21. Longitude, 107° 35' 05''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
South Point	74 46 10	254 40 37	3·818203
West Base.....	113 18 40	293 14 02	3·958681
North Point	156 54 04	336 51 34	4·063616

WEST BASE.

In Crow Indian Reservation, Mont., about 6½ miles northwest of Fort Custer and 2 miles north of Billings and Fort Custer road. One-eighth of a mile north is a spring in dry cañon.

Permanent mark: A 4-inch cast-iron pipe with cap, set 3 feet in the ground and projecting about 1 foot above, with cross cut on upper surface of cap.

[Latitude, 45° 45' 31''-57. Longitude, 107° 41' 31''-38.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
North Point	208 17 48	28 19 54	3·903846
East Base	293 14 02	113 18 40	3·958681
South Point	15 02 17	195 01 21	3·817202

RYAN.

On high mesa in Crow Indian Reservation, Montana, about 5 miles east of stage station on Big Horn River, between Custer Station and Fort Custer.

[Latitude, 45° 54' 22''-1. Longitude, 107° 27' 07''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Far West.....	38 29 14	218 14 56	4·6199678
Pine Ridge.....	119 21 28	299 12 31	4·2662940
Terry.....	158 46 01	338 39 29	4·5088867
West Base.....	159 59 08	339 54 41	4·3670918
East Base.....	168 43 45	348 40 58	4·4085105
Abbott.....	347 57 14	168 00 11	4·4094429
Mesa.....	74 10 06	253 53 04	4·5042215

PINE RIDGE.

On east slope of Pine Ridge, in Crow Indian Reservation, Montana, about 10 miles west of Custer Station.

Permanent mark: A peculiar spreading pine tree, $1\frac{1}{2}$ feet in diameter, leaning down hill.

[Latitude, $45^{\circ} 59' 14''\cdot 6$. Longitude, $107^{\circ} 39' 34''\cdot 7$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Terry.....	191 40 18	11 42 44	4·3322294
West Base.....	212 11 24	32 15 55	4·1813560
Far West.....	13 08 51	193 03 29	4·6317223
Ryan.....	299 12 31	119 21 28	4·2662940
Abbott.....	327 43 26	147 55 20	4·6056647

WEST BASE (CUSTER STATION).

In Crow Indian Reservation, Mont., on highest point (west end) of mesa, south of Custer Station, about $2\frac{1}{2}$ miles west of stage road and from 3 to 4 miles from Custer Station.

[Latitude, $46^{\circ} 06' 10''\cdot 6$. Longitude, $107^{\circ} 33' 18''\cdot 1$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Terry.....	155 32 32	335 30 27	3·9547039
East Base.....	222 20 57	42 22 36	3·6427125
Pine Ridge.....	32 15 55	212 11 24	4·1813560
Ryan.....	339 54 41	159 59 08	4·3670918

EAST BASE (CUSTER STATION).

On edge of mesa, in Crow Indian Reservation, Mont., 2 miles south-east of Custer Station and two-thirds of a mile east of Fort Custer stage road.

[Latitude, $46^{\circ} 07' 55''\cdot 7$. Longitude, $107^{\circ} 31' 00''\cdot 3$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Terry.....	126 33 21	306 29 36	3·9203511
Ryan.....	348 40 58	168 43 45	4·4085105
West Base.....	42 22 36	222 20 57	3·6427125

TERRY.

On south edge of partly timbered mesa, in Yellowstone Co., Mont., 4 miles north of Yellowstone River, at Custer Station. The dry drainage which heads at south foot of mesa, near signal, enters Yellowstone River half a mile above ferry, at Junction City.

[Latitude, $46^{\circ} 10' 36''\cdot 2$. Longitude, $107^{\circ} 36' 12''\cdot 0$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
East Base.....	306 29 36	126 33 21	3·9203511
West Base.....	335 30 27	155 32 32	3·9547039
Ryan.....	338 39 29	158 46 01	4·5088867
Pine Ridge.....	11 42 44	191 40 18	4·3322294

FAR WEST.

On butte just east of large mesa, in Crow Indian Reservation, Mont., about 6 miles west of Big Horn River and 13 miles southwest of Fort Custer.

[Latitude, 45° 36' 43''-5. Longitude, 107° 47' 04''-3.]

Station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine Ridge.....	193 03 29	13 08 51	4·6317223
Custer.....	275 47 06	96 08 42	4·5970066
Rosebud.....	302 48 28	122 53 48	4·7404811
Rotten Grass.....	329 09 57	149 19 22	4·5270876
Absaroka.....	111 17 09	291* 01 30	4·4838382
Ryan.....	38 29 14	218 14 56	4·6199678
Abbott.....	256 14 53	76 32 06	4·5077235
Mauvaise Terre....	82 39 53	262 16 35	4·6319331
Mesa.....	168 27 43	348 25 01	4·3871966

CUSTER.

In Crow Indian Reservation, Mont., on a rocky butte 8 miles east of Crow Agency, partly timbered below, and having a large sandstone boulder on the summit. A road leaving the Crow Agency and going up the drainage immediately opposite runs directly to the station.

[Latitude, 45° 34' 30''-4. Longitude, 107° 16' 50''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Reno.....	16 38 43	196 31 41	4·6548219
Rotten Grass.....	41 54 45	221 42 37	4·5223663
Rosebud.....	344 52 50	164 56 36	4·4234948
Abbott.....	145 37 31	325 33 07	4·1510836
Far West.....	96 08 42	275 47 06	4·5970066

ROTTEN GRASS.

A bare grassy butte on divide just east of Rotten Grass Creek, in Crow Indian Reservation, Mont. It is 3 miles east of Rotten Grass Creek, 12 miles southeast of Xavier Mission, and 3 miles north of road from Rotten Grass Creek to Lodge Grass Creek.

[Latitude, 45° 21' 06''-6. Longitude, 107° 33' 51''-7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Reno.....	336 06 05	153 11 09	4·3160829
Far West.....	149 19 22	329 09 57	4·5270876
Custer.....	221 42 37	41 54 45	4·5223663
Rosebud.....	271 24 40	91 40 33	4·4649032
Abbott.....	201 08 11	21 15 56	4·5927058

ROSEBUD.

On partly timbered point in Rosebud Mountains, in Crow Indian Reservation, Mont., 8 miles north of east of mouth of Lodge Grass Creek, at head of Snake Creek. There are wood roads crossing the ridge on each side (north and south) of the station, one running up Snake Creek and the other up a creek which enters the Little Horn just above the mouth of Lodge Grass Creek.

[Latitude, 45° 20' 41"·2. Longitude, 107° 11' 32"·4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Red Bluff.....	00 01 58	180 01 57	4·5326235
Little Horn.....	30 26 46	210 16 37	4·5684396
Reno.....	48 22 56	228 12 09	4·4246037
Rotten Grass.....	91 40 33	271 24 40	4·4649032
Custer.....	164 56 36	344 52 50	4·4234948
Far West.....	122 53 48	302 48 28	4·7404811
Abbott.....	158 15 55	338 07 45	4·6037525

RENO.

On west end of mesa, in Crow Indian Reservation, Mont., 3 miles west of Little Horn Canyon. There is a high, flat-topped butte 8 miles west, and a high mesa beyond this, sloping to Lodge Grass Creek. The station Mesa is between the second and third large drainages south of Lodge Grass Creek.

[Latitude, 45° 11' 08"·3. Longitude, 107° 26' 42"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Red Bluff.....	309 26 16	129 37 00	4·4111685
Little Horn.....	355 21 13	175 21 50	4·1554425
Rotten Grass.....	153 11 09	333 06 05	4·3160829
Cloud Peak.....	346 17 44	-----	4·9625670
Custer.....	196 31 41	16 38 43	4·6548219
Rosebud.....	228 12 09	48 22 56	4·4246037

LITTLE HORN.

In Crow Indian Reservation, Mont., on grassy butte (steep on south with road at foot), between Little Horn and Pass creeks, 3½ miles southwest of stage station and about 2 miles north of Wyoming-Montana line.

[Latitude, 45° 03' 26"·. Longitude, 107° 25' 49"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Red Bluff.....	276 26 58	96 37 04	4·2756655
Rosebud.....	210 16 37	30 26 46	4·5684396
Reno.....	355 21 13	175 21 50	4·1554425

RED BLUFF.

On large red hill, in Crow Indian Reservation, Mont., at south end of Rosebud Range, $1\frac{1}{2}$ miles east of Owl Creek and 2 miles north of Wyoming-Montana line.

Permanent mark: Tripod of pine trees and stones.

[Latitude, $45^{\circ} 02' 16''$. Longitude, $107^{\circ} 11' 33''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Reno	129 37 00	309 26 16	4 4111685
Rosebud	180 01 57	000 01 58	4 5326235
Little Horn	96 37 04	276 26 58	4 2756655

CLOUD PEAK.

The highest peak of the Big Horn Mountains, Wyo., about 24 miles west of Fort McKinney, Wyo., and probably on boundary line between Big Horn and Johnson counties. It has not been occupied and is poorly located. Elevation, 12,926 feet.

Permanent mark: A large cairn of rocks on the summit.

[Latitude, $44^{\circ} 23' 00''$. Longitude, $107^{\circ} 10' 23''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
		° ' "	Meters.
Reno	346 17 44	4 962567

IDAHO.

METHODS OF WORK.

The triangulation in Idaho covers an area of about 15,000 square miles, in the form of a parallelogram, 100 miles in breadth by 150 miles in length, in the center of the southern part of the State, extending from the western boundary as far east as Hailey. Work was begun in the summer of 1889 and continued during the seasons of 1890-'91-'92.

A base line $4\frac{3}{4}$ miles in length was measured near Boise, and the triangulation expansion from this base governs the topographic work. In the measurement of the base a steel tape line 100 feet in length was used with a resulting probable error of 0.19 foot. In the fall of 1889 telegraphic connection was had with the observatory at St. Louis and astronomical observations were taken to determine the position of a pier near the west end of the Boise base and the initial point of triangulation.

In expanding this base a 7-inch theodolite, reading to 10 seconds, was used during the seasons of 1889 and 1890. During the seasons of 1891 and 1892 a 10-inch theodolite, with micrometer microscopes reading to 2 seconds, was used. Circle readings, direct and reverse, were the general order of procedure, and as a rule angles were measured between points, without artificial signals, these signals not being built until the station was occupied, the natural points generally being sufficiently determinate. In a few instances in which the object sighted was not a good natural point, signals were built before observations were made.

During the period of use of the 7-inch theodolite the figures were adjusted by the method of least squares. When the 10-inch theodolite was used arbitrary adjustments were made.

The triangulation and base measurements were made by either Mr. Griswold or one of his assistants, Messrs. E. T. Perkins or F. M. Smith. The astronomical work was performed by Prof. R. S. Woodward, assisted by Mr. Griswold, in conjunction with Prof. H. S. Pritchett, at St. Louis.

DESCRIPTIONS AND POSITIONS OF STATIONS.

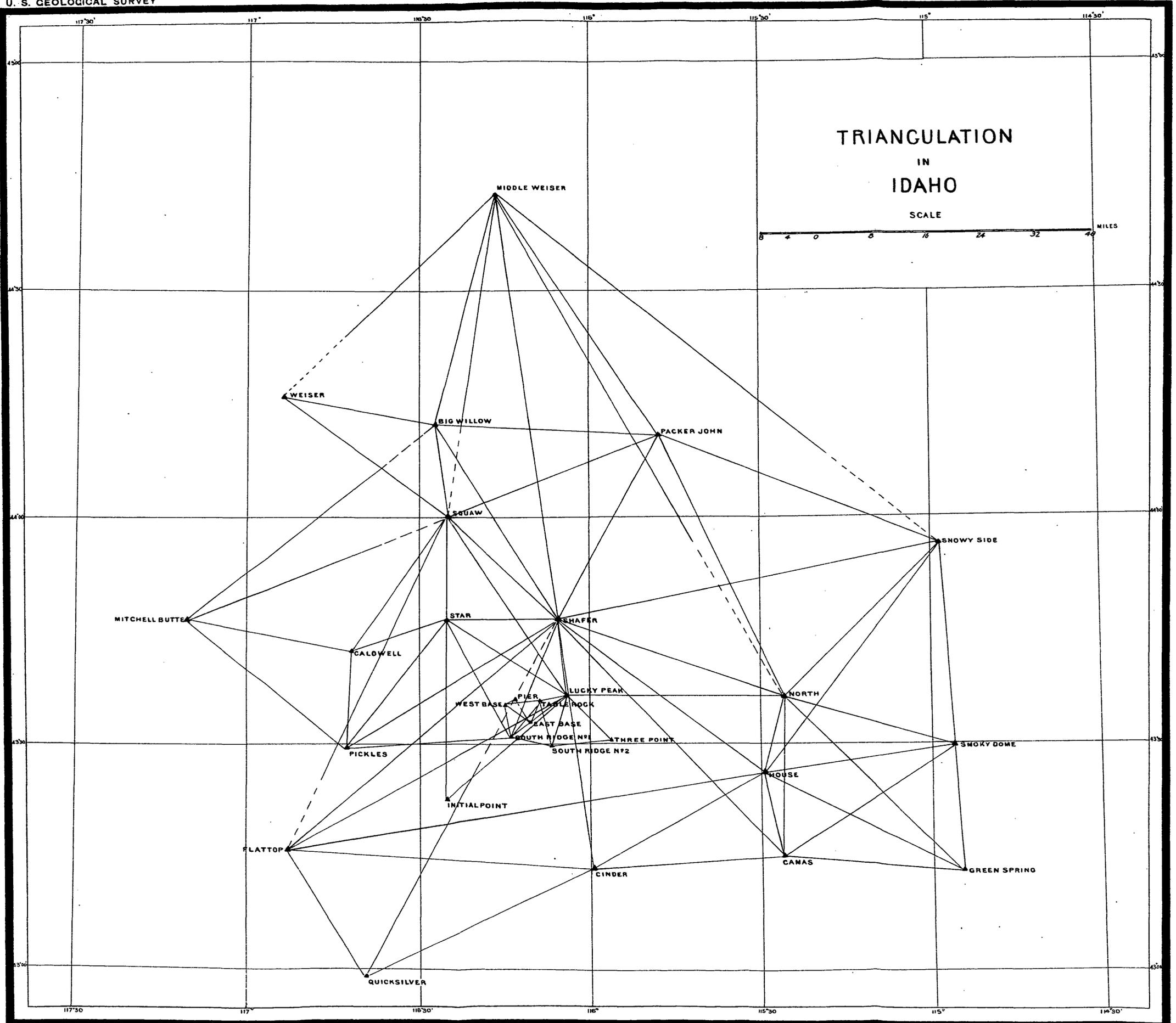
MIDDLE WEISER.

A high, sharp mountain on ridge between Long Valley and Weiser River and the head of Middle Weiser, in Washington Co., Idaho.

Permanent mark: Rock cairn.

[Latitude, $44^{\circ} 42' 37''$.77. Longitude, $116^{\circ} 16' 14''$.15.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Big Willow	14 24 12.51	194 16 38.23	4.7626201
Packer John	326 48 12.80	147 07 56.62	4.8461400



WEISER.

On Sage Brush Hill, in Washington Co., Idaho, 6 miles northeast of the city of Weiser.

[Latitude, 44° 15' 56''-2. Longitude, 116° 54' 5''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Squaw.....	306 34 51.68	126 55 17	4.6886081
Mitchell.....	22 15 40.00	202 04 09	4.7741042

BIG WILLOW.

A round, bald knob on ridge between Weiser River and Squaw Creek in Washington Co., Idaho, at head of Big Willow Creek.

Permanent mark: A pile of rocks 7 feet high and 5 feet at base.

[Latitude, 44° 12' 20''-60. Longitude, 116° 27' 02''-71.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Squaw.....	352 18 29.30	172 20 04.48	4.3572383
Packer John.....	272 44 06.00	93 11 43.84	4.7233831
Middle Weiser....	194 16 38.23	14 24 12.51	4.7626201

SQUAW.

Station on the southeast end of a flat-topped mountain in Ada Co., Idaho, about 6 miles north of Emmet.

[Latitude, 44° 00' 09''-66. Longitude, 116° 24' 45''-96.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lucky Peak.....	327 21 34.40	147 36 06.81	4.7193885
Star.....	000 42 21.25	180 42 11.51	4.4065461
Weiser.....	126 55 17.00	306 34 51.68	4.6886081
Big Willow.....	172 20 04.48	352 18 29.30	4.3572383
Packer John.....	248 06 19.28	68 32 19.09	4.7296846

PACKER JOHN.

Highest round peak on range between Deadwood River and Gordon Valley, in Boise Co., Idaho, reached by trail from Gordon Valley to Deadwood to summit, thence 1½ miles northwest on ridge of mountain.

Permanent mark: A stake driven in flat surface, about 5 feet square, amidst a group of rocks. Reference mark: A lone tree about 5 feet north of station.

[Latitude, 44° 10' 52''-00. Longitude, 115° 47' 24''-25.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Squaw.....	68 32 19.00	248 06 19.28	4.7296846
Shafer.....	27 59 17.03	207 46 46.40	4.7119787
Big Willow.....	93 11 43.84	272 44 06.00	4.7233831
Middle Weiser....	147 07 56.62	326 48 12.80	4.8461400

SNOWY SIDE.

A high granite peak at head waters of South Boise, Payette, and Solomon rivers, in Alturas Co., Idaho, about 15 miles west of Saw Tooth City.

Permanent mark: A small stone monument.

[Latitude, $43^{\circ} 56' 16''$.-25. Longitude, $114^{\circ} 58' 21''$.-50.]

To station..	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
North	44 30 08.63	224 11 09.28	4.7218576
Smoky Dome	356 42 29.43	176 43 56.91	4.6948826

MITCHELL.

On Mitchell Butte, in Malheur Co., Oreg., just north of Owyhee River.
Permanent mark: A large pile of rocks.

[Latitude, $43^{\circ} 46' 12''$.-59. Longitude, $117^{\circ} 10' 52''$.-19.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Pickels	309 31 40.33	129 51 01.33	4.6903732
Caldwell.....	280 23 51.60	100 43 58.32	4.5991384
Weiser	202 04 09.00	22 15 40.00	4.7741042

CALDWELL.

A low sage brush hill on the north bench of the Boise River, in Ada Co., Idaho, about 2 miles north of Caldwell, just where the bridge crosses the river..

[Latitude, $43^{\circ} 42' 16''$.-52. Longitude, $116^{\circ} 41' 46''$.-82.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Star	251 12 45.26	71 24 21.35	4.3762960
Pickels	3 21 32.51	183 20. 49.25	4.3813222
Mitchell	100 43 58.32	280 23 51.60	4.5991384

STAR.

On sand ridge 3 miles to the north of Star post-office, Ada Co., Idaho.

Permanent mark: A wooden stake.

[Latitude, $43^{\circ} 46' 23''$.-49. Longitude, $116^{\circ} 25' 00''$.-00.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lucky Peak	303 05 54.18	123 20 34.46	4.5329758
S. Ridge No. 1.....	332 09 34.49	152 17 21.30	4.5122886
Squaw	180 42 11.51	000 42 21.25	4.4065461
Pickels Butte.....	37 15 21.63	217 03 03.62	4.5987071
Caldwell	71 24 21.35	251 12 45.26	4.3762960
Initial Point.....	357 47 50.18	177 48 42.68	4.6495404

SHAFER.

Highest rocky point on mountains north of Boise City, in Boise Co., Idaho, at head of Shafer Creek.

Permanent mark: Rock monument 6 feet high.

[Latitude, 43° 46' 16"·45. Longitude, 116° 05' 25"·26.]

To station.	Azimuth.			Back azimuth.			Log dist.
	°	'	"	°	'	"	Meters.
Lucky Peak	353	06	10·16	173	07	18·99	4·2697214
South Ridge No. 1.	21	24	21·58	201	18	37·63	4·4867354
Flat Top.....	48	58	55·13	228	26	01·53	4·9328902
Cinder	352	46	41·85	172	50	39·05	4·7915183
House	307	33	50·99	127	58	43·23	4·7881882
North.....	289	35	18·35	110	02	39·92	4·7526931
Camas	317	25	28·26	137	52	30·77	4·8953144
Packer John	207	46	46·40	27	59	17·03	4·7119787

WEST BASE.

This end of Boise base is located about 2 miles southwest of Boise City, in Ada Co., Idaho, on the second bench from the river, in a sage brush flat.

Permanent mark: A copper bolt sunk in a dressed block of sandstone.

[Latitude, 43° 35' 14"·19. Longitude, 116° 14' 49"·70.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Astronomical Pier....	240	18	12·14	60	19	25·00	3·4359450
East Base.....	307	28	48·49	127	31	54·61	3·8830977
South Ridge No. 1.....	349	39	06·42	169	39	51·93	3·9170050
Table Rock.....	265	19	26·19	85	23	37·41	3·9138471

EAST BASE.

This end of the Boise base is located on a rocky point about 6 miles southeast of Boise City, in Ada Co., Idaho, on the second bluff above the river, close to the old overland road where it climbs the bluff and south of this road.

Permanent mark: A copper bolt sunk in a sandstone rock.

[Latitude, 43° 32' 43"·47. Longitude, 116° 10' 19"·64.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Astronomical Pier....	148	26	41·15	328	24	47·84	3·8479314
West Base.....	127	31	54·61	307	28	48·49	3·8850977
South Ridge No. 1.....	52	50	22·17	232	48	01·67	3·7596442

ASTRONOMICAL PIER.

The astronomical station from which the positions of all triangulation stations in Idaho were determined is on the plains south of Boise City, in Ada Co., Idaho, in the NW. $\frac{1}{4}$, sec. 16, T. 3 N., R. 2 E. of Boise

Meridian, being 50 feet south of the Nampa Land, Lumber and Irrigation Company's canal and 200 feet east of county road from Boise to Kuna. It is marked by one cubic yard of cemented concrete under the ground, upon which is built a brick pier laid in cement. Longitude determined by telegraphic connection with Saint Louis, Mo., by R. S. Woodward and W. T. Griswold. Latitude determined by Tolcott method.

[Latitude, 43° 35' 57''-98. Longitude, 116° 13' 04''-04.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
East Base.....	328 24 47·84	148 26 41·15	3·8479314
West Base.....	60 19 25·00	240 18 12·14	3·4359450

TABLE ROCK.

Located on the southeast end of table rock, a prominent landmark 2 miles east of Boise City, in Ada Co., Idaho.

Permanent mark: A rock monument, 6 feet high, 5 feet base.

[Latitude, 43° 35' 35''-69. Longitude, 116° 08' 45''-34.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
South Ridge No. 1.	37 19 39·31	217 16 13·76	4·0433493
West Base.....	85 23 37·41	265 19 26·19	3·9138471
South Ridge No. 2.	348 37 33·79	108 38 55·03	4·1284681

LUCKY PEAK.

A round-topped bald mountain, called Shaws Mountain, in Ada Co., Idaho, between Moores Creek and Boise River.

Permanent mark: A rock monument 6 feet high, 5 feet base.

[Latitude, 43° 36' 17''-84. Longitude, 116° 03' 45''-61.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
South Ridge No. 1.	53 07 21·29	233 00 29·19	4·2251047
South Ridge No. 2.	15 45 31·35	195 43 26·13	4·1773476
Three Point.....	316 51 44·90	136 57 00·58	4·1775766
Shafer.....	173 07 18·99	353 06 10·16	4·2697214
Star.....	123 20 34·46	303 05 54·18	4·5329758
Squaw.....	147 36 06·81	327 21 34·40	4·7193885
Quicksilver.....	35 05 16·65	214 40 44·51	4·9274756
Initial Point.....	46 12 04·46	225 58 20·50	4·5722373

SOUTH RIDGE NO. 1.

Located on a salient of the third bluff, in Ada Co., Idaho, south of the Boise River.

Permanent mark: A 2-inch stake driven in the ground.

[Latitude, 43° 30' 50''-88. Longitude, 116° 13' 43''-64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
West Base.....	169 39 51·93	349 39 06·42	3·9170050
East Base	232 48 01·67	52 50 22·17	3·7596442
Table Rock.....	217 16 13·76	37 19 39·31	4·0433493
South Ridge No. 2.	295 05 57·87	115 10 44·46	4·0141441
Lucky Peak.....	233 00 29·19	53 07 21·29	4·2251047
Star	152 17 21·30	332 09 34·49	4·5122886
Shafer.....	201 18 37·63	21 24 21·58	4·4867354
Pickels Butte	85 59 47·65	265 39 45·80	4·5947018

SOUTH RIDGE NO. 2.

Located on dividing ridge between Indian Creek and Boise River, in Ada Co., Idaho, one-fourth mile south of overland road.

Permanent mark: A 2-inch stake driven in ground.

[Latitude, 43° 28' 28''-67. Longitude, 116° 06' 47''-39.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Table Rock.....	168 38 55·03	348 37 33·79	4·1284681
South Ridge No. 1.	115 10 44·46	295 05 57·87	4·0141441
Lucky Peak	195 43 26·13	15 45 31·35	4·1773476
Three Point	256 18 09·94	76 25 30·34	4·1701353

THREE POINT.

The western of a group of three bald mountains on the south of the Boise River in Elmore Co., Idaho, between the heads of Grouse Creek and Blocks Creek.

Permanent mark: A small stone monument.

[Latitude, 43° 30' 21''-70. Longitude, 115° 56' 07''-48.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lucky Peak	136 57 00·58	316 51 44·90	4·1775766
South Ridge No. 2.	76 25 30·34	256 18 09·94	4·1701353

PICKELS BUTTE.

A lava butte on the north bank of Snake River, in Ada Co., Idaho, about 3 miles north of Warm Spring ferry.

[Latitude, 43° 29' 18''-21. Longitude, 116° 42' 49''-56.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Star	217 03 03·62	37 15 21·63	4·5987971
South Ridge No. 1.	265 39 45·80	85 59 47·65	4·5947018
Caldwell.....	183 20 49·25	3 21 32·51	4·3813222
Mitchell.....	129 51 01·33	309 31 40·33	4·6903732

INITIAL POINT.

Small black butte on Snake River plains, in Ada Co., Idaho, 4 miles from Kuna (south) Station on Oregon Short Line Railroad. Initial point of the land survey of Idaho.

[Latitude, $43^{\circ} 22' 18''$.20. Longitude, $116^{\circ} 23' 42''$.80.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Lucky Peak	225 58 20.50	46 12 04.46	4.5722373
Star	177 48 42.68	357 47 50.18	4.6495404

FLAT TOP.

A long, flat-topped mountain in Owyhee Co., Idaho, locally known as Squaw Mountains, between Reynold Creek and Jump Creek, at the head of Squaw Creek.

Permanent mark: A monument of slab rock at the south end of the mountain.

[Latitude, $43^{\circ} 15' 44''$.31. Longitude, $116^{\circ} 53' 11''$.56.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Shafer.....	228 26 01.53	48 58 55.18	4.9328902
Cinder.....	273 31 17.91	94 07 57.53	4.8609823
Quicksilver.....	329 21 45.09	149 31 04.79	4.5611815

QUICKSILVER.

Highest peak to the northeast of Silver City, Owyhee Co., Idaho.

Permanent mark: A large stone monument.

[Latitude, $42^{\circ} 58' 48''$.47. Longitude, $116^{\circ} 39' 32''$.46.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Flat Top.....	149 31 04.79	329 21 45.09	4.5611815
Lucky Peak.....	214 40 44.51	35 05 16.65	4.9274756

CINDER.

Cinder Cone, 200 feet high, in Ada Co., Idaho, 12 miles southwest of Cleft, a station on Union Pacific Railroad.

Permanent mark: A rock monument 8 feet high.

[Latitude, $43^{\circ} 13' 07''$.26. Longitude, $115^{\circ} 59' 40''$.65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Shafer.....	172 50 39.05	352 46 41.85	4.7915183
Flat Top.....	94 07 57.53	273 31 17.91	4.8609823
House.....	239 42 37.95	60 03 26.16	4.6756929

NORTH.

Highest peak in Granite range, in Elmore Co., Idaho, between Smith Prairie and Trinity lakes, three-fourths of a mile to east from the trail to Smith Prairie from Rocky Bar.

Permanent mark: A large sharp-pointed rock on highest peak.

[Latitude, 43° 35' 54''-90. Longitude, 115° 25' 48''-56.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shafer	110 02 39-92	289 35 18-35	4-7526931
House	14 33 10-22	194 30 43-82	4-2795957
Camas	000 40 04-62	180 39 50-79	4-5898895
Green Springs	315 28 31-54	135 49 49-15	4-7770614
Smoky Dome	286 16 52-80	106 37 14-71	4-6182232
Snowy Side	224 11 09-28	44 30 08-63	4-7218576

HOUSE.

A bald mountain in the bend of the South Boise River, in Elmore Co., Idaho, between Smith Prairie and Little Camas Prairie.

Permanent mark: A monument of stone on west end.

[Latitude, 43° 25' 57''-75. Longitude, 115° 29' 21''-53.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shafer	127 58 43-23	307 33 50-99	4-7881882
Cinder	60 03 26-16	239 42 37-95	4-6756929
North	194 30 43-82	14 33 10-22	4-2795957

CAMAS.

High bald mountain between Mountain Home and Camas Prairie, in Elmore Co., Idaho, 2 miles east of road from Mountain Home to Rocky Bar.

Permanent mark: A stone monument 7 feet high.

[Latitude, 43° 14' 54''-66. Longitude, 115° 26' 08''-64.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shafer	137 52 30-77	317 25 26-26	4-8953144
North	180 39 50-79	000 40 04-62	4-5898895
Smoky Dome	235 55 54-90	56 16 26-69	4-6871167

SMOKY DOME.

A dome-shaped peak in the range to the north of Camas Prairie about north of Soldier Creek, in Logan Co., Idaho.

Permanent mark: A stone monument.

[Latitude, 43° 29' 33''-93. Longitude, 114° 56' 14''-94.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
North	106 37 14-71	286 16 52-80	4-6182232
Camas	56 16 26-69	235 55 54-90	4-6871167
Green Springs	356 26 17-82	176 27 16-58	4-4927915
Kelly Mountain	269 59 16-56	90 18 39-94	4-5795620
Snowy Side	176 43 56-91	356 42 29-43	4-6948826

KELLY MOUNTAIN.

High bald peak, northwest from Hailey Hot Springs, in Logan Co., Idaho, on same mountain as Red Elephant Mine.

Permanent mark: Rock monument.

[Latitude, $43^{\circ} 29' 30'' \cdot 71$. Longitude, $114^{\circ} 28' 04'' \cdot 61$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Smoky Dome	90 18 39·94	269 59 16·56	4·5795620
Green Springs	49 34 58·31	229 16 36·08	4·6773992

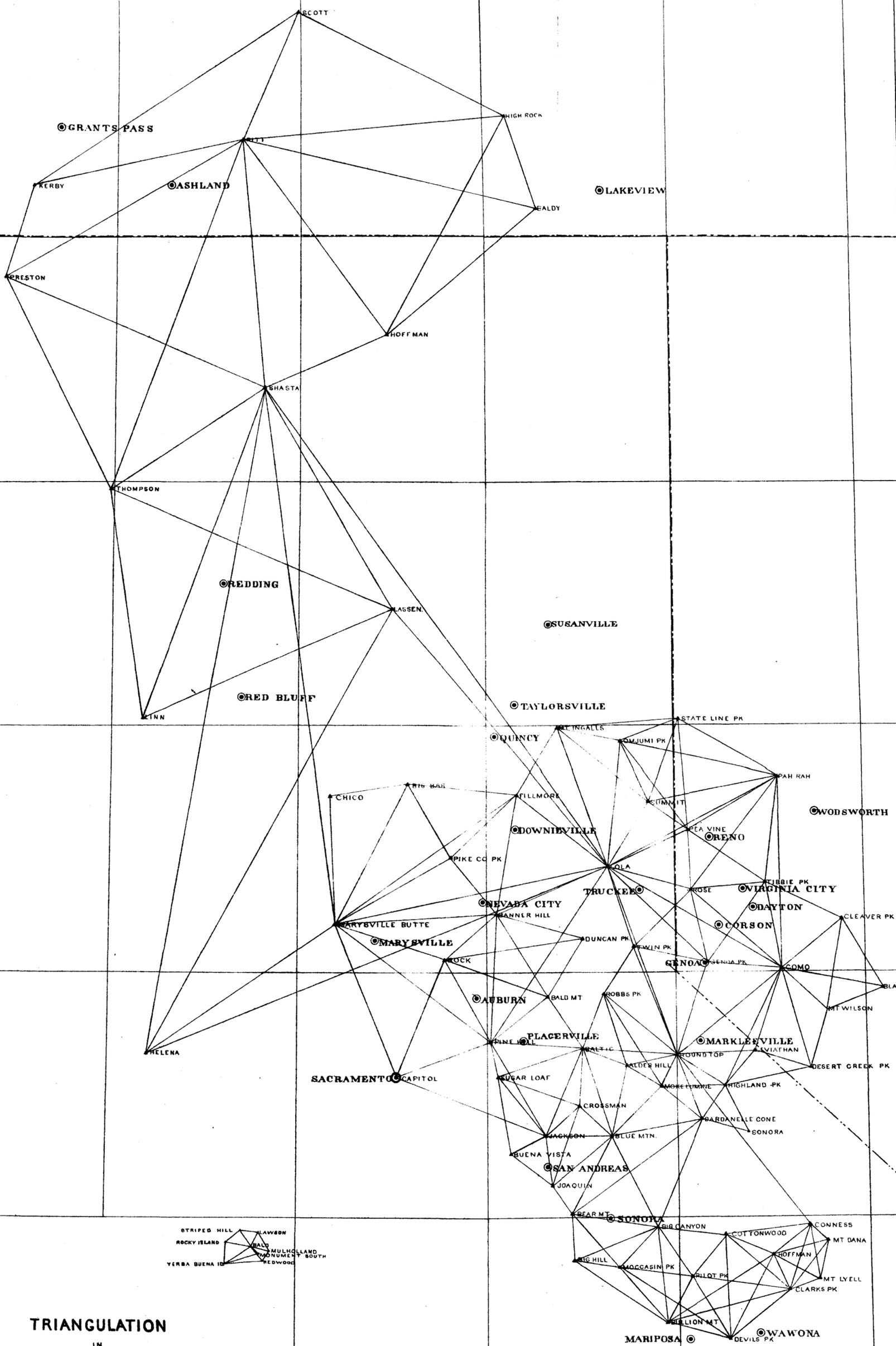
GREEN SPRINGS.

High flat mountain, in Logan Co., Idaho, on ridge between Camas Prairie and King Hill Creek, about 4 miles south of Camas Prairie.

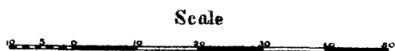
Permanent mark: A large stone monument.

[Latitude, $43^{\circ} 12' 48'' \cdot 03$. Longitude, $114^{\circ} 54' 49'' \cdot 34$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
North	135 49 49·15	315 28 31·54	4·7770614
Smoky Dome	176 27 16·58	356 26 17·82	4·4927915
Kelly Mountain ..	229 16 36·68	49 34 58·31	4·6773992



**TRIANGULATION
IN
OREGON, CALIFORNIA, NEVADA**



CALIFORNIA, NEVADA, AND SOUTHERN OREGON.

METHODS OF WORK.

The triangulation of California is in three separate and independent sections, namely, the Cascade section, in northern California and southern Oregon; the Gold Belt section, including the Sierras from Red Bluff to Yosemite Valley, and from the Sacramento Valley eastward well into Nevada. The third section includes a few stations in the Coast Range, southeast of San Francisco.

The first work was done in 1882 and continued in 1883 by Gilbert Thompson in the vicinity of Mount Shasta. Work was carried forward in this section by Mark B. Kerr and Eugene Ricksecker until 1886 and by W. T. Griswold in 1887. All distances, azimuths, and positions depend on the position of Lassen and on the line Lassen-Shasta, as computed by E. M. Douglas from unclosed triangles of the U. S. Coast and Geodetic Survey. The instrument used was an 8-inch 10-second vernier theodolite. Natural points were generally sighted and single and double angles measured by circle readings. The work was all adjusted by least squares.

In the Gold Belt section work was commenced in 1885 by H. M. Wilson, who measured a base line with steel tape near Oroville for temporary use. The distances thus obtained were afterwards replaced by others depending on the U. S. Coast and Geodetic Survey transcontinental line Marysville Butte-Pine Hill, afterwards checked by the lines between Lola, Pine Hill, Round Top and Pah Rah and Como. The instrument used for nearly all the work was an 8-inch 10-second theodolite. A few angles were measured in 1885 with a 7-inch theodolite. The method of circle readings was generally adopted for measuring angles, and least-square adjustment was made for station and figure.

During the years from 1889 to 1893 the triangulation was carried on by H. E. C. Feusier, who located points as far south as the Yosemite Valley and eastward into Nevada to Walker Lake. A few stations in California and Nevada, in the vicinity of Taylorsville, Cal., were occupied in 1890 by E. M. Douglas, using an 8-inch micrometer theodolite. The initial stations for this work were Lola-Pah Rah, two stations of the U. S. Coast and Geodetic Survey transcontinental triangulation.

In this work good, bare, natural peaks were found on nearly all of the stations occupied in the Oregon and Nevada portions of the work. On these, stone monuments were erected to mark the stations and serve as signals. In the Gold Belt work, however, many of the hills were timbered or were so flat on top as to require the construction of special signals. In some cases these consisted of trimmed trees to mark the

station and serve as signals. In a few instances, high observing scaffolds were built, notably in the case of Pike County Peak, where the signal was placed on such a scaffold 66 feet in height. In many of the cases where the hills were heavily timbered, heliotropes were used extensively as signals and the stations marked by small cairns of rock.

DESCRIPTIONS AND POSITIONS OF STATIONS.

SCOTT.

Sharp point in Klamath Co., Oreg., 2 miles east of Crater Lake.

[Latitude, 42° 55' 18''-9. Longitude, 122° 01' 00''-2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pitt.....	24 53 30	204 41 19	4.7675002

HIGH ROCK.

Situated in Lake Co., Oreg., about 16 miles northeast of Bly.

[Latitude, 42° 29' 42''-7. Longitude, 120° 52' 40''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pitt.....	87 42 17	266 44 00	5.0734618
Baldy.....	342 33 06	162 39 32	4.6428586

PITT.

A sharp point in Jackson Co., Oreg., 12 miles due west of Klamath Lake. Elevation, 9,760.

[Latitude, 42° 26' 36''-4. Longitude, 122° 18' 58''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shasta.....	354 58 25	175 03 16	5.0625150
Thompson.....	19 29 14	199 01 49	5.2386588
High Rock.....	266 44 00	87 42 17	5.0734618
Baldy.....	284 48 52	105 53 22	5.1356498
Scott.....	204 41 19	24 53 30	4.7675002
Hoffman.....	325 26 50	145 57 28	5.0494781
Kerby.....	75 35 29	254 49 12	4.9897085
Preston.....	58 08 48	237 16 37	5.1029871

KERBY.

High point on north end of ridge, 10 miles east of Kerby, Josephine Co., Oreg.

[Latitude, 42° 13' 08''-2. Longitude, 123° 27' 42''-6.]

To station.	Azimuth.	Back azimuth.	Log. dis.
	° ' "	° ' "	<i>Meters.</i>
Preston.....	16 18 25	196 12 22	4.6489509
Pitt.....	254 49 12	75 35 29	4.9897085

BALDY.

Prominent butte 6 miles southeast of Fall River Mills, Shasta Co., Cal.

[Latitude, 42° 07' 03''-7. Longitude, 120° 43' 06''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pitt.....	105 53 22	284 48 52	5·1356498
Hoffman.....	51 09 25	230 35 59	4·9512523
High Rock.....	162 39 32	342 33 06	4·6428586

PRESTON.

High peak in Siskiyou Range, at the head of Preston Creek, Del Norte Co., Cal.

[Latitude, 41° 50' 01''-7. Longitude, 123° 36' 44''-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pitt.....	237 16 37	58 08 48	5·1029871
Thompson.....	331 47 06	152 11 18	5·0356372
Kerby.....	196 12 22	16 18 25	4·6489509

HOFFMAN.

Rounded butte in Siskiyou Co., Cal., 1 mile northeast of Medicine Lake.

[Latitude, 41° 36' 35''-7. Longitude, 121° 33' 13''-5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pitt.....	145 57 28	325 26 50	5·0494781
Shasta.....	67 27 32	247 02 02	4·7639981
Baldy.....	230 35 59	51 09 25	4·9512523

SHASTA.

The highest peak in northern California, in Siskiyou Co., 6 miles northeast of Berryvale.

[Latitude, 41° 24' 27''-6. Longitude, 122° 11' 42''-9.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	<i>Meters.</i>
Linn.....	20 17 26	199 51 37	5·2103160
Thompson.....	54 39 51	234 07 57	4·9207588
Pitt.....	175 03 16	354 58 25	5·0625150
Hoffmann.....	247 02 02	67 27 32	4·7639981

THOMPSON.

Sixteen miles north of Junction City, in Trinity Co., Cal.

[Latitude, 40° 58' 15''·2. Longitude, 123° 00' 09''·9.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	<i>Meters.</i>
Pitt	199 01 49	19 29 14	5·2386588
Shasta.....	234 07 57	54 39 51	4·9207588
Lassen	292 32 14	113 30 51	5·1381783
Preston.....	152 11 18	331 47 06	5·0356372

LASSEN.

Highest peak in Shasta Co., Cal.

[Latitude, 40° 29' 12''·0. Longitude, 121° 30' 19''·0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Linn.....	66 49 53	245 57 34	5·0078405
Thompson.....	113 30 51	292 32 14	5·1381783

LINN.

Highest peak in the Yallo Bally Mountains, Tehama Co., Cal., near its boundary with Trinity County.

[Latitude, 40° 02' 05''·7. Longitude, 122° 51' 16''·5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lassen	245 57 34	66 49 53	5·0978405
Shasta.....	199 51 37	20 17 26	5·2103160

STATE LINE PEAK.

Local name, Fort Sage Peak. Highest point of mountain. Due east of Long Valley Post-Office (Doyle's ranch).

Permanent mark: Rock monument, about in center of hilltop.

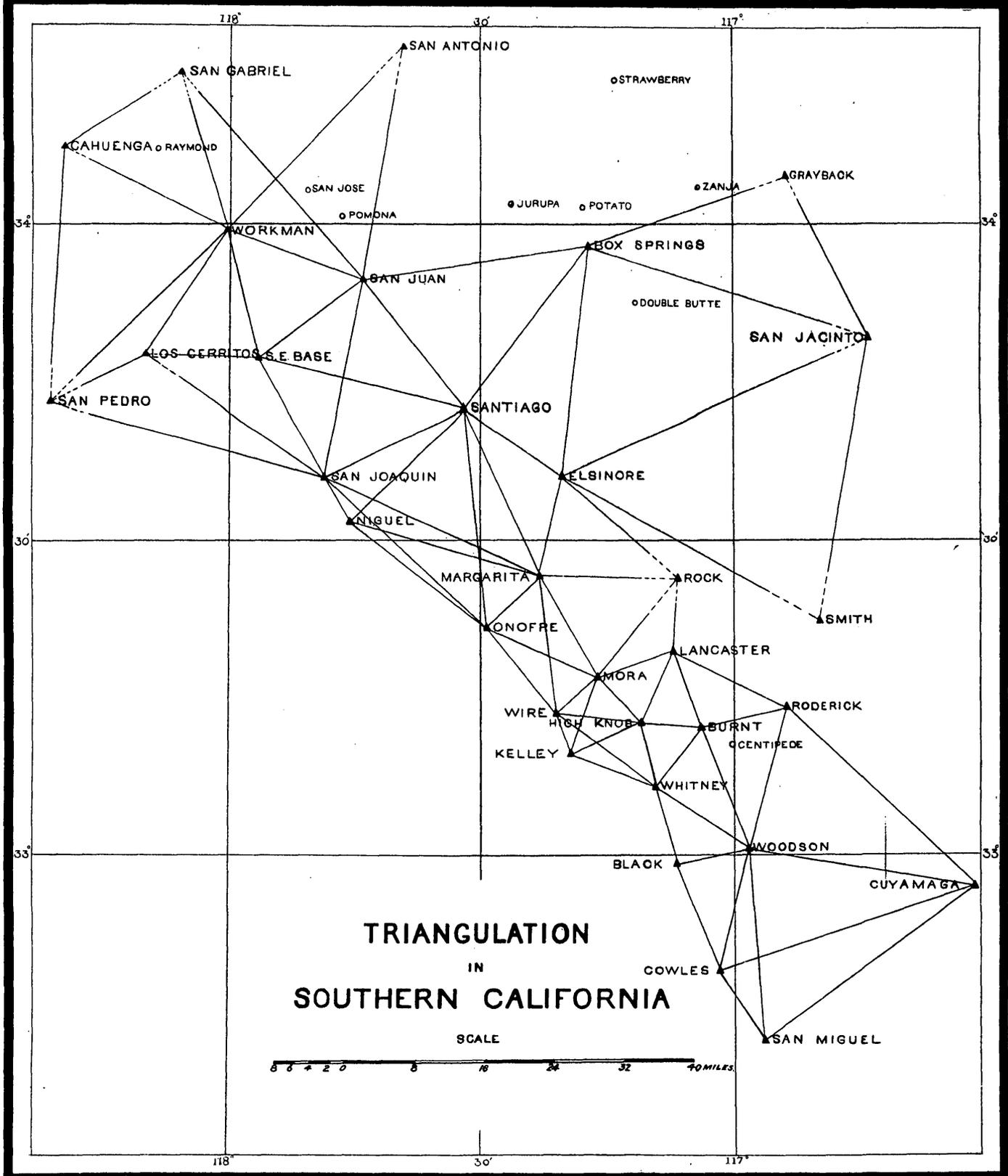
[Latitude, 40° 01' 42''·1. Longitude, 119° 58' 45''·4.]

MOUNT INGALLS.

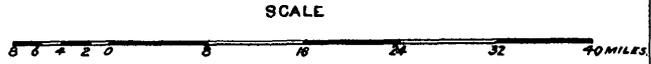
A high, bare-topped peak about 20 miles from Beckwith post-office, down Red Clover Valley and 6 miles west of Chase's ranch.

Permanent mark: A rock monument.

[Latitude, 39° 59' 33''·7. Longitude, 120° 37' 40''·1.]



TRIANGULATION
IN
SOUTHERN CALIFORNIA



OMJUMI PEAK.

Local name, Dixie Peak. Highest peak on west side of Last Chance Valley. Station is about the center one, of three or four equally high peaks close together.

Permanent mark: Stone cairn.

[Latitude, 39° 56' 14"-18. Longitude, 120° 17' 03"-0.]

PAH RAH (C. AND G. S. STATION).

[Latitude, 39° 47' 34"-73. Longitude, 119° 28' 23"-74.]

To station.	Azimuth.	Back azimuth.	Log. dist.
Lola.....	° ' " 62 35 59.68	° ' " 242 01 55.06	<i>Meters.</i> 4.9364404

SUMMIT.

A station of the Wheeler survey; the westernmost of two high rocky peaks, about 2 miles north of where old stage road from Long Valley Creek to Loyalton crosses the divide.

Permanent mark: A rock cairn about 8 feet high.

[Latitude, 39° 42' 03"-5. Longitude, 120° 08' 37"-3.]

BIG BAR HILL.

A high, round topped, heavily timbered hill in Butte Co., Cal., 8 miles north of Merrimac Mills and 6 miles northwest of Mountain House.

Permanent mark: Cairn of rocks under observing tripod, 15 feet high, beneath two tall firs on highest point of hill.

[Latitude, 39° 46' 32"-7. Longitude, 121° 25' 40"-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
Marysville Butte ..	° ' " 28 11 22	° ' " 207 56 22	<i>Meters.</i> 4.8506666
Fillmore	275 51 43	96 13 46	4.6950446
Chico	81 00 23	260 44 17	4.5615898

CHICO.

In Butte Co., Cal.

Permanent mark: Flagstaff in center of top of waterworks tower, near railroad depot.

[Latitude, 39° 43' 25"-2. Longitude, 121° 50' 51"-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
Marysville Butte ..	° ' " 357 42 48	° ' " 177 43 49	<i>Meters.</i> 4.7611889
Big Bar Hill.....	260 44 17	81 00 23	4.5615898

FILLMORE.

A high, bare-topped peak, situated in Sierra Co., Cal., 3 miles east of Howland Flat and 4 miles southeast of Gibsonville. Scattering timber on west side of hill.

Permanent mark: A pile of brush and rocks 10 feet high on highest point.

[Latitude, $39^{\circ} 43' 43''$.5. Longitude, $120^{\circ} 51' 10''$.3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Marysville Butte .	55 21 43	234 44 48	5.0070456
Banner Hill.....	10 16 15	190 11 56	4.7376420
Big Bar Hill.....	96 13 46	275 51. 43	4.6950446

PEAVINE MOUNTAIN.

In Washoe Co., Nev., 7 miles northwest of the town of Reno, Nev., and 6 miles northeast of the town of Verdi, Cal.

Permanent mark: Rock monument.

[Latitude, $39^{\circ} 35' 07''$.4. Longitude, $119^{\circ} 55' 57''$.0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Rose.....	357 24 14	177 24 47	4.4316384
Tibbie Peak	304 54 18	125 09 27	4.6204635

PIKE COUNTY PEAK.

High, timbered hill in Yuba Co., Cal., about 4 miles east of Brownsville and 1 mile southeast of Challenge Mills.

Permanent mark: Center of 66-foot spruce stump in center of 64-foot scaffold of standing stumps.

[Latitude, $39^{\circ} 28' 24''$.3. Longitude, $121^{\circ} 12' 10''$.0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Marysville Butte.	60 55 31	240 32 00	4.7860026
Banner Hill	321 09 27	141 18 28	4.5135932

LOLA.

U. S. C. & G. S. station, in Nevada Co., Cal. The south summit of the high ridge between Weber and Independence lakes, from either of which it can be reached.

Permanent mark: A cairn of rocks 10 feet high, under which is U. S. C. & G. S. drill hole.

[Latitude, 39° 25' 53''-3. Longitude, 120° 21' 55''-5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine Hill	34 32 04	214 08 25	4-9819924
Marysville Butte	79 06 06	258 10 46	5-1073108
Round Top	339 37 56	159 51 42	4-9592252
Banner Hill	68 18 57	247 56 07	4-7464188
Pah Rah	242 01 55	62 36 00	4-9364404

TIBBIE PEAK.

A high, bare, and rocky twin peak in Storey Co., Nev.; highest point on Flowery Ridge, 7 miles northwest of Virginia City. Station is on eastern and highest twin summit.

Permanent mark: Monument of rock 7 feet high.

[Latitude, 39° 22' 10''-7. Longitude, 119° 32' 07''-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rose	84 52 08	264 37 33	4-5204370
Como	352 15 00	172 17 18	4-5931781
Cleaver Peak	295 56 53	116 12 09	4-5861595
Peavine Mountain	125 09 27	304 54 18	4-6204635

ROSE.

A peak on bare ridge, west of Washoe Valley, and 6 miles east by north from the town of Washoe, in Washoe Co., Nev.

Permanent mark: Rock monument.

[Latitude, 39° 20' 32''-3. Longitude, 119° 55' 05''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Genoa	354 35 29	174 36 52	4-5255739
Como	312 52 50	133 09 39	4-7199236
Peavine Mountain	177 24 47	357 24 14	4-4316384
Tibbie Peak	264 37 33	84 52 08	4-5204370
Twin Peak	46 38 52	226 26 57	4-5722948

CLEAVER PEAK.

Often called Wabuska hill; a bare, rocky, flat topped peak, 6 miles east of north of the town of Wabuska, in Lyons Co., Nev.

Permanent mark: A cairn of rocks 8 feet high.

[Latitude, 39° 13' 01''-1. Longitude, 119° 08' 01''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Como	53 29 16	233 16 22	4-5645136
Tibbie Peak	116 12 09	295 56 53	4-5861595
Black Mountain ..	327 57 11	148 05 37	4-5612553

BANNER HILL.

Station is about 3 miles southeast of Nevada City, Cal., and 5 miles northeast of Grass Valley, in Nevada Co.

Permanent mark: A large dead oak tree, marked U. S. G. S.

[Latitude, $39^{\circ} 14' 39''$.4. Longitude, $120^{\circ} 57' 56''$.6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bald Mountain	329 12 26	149 22 17	4·6446840
Rock Mountain.....	48 11 46	228 01 40	4·4914659
Lola.....	247 56 07	68 18 57	4·7464188
Pine Hill.....	2 07 57	182 07 01	4·7669790
Duncan Peak.....	285 53 09	106 10 27	4·6129737
Fillmore.....	190 11 56	10 16 15	4·7376420
Pike County Peak....	141 18 28	321 09 27	4·5135932
Marysville Butte.....	86 50 11	266 17 44	4·8691326

MARYSVILLE BUTTE.

U. S. C. & G. Survey station, in Sutter Co., Cal., 10 miles north of west from Marysville and 5 miles southeast of Colusa.

Permanent mark: The southern and next to highest rock cropping on South Butte, the highest of the group.

[Latitude, $39^{\circ} 12' 15''$.7. Longitude, $121^{\circ} 49' 15''$.4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Banner Hill	266 17 44	86 50 11	4·8691326
Capitol	337 47 17	157 59 36	4·8772911
Big Bar Hill.....	207 56 22	28 11 22	4·8566666
Chico.....	177 43 49	357 42 48	4·7611889
Fillmore.....	234 44 48	55 21 43	5·0070456
Lola.....	258 10 46	79 06 06	5·1073108
Pike County Peak....	240 32 00	60 55 31	4·7860026
Pine Hill	306 37 37	127 08 57	4·9540856

DUNCAN PEAK.

Rocky and bare projection of a square partly timbered hill in Placer Co., 20 miles east of Iowa Hill, 25 miles northeast of Michigan Bluffs, and 8 miles southeast of Indian Springs.

Permanent mark: The highest point of the rock on southwest part of the hill.

[Latitude, $39^{\circ} 08' 32''$.1. Longitude, $120^{\circ} 30' 33''$.9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Banner Hill	106 10 27	285 53 09	4·6129737
Bald Mountain....	32 35 05	212 27 41	4·4991272

TWIN PEAK.

This station is a bare rocky peak on a timbered ridge at the head of Blackwood Creek, 4 miles west of Lake Tahoe and 6 miles southwest of Tahoe city, in Placer Co., Cal.

Permanent mark: Rock monument.

[Latitude, 39° 06' 39".3. Longitude, 120° 13' 56".3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Genoa	284 08 30	104 21 45	4.4954839
Rose	226 26 57	46 38 52	4.5722948
Round Top	338 01 12	158 09 54	4.7299718
Robbs Peak	35 34 38	215 28 09	4.4078178

ROCK MOUNTAIN.

High bare hill in Nevada Co., Cal., 4 miles southwest of Spencer-ville and 12 miles east of Wheatland.

Permanent mark: Top of large bare rocky knob on summit.

[Latitude, 39° 03' 28".0. Longitude, 121° 13' 58".0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine Hill	330 49 41	150 58 48	4.6353051
Banner Hill	228 01 40	48 11 46	4.4914659

GENOA PEAK.

In Douglas Co., Nev.; bare rocky cone on ridge between Carson Valley and Lake Tahoe and 4 miles northwest of the town of Genoa.

Permanent mark: Rock monument.

[Latitude, 39° 02' 29".5. Longitude, 119° 52' 54".4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Round Top	13 53 09	193 48 39	4.6372704
Como	273 46 30	94 01 54	4.5485606
Rose	174 36 52	354 35 29	4.5255739
Twin Peak	104 21 45	284 08 30	4.4954839

COMO.

U. S. C. & G. S. station on the Como Mountains, lying between Carson and Mason valleys, in Douglas Co., Nev. It is a bare, sharp cone, about 30 miles by road from either Carson City or Dayton. There is a spring

and camping ground at the head of Pine Mount Valley. From this place a trail leads to the summit.

Permanent mark: Stone monument, 12 feet high, over U. S. C. & G. S. mark.

[Latitude, 39° 01' 11".4. Longitude, 119° 28' 27".6.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Round Top.....	49	12	53	228	53	03	4 7823826
Genoa Peak.....	94	01	54	273	46	30	4 5485606
Black Mountain.....	280	16	25	100	37	41	4 6958039
Cleaver Peak.....	233	16	22	53	29	16	4 5645136
Desert Creek Peak.....	343	02	38	163	08	36	4 6744512
Highland Peak.....	24	51	48	204	41	13	4 7663800
Leviathan.....	17	43	54	197	38	43	4 5952729
Rose.....	133	09	39	312	52	50	4 7199236
Tibbie Peak.....	172	17	18	352	15	00	4 5931781
Mount Wilson.....	310	37	13	130	46	47	4 4625328

BLACK MOUNTAIN.

A long timbered ridge in Walker River range of mountains. It lies between Mason Valley and Walker Lake, 15 miles southeast of town of Mason Valley (Poison Switch), in Esmeralda Co., Nev., and 10 miles south of west of Rio Vista railroad station. Summit cleared of timber.

Permanent mark: A lone tree.

[Latitude, 38° 56' 19".4. Longitude, 118° 54' 39".6.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Cleaver Peak.....	148	05	37	327	57	11	4 5612553
Como.....	100	37	41	280	16	25	4 6958039

MOUNT WILSON.

A bare peak, the northernmost summit of the range between Warm Spring Valley and Mason Valley, and 3 miles northeast of Wilson's ranch. In Lyon Co., Nev., on north side of Walker River.

Permanent mark: Rock monument.

[Latitude, 38° 50' 57".9. Longitude, 119° 13' 14".5.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	Meters.
Como.....	130	46	47	310	37	13	4 4625328
Desert Creek Peak.....	17	32	28	197	28	53	4 4405014

ROBBS PEAK.

A brush-covered hill in Eldorado Co., Cal., 24 miles east by north from Georgetown, near the Uncle Tom's Cabin road, 1½ miles west of Orellis Dairy ranch.

Permanent mark: Rock monument.

[Latitude, 38° 55' 24"·3. Longitude, 120° 24' 14"·0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Round Top.....	309 32 58	129 48 06	4·6573774
Twin Peak.....	215 28 09	95 34 38	4·4078178
Alder Hill.....	341 31 45	161 36 28	4·5390325

BALD MOUNTAIN.

High, heavily timbered point, in Eldorado Co., Cal., about 7 miles east of Georgetown. Nearest camp at Twelve Mile House.

Permanent mark: A stone cairn between two blazed pine trees.

[Latitude, 38° 54' 09"·2. Longitude, 120° 42' 19"·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Duncan.....	212 27 41	32 35 05	4·4991272
Baltic Peak.....	324 41 42	144 48 49	4·4552510
Pine Hill.....	50 30 12	230 19 23	4·5074335
Banner Hill.....	149 22 17	329 12 26	4·6446840

PINE HILL.

U. S. C. & G. S. station, situated in Eldorado Co., Cal., 6 miles east of Salmon Falls and 3 miles northeast of Green Valley. Highest part of peak is bare.

Permanent mark: A cairn of rocks on northernmost of two rock croppings, situated 30 feet apart and on highest summit of hill.

[Latitude, 38° 43' 04"·4. Longitude, 120° 59' 26"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Banner Hill.....	182 07 01	2 07 57	4·7669790
Marysville Butte..	127 08 57	306 37 37	4·9540856
Bald Mountain...	230 19 28	50 30 12	4·5074335
Baltic Peak.....	273 43 37	94 01 26	4·6170650
Capitol.....	70 16 26	249 57 35	4·6681981
Crossman.....	305 10 38	125 27 45	4·6885248
Jackson Butte....	330 46 53	150 56 57	4·6832661
Lola.....	214 08 25	34 32 04	4·9819924
Rock Mountain...	150 58·48	330 49 41	4·6353051

BALTIC PEAK.

The westernmost and highest spur of Baltic Ridge, situated in Eldorado Co., Cal., 4 miles due north of Grizzly Flat and 4 miles southeast of Sly Park.

Permanent mark: A cairn of rocks. There is a blazed oak 5 feet west of this cairn.

[Latitude, 38° 41' 33''·6. Longitude, 120° 30' 57''·0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine Hill	94 01 26	273 43 37	4·6170650
Bald Mountain	144 48 49	324 41 42	4·4552510
Crossman	3 29 42	183 29 03	4·4060125

ROUND TOP.

U. S. C. & G. S. station, situated in Alpine Co., Cal., about 4 miles south by west from Carson Pass and 6 miles east of Silver Lake, 4 miles southeast of Kirkwood's (on Amador road).

Permanent mark: Stone monument over U. S. C. & G. S. mark.

[Latitude, 38° 39' 43''·6. Longitude, 120° 00' 05''·0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Como	228 53 03	49 12 53	4·7823826
Genoa	193 48 39	13 53 09	4·6372703
Robbs Peak	129 48 06	309 32 58	4·6573774
Twin Peak	158 09 54	338 01 12	4·7299713
Alder Hill	81 05 05	260 54 43	4·3870881
Highland Peak	301 49 44	121 58 56	4·4011548
Lola	159 51 42	339 37 56	4·9592252
Mokelumne	30 20 24	210 16 54	4·2075502

LEVIATHAN.

In Alpine Co., Cal., a bare peak on ridge east of Antelope Valley and northwest of the lower end of Slinkards Valley. It is 6 miles southwest of the Mountain House.

Permanent mark: A rock monument.

[Latitude, 38° 40' 54''·7. Longitude, 119° 36' 43''·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Desert Creek Peak	286 31 52	106 42 58	4·4297204
Como	197 38 43	17 43 54	4·5952729

DESERT CREEK PEAK.

A bare peak, the northernmost of the ridge between Desert Creek and the Carson-Aurora road. It is 3 miles south of Hall and Simpson's ranch, in Lyon Co., Nevada.

Permanent mark: A rock monument.

[Latitude, 38° 36' 45''-2. Longitude, 119° 18' 58''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Como.....	163 08 36	343 02 38	4·6744512
Highland Peak....	78 37 23	258 20 55	4·5923509
Mount Wilson.....	197 28 53	17 32 28	4·4405014
Leviathan.....	106 42 58	286 31. 52	4·4297204

ALDER HILL (OFTEN CALLED LEAK SPRING HILL).

A timbered hill at the head of the north fork of the Cosumne River, 11 miles due east from Grizzly Flat and 10 miles west by south from Silver Lake, in Eldorado Co., Cal.

Permanent mark: A tree with limbs trimmed off and marked U. S. G. S.

[Latitude, 38° 37' 40''-0. Longitude, 120° 16' 41''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Round Top.....	260 54 43	81 05 05	4·3870881
Robbs Peak.....	161 36 28	341 31 45	4·5390325

CAPITOL.

The center of cupola of capitol building at Sacramento, Cal.

[Latitude, 38° 34' 30''-7. Longitude, 121° 29' 38''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine Hill.....	249 57 35	70 16 26	4·6681981
Jackson Butte....	291 03 20	111 32 09	4·8595054
Marysville Butte.	157 59 36	337 47 17	4·8772911

SUGAR LOAF.

A high cone in Eldorado Co., Cal., 4 miles east of Latrobe.

Permanent mark: A lone digger pine which is blazed and has a cairn of rocks built against it. This tree is 35 feet east of the highest rock cropping on the hill and 8 feet below the summit.

[Latitude, 38° 34' 43''-0. Longitude, 120° 56' 59''-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Buena Vista.....	354 51 13·55	174 52 32·79	4·5385235
Jackson Butte....	323 09 16·23	143 17 47·43	4·5222681

MOKELUMNE.

A bare rocky peak on the north side of Mokelumne River Canyon and 9 miles due south from Silver Lake.

Permanent mark: Rock monument.

[Latitude, 38° 32' 12''-12. Longitude, 120° 05' 41''-34.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Highland Peak ...	268 42 34	88 55 14	4·4705789
Round Top	210 16 54	30 20 24	4·2075502
Dardanelle Cone..	307 17 38	127 25 56	4·3377463

HIGHLAND PEAK.

A bare rocky peak 8 miles west of Hermit Valley and 10 miles south of Markleeville, in Alpine Co., Cal. Local name is South Silver Mountain.

Permanent mark: Rock monument.

[Latitude, 38° 32' 31''-9. Longitude, 119° 45' 21''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Como	204 41 13	24 51 48	4·7663800
Round Top	121 58 56	301 49 44	4·4011548
Dardanelle Cone.....	33 24 30	213 20 10	4·2666422
Desert Creek Peak....	258 20 55	78 37 23	4·5923509
Mokelumne.....	88 55 14	268 42 34	4·4705789
Sonora.....	333 31 32	153 35 01	4·3718484

CROSSMAN.

The highest point on wooded rise or knoll on the first ridge south of Sutter Creek, known as Crossman Mount or Mount Heckler. Twenty miles east of Jackson, on Antelope Spring road, or 7 miles a little south of east of Volcano and 1½ miles northwest of Whitmore's sawmill. Hill covered with undergrowth and some timber.

Permanent mark: A small cairn of rocks.

[Latitude, 38° 27' 49''-2. Longitude, 120° 32' 01''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pine Hill.....	125 27 45	305 10 38	4·6885248
Baltic Peak.....	183 29 03	3 29 42	4·4060125
Blue Mountain....	312 50 09	132 56 25	4·3025016
Jackson Butte....	49 47 25	229 40 25	4·3326197

DARDANELLE CONE.

A bare lava cone, 4 miles north by east from the junction of the middle fork of the Stanislaus and Clark's fork of the Stanislaus. Bloods Station on Big Tree road is 12 miles northwest.

Permanent mark: A rock monument.

[Latitude, $38^{\circ} 24' 11''$.5. Longitude, $119^{\circ} 52' 20''$.7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Highland Peak ...	213 20 10	33 24 30	4·2666422
Mokelumne.....	127 25 56	307, 17 38	4·3877463
Bear Mountain ...	55 54 12	235 17 44	4·8787191
Sonora.....	.....	105 21 40	4·3309599

SONORA.

[Latitude, $38^{\circ} 21' 08''$.25. Longitude, $119^{\circ} 38' 09''$.18.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Dardanelle Cone..	105 21 39·62	.....	4·3309599
Highland Peak ...	153 35 00·82	333 31 32·06	4·3718484

BLUE MOUNTAIN.

In Calaveras Co., Cal., between north and middle forks of Mokelumne River, on a very prominent hill, locally known as Blue Mountain, about 5 miles due north of Big Trees and 8 miles south of east of West Point. Station on summit of highest rock cropping on Blue Mountain.

[Latitude, $38^{\circ} 20' 26''$.2. Longitude, $120^{\circ} 21' 55''$.0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Jackson Butte....	89 39 47	269 26 32	4·4933875
Crossman.....	132 56 25	312 50 09	4·3025616
Bear Mountain....	28 28 57	208 20 46	4·6083280
Joaquin.....	51 42 48	231 30 44	4·5598667

JACKSON BUTTE.

Is situated in Amador Co., Cal., 3 miles southeast of Jackson, on an isolated, conical, very steep hill. It is covered with scattered timber which has been cleared from the summit, leaving a single tall oak as a signal.

Permanent mark: A + on a copper bolt, 34 feet north of signal tree,

the bolt projecting three-quarters of an inch above surface rock; over this are two flat stones and a cairn of rocks.

[Latitude, $38^{\circ} 20' 18'' \cdot 3$. Longitude, $120^{\circ} 43' 17'' \cdot 4$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Crossman.....	229	40	25·00	49	47	25·00	4·3326197
Pine Hill.....	150	56	57·00	330	46	53·00	4·6832661
Blue Mountain....	269	26	32·00	89	39	47·00	4·4933875
Buena Vista.....	65	22	42·00	245	15	32·00	4·2687901
Joaquin.....	352	59	35·00	173	00	47·00	4·3514767
Sugar Loaf.....	143	17	47·43	323	09	16·23	4·5222831
Capitol.....	111	32	09·00	291	03	20·00	4·8505054

BUENA VISTA.

Situated on center of north side of prominent hill locally known as Buena Vista Butte, in Amador Co., Cal., $5\frac{1}{2}$ miles south of Ione and 1 mile south of Buena Vista.

Permanent mark: Tall, lone Digger pine tree on north central side of butte, blazed and marked U. S. G. S. This tree is 125 feet east and 10 feet below the highest rock outcropping of the hill.

[Latitude, $38^{\circ} 16' 06'' \cdot 8$. Longitude, $120^{\circ} 54' 51'' \cdot 8$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Joaquin.....	306	27	26·00	126	35	45·00	4·3879729
Jackson Butte....	245	15	32·00	65	22	42·00	4·2687901
Sugar Loaf.....	174	52	32·79	354	51	13·55	4·5385235

JOAQUIN.

In Calaveras Co., Cal., $3\frac{1}{2}$ miles south of San Andreas, on southernmost high point of Hogback Ridge. Station on the high, rocky outcrop rising from the north end of a thicket of chaparral. Finders, a clump of trees 300 yards north of station on highest point of summit.

[Latitude, $38^{\circ} 03' 15'' \cdot 2$. Longitude, $120^{\circ} 41' 24'' \cdot 9$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Blue Mountain....	231	30	44	51	42	48	4·5598667
Jackson Butte....	173	00	47	352	59	35	4·3514767
Buena Vista.....	126	35	45	306	27	26	4·3879729

BEAR MOUNTAIN.

Highest point on ridge, 5 miles southwest of Angels, in Calaveras Co., Cal.

[Latitude, $38^{\circ} 01' 08'' \cdot 5$. Longitude, $120^{\circ} 35' 08'' \cdot 4$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	<i>Meters.</i>
Blue Mountain...	208	20	46	28	28	57	4·6083280
Dardanelle Cone..	235	17	44	55	54	12	4·8787191
Big Hill.....	366	05	15	176	05	51	4·3296475

BIG CANYON.

Local name, Duckwall Mount; a high timbered point on a ridge, 14 miles east of Sonora in Tuolumne Co., Cal.

[Latitude, 37° 58' 01"-5. Longitude, 120° 07' 13"-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Big Hill	68 38 35	248 22 02	4-0276730
Moccasin Peak ...	45 19 41	225 12 01	4-4116285
Bullion Peak	355 04 57	175 06 34	4-6590366
Pilot Peak.....	324 39 25	144 46 11	4-4473833

COTTONWOOD PEAK.

In Tuolumne Co., Cal., immediately south of Hetch-Hetchy Valley and Tuolumne River.

[Latitude, 37° 55' 30"-9. Longitude, 119° 44' 07"-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Conness	262 51 29	83 06 45	4-5639041
Hoffman.....	114 13 52	294 05 36	4-3353253

CONNESS.

A primary station of the U. S. C. & G. S., 10 miles north of Soda Springs, Mono Co., Cal. In shape an irregular parallelogram of granite; from northwest portion rises the top of peak with precipitous side of 1,000 feet or more.

Permanent mark: Concrete pier with five-eighths copper bolt in center.

[Latitude 37° 57' 56"-0. Longitude 119° 19' 18"-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Hoffman.....	51 21 09	231 14 11	4-3288340
Cottonwood Peak.	83 06 45	262 51 29	4-5639041

MOUNT DANA.

Large, bare, somewhat irregular peak with cone-shaped top, covered with broken sandstones and granite, in Tuolumne Co., Cal.

Permanent mark: Stone monument about 6 feet high.

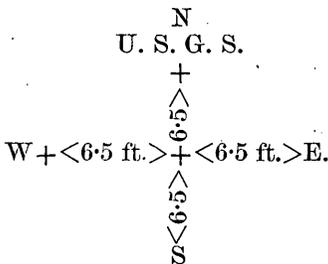
[Latitude, 37° 53' 54"-3. Longitude, 119° 13' 17"-4]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lyell	14 01 13	193 59 22	4-2637689
Hoffman.....	77 05 00	256 54 20	4-4171931

HOFFMAN.

About 2 miles west of Lake Tenaiaya and 39 miles from Sequoia, on the west of Tioga road, in Tuolumne Co., Cal. The mountain has three sharp ridges of granite, and the point occupied is the highest and farthest to the west. On this ridge is Chimney Rock, a cylinder of granite rising from main ledge to height of 60 feet, and it is north of this that station occupied is situated.

Point marked thus:



A monument about 5 feet high over the center mark.

[Latitude, 37° 50' 43".5. Longitude, 119° 30' 39".2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Mount Dana.....	256 54 20	77 05 00	4.4171931
Conness.....	231 14 11	51 21 09	4.3288340
Clarks Peak.....	336 34 42	156 37 42	4.2597
Cottonwood Peak.....	294 05 36	114 13 52	4.3353926
			253

BIG HILL.

In Tuolumne Co., Cal., 6 miles east of Knights Ferry and 6 miles west of the Crimea House.

[Latitude, 37° 49' 37".3. Longitude, 120° 34' 08".8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Bear Mountain.....	176 05 51	356 05 15	4.3296475
Big Canyon.....	248 22 02	68 38 35	4.6276730
Bullion.....	304 21 06	124 39 12	4.7224157
Moccasin Peak.....	276 57 29	97 06 20	4.3291570

MOCCASIN PEAK.

A potato-shaped peak, slightly flattened on top, covered with oak timber. It is situated on southwest side of Moccasin Creek, above Hugh's place, close to bridge across Moccasin Creek, in Tuolumne Co., Cal.

Permanent mark: Bull-pine tree about 40 feet high, 2 feet in diameter.

[Latitude, 37° 48' 12''-5. Longitude, 120° 19' 43''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Big Hill	97 06 20	276 57 29	4-3291570
Big Canyon.....	225 12 01	45 19 41	4-4116285
Pilot Peak.....	277 38 19	97 52 44	4-5424939

PILOT PEAK.

On boundary of Mariposa and Tuolumne counties, Cal. Rose's ranch is 2½ miles east.

[Latitude, 37° 45' 39''-8. Longitude, 119° 56' 10''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Moccasin Peak ...	97 52 44	277 38 19	4-5424939
Big Canyon.....	144 46 11	324 39 25	4-4473833
Devils Peak	328 16 40	146 23 49	4-4928478

CLARKS PEAK.

An obelisk-shaped peak on north end of Merced Group, in Mariposa Co., Cal., at head waters of Merced River, about 11 miles southeast of Yosemite. The peak is merely a sharp ridge; there is not space enough on top to stand tripod.

Permanent mark: Monument of stone about 4 feet high.

[Latitude, 37° 41' 42''-0. Longitude, 119° 25' 44''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Devils Peak.....	56 07 20	235 55 55	4-5212361
Hoffman.....	156 .37 42	336 34 42	4-2597926

MOUNT LYELL.

Situated 14 miles southeast of Soda Springs, at end of Tuolumne Meadows, in Mono Co., Cal. In shape very irregular; the south side a perpendicular wall, the north a series of meadows till the glacier is reached; the east and west sides are rather steep. The highest point is a short, sharp ridge about 200 yards long, running northwest and south-east, the northwest end being the lower.

Permanent mark: Small stone monument; U. S. G. S. chiseled on rock east of it.

[Latitude, $37^{\circ} 44' 16''$. Longitude, $119^{\circ} 16' 19''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Mount Dana.....	193 59 22	14 01 13	4.2637680

BULLION PEAK.

A high point on a timbered ridge, 15 miles north of east of Merced Falls, 2 miles east of Bear Valley, in Mariposa Co., Cal.

[Latitude, $37^{\circ} 33' 27''$. Longitude, $120^{\circ} 04' 33''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Big Hill.....	124 39 12	304 21 06	4.7224157
Big Canyon.....	175 06 34	356 04 57	4.6590366

DEVILS PEAK.

A cone on southeast end of short potato-shaped ridge, 9 miles southwest of Wawona Peak; bare on top and covered with loose rock.

Permanent mark: Fir tree, about 30 feet high, placed in center of monument, 5.6 feet west of U. S. G. S. chiseled on rock.

[Latitude, $37^{\circ} 31' 40''$. Longitude, $119^{\circ} 44' 26''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pilot Peak.....	146 23 49	326 16 40	4.4928478
Clark's Peak.....	235 55 55	56 07 20	4.5212361

LAWSON HILL.

At north end of flat ridge, North of Bear Creek (a north branch of San Pablo Creek).

Permanent mark: A 4 by 4 stake (pine) in middle of pile of stones, about 50 feet southwest of large oak tree on edge of steep slope. Hill is timbered on north slope.

[Latitude, $37^{\circ} 56' 34''$. Longitude, $122^{\circ} 11' 36''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald.....	20 53 59	200 52 55	3.8552896
Striped Hill.....	94 27 02	273 23 32	3.9211217

STRIPED HILL.

A bare, round hill at northern end of ridge between Wild Cat and San Pablo creeks. Small slide on west slope from which the station is named.

[Latitude, 37° 56' 49". Longitude, 122° 17' 17".]

To station.	Azimuth	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Yerba Buena.....	24 07 15	204 04 22	4-2271188
Rocky Island.....	45 51 57	225 49 27	3-9195784
Lawson Hill.....	273 23 32	94 27 02	3-9211217

ROCKY ISLAND.

Highest point of Rocky or Sheep Island, Bay of San Francisco.
Permanent mark: Cross cut in rock.

[Latitude, 37° 53' 42". Longitude, 122° 21' 21".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Striped Hill.....	225 49 27	45 51 57	3-9195784

BALD.

[Latitude, 37° 52' 56". Longitude, 122° 13' 20".48.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lawson Hill.....	200 52 55	20 53 59	3-8552896
Mulholland Hill..	291 40 28	111 43 22	3-8742967
Yerba Buena.....	56 57 37	237 01 00	4-1788065

MULHOLLAND HILL.

Highest point on ridge south of road through Moroga Valley, about one-half mile south of residence of Mr. Mulholland; one small oak tree on north side of point; distance from station about 50 feet.

Permanent mark: Mound of stones.

[Latitude, 37° 51' 26". Longitude, 122° 08' 36".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald.....	111 43 22	291 40 28	3-8742967
Redwood.....	33 10 03	213 08 49	3-7315417

MONUMENT SOUTH.

[Latitude, 37° 50' 55". Longitude, 122° 11' 35".52.]

REDWOOD.

Highest point on ridge between Contra Costa and Alameda counties, Cal., covered with redwood timber and sandstone rocks, about three-fourths of a mile southwest of Redwood Canyon.

Permanent mark: Redwood tree, 15 feet high and 6 inches in diameter, marked U. S. G. S. Southwest of which, and about 2 feet distant, is large sandstone marked U. S. G. S.

[Latitude, 37° 49' 00". Longitude, 122° 10' 37".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Yerba Buena.....	86 52 49	266 45 50	4·2230198
Mulholland Hill...	213 08 49	33 10 03	3·7315417

YERBA BUENA.

Highest point of Yerba Buena, or Goat Island, Bay of San Francisco. U. S. Coast and Geodetic Survey Point.

[Latitude, 37° 48' 30". Longitude, 122° 21' 59".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bald.....	237 01 00	56 57 37	4·1788065
Striped Hill.....	204 04 22	24 07 15	4·2271188
Redwood.....	266 45 50	86 52 49	4·2230198

SOUTHERN CALIFORNIA.

METHODS OF WORK.

The triangulation in southern California was begun in July, 1891, and covers an area of about 5,000 square miles. The line Wire-Kelly, as fixed by positions obtained from the U. S. Coast and Geodetic Survey, was taken as the basis of the work of 1891, which includes the line Wire-Mora and all points south of that line. Subsequent work depends upon the line Southeast Base-San Juan, as given by the same organization. The instrument used in this work was an 8-inch nonrepeating theodolite reading by micrometer to two seconds, and by estimation to one-fifth of a second. The angles were measured individually and by directions with telescope direct and reversed and on different positions of the circle. The station adjustment was made arbitrarily, the angles being required to agree among themselves and to close the horizon. Figures were adjusted by the method of least squares. All work in connection with this triangulation was done by Mr. A. P. Davis.

DESCRIPTIONS AND POSITIONS OF STATIONS.

WOODSON.

A high, prominent, and very rocky butte in San Diego Co., Cal., 6 miles south of San Pascual Valley, and just west of Woodson's ranch. It is surmounted by a huge granite boulder, the highest point of which is the station.

Permanent mark: A cairn of stones.

[Latitude, 33° 00' 25".1. Longitude, 116° 58' 17".8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Whitney.....	122 51 51.8	302 45 49.4	4.3119354
Burnt.....	157 35 13.1	337 32 05.7	4.3675063
Cuyamaca.....	281 18 22.6	101 30 16.2	4.5407133
San Miguel.....	354 42 02.0	174 43 09.0	4.5414240
Cowles.....	14 46 27.4	194 44 27.7	4.3515457
Black.....	77 33 36.7	257 28 51.2	4.1442189

CUYAMACA.

Cuyamaca Mountain is the highest mountain in San Diego County. The station is not on the highest point, but is indicated by a large, lone spruce tree east of the summit, which was trimmed up for a signal.

[Latitude, $32^{\circ} 56' 42''.2$. Longitude, $116^{\circ} 36' 26''.7$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Woodson	101 50 16.2	281 18 22.6	4.5407133
Cowles	69 38 51.9	249 25 00.6	4.6282849

SAN MIGUEL.

A high prominent mountain peak, about 12 miles east of San Diego, in San Diego Co., Cal. It is approached from the southwest by a good trail leading to the top. The station is on the highest point.

Permanent mark: A large cairn of stones.

[Latitude, $32^{\circ} 41' 41''$. Longitude, $116^{\circ} 56' 14''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Woodson	174 43 09	354 42 02	4.541424
Cowles	145 19 09	325 16 03	4.196130

COWLES.

The highest of a range of hills 4 miles west of Santee Station, in San Diego Co., Cal., on the Cuyamaca railroad, and south of the San Diego River.

Permanent mark: A cairn of stones on the highest point marks the station.

[Latitude, $32^{\circ} 48' 39''.9$. Longitude, $117^{\circ} 01' 58''.0$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Woodson	194 44 27.7	14 46 27.4	4.3515457
Black	157 08 06.4	337 65 21.3	4.3077783
Cuyamaca	249 25 00.6	69 38 51.9	4.6282849
San Miguel	325 16 03.0	145 19 09.0	4.1961300

BLACK.

A prominent hill, 7 miles southwest of Bernardo Post-Office, in San Diego Co., Cal., and the highest point on the Penasquitas ranch.

Permanent mark: A cairn of stones on the highest point.

[Latitude, $32^{\circ} 58' 47''.4$. Longitude, $117^{\circ} 07' 02''.0$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Whitney	165 34 22.7	345 33 06.3	4.1639436
Woodson	257 28 51.2	77 33 36.7	4.1442189
Cowles	337 05 21.3	157 08 06.4	4.3077783

WHITNEY.

A round prominent knoll, the highest peak of a cluster of hills, in San Diego Co., Cal., about 5 miles west of Escondido.

Permanent mark: A cairn of stones on the highest point.

[Latitude, 33° 06' 25''-9. Longitude, 117° 09' 22''-2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kelley.....	111 15 04.5	291 09 35.6	4-2234196
High Knob.....	166 44 32.3	346 43 35.2	4-0712031
Burnt.....	218 34 29.7	38 37 25.4	4-1253160
Woodson.....	302 45 49.4	122 51 51.8	4-3119354
Black.....	345 33 06.3	165 34 22.7	4-1639436

BURNT.

A sharp rocky peak, surmounted by a large boulder, 2½ miles southwest of Valley Center, in San Diego Co., Cal., and 6 miles north of Escondido.

Permanent mark: A cairn of stones on the highest point.

[Latitude, 33° 12' 04''-4. Longitude, 117° 04' 00''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
High Knob.....	95 24 39.0	275 20 45.9	4-0442018
Whitney.....	38 37 25.4	218 34 29.7	4-1253160
Lancaster.....	154 07 58.4	334 05 42.6	4-1667805
Roderick.....	257 10 20.0	77 15 41.5	4-1927250
Centipede.....	309 04 16.0	129 06 18.0	3-8724629
Woodson.....	337 32 05.7	157 35 13.1	4-3675063

RODERICK.

A bare, rocky summit, about 10 miles east of Valley Center, in San Diego Co., Cal.

Permanent mark: A granite boulder, surmounted by a cairn of stones.

[Latitude, 33° 13' 56''-4. Longitude, 116° 54' 14''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Lancaster.....	114 22 56.1	294 15 18.2	4-3747615
Burnt.....	77 15 41.5	257 10 20.0	4-1927250

HIGH KNOB.

A prominent summit, the highest point of the San Marcos Mountains, in San Diego Co., Cal., 3½ miles nearly east of Vista, a station on the Southern California Railway.

Permanent mark: A cairn of stones on the highest point, with a pole in the center.

[Latitude, $33^{\circ} 12' 38''$.1. Longitude, $117^{\circ} 11' 06''$.5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Wire	95 32 48.4	275 26 47.5	4.2339837
Kelley	67 13 57.4	247 09 25.2	4.1453561
Lancaster	200 42 49.9	20 44 27.5	4.1143860
Burnt	275 20 45.9	95 24 30.0	4.0442018
Centipede	288 48 23.0	108 54 18.0	4.2494800
Whitney	346 43 35.2	166 44 32.3	4.0712031

KELLEY.

A station of the U. S. Coast and Geodetic Survey, on top of the ridge back of Carlsbad, in San Diego Co., Cal., 2 miles from the coast. It is on a rise slightly higher than the rest of the ridge. A black glass bottle was buried neck up, 20 inches below ground, and the center of its mouth marks the station. A 3 by 4 by 24 inch redwood stub, nail in center of its top, buried 20 inches in ground, is the surface mark.

[Latitude, $33^{\circ} 09' 42''$.3. Longitude, $117^{\circ} 19' 23''$.8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Wire	149 21 30.3	329 20 01.8	3.9140790
Mora	197 53 02.6	17 54 46.2	4.2021598
High Knob	247 09 25.2	67 13 57.4	4.1453561
Whitney	291 09 35.6	111 15 04.5	4.2234196

WIRE.

A station of the U. S. Coast and Geodetic Survey, on the Santa Margarita ranch, in San Diego Co., Cal. It is situated on the top of the ridge between the San Luis Rey and the Santa Margarita rivers, about 2 miles from the coast, and 300 yards north of the wire fence on the ranch line which crosses this ridge. A black glass bottle was buried neck up, with its top 24 inches beneath the surface of the ground, the center of the mouth of the bottle denoting the station. A 3 by 4 by 24 inch redwood stub, buried 24 inches in the ground, is the surface mark, and a nail driven in the center of the top of this stub marks the station.

[Latitude, $33^{\circ} 13' 31''$.4. Longitude, $117^{\circ} 22' 05''$.3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Kelley	329 20 01.8	149 21 30.3	3.9140790
Mora	228 13 20.8	48 16 33.0	4.0850062
High Knob	275 26 47.5	95 32 48.4	4.2339837

MORA.

A round, prominent butte on the northern edge of the San Luis Rey Valley, in San Diego Co., Cal., about 3 miles northeast of the San Luis Rey Mission, and is exactly on the southern line of the Santa Margarita grant.

Permanent mark: A cairn of stones on the highest point.

[Latitude, 33° 17' 54". Longitude, 117° 16' 14".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Wire	48 16 33.0	228 13 20.8	4.0850062
Kelley	17 54 46.2	197 53 02.6	4.2021598

CENTIPEDE.

A prominent and very brushy and rocky knoll in San Diego Co., Cal., 5½ miles northeast of Escondido and 2 miles east of the road from Escondido to Valley Center. The station is on the summit of an immense boulder.

Permanent mark: A small cairn of stones.

[Latitude, 33° 09' 32". Longitude, 117° 00' 18".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
High Knob.....	108 54 18	288 48 23	4.249480
Burnt	129 06 18	309 04 16	3.872482

LANCASTER.

A prominent, rocky point about 1 mile south of the San Luis Rey River, between that river and Moosa Canyon, in San Diego Co., Cal.

Permanent mark: A cairn of stones on the highest point.

[Latitude, 33° 19' 13". Longitude, 117° 08' 08".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
High Knob.....	20 44 27.5	200 42 49.9	4.1143860
Burnt	334 05 42.6	154 07 58.4	4.1667805
Roderick	294 15 18.2	114 22 56.1	4.3747615

MARGARITA.

The highest point on the Santa Margarita ranch, in San Diego Co., Cal., about 10 miles north of the main ranch house and about the same distance from the coast.

Bull. 122—23

Permanent mark: A cairn of stones on the highest point.

[Latitude, $33^{\circ} 26' 34''\cdot 5$. Longitude, $117^{\circ} 23' 30''\cdot 0$]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Santiago	155	43	39·9	335	38	54·0	4·5103156
Elsinore	194	04	00·2	14	05	34·2	4·2567592
Niguel	103	22	57·9	283	11	35·7	4·5160349
Onofre	47	25	14·6	227	21	47·8	4·1200442

ONOFRE.

This is a summit on the range of hills on the coast between the railway stations San Onofre, in San Diego Co., Cal., and Las Flores, on the Santa Margarita grant. It is the highest point on the coast south of San Pedro, and is about 4 miles north of the Las Flores ranch house.

Permanent mark: A large cairn of stones built on the highest point.

[Latitude, $33^{\circ} 21' 44''\cdot 8$. Longitude, $117^{\circ} 29' 45''\cdot 5$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Santiago	174	35	12·4	354	33	54·3	4·5866848
Niguel	126	34	19·4	306	26	24·8	4·4421641
Margarita	227	21	47·8	47	25	14·6	4·1200442

NIGUEL.

A station of the U. S. C. & G. S. It is on the highest point of the flat summit of the highest ridge, Orange Co., Cal., between San Juan Capistrano and Aliso Canyon, and is the highest summit overlooking the coast between Aliso Canyon and the Canada Salado.

Permanent mark: A hole drilled in a large stone, buried about 1 foot below surface.

[Latitude, $33^{\circ} 30' 39''\cdot 3$. Longitude, $117^{\circ} 44' 06''\cdot 8$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Santiago	220	08	02·7	40	14	41·2	4·4587607
San Joaquin	145	07	31·0	325	04	56·2	4·1012967
Margarita	283	11	35·7	103	22	57·9	4·5160349
Onofre	306	26	24·8	126	34	19·4	4·4421641

SAN JOAQUIN.

This station is the highest point of the range of hills on the coast, Orange Co., Cal., on the San Joaquin ranch, and just east of the bay of Newport. It is in plain view from the San Joaquin ranch house, and is crowned with a collection of boulders that show black from the

ranch house. It is about 500 meters east of the Coast Survey station of the same name, which is not so high and does not afford so good a view to the east.

Permanent mark: A large wire nail driven into the rotten rock at the center of station. The stone monument stands directly over the station.

[Latitude, 33° 36' 15".4. Longitude, 117° 48' 46".9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
S. E. Base	149 48 09.5	329 43 49.2	4.3801679
San Juan.....	191 18 21.0	11 20 48.7	4.5419586
Niguel.....	325 04 56.2	145 07 31.0	4.1012967

SANTIAGO.

The highest peak of the group of mountains lying south of Riverside and South Riverside. It is on the county line between Los Angeles and Riverside counties, and a bowlder marked with lead, which was placed to indicate the county line, marks the station. Of the two highest peaks that surmount the range, Santiago is the higher, the less sharp, and the more southern.

[Latitude, 33° 42' 32".4. Longitude, 117° 32' 07".0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
S. E. Base	103 40 31.3	283 26 55.1	4.5899081
San Juan	140 06 15.4	319 59 26.9	4.4683918
Jurupa.....	193 20 12.0	13 23 16.0	4.5647520
Strawberry.....	205 28 50.0	25 38 52.0	4.8068850
Potato.....	212 22 21.0	32 30 17.0	4.6123800
Niguel.....	40 14 41.2	220 08 02.7	4.4587607
Box Springs.....	220 03 43.4	40 12 11.7	4.5613244
Zania.....	227 53 15.0	48 08 55.0	4.7634030
Elsinore.....	304 03 19.3	124 09 40.2	4.3301272
Margarita.....	335 38 54.0	155 43 39.9	4.5163156
Onofre.....	354 33 54.3	174 35 12.4	4.5866848

ELSINORE.

A knoll upon the ridge back of Lake Elsinore, in San Diego Co., Cal., opposite the town of Elsinore, and about 3 miles southwest of the lake. The station is on the highest point of the knoll and is marked by an 8-inch iron bolt, driven in the ground with head 6 inches beneath the surface. A cairn of stones is built over the spot, with a flag pole in the center.

[Latitude, 33° 36' 03".1. Longitude, 117° 20' 39".8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Santiago.....	124 09 40.2	304 03 19.3	4.3301272
Box Springs.....	188 16 36.5	8 18 42.0	4.6048463
Double Butte.....	236 30 20.0	56 37 40.0	4.3884170
Margarita.....	14 05 34.2	194 04 00.2	4.2567592

BOX SPRINGS.

This station is on that spur of the San Jacinto Mountains, in San Bernardino Co., Cal., that lies between the San Timoteo Canyon and the San Jacinto Valley. It extends from the main spur toward Alessandro, and lies about 5 miles northeast of the station of Box Springs, on the Perris branch of the Southern California Railroad. The station is on an elevation above the rest of the ridge.

Permanent mark: A cairn of stones.

[Latitude, 33° 57' 36". Longitude, 117° 16' 54".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Juan.....	82 58 48.8	262 43 29.3	4.6297259
Santiago.....	40 12 11.7	220 03 43.4	4.5613244
Double Butte.....	331 01 45.0	151 07 00.0	4.4787560
Elsinore.....	8 18 42.0	188 16 36.5	4.6048463

DOUBLE BUTTE.

A small double butte, about 8 miles east of the town of Perris, in San Diego Co., Cal. It lies between the railroad and wagon road connecting Perris with San Jacinto. The station is on the highest point.

Permanent mark: A small pile of rocks on a large boulder.

[Latitude, 33° 43' 21". Longitude, 117° 07' 28".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Elsinore.....	56 37 40	236 30 20	4.338417
Box Springs.....	151 07 00	331 01 45	4.478756

ZANJA.

The highest point of the Crafton Hills, San Bernardino Co., about 5 miles southeast of Redlands.

Permanent mark: A cairn of stones.

[Latitude, 34° 03' 32". Longitude, 117° 04' 09".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Santiago.....	48 08 55	227 53 15	4.763403
Strawberry.....	141 07 04	321 01 27	4.338602

STRAWBERRY.

An elevation or knoll on the main ridge of the San Bernardino Mountains, in San Bernardino Co., Cal., just above Arrowhead Hot

Springs, and 3 miles southwest of Little Bear Valley. The knoll has been nearly cleared of timber.

Permanent mark: A lone tree.

[Latitude, $34^{\circ} 13' 49''$. Longitude, $117^{\circ} 14' 10''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Juan	52 54 55	232 38 00	4.765922
Santiago	25 38 52	205 28 50	4.806885
Zanja	321 01 27	141 07 04	4.988602

JURUPA.

The highest point of a range of rocky hills in San Bernardino Co., Cal., about 3 miles southwest of Bloomington, and 6 miles northwest of Riverside.

Permanent mark: A hole drilled in the boulder on the highest point, and filled with lead. A large cairn of stones is built over the spot.

[Latitude, $34^{\circ} 01' 51''$. Longitude, $117^{\circ} 26' 37''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Juan	64 19 58	244 10 03	4.481820
Santiago	15 23 16	193 20 12	4.564752

POTATO.

A prominent butte rising abruptly from its base, in San Bernardino Co., Cal., about 3 miles southeast of Colton.

Permanent mark: A small pile of stones on the highest boulder on the summit.

[Latitude, $34^{\circ} 01' 14''$. Longitude, $117^{\circ} 17' 52''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Juan	73 41 12	253 26 30	4.628655
Santiago	32 30 17	212 22 21	4.612380

WORKMAN.

The highest point of a cluster of hills in Los Angeles Co., Cal., lying directly between the towns of Whittier and Puente. An indifferent wagon road leads to the summit from Whittier.

Permanent mark: A glass bottle, neck upward, about a foot under the surface.

[Latitude, $33^{\circ} 59' 24''$. Longitude, $118^{\circ} 00' 14''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Juan	289 22 11	109 31 03	4.414242
Southeast Base	345 43 11	165 45 20	4.357178
Pomona	261 54 40	82 02 08	4.316835

POMONA.

A high, round, prominent hill in Los Angeles Co., Cal., about 4 miles southwest of the town of Pomona.

Permanent mark: A small pile of stones on the highest point.

[Latitude, $34^{\circ} 00' 58''$. Longitude, $117^{\circ} 46' 54''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Juan	341 11 53	161 13 23	4.085854
Workman	82 02 08	261 54 40	4.316835
San Jose	123 33 08	303 30 47	3.889230

SAN JOSE.

The highest point of the San Jose hills, in Los Angeles Co., Cal., about 5 miles northeast of the town of Puente. It is a prominent and rather sharp point, and is directly in line with the tangent of the Southern Pacific Railroad running from Pomona eastward to Bloomington.

Permanent mark: A small pile of stones on the highest point.

[Latitude, $34^{\circ} 03' 17''$. Longitude, $117^{\circ} 51' 06''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Juan	326 40 27	140 44 13	4.277008
Pomona	303 30 47	123 33 08	3.889230

RAYMOND.

The tower of the Raymond (Los Angeles Co., Cal.) Hotel, on a hill 2 miles southeast of Pasadena.

[Latitude, $34^{\circ} 07' 20''$. Longitude, $118^{\circ} 08' 57''$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Cahuenga	95 12 46	275 06 48	4.216838
San Gabriel	198 57 45	18 59 26	4.147545

SOUTHEAST BASE.

In Los Angeles Co., near Los Angeles, Cal., about 100 meters west of the main road from Anaheim to Garden Grove and 1 mile from the last-named place.

Permanent mark: A small hole in the silver core of a copper bolt, set in a granite block, 20 inches square, which is set in the brick foundation of the pier. A tower 14 feet square at base and 40 feet high erected around the brick pier.

[Latitude, 33° 47' 28". Longitude, 117° 56' 36".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Los Angeles, N. W. Base .	142 37 01.1	322 33 10.8	4.2428968
San Joaquin.....	329 43 49.2	149 48 09.5	4.3801679
Santiago.....	283 26 55.1	103 40 31.3	4.5899081
Workman.....	165 45 20.0	345 43 11.0	4.3571780

PLATEAU REGION OF NEW MEXICO, EASTERN ARIZONA, AND UTAH.

METHODS OF WORK.

This triangulation extends over parts of northern New Mexico and eastern Arizona and southeastern Utah, with a few points reaching into Nevada, California, and Colorado. The work depends on the base line at Fort Wingate, New Mexico, which was measured and expanded in 1881 and 1882, and the triangulation carried forward as required for topographic work until the year 1890.

The base line was measured by Prof. J. Howard Gore in 1881, in the valley of the Rio Puerco, near Fort Wingate, using a 4-meter base bar apparatus designed by the U. S. Coast and Geodetic Survey, and has a length, after all corrections are applied, of 6,721,893 meters. The latitude, longitude, and azimuth of the base were determined in 1883 by Prof. A. H. Thompson, assisted by Arthur P. Davis. A Wurdeman combined zenith telescope and transit was used. Longitude was obtained by exchange of time signals with the observatory of the Washington University at St. Louis, Prof. H. S. Pritchett conducting the observations and exchanges at this place. Latitude was determined by the method of zenith distances.

The final results of these observations gives as the position of the east end of the Wingate base line: Latitude, $35^{\circ} 30' 17''80$. Longitude, $108^{\circ} 30' 28''08$.

The expansion was made by Prof. Gilbert Thompson, in 1881, and Prof. A. H. Thompson in 1882 and 1883, from the base line, both using a Kubel 10-inch repeating vernier theodolite reading to five seconds. Different stations were used in these separate expansions. Subsequent triangulation was performed with the same instrument by Arthur P. Davis until 1890, when a nonrepeating 8-inch micrometer theodolite was used. In the latter part of the season of 1890 the observations were made by Mr. Fred. J. Knight. All that portion of the triangulation west of the one hundred and twelfth meridian was executed by Mr. H. M. Wilson in 1884, with an 8-inch vernier theodolite reading to ten seconds.

In general, the method adopted for the measurement of angles was that of directions, the aim being to obtain from eight to twelve complete sets, including all visible stations. Readings were made on different parts of the circle and with the telescope in direct and reversed position. Measurements were made of single angles and of combinations, in order to obtain conditions for the adjustment, which was made both of stations and figures, by the method of least squares.

Many of the stations in this triangulation were natural points. Upon these no signals were erected before observing. In other cases, signals, either of stone, brush, or trees, were erected. In all cases permanent marks were left to indicate the exact point sighted.

The triangulation covered and gave control points for topography over an area of, approximately, 94,000 square miles.

A descriptive list of stations follows:

DESCRIPTIONS AND POSITIONS OF STATIONS.

CARRISO.

A low, bare, rounded butte, about 150 or 200 feet above the plain, being the southeastern of two buttes in the northern part of township 22 north, range 28 east, and east of Carriso Creek, New Mexico.

Permanent mark: A stone monument on highest point.

[Latitude, 36° 09' 12''-68. Longitude, 103° 58' 35''-88.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Canadian	71 20 46.1	250 59 11.3	4.7645271
Montoya	19 20 07.5	199 13 35.8	4.7047279
Laughlin	160 23 07.9	340 15 41.7	4.7455943
Ocate	86 31 46.4	265 53 25.8	4.9903355

LAUGHLIN.

A bare, rounded peak, not rocky, about 16 miles east of Maxwell station, at head of Tinaja Arroya, in township 28 north, range 26 west, in Colfax Co., N. Mex.

Station on highest point.

[Latitude, 36° 37' 33''-22. Longitude, 104° 11' 07''-95.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Canadian	27 00 45.5	206 46 28.6	4.9021113
Carriso	340 15 41.7	160 23 07.9	4.7455943
Ocate	53 24 08.0	232 53 00.3	4.9919418

MONTOYA.

A wooded mesa, about 45 miles east of Watrous, on the north line of the Montoya grant, in San Miguel Co., N. Mex.

Permanent mark: A lone tree on flat, partly cleared summit.

[Latitude, 35° 43' 20''-95. Longitude, 104° 09' 43''-34.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Canadian	127 12 39.1	306 57 42.0	4.6828758
Corazon	50 50 54.9	230 36 48.7	4.6747201
Carriso	199 13 35.8	19 20 07.5	4.7047279

CANADIAN.

The highest point of the Cornudo hills in Mora Co., N. Mex. It is a bare, round-topped knoll, 25 miles northeast of Watrous.

Permanent mark: A stone monument on highest point.

[Latitude, 35° 59' 03"·64. Longitude, 104° 35' 15"·10.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rincon	74 51 38·4	254 17 41·2	4·9564545
Corazon	358 05 50·0	178 06 35·4	4·7709692
Carriso	250 59 11·3	71 20 46·1	4·7645271
Laughlin	206 46 28·6	27 00 45·5	4·9021113
Montoya	306 57 42·0	127 12 39·1	4·6828758
Ocate	106 14 22·1	285 57 40·1	4·6471564

CORAZON.

A mesa butte in San Miguel Co., N. Mex. About 1,000 feet higher than and 3 miles northeast of the Mexican village of Corazon. The top is flat and has been cleared of timber, leaving a lone tree to mark the station, near north end.

[Latitude, 35° 27' 09"·82. Longitude, 104° 33' 57"·39.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rincon	111 36 57·6	291 02 28·2	4·9823850
Aguiar	78 10 56·4	257 56 03·8	4·5990019
Pederal	55 52 19·6	235 15 05·3	5·0759472
Jospinto No. 2	31 49 28·6	211 36 13·2	4·8221737
Canadian	178 06 35·4	358 05 50·0	4·7709692
Montoya	230 36 48·7	50 50 54·9	4·6747201

OCATE.

An old crater or cinder cone about 12 miles north of Fort Union, Mora Co., N. Mex.

Permanent mark: A monument of rough lava rock on highest point.

[Latitude, 36° 05' 42"·93. Longitude, 105° 03' 33"·27.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Rincon	50 51 26·0	230 34 05·5	4·7591135
Canadian	285 57 40·1	106 14 22·1	4·6471564
Carriso	265 53 25·8	86 31 46·4	4·9903355
Laughlin	232 53 00·3	53 24 08·0	4·9919418

AGUILAR.

The mesa Aguilar is a flat-topped mesa butte, 2 miles southwest of the Mexican village of Torres, on Gallinas Creek, about 25 miles south-east of Las Vegas, in San Miguel Co., N. Mex.

Permanent mark: A lone tree on about the highest part.

[Latitude, 35° 22' 43''-14. Longitude, 104° 59' 37''-65.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Thompson	114 07 09·4	293 38 49·7	4·9063551
Rincon	130 33 24·7	310 13 53·2	4·8233282
Pedernal	45 15 03·4	224 52 37·1	4·9228933
Corazon	257 56 03·8	78 10 56·4	4·5990019
Jospinto No. 2	355 10 43·9	175 12 16·3	4·6851871

JOSPINTO NO. 1.

On a mesa about 12 miles southwest of Las Colonias, San Miguel Co., N. Mex.

[Latitude, 34° 56' 42''. Longitude, 104° 57' 10'']

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pedernal	80 16 44	259 52 50	4·807075
Jospinto No. 2	298 41 20	118 41 27	2·557580

JOSPINTO NO. 2.

The highest point of Jospinto Mesa, about 12 miles southwest of Las Colonias, San Miguel Co., N. Mex, and about one-half mile south-east of Jospinto No. 1.

Permanent mark: A leaning lone tree.

[Latitude, 34° 56' 36''-8. Longitude, 104° 56' 57''-2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Jose	134 16 13·6	313 56 38·4	4·8567790
Pedernal	80 28 53·4	260 05 02·8	4·8090772
Aguilar	175 12 16·3	355 10 43·9	4·6851871
Corazon	211 36 13·2	81 49 28·6	4·8221737
Jospinto No. 1	118 41 27·0	298 41 20·0	2·5575800

JACINTO.

A slight wooded elevation in the plain about 19 miles southwest of Anton Chico and 6 miles south of Cañon Blanca, San Miguel Co., N. Mex.

Permanent mark: A conspicuous lone tree.

[Latitude, 35° 05' 26''. Longitude, 105° 26' 59''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bernal	199 13 19	19 17 33	4·528035

PEDERNAL.

A large, lone granite cone, about 60 miles east of Albuquerque. It was used in the Wheeler triangulation.

Permanent mark: A stone monument on highest point.

[Latitude, $34^{\circ} 50' 43''$.96. Longitude, $105^{\circ} 38' 38''$.28.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Sandia.....	120	29	58.9	300	02	0.2	4.9334895
Thompson.....	170	53	58.6	350	48	21.1	4.9682833
Aquilar.....	224	52	37.1	45	15	03.4	4.9228933
Corazon.....	235	15	05.3	55	52	19.6	5.0759472
Jospinto No. 1.....	259	52	50.0	80	16	44.0	4.807075
Rincon.....	184	35	24.7	4	38	33.7	5.0112350
Jospinto No. 2.....	260	05	02.8	80	28	53.4	4.8090772

RINCON.

A high knoll on the summit of the Las Vegas Mountains, on the main backbone east of the Pecos River.

Permanent mark: A stone monument on the highest point.

[Latitude, $35^{\circ} 46' 03''$.1. Longitude, $105^{\circ} 33' 11''$.4.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Sandia.....	54	29	01.3	233	57	33.6	5.0042487
Baldy.....	111	23	05.9	291	15	54.9	4.2980256
Thompson.....	65	25	49.1	245	16	57.0	4.4015151
Pedernal.....	4	38	33.7	184	35	24.7	5.0112350
Aquilar.....	310	13	53.2	130	33	24.7	4.8233282
Canadian.....	254	17	41.2	74	51	38.4	4.9564545
Corazon.....	291	02	28.2	111	36	57.6	4.9823850
Ocate.....	230	34	05.5	50	51	26.0	4.7591135

THOMPSON.

The highest peak of the southern group of the Santa Fe Mountains, 8 miles east of the city of Santa Fe.

Permanent mark: A slender balsam tree north of the highest point.

[Latitude, $35^{\circ} 40' 22''$.07. Longitude, $105^{\circ} 48' 22''$.89.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Sandia.....	50	44	36.3	230	21	59.4	4.8830092
Jemes.....	91	50	15.2	271	13	25.8	4.9789888
Aquilar.....	293	38	49.7	114	07	09.4	4.9063551
Langley.....	125	36	48.7	305	16	30.6	4.8067770
Pedernal.....	350	48	21.1	170	53	58.6	4.9682933
Rincon.....	245	16	57.0	65	25	49.1	4.4015151

BALDY.

A high, round, bald peak in the Santa Fe Mountains, about 15 miles northeast of Santa Fe, N. Mex. It was a triangulation point of the Wheeler Survey.

Permanent mark: A large stone monument on the highest point.

[Latitude, 35° 49' 57''-54. Longitude, 105° 45' 27''-91.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Sandia.....	43 54 30·5	223 30 09·3	4·9622107
Langley	109 08 44·2	288 46 46·4	4·7766344
Rincon	291 15 54·9	111 23 05·9	4·2980256

LANGLEY.

Called Santa Clara by Wheeler Survey. The highest peak of the Tewan Mountains, about 17 miles west of Espanola, a station on the Denver and Rio Grande Railroad, in Rio Arriba Co., N. Mex.

Permanent mark: A large stone monument.

[Latitude, 36° 00' 27''-96. Longitude, 106° 23' 03''-31.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Jemes	51 11 47·1	230 55 07·1	4·7409990
Thompson	305 16 30·6	125 36 48·7	4·8067770
Baldy.....	288 46 46·4	109 08 44·2	4·7766344

SANDIA.

The highest peak of the Sandia Mountains, about 15 miles northeast of Albuquerque, N. Mex.

Permanent mark: A lone tree.

[Latitude, 35° 14' 07''-33. Longitude, 106° 27' 22''-03.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Jemes	144 32 54·4	324 18 53·9	4·7979000
Taylor.....	90 33 25·7	269 53 33·0	5·0206116
Baldy.....	223 30 09·3	43 54 30·5	4·9622107
Federal	300 02 00·2	120 29 58·9	4·9334895
Rincon	233 57 33·6	54 29 01·3	5·0042487
Thompson	230 21 59·4	50 44 36·3	4·8630092

JEMES.

The highest peak of the southern end of the Sierra Nacimiento, about 19 miles northwest of the Pueblo of Jemes, Bernalillo Co., N. Mex.

Permanent mark: A lone pine tree near the highest point.

[Latitude, 35° 41' 44''-66. Longitude, 106° 51' 30''-59.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Taylor.....	53 32 43·5	233 06 37·7	4·9285535
Hosta.....	84 41 15·2	263 54 38·6	5·0840194
Langley	230 55 07·1	51 11 47·1	4·7409990
Sandia.....	324 18 53·9	144 32 54·4	4·7979000
Thompson	271 13 25·8	91 50 15·2	4·9789883
Copper.....	180 31 34·3	00 31 42·4	4·5735262

COPPER,

Otherwise called Copper Mountain, is a small butte on the summit of the Sierra Nacimiento range, about 6 miles east of Copper City, Rio Arriba Co., N. Mex. It is just north of the gap through which flows the ditch that conveys water to Copper City.

Permanent mark: A large lone tree northwest of the highest point.

[Latitude, $36^{\circ} 01' 59''$. Longitude, $106^{\circ} 51' 16''$.8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Hosta	68 06 43.4	247 19 47.2	5.1158874
Jemes	00 31 42.4	180 31 34.3	4.5735262

WAAS.

A high sharp point on the northern end of the Sierra La Sal, Grand Co., Utah. It is of loose rock from the top to some distance down. It is the point occupied by the Powell survey, whose monument stands on the highest point. Observations were taken near this monument and reduced to it. Waas is a good natural point.

[Latitude, $38^{\circ} 32' 21''$. Longitude, $109^{\circ} 13' 39''$.7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Navajo	41 23 00.0	224 19 53.6	5.3442340

PEALE.

The highest peak of the Sierra La Sal, in Grand Co., Utah. The same point under same name was used in the Hayden triangulation.

Permanent mark: A small stone monument.

[Latitude, $38^{\circ} 26' 18''$. Longitude, $109^{\circ} 13' 44''$.3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Ute Peak	342 39 53.9	162 56 29.3	5.1274286
Abajo	17 09 56.4	197 01 18.1	4.8422017
Navajo	43 21 12.8	222 20 58.9	5.3275052

ABAJO.

Abajo is the highest point of the Sierra Abajo, in San Juan Co., Utah, and is the same point as occupied by A. D. Wilson of the Hayden survey. It was timbered nearly to the top, the trees showing far above

the highest point, but it is now cleared. The highest point was occupied and used.

[Latitude, 37° 50' 22".5. Longitude, 109° 27' 43".7.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Peale.....	197	01	18.1	17	09	56.4	<i>Meters.</i> 4.8422017
Ute Peak.....	315	22	19.7	135	47	20.1	4.9360333
Pastora.....	347	09	02.5	167	19	51.7	5.0769876

UTE PEAK.

The highest point of the Sierra El Late, in Montezuma Co., Colo. The top was sparsely timbered, but it is now cleared.

Permanent mark: A stone monument on highest point.

[Latitude, 37° 17' 03".0. Longitude, 108° 46' 42".5.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Pastora.....	32	12	09.9	211	58	12.5	4.8108075
Abajo.....	135	47	20.1	315	22	19.7	4.9360333
La Huerfano.....	318	32	54.6	139	06	30.8	5.1020647
Peale.....	162	56	29.3	342	39	53.9	5.1274286

NAVAJO.

In San Juan Co., Utah, south of the Colorado River, near Lee's Ferry. It is difficult to approach except from the south. It is heavily timbered, with tall pine and balsam. The station consists of a scaffold, built of five tall trees near the highest point. The instrument was placed on this scaffold, and lanes cut to the points sighted. The signal was seen from Wilson, Oraibe, Calabasa, Sonsala, Pastora, Ute Peak, Abajo, and Peale, the latter being over 140 miles distant. When Navajo was occupied the tallest tree had to be cut off for a support for the theodolite independent of the platform. The instrument was 27 feet above the ground.

[Latitude, 37° 02' 02".9. Longitude, 110° 52' 08".7.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Waas.....	224	19	53.6	41	23	00.0	5.3442340
Pastora.....	279	35	18.1	100	36	43.6	5.1883026
Peale.....	222	20	58.9	43	21	12.6	5.3275052
Wilson.....	324	41	48.2	145	07	24.4	5.0465085
Oraibe.....	353	44	30.2	173	50	02.7	5.1097488
Calabasa.....	308	16	22.1	128	53	21.0	5.0713882

PASTORA.

The highest point of the Carriso Mountains, in northeastern Apache Co., Ariz. It is a bare rounded knoll and not a natural point.

Permanent mark: A stone monument.

[Latitude, $36^{\circ} 47' 25''$.1. Longitude, $109^{\circ} 09' 52''$.8.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	Meters.
Navajo	100 36 43.6	279 35 18.1	5.1883026
Abajo	167 19 51.7	347 09 02.5	5.0769376
Calabasa	52 34 32.4	232 10 27.9	4.8812791
La Huerfano	288 29 43.3	109 16 56.9	5.0962691
Roof Butte	170 04 16.1	170 04 16.1	4.5705043
Ute Peak	211 58 12.5	32 12 09.9	4.8108075

ROOF BUTTE.

A high butte in the eastern part of the Tunitcha Mountains, in Apache Co., Ariz. The top is nearly flat, several hundred yards across, and is not a natural point.

[Latitude, $36^{\circ} 27' 37''$.1. Longitude, $109^{\circ} 05' 31''$.4.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	Meters.
Pastora	170 04 16.1	170 04 16.1	4.5705043
Zilh	12 27 29.3	192 21 58.4	4.8141432
Calabasa	81 51 19.4	261 24 47.2	4.8235738
Sonsala	358 06 15.7	178 06 37.8	4.6003783

LA HUERFANA.

The highest point of a group of mesas, about 15 miles south of the San Juan River, San Juan Co., N. Mex. This is by no means a natural point, and the absence of suitable rock renders it impracticable to build a monument.

[Latitude, $36^{\circ} 25' 34''$.1. Longitude, $107^{\circ} 50' 41''$.2.]

To station.	Azimuth.	Back azimuth.	Log dist.
	° ' "	° ' "	Meters.
Pastora	109 16 56.9	288 29 43.3	5.0962691
Ute Peak	139 06 30.8	318 32 54.6	5.1020647

CALABASA.

Calabasa, in Apache Co., Ariz., is on a slight rise on Calabas mesa, near its edge. It was timbered with cedar and piñon. The timber has been cut, with the exception of one piñon tree near the highest point, which constitutes a part of the station. The instrument was

placed over the center. A large red pine stands about 150 feet to the southwest and serves for a witness tree.

[Latitude, 36° 22' 18"·3. Longitude, 109° 50' 16"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Navajo	128 53 21·0	308 16 22·1	5·0713882
Pastora	232 10 27·9	52 34 32·4	4·8812791
Roof Butte	261 24 47·2	81 51 19·4	4·8295738
Sonsala	293 29 17·0	113 56 04·5	4·8726795
Wilson	58 19 24·9	238 08 11·9	4·5233561

WILSON.

A high wooded mesa, about 20 miles north of Kean's Canyon, Apache Co., Ariz. The point occupied is marked by a signal built of poles and trees on the highest point. Lanes are cut to all points sighted.

[Latitude, 36° 12' 48"·3. Longitude, 110° 09' 13"·6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Zilh	293 42 16·2	114 14 13·8	4·9506506
Calabasa	238 08 11·9	58 19 24·9	4·5233561
Cottonwood	10 40 44·7	190 35 01·4	4·9014405
Navajo	145 07 24·4	324 41 48·2	5·0465085
Orain	53 58 11·0	233 38 25·0	4·7960006

SONSALA.

The eastern of two buttes, and just east of Washington Pass and 25 miles north of Fort Defiance, Apache Co., Ariz. It is not a good natural point. The sides are timbered, but the top is not.

Permanent mark: A stone monument on highest point.

[Latitude, 36° 06' 05"·2. Longitude, 109° 04' 41"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
McKenzie	325 03 00·20	145 25 15·4	5·0033911
Calabasa	113 56 04·50	293 29 17·0	4·8726795
Roof Butte	178 06 37·80	358 06 15·7	4·6003783
Chusca	317 46 14·40	137 54 44·1	4·5100664
Zilh	32 50 54·98	212 44 54·5	4·4527421

ZILH.

A small butte standing on Navajo Plateau, in Apache Co., Ariz., 12 miles northwest of Fort Defiance. It was heavily timbered but

is now cleared with the exception of a tall pine tree, left for a signal, to which the observations were reduced. It is not a natural point.

[Latitude, 35° 53' 11" 65. Longitude, 109° 14' 55" 11.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Sonsala	212	44	54.50	32	50	54.98	4.4527421
Cottonwood	66	47	37.24	246	10	13.88	5.0228907
Chusca	270	06	42.20	90	21	10.10	4.5698015
Iola	35	26	01.20	215	06	27.60	4.7849436
McKenzie	308	41	48.40	129	09	57.40	4.9722791
Roof Butte	192	21	58.40	12	27	29.30	4.8141432
Wilson	114	14	13.80	293	42	16.20	4.9506506

CHUSCA.

Is a sharp peak, on the end of a spur that juts out to the south from the Chusca Plateau, in Bernalillo Co., N. Mex. It is bare and an excellent natural point, affording a good view in all directions except north, where the Chusca Plateau cuts off the view.

[Latitude, 35° 53' 06" 75. Longitude, 108° 50' 14" 52.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Nell	339	21	40.2	159	29	08.7	4.7410188
Twins	359	40	03.1	179	40	08.9	4.6371148
Zuñi	40	33	18.8	184	30	44.4	4.9280539
McKenzie	323	36	30.1	148	50	16.8	4.8376057
Zihl	90	21	10.1	270	06	42.2	4.5698015
Sonsala	137	54	44.1	317	46	14.4	4.5100664
Crofton	18	13	51.4	198	03	51.7	4.9067286
Square Mesa	325	28	09.2	145	47	36.5	4.9521800
Taylor	302	23	33.0	123	06	24.7	5.1222508
Hosta	299	19	49.5	119	42	27.2	4.8269210

PYRAMID.

A sandstone butte, 7 miles northwest of Fort Wingate, Bernalillo Co., N. Mex., and 1 mile west of the "Navajo church."

Permanent mark: A stone monument on the highest point.

[Latitude, 35° 33' 18" 80. Longitude, 108° 37' 01" 12.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
East Base	299	21	41.5	119	25	29.9	4.0555817
Nell	2	17	56.7	182	17	42.9	4.1751919
Twins	71	11	05.8	251	03	30.6	4.3193257

HOSTA.

A flat-topped mesa butte, 13 miles northeast of Coolidge, Bernalillo Co., N. Mex.

Permanent mark: A large pine tree with trunk trimmed and heavy foliage in top.

[Latitude, 35° 35' 13''-5. Longitude, 108° 11' 29''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Square Mesa.....	11 06 11·9	191 03 08·2	4·6194709
Taylor.....	305 54 10·6	126 14 27·9	4·8167308
James.....	263 54 38·6	84 41 15·2	5·0840194
Copper.....	247 19 47·2	68 06 43·4	5·1158874
Chusca.....	119 42 27·2	299 19 49·5	4·8269210

TWINS.

The eastern of two symmetrical cones, joined at the base, 6 miles southwest of Gallup, Bernalillo Co., N. Mex.

Permanent mark: A stone monument on the summit.

[Latitude, 35° 29' 39''-79. Longitude, 108° 50' 04''-54.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pyramid.....	251 03 30·6	71 11 05·8	4·3193257
Nell.....	293 07 57·8	113 15 18·5	4·3188760
Chusca.....	179 40 08·9	359 40 03·1	4·6371148

NELL.

A rocky peak on a monoclinical ridge, 6 miles southwest of Fort Wingate, Bernalillo Co., N. Mex.

Permanent mark: A small stone monument.

[Latitude, 35° 25' 13''-47. Longitude, 108° 37' 24''-92.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
West base.....	199 49 31·70	19 51 12·78	4·1118837
East base.....	228 13 24·91	48 17 26·75	4·1488124
Chusca.....	159 29 08·70	339 21 40·20	4·7410188
Zuñi.....	38 34 54·70	218 24 56·90	4·6236305
Twins.....	113 15 18·50	293 07 57·80	4·3188760
Pyramid.....	182 17 42·90	2 17 56·70	4·1751919

WEST BASE.

This station is situated near the foot of some low cliffs about 2 miles northwest from Wingate Station, in Valencia Co., N. Mex.

Permanent mark: A stone post set firmly in the ground. A cross on the upper surface marks the end of the base line and the position of the theodolite in observing angles. Witness stones are placed in

the form of a square about the stone, and the intersection of the diagonals of the square marks the position of the stone post indicating the end of the base line.

[Latitude, $35^{\circ} 31' 48'' \cdot 38$. Longitude, $108^{\circ} 34' 30'' \cdot 74$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nell	19 51 12·78	199 49 31·70	4·118837
East base.....	294 31 11·17	114 33 32·15	3·8274916

EAST BASE.

This station is on a low knoll in Valencia Co., N. Mex., about 2 miles east of the astronomical pier at Wingate Station, N. Mex.

Permanent mark: A stone post set firmly in the ground. A cross cut in the upper surface marks the exact point of the base line and the position of the theodolite in observing angles. The azimuth of the base line was determined by observations at this station on Polaris. Four witness stones were set in the form of a square about the stone post marking this station. The intersection of the diagonals of this square mark the position of the cross on the upper surface of the post.

[Latitude, $35^{\circ} 30' 17'' \cdot 80$. Longitude, $108^{\circ} 30' 28'' \cdot 08$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
West base	114 33 32·15	294 31 11·17	3·8274916
Nell	48 17 26·75	228 13 24·91	4·1488124
Pyramid.....	119 25 29·91	299 21 41·50	4·0555817

ASTRONOMICAL PIER.

The position of the astronomical pier from which the latitude and longitude of the Fort Wingate base was determined is 105 feet northeast from ticket office at Wingate, N. Mex. It was marked by a limestone post set firmly in the ground. A cross was cut on the upper face of the stone to indicate the exact position of the instrument. Longitude of the pier was determined by exchange of time signals for 5 nights with the observatory of the Washington University at St. Louis, Mo. Latitude by observations made on 22 pairs of stars.

Latitude, $35^{\circ} 30' 51'' \cdot 38$. Longitude, $108^{\circ} 32' 27'' \cdot 32$.

MCKENZIE.

Situated on a wooded ridge about 8 miles east of Fort Wingate, Valencia Co., N. Mex. The station is a scaffold about 40 feet high and the instrument was placed part way up. An enormous amount of chipping has been done here from time to time, and this station has

been a source of great annoyance on account of the difficulty of finding the signal, at long distances, among the trees. On this account it was abandoned in extending the triangulation and Square Mesa substituted in its place.

[Latitude, $35^{\circ} 21' 18''\cdot 7$. Longitude, $108^{\circ} 26' 35''\cdot 1$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Zuñi	59	04	24·9	238	48	12·5	<i>Meters.</i> 4·6967127
Zilh	129	09	57·4	308	41	48·4	4·9722791
Chusca	148	50	16·8	328	36	30·1	4·8370657
Sonsala	145	25	15·4	325	03	00·2	5·0039911
Taylor .....	.....	.....	.....	99	52	07·0	4·8866779

TAYLOR.

The highest point of the San Mateo Mountains, a high volcanic mountain mass in Valencia Co., N. Mex. The northern slope was timbered and is partly cleared. The highest point was occupied and used, and is marked by a tripod signal. It is the same point published by the Wheeler survey.

[Latitude, $35^{\circ} 14' 30''\cdot 7$. Longitude, $107^{\circ} 36' 29''\cdot 2$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Chusca	123	06	24·7	302	23	33·0	<i>Meters.</i> 5·1222508
McKenzie	99	52	07·0	.....	.....	.....	4·8866779
Square Mesa	88	05	10·1	267	41	55·4	4·7866140
Hosta	126	14	27·9	305	54	10·6	4·8167308
Jemes	233	06	37·7	53	32	43·5	4·9285535
Pinon	34	25	07·8	213	55	50·8	5·1450548
Sandia	269	53	33·0	90	33	25·7	5·0206116

CROFTON.

A rise on a ridge originally covered by a thick growth of cedars, and situated 6 miles east of south of Allantown, Apache Co., Ariz. It has been cleared, and a signal built of cedar poles with brush in the top. The center of the station is marked by a large nail driven in a cedar bough projecting from the parent stump near the ground.

[Latitude, $35^{\circ} 11' 39''\cdot 26$. Longitude, $109^{\circ} 06' 51''\cdot 84$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	"	o	'	"	
Iola	119	52	13·1	299	34	07·0	<i>Meters.</i> 4·7375673
Pinon	331	30	29·0	151	52	40·8	5·0989330
Ords Peak	18	01	11·2	197	44	30·3	5·1656953
Hasseltine	53	12	06·1	233	00	41·3	4·5766780
Chusca	198	03	51·7	18	13	31·4	4·9067286
Douglas	86	23	30·5	265	57	10·4	4·8424105
Square Mesa	267	42	22·7	88	11	15·1	4·8811374
Zuñi	292	48	13·2	112	55	14·4	4·3030530

ZUÑI.

The smaller and southeastern of two buttes, northwest of Zuñi Town, Valencia Co., N. Mex.; accessible only from the west.

Permanent mark: A stone monument.

[Latitude, 35° 07' 25"·93. Longitude, 108° 54' 40"·29.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Nell	218 24 56·9	38 34 54·7	4·6236305
Crofton	112 55 14·4	292 48 13·2	4·3030530
Chusca	184 30 44·4	4 33 18·8	4·0280539
McKenzie	238 48 12·5	50 05 24·9	4·6967127

SQUARE MESA.

A high, timbered "square mesa" in the Zuñi Mountains, Valencia Co., N. Mex., and 13 miles south of Chaves. Lanes were cut to the points sighted, and observations were taken from a scaffold and reduced to the mark.

Permanent mark: A very tall tree trimmed up to about 12 feet from the top.

[Latitude, 35° 13' 07"·7. Longitude, 108° 16' 46"·9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Crofton	88 11 15·1	267 42 22·7	4·8811374
Chusca	145 47 36·5	325 28 09·2	4·9521800
Hosta	191 03 08·2	11 06 11·9	4·6194709
Pinon	8 33 02·9	183 26 44·1	5·0589954
Taylor	267 41 55·4	88 05 10·1	4·7866140

PINON.

The highest peak of the Datil Range, in Socorro Co., N. Mex. It was sparsely timbered on top and has been cleared, leaving a small signal tree near the top. Observations were taken at the highest point and were reduced to the tree. Some of the trees growing on the side are about as high as the top of the mountain, and might be mistaken for the highest point from some directions. The mountain is easiest climbed from the southeast. It was published by Wheeler's survey under the name of Alamocita.

[Latitude, 34° 11' 51"·1 Longitude, 108° 27' 52"·1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Square Mesa	188 26 44·1	8 33 02·9	5·0589954
Taylor	213 55 50·8	34 25 07·8	5·1450548
Crofton	151 52 40·8	331 30 29·0	5·0989330
Ords Peak	75 00 27·5	254 22 08·7	5·0378288
Tularosa	10 11 31·6	190 07 46·8	4·7681763

TULAROSA.

In Socono Co., N. Mex., about 20 miles south of old Fort Tularosa. The same point was occupied by Wheeler survey under the name of Eagle Peak.

Permanent mark: A stone monument on the highest point of the mountain.

[Latitude, 33° 40' 37". Longitude, 108° 34' 34".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Ords Peak.....	107 10 40.2	286 36 20.9	4.9977404
Piñon.....	190 07 46.8	10 11 31.6	4.7681763
Graham.....	48 29 12.1	227 46 41.8	5.2096385

ORDS PEAK,

Otherwise known as Baldy, is a high, bald knob in the White Mountains, Ariz. Thomas Peak to the east is higher and a better natural point, but affords no view to the west which is cut off by Ords Peak, and for this reason the latter was used as the triangulation point.

Permanent mark: A stone monument 16 feet high and 10 feet in diameter at the base on the highest point.

[Latitude, 23° 56' 16". Longitude, 109° 36' 15".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Browns Peak.....	80 28 42.2	259 31 15.5	5.2088659
San Francisco.....	130 00 48.4	308 50 07.1	5.3909744
Piñon.....	254 22 08.7	75 00 27.5	5.0378288
Tularosa.....	286 36 20.9	107 10 40.2	4.9977404
Crofton.....	197 44 30.3	18 01 11.2	5.1656953
Douglas.....	169 34 44.7	349 25 31.3	5.1368081
Graham.....	10 18 59.9	190 10 13.9	5.1438981
Mazatzal.....	95 08 17.8	274 06 00.6	5.2356658

GRAHAM.

Highest point of Graham Mountain, south of the Gila River, near Solomonsville, Graham Co., Ariz. The mountain is heavily timbered, and lanes are cut to Piñon Mountain, Ords Peak, and Browns Peak.

Permanent mark: A small clump of very tall trees, growing close together.

[Latitude, 32° 42' 07". Longitude, 109° 52' 13".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Ords Peak.....	190 10 13.9	10 18 59.9	5.1438981
Tularosa.....	227 46 41.8	48 29 12.1	5.2096385
Browns Peak.....	129 10 31.6	308 22 44.7	5.2405049

BROWNS PEAK.

The highest and most northern of the "Four Peaks," west of Tonto Basin, Ariz. It is very difficult to climb, bare on top, and a fair natural point.

Permanent mark: A stone monument on the highest point.

[Latitude, 33° 41' 04"·2. Longitude, 111° 19' 29"·6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Graham	308 22 44·7	129 10 31·6	5·2405049
San Francisco.....	170 09 50·6	349 56 54·1	5·2722252
Mazatzal	163 22 45·7	343 17 13·2	4·6413886
Ords Peak.....	259 31 15·5	80 28 42·2	5·2088659

MAZATZAL.

The highest point of the northern group of the Mazatzal Mountains west of Tonto Basin, Yavapai Co., Ariz. The point is best approached by climbing the long ridge reaching down to the east.

Permanent mark: A small pile of stones.

[Latitude, 34° 03' 45"·7. Longitude, 111° 27' 38"·5.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Browns Peak	343 17 13·2	163 22 45·7	4·6413886
Granite.....	122 43 59·9	302 07 02·5	5·0754858
Ords Peak.....	274 06 00·6	95 08 17·8	5·2356658
San Francisco.....	172 56 41·9	352 00 38·4	5·1576796
Bakers Butte.....	190 00 56·1	10 03 44·4	4·6422243

BAKERS BUTTE.

Is a knoll on the edge of the Mogollon mesa, above Tonto Basin, about 8 miles west of the "Tunnel," in Yavapai Co., Ariz. It was heavily timbered, but has been cleared, except a large pine tree near the top, to which observations were reduced. The "Potato Ranch," a mile to the north, is a convenient and excellent camp from which to visit the butte.

[Latitude, 34° 27' 08"·6. Longitude, 111° 22' 39"·6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
San Francisco	164 39 15·4	344 28 58·5	5·0123560
Mazatzal	10 03 44·4	190 00 56·1	4·6422243
Granite.....	101 08 50·0	280 28 52·9	5·0404877
Del Pasco.....	75 24 21·0	.....	4·974008
Chevron.....	241 06 48·0	61 24 50·4	4·7439038
Sunset.....	217 11 21·6	37 25 35·0	4·7993065

CHEVLON.

Is a large, flat-topped, timbered butte about 30 miles south of Winslow, Apache Co., Ariz. The horizon from south around by the west to the northeast is commanded, but the east and southeast are cut off by the timber.

Permanent mark: A lone tree near the northeast end of summit.

[Latitude, 34° 41' 33"·8. Longitude, 110° 50' 52"·1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Bakers Butte.....	61 24 50·4	241 06 48·0	4·7439038
San Francisco.....	134 00 32·2	306 43 39·8	5·0204678
Douglas.....	239 49 38·9	60 23 29·5	5·0090390
Sunset.....	156 11 11·5	336 07 18·9	4·4088258

SUNSET.

The knoll on the mesa that forms the western wall of Sunset Pass, 18 miles southwest of Winslow, Yavapai Co., Ariz. It is a fair, natural point.

Permanent mark: A stone monument on the highest point.

[Latitude, 34° 54' 14"·7. Longitude, 110° 57' 39"·8.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Chevron.....	326 07 18·9	156 11 11·5	4·4088258
Bakers Butte.....	37 25 35·0	217 11 21·6	4·7993065
Cottonwood.....	221 03 26·5	41 25 43·8	4·9494996
Douglas.....	254 08 15·2	74 45 36·4	5·0117591
San Francisco.....	127 08 23·0	306 43 39·7	4·9120243
Woodruff Butte..	277 37 30·4	98 09 01·2	4·9286824

WOODRUFF BUTTE.

A sharp lava cone near the town of Woodruff, Ariz., occupied as a secondary station.

Permanent mark: A stone monument on the highest point.

[Latitude, 34° 47' 56"·7. Longitude, 110° 02' 31"·1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Douglas.....	201 02 55·7	21 08 37·4	4·6233254
Hasseltine.....	248 36 03·1	68 56 32·0	4·7672366
Sunset.....	98 09 01·2	277 37 30·4	4·9286824

HASSELLTINE.

A slight elevation on the wooded ridge trending in an east and west direction, about 8 miles south of Navajo Springs, Apache Co., Ariz. It is about one-half mile west of where the road from Navajo to St.

Johns climbs the ridge. The point is marked by two trees standing close together, the vicinity having been cleared. The instrument was placed on the highest point, and the observations reduced to the signal. This station is hard to find, and is not used in the main scheme of triangulation.

[Latitude, $34^{\circ} 59' 24''$.3. Longitude, $109^{\circ} 26' 43''$.1.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Douglas	114	43	38.5	294	28	46.8	4.6359622
Iola	160	47	08.0	340	40	31.5	4.7217592
Crofton	233	00	41.3	53	12	06.1	4.5766780
Woodruff Butte ..	68	56	32.0	248	36	03.1	4.7672366

DOUGLAS.

A large, prominent butte, about 12 miles north of Carrizo, Apache Co., Ariz. It is of lava, and stands perhaps 600 feet above the base. Permanent mark: A stone monument on the highest point.

[Latitude, $35^{\circ} 09' 08''$.6. Longitude, $109^{\circ} 52' 35''$.1.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Crofton.....	265	57	10.4	86	23	30.5	4.8424105
Sunset.....	74	45	36.4	254	08	15.2	5.0117591
Chevon	60	23	29.5	239	49	38.9	5.0090390
Ords Peak	349	25	31.3	169	34	44.7	5.1368081
San Francisco	98	00	03.5	276	57	42.2	5.2182681
Hasseltine.....	294	28	46.8	114	43	38.5	4.6359622
Iola.....	214	28	01.0	34	36	20.5	4.5857480
Woodruff Butte ..	21	08	37.4	201	02	55.7	4.6233254

IOLA.

Situated on a sand ridge, about 9 miles northeast of Tanners Springs, Apache Co., Ariz. A lone piñon tree serves as a signal, and a nail driven in a low horizontal branch marks the center of the station.

[Latitude, $35^{\circ} 26' 18''$.4. Longitude, $109^{\circ} 38' 10''$.6.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Zilh	215	06	27.6	35	20	01.2	4.7843436
Cottonwood	97	15	55.8	276	52	14.6	4.7938988
Douglas	34	36	20.5	214	28	01.0	4.5857480
Crofton	299	34	07.0	119	52	13.1	4.7375673
Hasseltine.....	340	40	31.5	160	47	08.0	4.7217592

COTTONWOOD.

Is a small knoll, in Apache Co., Ariz., on the mesa, about 30 miles north of Holbrook, in which Cottonwood Spring is situated. It is difficult to recognize, and is not a good natural point.

Permanent mark: A stone monument.

[Latitude, $35^{\circ} 30' 26''$. Longitude, $110^{\circ} 18' 59''$.6.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Oraibe	139	09	30.4	318	55	36.3	<i>Meters.</i> 4.7390394
Sunset	41	25	43.8	221	03	26.5	4.9494990
San Francisco	82	09	59.9	261	22	41.3	5.0963786
Wilson	190	35	01.4	10	40	44.7	4.9014405
Iola	276	52	14.6	97	15	55.8	4.7938988
Ziilz	246	10	13.9	66	47	37.2	5.0228907

ORAIBE.

A butte (Apache Co., Ariz.) on the end of a spur reaching to the south from the long mesa on which the Moqui towns are built. It is about 6 miles west of Oraibe village.

Permanent mark: A stone monument.

[Latitude, $35^{\circ} 52' 50''$.4. Longitude, $110^{\circ} 42' 49''$.2.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Navajo	173	50	02.7	353	44	30.2	<i>Meters.</i> 5.1097488
Wilson	233	38	25.0	53	58	11.0	4.7960006
Cottonwood	318	55	36.3	139	09	30.4	4.7390394

SAN FRANCISCO.

A well-known volcanic mountain, standing on the Colorado Plateau, in Coconino Co., Ariz.

Permanent mark: A stone cairn 10 feet high.

[Latitude, $35^{\circ} 20' 47''$.0. Longitude, $111^{\circ} 40' 37''$.8.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Ords Peak	308	50	07.1	130	00	48.4	<i>Meters.</i> 5.3909744
Cottonwood	261	22	41.3	82	09	59.9	5.0963786
Douglas	276	57	42.2	98	00	03.5	5.2182681
Chevron	306	43	39.8	134	00	32.2	5.0204678
Bakers Butte	344	28	58.5	164	39	15.4	5.0123560
Mazatzal	352	00	38.4	172	56	41.9	5.1570253
Browns Peak	349	56	54.1	170	09	50.6	5.2722252
Granite	45	43	39.8	225	13	33.2	5.0494630
Floyd	93	23	34.4	272	47	14.3	4.9787020
Sunset	306	43	39.7	127	08	23.0	4.9120243

GRANITE.

A sharp, rocky peak, 8 miles northwest of Prescott, Yavapai, Co., Ariz. It is difficult to climb, being most easily accessible from the northwest. It is a good natural point, being rather sharp, and sur-

mounted by a large bowlder. The observations were taken near this bowlder and reduced to its center.

[Latitude, $34^{\circ} 38' 17''\cdot 0$. Longitude, $112^{\circ} 33' 08''\cdot 3$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
San Francisco	225 13 33·2	45 43 39·8	5·0494630
Bakers Butte	280 28 52·9	101 08 50·8	5·0404877
Floyd.....	169 28 59·7	349 23 06·3	4·9302200
Aquarius.....	117 02 10·3	296 36 39·5	4·8832267
Mazatzal	302 07 02·5	122 43 59·9	5·0754858

BILL WILLIAMS.

A good natural point; the highest point of Bill Williams Mountain, about 5 miles south of Williams, a station on the Atlantic and Pacific Railroad, in Yavapai Co., Ariz.

Permanent mark: A cairn of stones.

[Latitude, $35^{\circ} 11' 59''\cdot 6$. Longitude, $112^{\circ} 12' 15''\cdot 4$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Floyd.....	114 31 04·3	294 13 04·6	4·7146148
Aquarius.....	74 42 51·4	254 05 09·9	5·0150355

FLOYD.

A sharp peak, about 8 miles north of Crookton, Yavapai Co., Ariz.

Permanent mark: A stone monument 12 feet high and 10 feet in diameter, built by the Powell Survey.

[Latitude, $35^{\circ} 23' 33''\cdot 6$. Longitude, $112^{\circ} 43' 24''\cdot 1$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Aquarius	46 54 04·0	226 34 13·5	4·8562771
San Francisco	272 47 14·3	93 23 34·4	4·9787020
Granite	349 23 06·3	169 28 59·7	4·9302200
Hualapai	72 04 56·8	251 24 19·9	5·0510471
Tipton	97 21 59·8	276 30 52·6	5·1279544
Emma	157 27 56·7	337 12 15·2	5·0202043
Bill Williams.....	294 13 04·6	114 31 04·3	4·7146148

AQUARIUS.

Highest point of Aquarius Mountain, in Yavapai Co., Ariz., about 25 miles south of Peach Spring.

Permanent mark: A cairn of rocks 8 feet high.

[Latitude, $34^{\circ} 56' 56''\cdot 2$. Longitude, $113^{\circ} 17' 51''\cdot 0$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Granite.....	296 36 39·5	117 02 10·3	4·8832267
Floyd.....	226 34 13·5	46 54 04·0	4·8562771
Hualapai	104 31 14·8	284 10 37·0	4·7517284
Bill Williams.....	254 05 09·9	74 42 51·4	5·0150355

HUALAPAI.

In Mohave Co., Ariz., on highest point of Hualapai Mountain, 8 miles south of Kingman.

Permanent mark: Two large rocks on summit.

[Latitude, 35° 04' 30''-2. Longitude, 113° 53' 48''-3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Floyd.....	251 24 19.9	72 04 56.8	5.0510471
Aquarius.....	284 10 37.0	104 31 14.8	4.7517284
Emma.....	206 17 47.4	26 43 12.9	5.1685025

EMMA.

The highest southerly peak of the Uinkaret Mountains, in Mohave Co., Ariz., about 7 miles north of the Colorado River, on the brink of the Grand Canyon, and 10 miles south of Trumbull Spring.

Permanent mark: A stone monument.

[Latitude, 36° 15' 50''-2. Longitude, 113° 10' 12''-4.1]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Brink.....	254 07 01.4	74 33 44.8	4.8453629
Floyd.....	337 12 15.2	157 27 56.7	5.0202043
Hualapai.....	26 43 12.9	206 17 47.4	5.1685025
Tipton.....	49 12 09.4	228 36 12.8	5.0877102
Virgin.....	114 17 40.3	293 44 09.1	4.9654204

TIPTON.

In Mohave Co., Ariz., on highest point of Mount Tipton, 6 miles north of Mineral Park.

Permanent mark: Large pine tree on summit of peak.

[Latitude, 35° 32' 21''-1. Longitude, 114° 11' 30''-1.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Charleston.....	121 22 54.8	300 30 02.9	5.1989854
Emma.....	228 36 12.8	49 12 09.4	5.0877102
Floyd.....	276 30 52.6	97 21 59.8	5.1279543
Virgin.....	183 30 28.7	3 33 20.2	5.0728221
Dead Man.....	58 53 00.0	238 34 33.3	4.7512024
Muddy.....	150 59 22.7	330 41 02.1	4.9840258

VIRGIN.

The highest peak of the Virgin Mountains, 16 miles northeast of St. Thomas, Lincoln Co., Nev. This station was formerly occupied by the Powell Survey.

[Latitude, 36° 36' 09''-6. Longitude, 114° 06' 39''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Tipton.....	3 33 20.2	183 30 28.7	5.0728221
Emma.....	293 44 09.1	114 17 40.3	4.9654204
Dead Man.....	20 42 53.8	200 21 21.7	5.1967173
Charleston.....	75 57 55.9	255 01 30.6	5.1662173

DEAD MAN.

The highest point of Dead Mountain, in Lincoln Co., Nev., 16 miles north and a little west of Camp Mojave, and 8 miles west of the Colorado River. Station is on the highest point of rocks at extreme north-west end of peak, which is not a good natural point.

Permanent mark: A stone monument.

[Latitude, $35^{\circ} 16' 30'' \cdot 3$. Longitude, $114^{\circ} 43' 20'' \cdot 3$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Virgin.....	200 21 21·7	20 42 53·8	5·1967173
Tipton.....	238 34 33·3	58 53 00·0	4·7512024
Muddy.....	180 25 48·9	360 26 08·9	5·0552302

MUDDY.

Highest point of Muddy Mountains, 24 miles southwest of St. Thomas, Lincoln Co., Nev. Peak is a good natural point.

[Latitude, $36^{\circ} 17' 54'' \cdot 8$. Longitude, $114^{\circ} 42' 46'' \cdot 1$.]

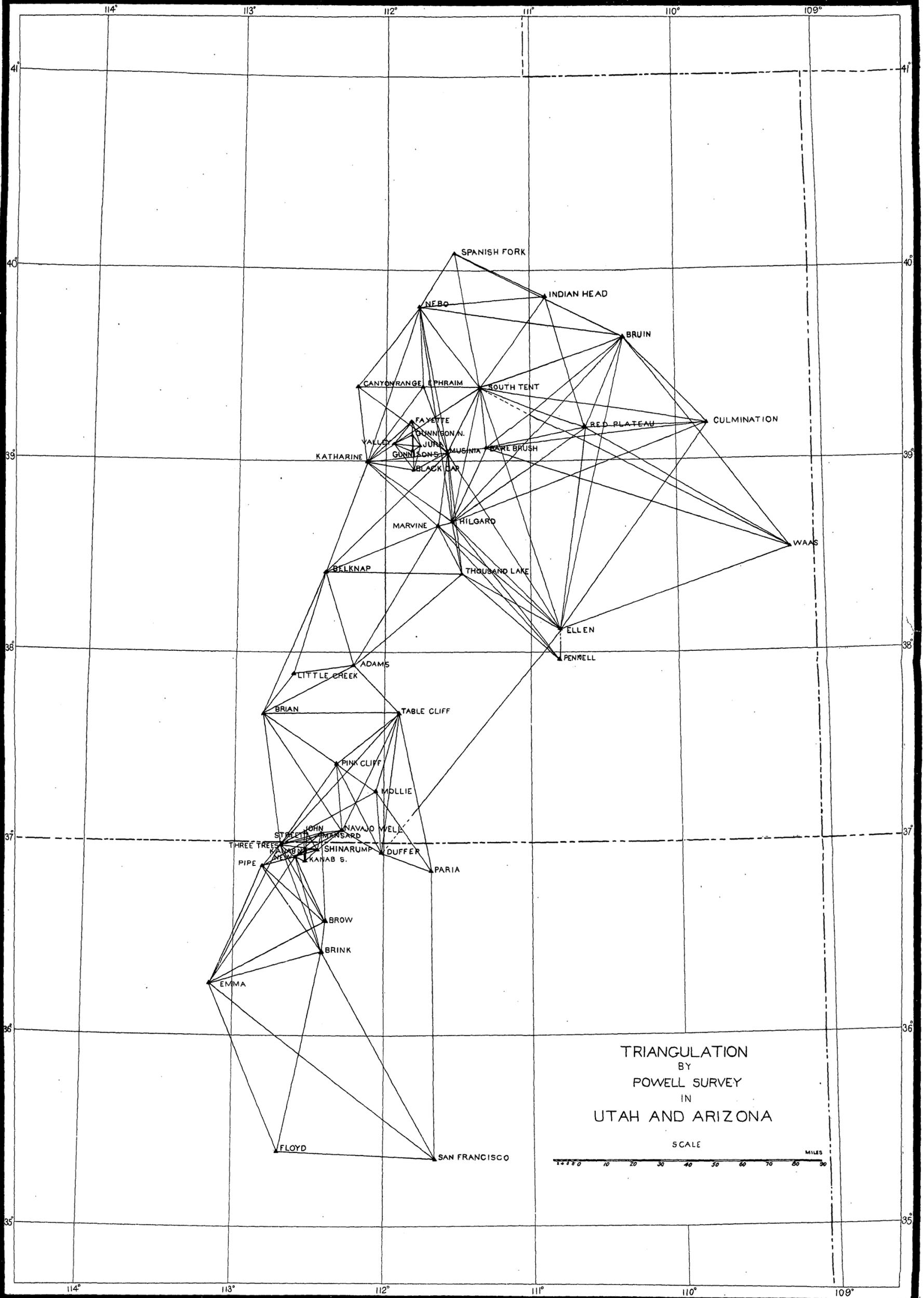
To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Dead Man.....	360 26 08·9	180 25 48·9	5·0552302
Tipton.....	330 41 02·1	150 59 22·7	4·9846258

CHARLESTON.

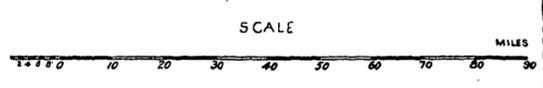
In Lincoln, Nev., on highest peak of Timber Mountain, 15 miles southwest of Los Vegas, Nev. Signal is natural point of rocks.

[Latitude, $36^{\circ} 16' 18'' \cdot 0$. Longitude, $115^{\circ} 41' 38'' \cdot 7$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Tipton.....	300 30 02·9	121 22 54·8	5·1989854
Virgin.....	255 01 30·6	75 57 55·9	5·1662173



TRIANGULATION
BY
POWELL SURVEY
IN
UTAH AND ARIZONA



TRIANGULATION OF THE POWELL SURVEY.

METHODS OF WORK.

The triangulation in this State was developed from two base lines, the first being measured at Kanab, Utah, and the second at Gunnison, in the same State. These base lines are 150 miles apart, the Gunnison line being the more northern and eastern. The Kanab base was first located and measured under direction of Prof. A. H. Thompson, in the winter of 1871-'72. Trussed wooden bars, supported upon adjustable trestles, were used. These bars were oiled and varnished to prevent absorption of moisture and tested by comparison with a standard steel tape, whose length and coefficient of temperature were known.

In the fall of 1878 a portion of this base line was remeasured under direction of Prof. G. K. Gilbert, with the apparatus used in the measurement of the Gunnison base line, and the result of this latter measurement adopted as the length of the Kanab base. The ends of the base line were marked by stone posts of basalt set firmly in the ground, the ends of the line being marked by a cut in the upper surface of the posts.

The latitude and longitude of the Kanab base line were determined by Prof. A. H. Thompson, in 1872. For longitude, time signals were exchanged with the astronomical observatory of the Deseret University at Salt Lake City, Mr. E. P. Austin, astronomer of the U. S. Engineers Geographical Survey west of the one hundredth meridian, whose services were kindly tendered by Lieut. Geo. M. Wheeler, in charge of that organization, conducting the observations and exchanges at that place.

Latitude was determined by the Talcott method of zenith distances, the instrument used being a combined transit and zenith telescope. Azimuth was determined by observations on Polaris.

The final adjusted results of these observations gives, as the position of the north end of the Kanab base line, longitude $112^{\circ} 31' 21'' \cdot 42$ W., latitude $36^{\circ} 57' 46'' \cdot 54$ N.

The Gunnison base line was measured under the direction of Prof. A. H. Thompson, in 1875, the measurement being made by wooden rods carried in a trussed wooden case. These rods were oiled and varnished to prevent absorption of moisture, and their length was carefully determined by comparisons with standard steel rods furnished by the U. S. Coast and Geodetic Survey.

The Gunnison base line was located in the meridian of the astronomical station at Gunnison, determined in 1872 by the U. S. engineers'

survey west of the one hundredth meridian, and the longitude of their monument adopted as the longitude of the north end of the base line. Its latitude was determined from observations of zenith distances by Prof. A. H. Thompson, in 1874. The adopted position of the north end of the base line is latitude $39^{\circ} 08' 28'' 30$ N., longitude $111^{\circ} 49' 16'' 23$ W. Both ends of this base are marked by a cross on the upper surface of a stone post set firmly in the ground.

The Gunnison and Kanab bases were connected by triangulation, the angles being measured by a theodolite having a 10-inch circle and reading by two verniers to 5 seconds. This triangulation was adjusted by the method of least squares, and the result, giving for the Gunnison base a length of 32,182.39 feet, and for the Kanab base a length of 22,619.73 feet, adopted for the computation of the latitudes and longitudes of the triangulation stations in Utah and northwestern Arizona.

Signals were erected on all triangulation stations, which were not good natural points, before the angles were observed.

The method adopted for observations of angles was usually by directions and on different parts of the circle. These angles were then repeated with the telescope in reversed position. From three to eight sets of these observations were made. After making an arbitrary station adjustment, all figures were adjusted by the method of least squares.

This system of triangulation covered and gave control points for topography over an area of approximately 108,000 square miles. Following is a descriptive list of triangulation stations, giving latitude and longitude of each station, together with azimuth and distances to such other stations as were used in the adjustment of figures.

DESCRIPTIONS AND POSITIONS OF STATIONS.

SPANISH FORK.

A well-defined and well-known peak of the Wasatch Range, in Utah Co., Utah, seven miles east of the village of Spanish Fork.

Permanent mark: A small cairn of stone.

[Latitude, $40^{\circ} 05' 13'' 5$. Longitude, $111^{\circ} 31' 40'' 7$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Nebo.....	33 35 57	213 26 45	4 5672955
Indian Head.....	294 25 25	114 49 59	4 7773526
Bruin.....	295 38 14	116 23 34	5 0501985
South Tent.....	349 15 10	169 21 41	4 8954328

NEBO.

The most southerly high peak of the Wasatch Mountains in Juab Co., Utah. The summit shows three sharp points of nearly the same altitude, and the station was made upon the one farthest south. It

is 8 miles north-northeast from the town of Nephi and 4½ miles east from Mona.

Permanent mark: A cairn 7 feet high.

[Latitude, 39° 48' 35"4. Longitude, 111° 45' 59"7.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Katharine	19	39	31	199	25	18	4-9832646
Canyon Range.....	39	21	02	219	04	10	4-7773485
Spanish Fork.....	213	26	45	33	35	57	4-5672955
Indian Head.....	265	16	45	85	50	25	4-8762365
Bruin.....	278	10	52	99	05	14	5-0896693
South Tent.....	322	47	26	143	03	04	4-7651455
Musinia.....	349	14	31	169	21	41	4-9418712
Hilgard.....	351	11	37	171	20	05	5-1021473
Ephraim.....	358	26	11	178	26	46	4-6881882

INDIAN HEAD.

A rounded summit of the west Tavaputs Plateau, north of Emma Park, in Utah Co., Utah. It is the highest point in the vicinity.

Permanent mark: A 5-foot cairn of rocks.

[Latitude, 39° 51' 44"2. Longitude, 110° 53' 26"4.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
South Tent.....	37	38	48	217	20	55	4-8188333
Nobo.....	85	50	25	265	16	45	4-8762365
Spanish Fork.....	114	49	59	294	25	25	4-7773526
Bruin.....	297	26	01	117	46	48	4-7192701
Red Plateau.....	343	01	56	163	12	17	4-9044670

BRUIN.

A summit of the west Tavaputs Plateau, Emery Co., Utah, 17 miles west from the Green River. It is the highest point of the vicinity.

Permanent mark: A cairn 5 feet high.

[Latitude, 39° 38' 37"1. Longitude, 110° 20' 56"4.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
							<i>Meters.</i>
Ellen.....	13	35	55	193	18	21	5-2401173
Red Plateau.....	24	01	37	203	51	19	4-7593733
Hilgard.....	44	28	34	223	43	19	5-1714955
Bare Brush.....	52	44	14	232	07	38	5-0195761
South Tent.....	72	26	06	251	47	36	4-9598213
Nobo.....	99	05	14	278	10	52	5-0896693
Spanish Fork.....	116	23	34	295	38	14	5-0501985
Indian Head.....	117	46	48	297	26	01	4-7192701
Waas.....	321	19	28	142	01	53	5-1941553

CANYON RANGE.

The mountain range through which the Sevier River cuts in its lower course bears a number of sharp peaks in Millard Co., Utah. The one

selected stands about midway between the canyon of the Sevier and the town of Scipio. It was not occupied, but was sighted from a number of stations at the east.

[Latitude, $39^{\circ} 23' 30'' \cdot 7$. Longitude, $112^{\circ} 12' 26'' \cdot 5$.]

Station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Nebo	219	04	10	39	21	02	4·7773485
South Tent.....	269	46	16	90	18	37	4·8644279
Ephraim.....	270	05	04	90	22	26	4·5937830
Musinia	305	50	21	126	14	13	4·8274974
Katharine	352	30	28	172	33	13	4·6498542

EPHRAIM.

A flat-topped summit of the Gunnison Plateau, in Sanpete Co., Utah, 9 miles west-northwest from the town of Ephraim.

Permanent mark: A cairn 5 feet high.

[Latitude, $39^{\circ} 23' 25'' \cdot 6$. Longitude, $111^{\circ} 45' 06'' \cdot 6$.]

Station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Katharine	37	22	37	217	07	53	4·7437159
Canyon Range....	90	22	26	270	05	04	4·5937830
Nebo.....	178	26	46	358	26	11	4·6681882
South Tent.....	269	41	51	89	56	51	4·5307425
Musinia.....	339	04	58	159	11	33	4·6248411
Hilgard.....	347	01	18	167	09	09	4·9059241

SOUTH TENT.

A summit of the Wasatch Plateau, in Sanpete Co., Utah, 10 miles southeast from Springtown. There is no well-defined point, but a rounded profile is seen from most directions.

Permanent mark: A cairn 5 feet high.

[Latitude, $39^{\circ} 23' 29'' \cdot 1$. Longitude, $111^{\circ} 21' 28'' \cdot 2$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Hilgard.....	11	38	54	191	31	53	4·9043279
Musinia.....	25	46	45	205	38	23	4·6418233
Katharine.....	57	03	08	236	33	28	4·9072577
Ephraim.....	89	56	51	269	41	51	4·5307425
Canyon Range....	90	18	37	269	46	16	4·8644279
Nebo.....	143	03	04	322	47	26	4·7651455
Spanish Fork.....	169	21	41	349	15	10	4·8954328
Indian Head.....	217	20	55	37	38	48	4·8188333
Bruin.....	251	47	36	72	26	06	4·9598213
Culmination.....	278	47	20	99	47	19	5·1397025
Red Plateau.....	290	49	14	111	17	16	4·8340901
Ellen.....	241	20	00	161	40	22	5·1724351
Bare Brush.....	353	32	00	173	33	44	4·5564419

FAYETTE.

A low cliff 4 miles east of the town of Fayette, in Sanpete Co., Utah.

Permanent mark: A small cairn.

[Latitude, $39^{\circ} 12' 31''$.5. Longitude, $111^{\circ} 49' 20''$.3.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Valley	38 22 37	218 18 11	4·2107543
Katharine	49 03 11	228 51 09	4·5818306
Musinia	312 12 35	132 21 50	4·5557721
Jura	341 22 19	161 24 25	4·1767984
Gunnison North..	359 15 42	179 15 47	3·8751250
Black Cap	359 46 31	179 46 33	4·4505756

GUNNISON NORTH.

The north end of the Gunnison base line, in Sanpete Co., Utah, is in the meridian of the U. S. Engineer monument in the town of Gunnison and 5,972 feet to the southward.

Permanent mark: A monument of cut stone 1 foot square and standing about 18 inches high.

[Latitude, $39^{\circ} 08' 28''$.3. Longitude, $111^{\circ} 49' 16''$.2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Valley	62 47 26	242 42 55	4·0588179
Fayette	179 15 47	359 15 42	3·8751250
Jura	325 05 08	145 07 10	3·9146604
Black Cap	359 57 49	179 57 49	4·3164200
Gunnison South..	359 59 52	179 59 52	3·9916158

GUNNISON SOUTH.

The south end of the Gunnison base line, in Sanpete Co., Utah, is likewise in the meridian of the Engineer Astronomical Station in Gunnison. It is 7 miles to the southward and on the north side of Willow Creek.

Permanent mark: A monument of cut stone, dressed with an edge at top like a gable roof. It stands 6 inches above the ground.

[Latitude, $39^{\circ} 03' 10''$.2. Longitude, $111^{\circ} 49' 16''$.2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Valley	114 10 59	294 06 30	4·0477966
Gunnison North..	179 59 52	359 59 52	3·9916158
Jura	236 50 44	56 52 47	3·7494590
Black Cap	359 55 58	179 55 58	4·0379303

VALLEY.

The station was made on the eastern slope of the Valley Range near the base, in Sanpete Co., Utah, 7 miles west northwest from Gunnison. Permanent mark: A cairn of rocks.

[Latitude, 39° 05' 38''-3. Longitude, 111° 56' 20''-0.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Fayette.....	218	18	11	38	22	37	4·2107543
Gunnison North..	242	42	55	62	47	26	4·0588179
Jura.....	275	41	08	95	47	37	4·1749626
Gunnison South..	294	06	30	114	10	59	4·0477966
Black Cap.....	326	33	45	146	38	11	4·2681391

JURA.

An inconspicuous point among the Jurassic Hills, in Sanpete Co., Utah, 6 miles south southeast from Gunnison.

Permanent mark: A small cairn.

[Latitude, 39° 04' 49''-7. Longitude, 111° 46' 00''-6.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Black Cap.....	18	34	16	198	32	11	4·1687790
Gunnison South..	56	52	47	236	50	44	3·7494590
Valley.....	95	47	37	275	41	08	4·1749626
Gunnison North..	145	07	10	325	05	08	3·9146604
Fayette.....	161	24	25	341	22	19	4·1767984

KATHARINE.

A summit of the Pavant Range, in Millard Co., Utah, 20 miles west southwest from Gunnison and 8 miles east northeast from Fillmore. The point is not the highest of the vicinity and is not acute, but is rounded and bush-covered. A lone tree at the top was used for the station and a small cairn was built near it to identify it.

[Latitude, 38° 59' 35''. Longitude, 112° 08' 24''-7.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	<i>Meters.</i>
Belknap.....	20	23	10	200	17	55	4·8327198
Canyon Range....	172	33	13	352	30	38	4·6498542
Nebo.....	199	25	18	19	39	31	4·9832646
Ephraim.....	217	07	53	37	22	37	4·7437159
Fayette.....	223	51	09	49	03	11	4·5618306
South Tent.....	236	33	28	57	03	08	4·9072577
Musinia.....	264	16	42	84	37	56	4·6894906
Black Cap.....	278	41	25	98	53	30	4·4469548
Hilgard.....	303	23	46	123	46	12	4·7933449
Marvine.....	309	40	40	129	59	27	4·7514342

BLACK CAP.

An acute conical peak among the Jurassic hills, in Sevier Co., Utah, 2 miles east from Salina.

Permanent mark: A rock cairn.

[Latitude, 38° 57' 16''-3. Longitude, 111° 49' 15''-7.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Katharine	98	53	30	278	41	25	<i>Meters.</i> 4-4409548
Valley	146	38	11	326	33	45	4-2681391
Fayette	179	46	33	359	46	31	4-4505756
Gunnison South ..	179	55	58	359	55	58	4-0379303
Gunnison North ..	179	57	49	359	57	49	4-3164200
Jura,	198	32	11	18	34	16	4-1687790
Musinia	246	46	17	66	55	26	4-3598409

MUSINIA.

A south southwestern outline of the Wasatch Plateau, in Sevier Co., Utah, 14 miles east southeast from Gunnison. The peak is white and is very conspicuous from the Sevier Valley.

Permanent mark: A small cairn.

[Latitude, 39° 02' 08''-3. Longitude, 111° 34' 40''-6.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Marvine	7	40	16	187	37	52	4-6152683
Belknap	46	53	03	226	23	41	4-9991085
Black Cap	66	55	26	246	46	17	4-3598409
Katharine	84	37	56	264	16	42	4-6894906
Canyon Range	126	14	13	305	50	21	4-8274974
Fayette	132	21	50	312	12	35	4-5557721
Ephraim	159	11	33	339	04	58	4-6248411
Nebo	169	21	41	349	14	31	4-9418712
South Tent	205	38	23	25	46	45	4-6418233
Bare Brush	260	47	32	80	57	36	4-3694478
Ellen	326	33	09	147	01	32	5-0841937
Thousand Lake ..	352	51	13	172	54	53	4-8406418
Hilgard	355	40	12	175	41	30	4-5933804

BARE BRUSH.

An outlier at the east edge of the Wasatch Plateau, in Sevier Co., Utah, 27 miles east from the town of Gunnison. The top slopes to the north and breaks off southward in a cliff.

Permanent mark: A cairn 5 feet high.

[Latitude, 39° 04' 08''-7. Longitude, 111° 18' 39''-1.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	"	°	'	"	
Hilgard	25	21	26	205	12	42	4-6752708
Musinia	80	57	36	280	47	32	4-3694478
South Tent	173	33	44	353	32	00	4-5564419
Brush	232	07	38	52	44	14	5-0195701
Red Plateau	259	06	40	79	32	51	4-7841618
Culmination	263	41	15	84	39	16	5-1241292
Waas	287	22	43	108	41	02	5-2793519

SAN FRANCISCO.

A well-known volcanic mountain standing on the Colorado Plateau, in Coconino Co., Ariz.

Permanent mark: A stone cairn, 10 feet high.

[Latitude, $35^{\circ} 20' 44''\cdot 4$. Longitude, $111^{\circ} 40' 40''\cdot 0$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Floyd.....	93	23	54	272	47	34	4·9787442
Emma.....	127	27	47	306	35	21	5·2280572
Brink.....	151	11	19	330	45	12	5·1400820
Paria Station.....	179	56	05	359	56	01	5·2216020

This station was also determined by Mr. A. P. Davis, in 1885, from the Fort Wingate base line in the triangulation of New Mexico and northeastern Arizona, with the following adopted result: Latitude, $35^{\circ} 20' 47''\cdot 02$. Longitude, $111^{\circ} 40' 37''\cdot 84$.

RED PLATEAU.

A timbered plateau in Emery Co., Utah, with a south-facing cliff standing between Price and San Rafael rivers, and about 30 miles west from Green River.

Permanent mark: A cairn near the most southerly salient.

[Latitude, $39^{\circ} 10' 14''\cdot 0$. Longitude, $110^{\circ} 37' 10''\cdot 9$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Ellen.....	8	21	43	188	14	23	5·0710545
Hilgard.....	56	17	11	235	42	22	4·9853721
Bare Brush.....	79	32	51	259	06	40	4·7841618
South Tent.....	111	17	16	290	49	14	4·8340901
Indian Head.....	163	12	17	343	01	56	4·9044670
Bruin.....	203	51	19	24	01	37	4·7593733
Culmination.....	287	57	27	88	29	18	4·8609616
Waas.....	299	42	58	120	35	21	5·1451364

CULMINATION.

A summit of the east Tavaputs Plateau, Grand Co., Utah, 22 miles east from the Green River and 4 miles east from the most southerly salient of the plateau.

Permanent mark: A rock cairn 5 feet high.

[Latitude, $39^{\circ} 11' 27''\cdot 1$. Longitude, $109^{\circ} 46' 47''\cdot 5$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Ellen.....	37	30	22	216	51	32	4·1734765
Hilgard.....	70	20	27	249	31	56	5·2121867
Bare Brush.....	84	39	16	263	41	15	5·1241292
Red Plateau.....	88	29	18	267	57	27	4·8609616
South Tent.....	99	47	19	278	47	20	5·1397025
Waas.....	326	21	46	146	42	32	4·9385435

MARVINE.

The highest point of a rugged comb, in Sevier Co., Utah, separating Moraine and Summit valleys. It is 6 miles north from the foot of Fish Lake.

Permanent mark: A cairn 8 feet high.

[Latitude, 38° 40' 02''-9. Longitude, 111° 38' 28''-3.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Adams	31	20	05	210	50	04	4-9797391
Belknap	67	54	14	247	25	23	4-8615500
Katharine	129	59	27	309	40	40	4-7514342
Musinia	187	37	52	7	40	16	4-6152683
Hilgard	258	09	28	78	13	08	3-9308816
Ellen	309	48	05	130	18	53	4-9745088
Pennell	316	27	42	136	59	21	5-0352986
Thousand Lake...	333	05	44	153	11	47	4-4949190

HILGARD.

A well-defined peak in Sevier Co., Utah, 5 miles east from Mount Marvine.

Permanent mark: A small cairn.

[Latitude, 38° 41' 00''-4. Longitude, 111° 32' 38''-2.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Marvine	78	13	08	258	09	28	3-9268816
Katharine	129	46	12	303	23	46	4-7933449
Ephraim	167	09	09	347	01	18	4-9059241
Nebo	171	20	05	351	11	37	5-1021473
Musinia	175	41	30	355	40	12	4-5933804
South Tent	191	31	53	11	38	54	4-9043279
Bare Brush	205	12	42	25	21	26	4-6752708
Bruin	223	43	19	44	28	34	5-1714955
Red Plateau	235	42	22	56	17	11	4-9853721
Culmination	249	13	56	70	20	27	5-2121867
Ellen	314	13	20	134	40	28	4-9503856
Pennell	320	34	19	141	02	20	5-0178011
Thousand Lake...	349	12	56	169	15	20	4-4798016

BELKNAP.

A well-defined, symmetric peak, bare of vegetation; one of the principal summits of the Tushar Mountains in Piute Co., Utah, 10 miles west from Marysville and 16 miles northeast from Beaver.

Permanent mark: A stone cairn 5 feet high.

[Latitude, 38° 25' 06''-6. Longitude, 112° 24' 45''-5.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	°	'	''	°	'	''	
Little Creek.....	16	21	54	196	14	25	4-7942160
Brian	24	17	27	204	01	55	4-9532313
Katharine	200	17	55	20	28	10	4-8327198
Musinia	226	23	41	46	53	03	4-9991085
Marvine	247	25	23	67	54	14	4-8615500
Thousand Lake...	269	53	18	90	28	06	4-9111942
Adams	341	23	56	161	31	38	4-7558697

THOUSAND LAKE.

Thousand Lake Mountain is a lofty trachytic plateau in Wayne Co., Utah, 3 miles long and nearly 2 miles broad, overlooking Rabbit Valley from the northeast. The station is upon the highest point, a small eminence near the center, visible only from the surrounding summits, not from the valleys. The plateau is difficult of access, but the best approaches for horsemen are from the east and northeast.

Permanent mark: A stone cairn.

[Latitude, $38^{\circ} 24' 58''\cdot 5$. Longitude, $111^{\circ} 28' 45''\cdot 3$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Adams	50 01 44	229 34 46	4·9208549
Belknap	90 28 06	269 53 18	4·9111942
Marvine	153 11 47	333 05 44	4·4949190
Hilgard	169 15 20	349 12 56	4·4798016
Musinia	172 54 53	352 51 13	4·8406418
Ellen	299 14 01	119 38 43	4·8245111
Pennell	310 04 04	130 29 19	4·8977835

WAAS.

A sharp peak of the La Sal Mountains, in Grand Co., Utah. Seen from the east or west, it appears as the third high peak of the group, counting from the north.

Permanent mark: A stone monument, 11 feet high.

[Latitude, $38^{\circ} 32' 18''\cdot 6$. Longitude, $109^{\circ} 13' 41''\cdot 8$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Ellen	72 00 34	251 01 30	5·1651937
Bare Brush	108 41 02	287 22 43	5·2793519
Red Plateau	120 35 21	299 42 58	5·1451364
Bruin	142 01 53	321 19 25	5·1941553
Culmination	146 42 32	326 21 46	4·9385435

This position was also determined by Mr. A. P. Davis in 1884, from the Wingate base line, with results as follows: Latitude, $38^{\circ} 32' 21''\cdot 20$ north. Longitude, $109^{\circ} 13' 39''\cdot 70$ west.

ELLEN.

The well defined, most northerly and highest peak of the Henry Mountains, in Garfield Co., Utah.

Permanent mark: A stone cairn, 8 feet high.

[Latitude, 38° 07' 14''-3. Longitude, 110° 48' 53''-6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Duffer	99 30 25	.....	5·2250042
Thousand Lake	119 38 43	299 14 01	4·8245111
Marvine	130 18 53	309 48 05	4·9745688
Hilgard	134 40 28	314 13 20	4·9503856
Musinia	147 01 32	326 33 00	5·0841937
South Tent	161 40 22	241 20 00	5·1724351
Red Plateau	188 14 23	8 21 43	5·0710545
Bruan	193 18 21	13 35 55	5·2401173
Culmination	216 51 32	37 30 22	4·1734765
Waas	251 01 30	72 00 34	5·1651937
Pennell .....	.....	173 28 20	4·2647348

PENNELL.

A conspicuous peak of the Henry Mountains, in Garfield Co., Utah, 11 miles south of Mount Ellen. The apex is double, the western point being the higher and bearing the monument.

Permanent mark: A stone monument, 7 feet high.

[Latitude, 37° 57' 21''-4. Longitude, 110° 47' 27''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Thousand Lake	130 29 19	310 04 04	4·8977835
Marvine	136 59 21	316 27 42	5·0352986
Hilgard	141 02 20	320 34 19	5·0178011
Ellen	173 28 20	.....	4·2647348

ADAMS.

A conspicuous summit of the Sevier Plateau, in Garfield Co., Utah, 13 miles north-northeast from Panguitch. The principal eminence is subtabular and timbered. The point occupied is a naked crag at its western edge, visible from the high points of the vicinity but not from the valley of the Sevier.

Permanent mark: A stone monument on an acute natural elevation.

[Latitude, 37° 55' 53''-8. Longitude, 112° 12' 20''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Brian	63 20 41	242 57 38	4·7905702
Little Creek	81 02 03	260 47 05	4·5584322
Belknap	161 31 58	341 23 56	4·7558697
Marvine	210 59 04	31 20 05	4·9797391
Thousand Lake	229 34 46	50 01 44	4·9208549
Table Cliff	315 30 43	135 41 50	4·5819377

LITTLE CREEK.

An acute peak of trachyte, in Iron Co., Utah, 11 miles east from Panguitch and 12 miles west-northwest from Panguitch.

Permanent mark: A stone cairn 6 feet high.

[Latitude, 37° 52' 48". Longitude, 112° 36' 43".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Brian	41 08 37	221 00 32	4.4684356
Belknap	196 14 25	16 21 54	4.7942160
Adams	260 47 05	81 02 03	4.5584322
Table Cliff.....	288 49 18	109 15 24	4.8203700

BRIAN.

The highest point of the Markagunt Plateau, in Iron Co., Utah, 14 miles east from Cedar, 12 miles south from Parowan, and 25 miles west-southwest from Panguitch.

Permanent mark: A cairn of stone 9 feet in diameter and 12 feet high.

[Latitude, 37° 40' 49". Longitude, 112° 49' 53".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Belknap	204 01 55	24 17 27	4.9532313
Little Creek	221 00 32	41 08 37	4.4684356
Adams	242 57 38	63 20 41	4.7905702
Table Cliff.....	269 17 57	89 52 00	4.9134971
Pink Cliff.....	302 49 51	123 08 24	4.7291831
Navajo Well.....	324 25 48	144 45 56	4.9265047
Three Trees	351 08 54	171 13 45	4.8888201

TABLE CLIFF.

The extreme southward salient of a high plateau in Garfield Co., Utah, separating Panguitch Hayfields from Potato Valley. The only approach is from the north.

Permanent mark: A triangular crib of logs, 15 feet on a side and 8 feet high.

[Latitude, 37° 41' 08". Longitude, 111° 54' 08".]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Duffer	6 54 44	186 50 41	4.9166919
Mollie	16 22 23	196 16 48	4.6818306
Navajo Well.....	25 47 14	205 33 25	4.8866122
Three Trees	42 39 56	222 10 56	5.0188786
Pink Cliff.....	51 23 29	231 08 05	4.6775175
Brian	89 52 00	269 17 57	4.9134971
Little Creek	109 15 24	288 49 18	4.8203700
Adams	135 41 50	315 30 43	4.5819377
Paria Station.....	347 57 47	168 05 52	4.9783859

PINK CLIFF.

On the south edge of the Pownsagunt Plateau, in Kane Co., Utah, 11 miles north from Skumpah or Clarkston, and 8 miles southeast from Upper Kanab.

Permanent mark: A triangular crib of logs, 15 feet on a side and 8 feet high.

[Latitude, $37^{\circ} 25' 02''\cdot7$. Longitude, $112^{\circ} 19' 21''\cdot1$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	''	o	'	''	Meters.
Three Trees	35	14	27	215	00	50	4·7623467
Brian	123	08	24	302	49	51	4·7201831
Table Cliff.....	231	08	05	51	23	29	4·6775175
Mollie	304	31	41	124	41	27	4·4591229
Duffer	332	11	51	152	23	04	4·7703329
Navajo Well.....	354	26	26	174	28	02	4·6001607

MOLLIE.

An outlier of the white cliff sandstone standing near the west fork of Paria Creek, in Kane Co., Utah, about 7 miles northwest from Paria Settlement. It is an acute butte.

[Latitude, $37^{\circ} 16' 12''\cdot3$. Longitude, $112^{\circ} 03' 18''\cdot6$.]

To station.	Azimuth.			Back azimuth.			Log. dist.
	o	'	''	o	'	''	Meters.
Three Trees	61	42	36	241	19	15	4·8125077
Pink Cliff.....	124	41	27	304	31	41	4·4591229
Table Cliff.....	196	16	48	16	22	23	4·6818306
Paria Station	324	28	49	144	42	23	4·7604373
Duffer	354	08	47	174	10	17	4·5564336

TITHING YARD.

In the northwest corner of the public square at Kanab, in Kane Co., Utah, is the Tithing Office Yard, inclosed by a stone wall. In the northwest corner of this inclosure, close to the wall, stands a low monument of sandstone, square at top and marked 76 ft. east of B. L. This is not a station of the triangulation, but marks the "Street" station, which was 76 feet west of it.

[Latitude, $37^{\circ} 02' 55''\cdot9$. Longitude, $112^{\circ} 31' 50''\cdot1$.]

STREET.

This station marks the position of the astronomical pier from which was determined the latitudes and longitudes depending upon the Kanab Base, and is in its meridian. It was originally located in the northwest corner of the public square of the village of Kanab, but owing to a change in the boundaries of the square which threw the location into a

street, no permanent mark was set to indicate its exact position. A stone witness post was set firmly in the ground in the Tithing Office Square exactly seventy-six feet due east of the observing pier. This stone is marked 76 feet east of B. L.

[Latitude, 37° 02' 55''-85. Longitude, 112° 31' 50''-83.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kanab South	000 00 08	180 00 08	4-2146235
John.....	274 30 32	94 31 05	3-1275988

JOHN.

On a salient of the Vermilion Cliff, at the eastern edge of the town of Kanab, in Kane Co., Utah.

Permanent mark: A cairn of stone 4½ feet high.

[Latitude, 37° 02' 52''-5. Longitude, 112° 30' 56''-7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kanab South	4 42 18	184 41 46	4-2132806
Street	94 31 05	274 30 32	3-1275988
Shinarump	325 54 54	145 57 25	4-0457313

MANSARD.

A white, conspicuous sandstone knob on the Vermilion Cliff, in Kane Co., Utah, 5½ miles east of Kanab and 3½ miles southwest of Johnson. The station overlooks the road from Kanab to Johnson, but can not be approached with horses from that side.

Permanent mark: A conoid boss of eroded sandstone.

[Latitude, 37° 02' 52''-3. Longitude, 112° 25' 22''-0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Shinarump	12 34 34	192 33 45	3-9742210
New	48 08 23	228 02 06	4-3099047
Pipe	61 20 27	241 06 20	4-5952529
Three Trees	75 36 47	255 26 53	4-4023059
Navajo Well.....	263 49 48	83 55 03	4-1087869
Brow	357 36 37	177 37 21	4-7060202

NAVAJO WELL.

A southward salient of the Vermilion Cliff, in Kane Co., Utah, overlooking Navajo Well. The station is on the highest point of a peninsular mass, the flat top of which slopes gently to the northwest and is an acre in extent. It can be reached only from the north.

Permanent mark: A cairn of stone and wood, 10 feet in diameter.

[Latitude, 37° 03' 36''7. Longitude, 112° 16' 45.'']

To station.	Azimuth.			Back azimuth.			Log. dist. <i>Meters.</i>
	°	'	''	°	'	''	
Shinarump	54	34	34	234	28	29	4·2603437
New	61	52	57	241	41	32	4·5017003
Three Trees	78	28	11	258	13	03	4·5799215
Mansard	83	55	03	263	49	48	4·1087869
Brian	144	45	56	324	25	48	4·0265047
Pink Cliff	174	28	02	354	26	26	4·6001607
Table Cliff	205	33	25	25	47	14	4·8886122
Duffer	297	53	05	118	02	45	4·4269204

THREE TREES.

A high point on the Vermilion Cliff, in Coconino Co., Ariz., three miles west from Wolf Spring. It can be approached on horseback only from the north. The eminence is sandy and was covered with pine. All but three of the trees were felled and from those the lower branches were cut so as to leave tall shafts, with tufts of foliage at the top. The one used as the monument is the most northerly of the three and stands on higher ground than the others. The others were merely to aid in the identification of the station. To an observer standing at New, Brink, Brow, or Brian the monument appears as the middle tree. From Pipe and Emma it appears at the left of the others. From Kanab South, Shinarump, Navajo Well, Mansard, Table Cliff, and Pink Cliff it appears at the right.

[Latitude, 36° 59' 27''6. Longitude, 112° 41' 51''3.]

To station.	Azimuth.			Back azimuth.			Log. dist. <i>Meters.</i>
	°	'	''	°	'	''	
Emma	27	50	01	207	32	50	4·0598813
Pipe	38	30	31	218	26	14	4·2082578
Brian	171	13	45	351	08	54	4·8888201
Pink Cliff	215	00	50	35	14	27	4·7823467
Table Cliff	222	10	56	42	39	56	5·0188786
Mollie	241	19	15	61	42	36	4·8125077
Mansard	255	26	53	75	36	47	4·4023059
Navajo Well	258	13	03	78	28	11	4·5799215
Shinarump	277	16	03	97	25	08	4·3540809
New	308	17	12	128	20	45	4·0725590
Brow	328	59	15	149	09	46	4·7146050
Brink	338	03	28	158	13	12	4·8236043

KANAB-NORTH.

The north end of the Kanab base line, in Coconino Co., Ariz., about six miles south of Kanab. Its position is a few rods to the left of the road leading from Kanab to Demotte Park and is on a low knoll of sand.

Permanent mark: A monument of basalt firmly bedded and engraved, with a + on its upper surface.

[Latitude, 36° 57' 46''-5. Longitude, 112° 31' 21''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kanab-South	6 03 55	186 03 37	3-8384985
New	56 16 56	236 14 20	3-8800354
Shinarump	268 05 09	88 07 54	3-8351940

KANAB-SOUTH.

The south end of the Kanab base line, in Coconino Co., Ariz. The station is about 10 miles south of Kanab and is approximately in the meridian of the Street station. It stands at the crest of a low cliff, facing southward, and is about midway between the Kanab Wash and the road to Demotte Park. It is marked, like Kanab-North, by a monument of basalt and a target of wood. Touching the monument is a bedded block of conglomerate, on which is scratched the meridian mark of the astronomical station, Street.

[Latitude, 36° 54' 04''-1. Longitude, 112° 31' 50''-9.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
New	115 20 45	295 18 30	3-7907466
Street	180 00 08	000 00 08	4-2146235
John	184 41 46	4 42 18	4-2132806
Kanab-North	186 03 37	6 03 55	3-8384985
Shinarump	226 52 50	46 55 54	4-0155937

NEW.

On a salient of the Shinarump Cliff, in Coconino Co., Ariz., 9 miles in a southwest direction from Kanab. The station overlooks the lower road from Kanab to Pike Spring, near the point where it is joined by the road from Johnson. The conglomerate capping the salient is severed by erosion from the main mass at the north and is not easily scaled, except at a point near the saddle.

Permanent mark: A + engraved on the bare conglomerate.

[Latitude, 36° 55' 29''-8. Longitude, 112° 35' 36''-4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Emma	35 19 46	214 59 04	4-9532142
Pipe	74 40 50	254 33 00	4-3021522
Three Trees	128 20 45	308 17 12	4-0725590
Mansard	228 02 06	48 08 23	4-3099647
Kanab-North	236 14 20	56 16 56	3-8800354
Navajo Well	241 41 32	61 52 57	4-5017003
Shinarump	251 17 56	71 23 16	4-1423256
Kanab-South	295 18 30	115 20 45	3-7907466
Brow	334 53 45	155 00 44	4-6126907
Brink	344 03 38	164 09 51	4-7533245

PIPE.

A salient of the Vermilion Cliff, Coconino Co., Ariz., 4 miles west from Pipe Spring. The only approach for horses is from the north.

Permanent mark: An acute natural boss of sandstone.

[Latitude, 36° 52' 37" .3. Longitude, 112° 48' 37" .4.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Emma	25 29 12	205 16 17	4.8771504
Three Trees	218 26 14	38 30 31	4.2082578
Mansard	241 06 20	61 20 27	4.5952529
New	254 33 00	74* 40 50	4.3021522
Brow	310 46 26	131 01 13	4.6866137
Brink	324 30 50	144 44 49	4.7804136

SHINARUMP.

On a salient of the Shinarump Cliff, in Coconino Co., Ariz., 7½ miles southeast from Kanab. The station is in Arizona.

Permanent mark: A cairn of stone 5 feet high.

[Latitude, 36° 57' 53" .9. Longitude, 112° 26' 45" .0.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Kanab-South	46 55 54	226 52 50	4.0155937
New	71 23 16	251 17 56	4.1423256
Kanab-North	88 07 54	268 05 09	3.8351940
Three Trees	97 25 08	277 16 03	4.3540809
John	145 57 25	325 54 54	4.0457313
Mansard	192 33 45	12 34 34	3.9742210
Navajo Well	234 28 29	54 34 34	4.2603437

DUFFER.

The north part of the Paria Plateau is bounded on the west by a parapet of red sandstone, abounding in craggy points, in Coconino Co., Ariz. The highest of these is the Duffer Station.

Permanent mark: A small cairn perched on a summit naturally acute.

[Latitude, 36° 56' 50" .1. Longitude, 112° 00' 50" .2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Navajo Well	118 02 45	297 53 05	4.4269204
Pink Cliff	152 23 04	332 11 51	4.7703329
Mollie	174 10 17	354 08 47	4.5564336
Table Cliff	186 50 41	6 54 44	4.9166919
Paria Needle	289 54 02	110 06 00	4.4982456
Paria Station	290 23 31	110 35 33	4.5021502
Ellen		39 30 25	5.2250042

PARIA STATION.

The southern edge of the Paria Plateau, in Coconino Co., Ariz., is characterized by a series of sandstone mesas from 100 to 200 feet high.

The one nearest to Lee's Ferry was used as a station. It can be approached only from the north and west.

Permanent mark: A cairn of stone and wood 10 feet high.

[Latitude, $36^{\circ} 50' 49'' \cdot 2$. Longitude, $111^{\circ} 40' 47'' \cdot 7$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Duffer	110 35 33	290 23 31	4 5021502
Mollie	144 42 23	324 28 49	4 7604373
Paria Needle	153 59 48	333 59 44	2 5944976
Table Cliff	168 05 52	347 57 47	4 9783859
San Francisco	359 56 01	179 56 05	5 2216020

PARIA NEEDLE.

Close to Paria Station, in Coconino Co., Ariz., is a butte of sandstone so acute that it can not be scaled by ordinary means. It is a fine natural target and was determined as an accessory to Paria Station, to be used in observations from a great distance.

[Latitude, $36^{\circ} 51' 00'' \cdot 6$. Longitude, $111^{\circ} 40' 54'' \cdot 6$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Duffer	110 06 00	289 54 02	4 4982456
Paria Station	333 59 44	153 59 48	2 5944976

BROW.

The Kaibab Plateau, in Coconino Co., Ariz., has a broad, flat top covered with timber. Brow Station is on the western edge of a flanking bench, 4 miles east of the large spring in Sawmill Canyon.

Permanent mark: A small tree from which the lower branches are cut so as to leave a tuft at top. About its base is piled a triangular pyramid of stone 8 feet high.

[Latitude, $36^{\circ} 35' 25'' \cdot 0$. Longitude, $112^{\circ} 23' 56'' \cdot 7$.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	Meters.
Brink	6 07 44	186 06 59	4 2421579
Emma	62 34 54	242 07 22	4 8930123
Pipe	130 01 13	310 46 26	4 6866137
Three Trees	149 09 46	328 59 15	4 7146050
New	155 00 44	334 53 45	4 6126907
Mansard	177 37 21	357 36 37	4 7060202

BRINK.

On the western edge of the Kaibab Plateau, at the point where it is cut by the Grand Canyon of the Colorado, in Coconino Co., Ariz. The vicinity of the station was cleared of timber except 2 pines, and those

were deprived of their lower branches. The station is the more easterly tree, and is marked by a target of logs 10 feet long and 10 feet high, facing to the west.

[Latitude, 36° 26' 01"·6. Longitude, 112° 25' 11"·6.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Floyd.....	13 27 27	193 16 44	5·0748093
Emma.....	74 33 45	254 07 01	4·8453623
Pipe.....	144 44 49	324 30 50	4·7804136
Three Trees.....	158 13 12	338 03 28	4·8236043
New.....	164 09 51	344 03 38	4·7533245
Brow.....	186 06 59	6 07 44	4·2421579
San Francisco.....	330 45 12	151 11 19	5·1400820

EMMA.

The most southerly high summit of the Uinkaret Mountains, in Coconino Co., Ariz. The peak is a symmetric cone of volcanic scoria, covered with bushes, and overlooking the Grand Canyon. The bushes were cut away from the summit and piled in a heap with a packing of earth, to form a target. The target is 12 feet in diameter at base and 12 feet high, with a staff at top.

[Latitude, 36° 15' 48"·1. Longitude, 113° 10' 16"·7.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Pipe.....	205 16 17	25 29 12	4·8771504
Three Trees.....	207 32 50	27 50 01	4·9598813
New.....	214 59 04	35 19 46	4·9532142
Brow.....	242 07 22	62 34 54	4·8930123
Brink.....	254 07 01	74 33 45	4·8453623
San Francisco.....	306 36 21	127 27 47	5·2280572
Floyd.....	337 11 31	157 27 13	5·0200243

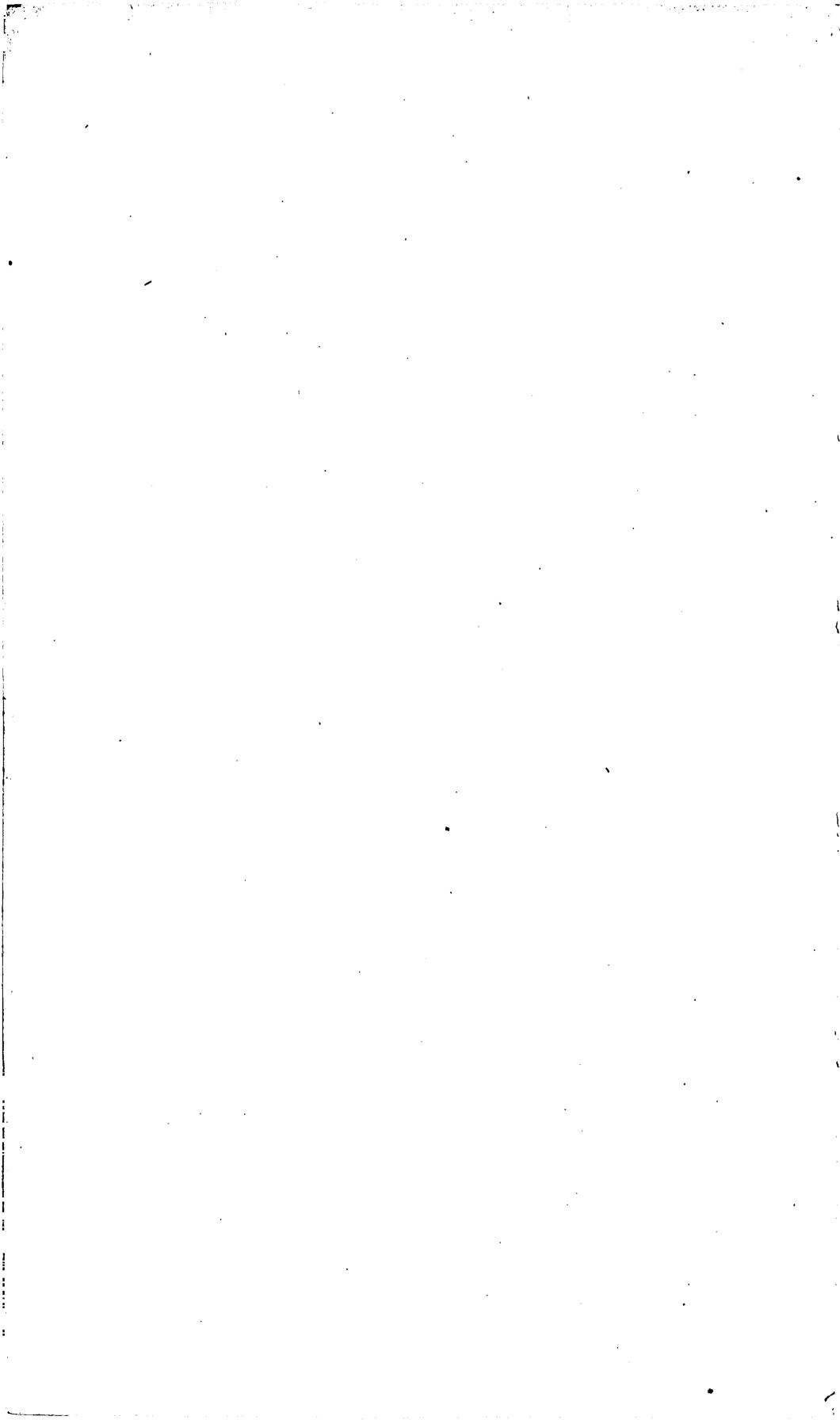
FLOYD.

A well-known trachytic peak standing on the Colorado Plateau, in Yavapai Co., Ariz.

Permanent mark: A cairn 12 feet high.

[Latitude, 35° 23' 31"·2. Longitude, 112° 43' 27"·2.]

To station.	Azimuth.	Back azimuth.	Log. dist.
	° ' "	° ' "	<i>Meters.</i>
Emma.....	157 27 13	337 11 31	5·0200243
Brink.....	193 16 44	13 27 27	5·0748098
San Francisco.....	272 47 34	93 23 54	4·9787442



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