

No. 105

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

711 E. LESTER JONES, SUPERINTENDENT

TERRESTRIAL MAGNETISM

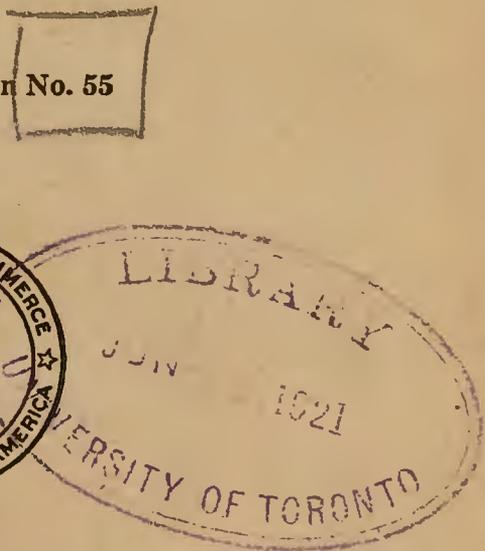
RESULTS OF MAGNETIC OBSERVATIONS MADE
BY THE UNITED STATES COAST AND
GEODETIC SURVEY IN 1918

BY

DANIEL L. HAZARD

CHIEF, DIVISION OF TERRESTRIAL MAGNETISM

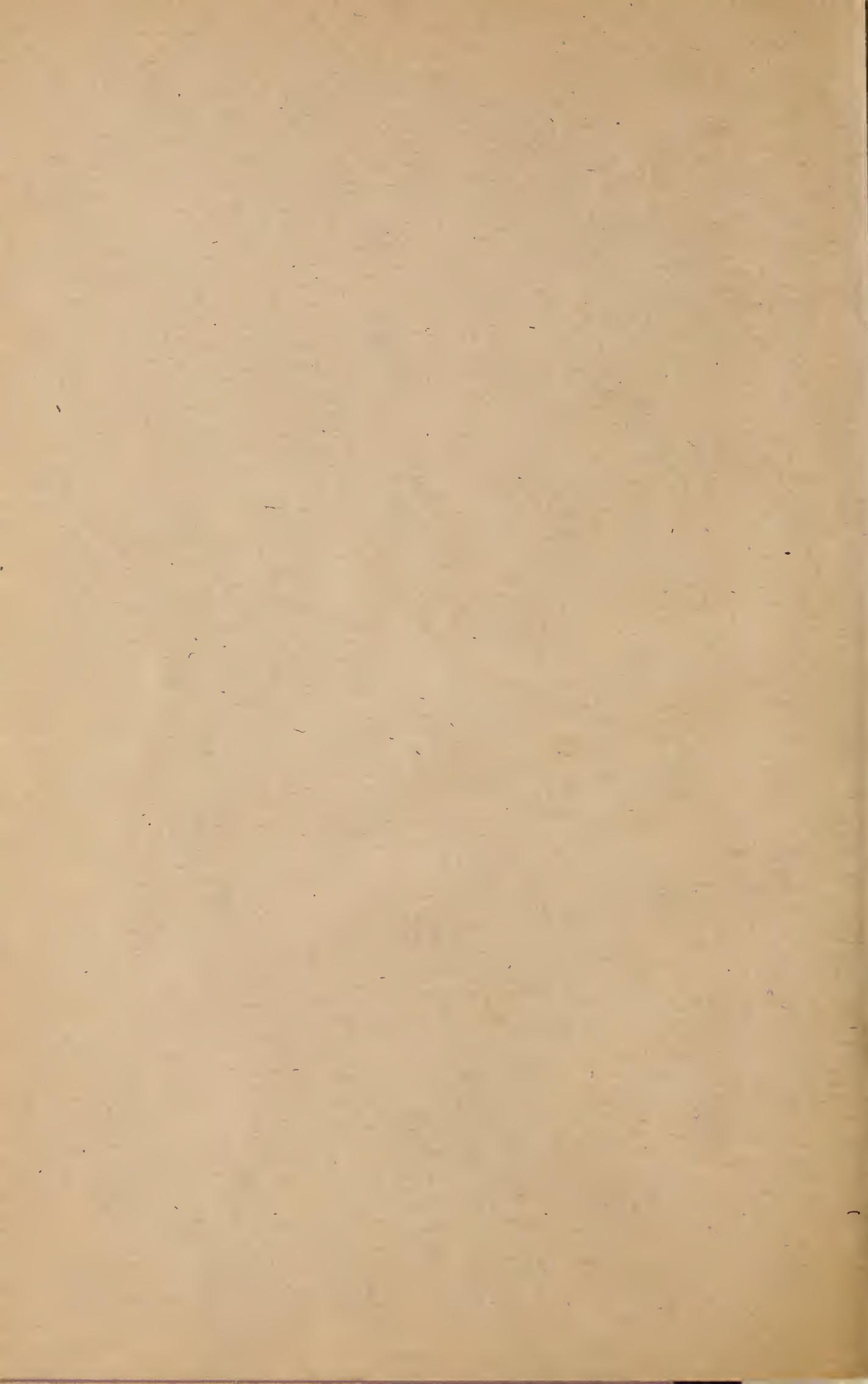
Special Publication No. 55



PRICE, 5 CENTS

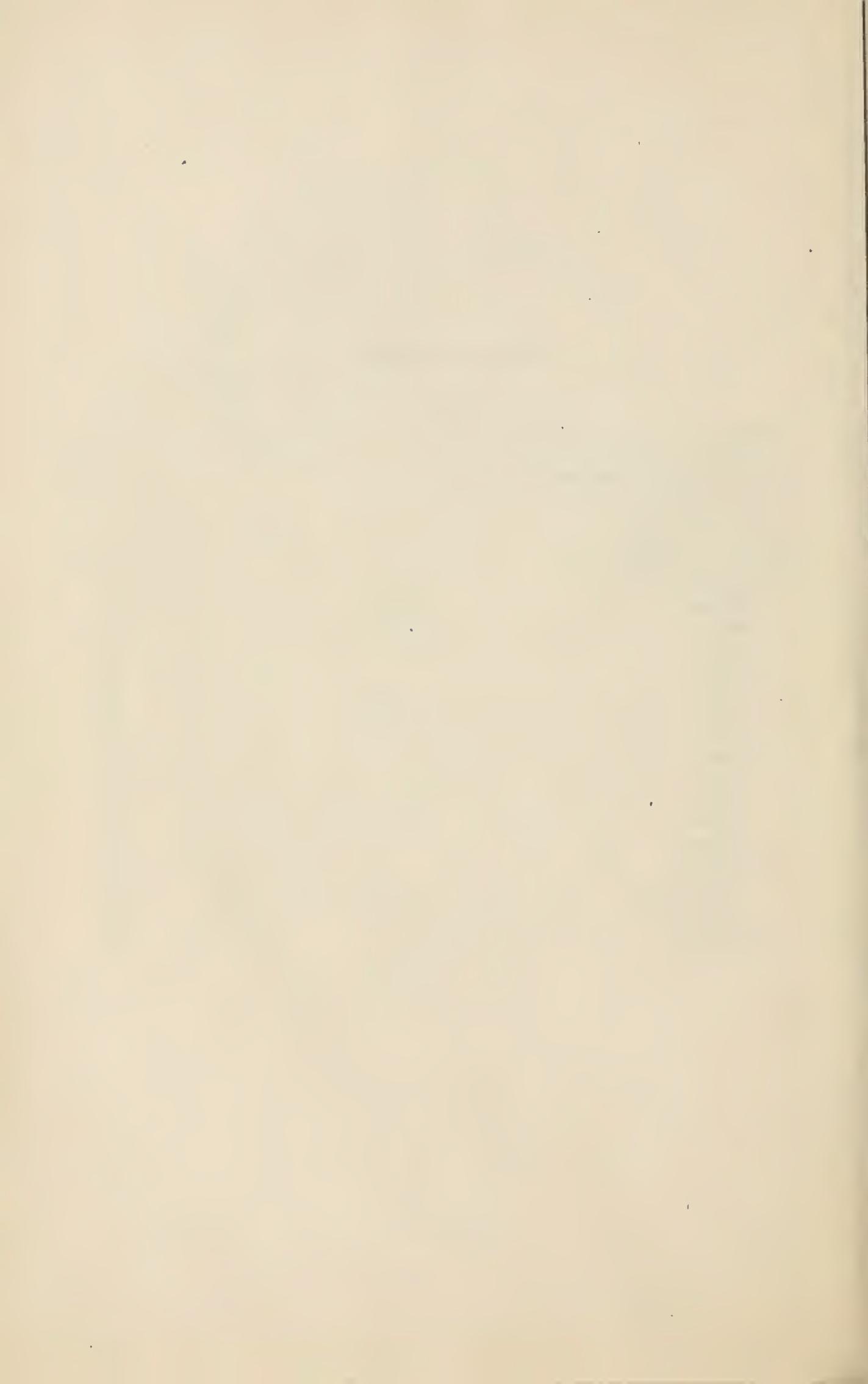
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WASHINGTON
GOVERNMENT PRINTING OFFICE
1919



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RESULTS OF MAGNETIC OBSERVATIONS MADE BY THE UNITED STATES COAST AND GEODETIC SURVEY IN 1918.

By DANIEL L. HAZARD, *Chief, Division of Terrestrial Magnetism.*

INTRODUCTION.

In 1882 the results of magnetic observations made by this Bureau prior to 1881, together with descriptions of stations, were published as Appendix 9, Report for 1881. From that time to 1902 the results were published only in connection with a discussion of the distribution or secular change of one or more of the three magnetic elements. In Magnetic Declination Tables and Isogonic Charts for 1902 the declination results were given for all stations occupied up to that time and descriptions were given of the stations occupied subsequent to 1881. From 1903 to 1911 there was published annually an appendix to the Superintendent's report, giving the results of magnetic observations made during the fiscal year (July to June) covered by the report.

When in 1912 it was decided to confine the annual report of the Superintendent to administrative matters and to publish separately the scientific results which had formerly appeared as appendixes to the report, the time was deemed opportune to change from the *fiscal* year to the *calendar* year in the publication of the results of magnetic observations in the field. Accordingly, Special Publication No. 15 contained the results of observations made between July 1, 1911, and December 31, 1912, and the results for subsequent calendar years have appeared in Special Publications Nos. 20, 25, 36, 42, and 51.

Five magnetic observatories have continued in operation throughout the year: At Cheltenham, Md.; Sitka, Alaska; near Honolulu, Hawaii; on Vieques Island, P. R.; and near Tucson, Ariz. Their records have furnished the means for reducing to mean of day the values of declination obtained from the field observations. There will be found in the tables the mean values of the magnetic elements for each of the observatories for the year 1918.

DISTRIBUTION OF OBSERVATIONS ON LAND.

The distribution of the stations on land is shown in the following table, from which it will be seen that observations were made in 21 States and Territories. Numerous old stations were reoccupied in order to determine the secular change of the magnetic elements, and many auxiliary stations were occupied where previous observations had indicated the presence of local disturbance. In the case of these auxiliary stations the observing program was usually very much curtailed, being limited to morning or afternoon azimuth, one set of declination with magnet erect, one set of oscillations, and dip with one needle without reversal of polarities.

Summary of results on land.

State.	Localities.	Stations.	Old localities re-occupied.	Declination results.	Dip results.	Intensity results.
Alabama.....	2	2	2	2	2	2
Alaska.....	22	24	10	26	26	26
Arizona.....	1	1	1	3	1	3
Arkansas.....	1	1	1	1	1	1
Colorado.....	19	19	3	20	20	20
Florida.....	1	1	1	1	1	1
Georgia.....	5	5	1	5	5	5
Hawaii.....	1	1	1	1	1	1
Illinois.....	1	1	0	1	1	1
Indiana.....	10	20	3	20	20	20
Iowa.....	10	10	2	10	10	10
Kansas.....	1	1	1	1	1	1
Louisiana.....	2	2	2	2	2	2
Maryland.....	1	1	1	5	3	5
Michigan.....	1	9	1	9	9	9
Mississippi.....	1	1	1	1	1	1
Nebraska.....	4	4	0	4	4	4
North Carolina.....	2	8	2	8	8	8
Porto Rico.....	1	1	1	1	1	1
Texas.....	4	4	4	4	4	4
Wyoming.....	2	3	2	3	3	3
Total.....	92	119	41	128	124	128

SECULAR CHANGE OF THE MAGNETIC DECLINATION.

A comparison of the declination results at "repeat" stations occupied during the year with the results of earlier observations in the same localities is presented in the table following. The letter after the name of a station indicates (a) that the old station was reoccupied exactly, (b) that the new station was very near the old one, and (c) that the new station was some distance (a quarter of a mile or more) from the old one. A tabular value of the annual change refers approximately to the middle of the period from which it is derived. A plus sign indicates increasing east declination or decreasing west declination; a minus sign, the reverse.

The results at repeat stations during the past few years show a decided falling off in the annual increase of declination in the western part of the country. Thus, at Tucson the annual increase from 1910 to 1914 was 3'.5 and from 1914 to 1918 only 1'.8. At Sitka

the annual increase from 1910 to 1914 was 1'.6 and from 1914 to 1918 only 0'.5. The annual change of declination in Washington now appears to be nearly zero and in California the increase is not much over 1' a year.

The repeat observations along the Yukon River indicate that in that region there has been a falling off in the rate of decrease of declination from the amounts indicated on the isogonic chart of Alaska for 1910.

Comparison of declination results at repeat stations.

State and station.	Former observations.		Last observations.		Average annual change.
	Date.	Declination.	Date.	Declination.	
Maryland: Cheltenham Observatory (a).....	1916, year...	6 07.7 W...	1918, year...	6 12.5 W...	-2.4
North Carolina:					
Mariou (b).....	1898, Au.....	0 53.6 W...	1918, Mh.....	1 13.0 W...	-1.0
Murphy (b).....	1898, Se.....	2 18.2 E....	1918, Ap.....	2 12.8 E....	-0.3
Georgia: Lagrange (a).....	1915, Fe.....	2 12.9 E....	1918, My.....	2 16.4 E....	+1.1
Florida: Orlando (c).....	1903, Ap.....	1 06.6 E....	1918, Je.....	0 58.4 E....	-0.5
Alabama:					
Selma (a).....	1915, Mh.....	3 04.2 E....	1918, My.....	3 08.5 E....	+1.4
Mobile (a).....	1915, Ap.....	4 48.9 E....	1918, My.....	4 55.0 E....	+2.0
Mississippi: Brookhaven (a).....	1914, No.....	5 57.2 E....	1918, My.....	6 05.4 E....	+2.3
Louisiana:					
Alexandria (a).....	1914, Mh.....	7 03.4 E....	1918, My.....	7 12.0 E....	+2.1
Shreveport (a).....	1914, No.....	7 28.4 E....	1918, My.....	7 35.0 E....	+1.9
Texas:					
Greenville (a).....	1912, Je.....	8 46.8 E....	1918, My.....	9 01.9 E....	+2.6
Texarkana (b).....	1912, Je.....	7 42.3 E....	1918, Je.....	7 54.5 E....	+2.0
Arkansas: Mena (a).....	1905, De.....	7 31.2 E....	1918, Je.....	8 01.0 E....	+2.4
Kansas: Baldwin (a).....	1909, Oe.....	8 34.8 E....	1918, My.....	8 40.7 E....	+0.7
Michigan: Grand Rapids (a).....	1907, Oe.....	1 47.8 E....	1918, Se.....	1 19.0 E....	-2.6
Indiana:					
Richmond (a).....	1907, Je.....	1 34.1 E....	1918, Au.....	1 14.1 E....	-1.8
New Castle (a).....	1907, Je.....	2 19.5 E....	1918, Au.....	2 01.2 E....	-1.6
Rochester (a).....	1909, Je.....	2 32.3 E....	1918, Au.....	2 15.7 E....	-1.8
Iowa: Des Moines (a).....	1912, Au.....	7 59.8 E....	1918, Jy.....	7 54.4 E....	-0.9
Colorado:					
Lake George (b).....	1913, Jy.....	13 59.2 E....	1918, Je.....	13 57.2 E....	-0.4
Cripple Creek (a).....	1913, Jy.....	14 11.4 E....	1918, Je.....	14 16.4 E....	+1.0
Wyoming:					
Cheyenne (a).....	1915, Se.....	15 17.8 E....	1918, Jy.....	15 15.6 E....	-0.8
Green River (a).....	1915, Se.....	17 22.0 E....	1918, Je.....	17 17.6 E....	-1.6
Arizona: Tucson Observatory (a).....	1916, year...	13 44.4 E....	1918, year...	13 47.0 E....	+1.3
Alaska:					
Sitka Observatory (a).....	1916, year...	30 23.9 E....	1918, year...	30 25.1 E....	+0.6
Eagle (a).....	1908, Je.....	35 55.5 E....	1918, Je.....	35 47.0 E....	-0.8
Circle (b).....	1908, Je.....	34 10.6 E....	1918, Je.....	34 01.0 E....	-1.0
Fort Yukon (a).....	1908, Je.....	34 01.6 E....	1918, Jy.....	33 46.4 E....	-1.5
Rampart (a).....	1908, Jy.....	29 57.4 E....	1918, Jy.....	29 50.9 E....	-0.6
Tanana (a).....	1908, Jy.....	28 43.4 E....	1918, Jy.....	28 31.6 E....	-1.2
Kokrines (a).....	1908, Jy.....	26 15.4 E....	1918, Jy.....	26 04.6 E....	-1.1
Nulato (a).....	1908, Jy.....	25 25.2 E....	1918, Jy.....	25 03.6 E....	-2.2
Holy Cross (a).....	1908, Au.....	23 08.2 E....	1918, Jy.....	22 40.4 E....	-2.8
Seward (c).....	1905, Oe.....	27 01.5 E....	1918, Se.....	26 53.5 E....	-0.6
Hawaii: Honolulu Observatory (a).....	1916, year...	9 43.9 E....	1918, year...	9 48.5 E....	+2.3
Porto Rico: Vieques Observatory (a).....	1916, year...	3 19.2 W...	1918, year...	3 34.1 W...	-7.4

INSTRUMENTAL CORRECTIONS.

Most of the instruments used in the field work have been compared with the observatory instruments at the end of the year, the results in general differing but little from those obtained at the end of 1917.

Beginning with 1913 the results of horizontal intensity observations made by the Coast and Geodetic Survey have been reduced to the international standard of the department of terrestrial magnetism of the Carnegie Institution of Washington. The published results of horizontal intensity determinations made before that year must be diminished by 0.001 H to reduce them to that standard.

The instrumental corrections indicated in the tables below have been applied.

Corrections to magnetometers.

Number.	Pattern.	Correction to east declination.	Correction to H in parts of H.
17	Coast and Geodetic Survey	0.0	0.0000
19	do .....	.0	.0000
26	Wild-Edelmann .....	.0	-.0010
29	Coast and Geodetic Survey .....	.0	-.0010
30	India Survey .....	.0	.0000
31	do .....	.0	-.0007
36	do	-.4	.0000
37	do .....	.0	+.0016
38	Carnegie Institution .....	.0	-.0012

Corrections to dip circles.

Number.	Pattern.	Needles.	Corrections.
36	Kew-Dover	1	-1.9
		2	-0.7
56	Kew-Casella	1	+0.7
		^a 3	-2.7
5678	Kew-Casella	1	-1.5
		2	-2.2

^a This needle was originally used with dip circle No. 18.

DIURNAL VARIATION CORRECTION.

Each value of the magnetic declination has been corrected for diurnal variation with the aid of the continuous observations at the nearest magnetic observatory, allowance being made for the change in diurnal range with change in magnetic latitude. No attempt has been made to correct the dip and intensity results for diurnal variation.

ARRANGEMENT OF TABLE.

The results presented are arranged by States alphabetically, and the results for each State are given in the order of increasing latitudes. The latitudes and longitudes are in most cases the results of solar observations made with the small theodolite, which forms a part of the magnetometer. In default of observations, a chart, or a topographic sheet of the United States Geological Survey, the geographic coordinates were scaled from the best available map,

usually a post-route map. In such cases only the nearest whole minute of latitude or longitude is given. The horizontal intensity is expressed in terms of the one hundred-thousandth part of a C. G. S. unit of intensity of magnetic force, termed a "gamma" and designated by the Greek letter γ .

In order to include the desired amount of information in the available space, the months have been abbreviated as follows:

January	Ja.	May	My.	September	Se.
February	Fe.	June	Je.	October	Oc.
March	Mh.	July	Jy.	November	No.
April	Ap.	August	Au.	December	De.

The numbers shown as a decimal in the column headed D. C. give the needles used. Dip circle 5678 is designated as 78 in the tabulation in order to conserve space.

The observer is indicated by the initials of his name. The names of the observers are as follows:

J. R. Benton.	G. Hartnell.	W. W. Merrymon.
W. H. Cullum.	W. M. Hill.	F. Neumann.
S. A. Deel.	H. E. McComb.	F. P. Ulrich.
J. W. Green.		

Magnetic observations on land.

ALABAMA.

Station.	Latitude.	Longitude.	Date.	Declination.	Dip.	Horizontal intensity.	Instruments.		Observer.
							M.	D. C.	
Móbile.....	30 41.8	88 08.8	My. 10	<i>East.</i> 4 55.0	62 11.4	25677	19	56.13	W. W. M.
Selma.....	32 26.8	87 02.3	My. 7	3 08.5	63 56.2	24757	19	56.13	W. W. M.

ALASKA.

Alitak Bay.....	56 53.7	154 17.8	Se. 29	22 44.8	70 38.4	18071	38	36.12	J. W. G.
Sitka Observatory...	57 03.0	135 20.1	Year	30 25.0	74 24.9	15570	37	2 EI	F. P. U.
Do.....	57 03.0	135 20.1	My. 25-28	30 24.2	74 24.4	15580	38	36.12	J. W. G.
Do.....	57 03.0	135 20.1	Oc. 14, 15	30 26.1	74 23.9	15551	38	36.12	J. W. G.
Seward.....	60 07.7	149 27	Se. 4	26 53.5	73 43.1	15776	38	36.12	J. W. G.
Chitina.....	60 30.8	144 25.7	Au. 16	30 20.8	75 29.2	14310	38	36.12	J. W. G.
Cordova.....	60 32.8	145 46.3	Au. 23	28 13.2	74 35.2	15168	38	36.12	J. W. G.
Fort Lisicum.....	61 05.5	146 22	Au. 26	28 59.8	74 59.8	14737	38	36.12	J. W. G.
Anchorage.....	61 13.0	149 53.8	Se. 11	27 14.0	74 34.9	15184	38	36.12	J. W. G.
McCarthy.....	61 26.6	142 54.6	Au. 19	30 48.0	75 40.8	14288	38	36.12	J. W. G.
Matanuska Junction.	61 33.5	149 14.0	Se. 12	28 44.3	75 02.6	14753	38	36.12	J. W. G.
Chickaloon.....	61 47.9	148 30.6	Se. 14	28 35.9	75 11.0	14534	38	36.12	J. W. G.
Montana.....	62 00.8	149 58.0	Se. 19	27 59.8	75 11.0	14582	38	36.12	J. W. G.
Holy Cross.....	62 11.9	159 45.8	Jy. 16	22 40.4	73 44.8	15570	38	36.12	J. W. G.
Nenana.....	64 33.8	149 06.2	Au. 8	30 02.4	76 57.8	12908	38	36.12	J. W. G.
Nulato.....	64 43.4	158 03.8	Jy. 15	25 03.6	75 40.7	13928	38	36.12	J. W. G.
Eagle.....	64 47.3	141 12.5	Je. 22	35 47.0	78 08.6	12023	38	36.12	J. W. G.
Fairbanks.....	64 51.1	147 44.0	Au. 11	30 56.2	77 21.4	12592	38	36.12	J. W. G.
Kokrines.....	64 55.5	154 41.5	Jy. 13	26 04.6	76 14.6	13462	38	36.12	J. W. G.
Hot Springs.....	64 59.9	150 36.1	Au. 2	29 35.7	77 00.3	12808	38	36.12	J. W. G.
Tanana.....	65 10.6	152 03.9	Jy. 11	28 31.6	76 51.4	12998	38	36.12	J. W. G.
Rampart.....	65 30.7	150 13.0	Jy. 8, 9	29 50.9	77 24.6	12528	38	36.12	J. W. G.
Circle, new.....	65 49.1	144 05.0	Je. 28	34 02.4	78 35.2	11483	38	36.12	J. W. G.
Circle, old.....	65 49.6	144 03.9	Je. 27	34 01.0	78 32.2	11520	38	36.12	J. W. G.
Fort Yukon, old.....	66 34.1	145 18.0	Jy. 1	33 46.4	78 55.1	11166	38	36.12	J. W. G.
Fort Yukon, new.....	66 34.3	145 18.0	Jy. 1	33 46.4	78 54.6	11186	38	36.12	J. W. G.

Magnetic observations on land—Continued.

ARIZONA.

Station.	Latitude.	Longitude.	Date.	Declination.	Dip.	Horizontal intensity.	Instruments.		Observer.
							M.	D. C.	
Tucson Observatory.	32 14.8	110 50.1	Year	13 47.0	59 27.1	26973	30	3 EI	W. H. C.
Do.....	32 14.8	110 50.1	My. 23-25	13 47.2	.....	26959	40	.....	H. E. M.
Do.....	32 14.8	110 50.1	Se. 7	13 47.6	26961	17	S. A. D.

ARKANSAS.

Mena.....	34 35.1	94 14.2	Je. 6-8	8 01.0	64 55.2	24271	19	56.13	W. W. M.
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COLORADO.

Fountain.....	38 40.9	104 41.9	Je. 14, 15	14 31.9	67 06.8	22468	19	56.13	W. W. M.
Cather Springs.....	38 44.0	104 53.8	Je. 25	16 12.6	67 13.2	22292	17	78.12	S. A. D.
Love.....	38 44.3	105 03.7	Je. 22	14 33.5	68 06.6	21158	17	78.12	S. A. D.
Rosemont.....	38 44.3	104 57.4	Je. 25	15 24.6	67 02.9	22245	19	56.13	W. W. M.
Cripple Creek.....	38 45.0	105 11.5	Je. 19	14 16.4	67 40.0	22024	17	78.12	S. A. D.
Wilson's Ranch.....	38 47.2	105 16.3	Je. 20	14 51.6	67 25.0	22384	17	78.12	S. A. D.
Manitou Junction.....	38 50.2	104 41.4	Je. 20	14 45.0	66 56.4	22457	19	56.13	W. W. M.
Colorado Springs.....	38 50.9	104 49.6	Je. 17	15 07.4	67 19.8	22086	19	56.13	W. W. M.
Manitou A.....	38 51.8	104 55.1	Je. 15	16 29.8	67 13.6	22390	19	56.13	W. W. M.
Manitou A.....	38 51.8	104 55.1	Je. 24	16 27.2	67 15.6	22413	17	78.12	S. A. D.
Glen Eyrie.....	38 53.6	104 53.0	Je. 18	14 29.5	67 12.3	22016	19	56.13	W. W. M.
Pikeview Station.....	38 53.9	104 49.2	Je. 19	15 42.8	66 57.4	22433	19	56.13	W. W. M.
Divide.....	38 56.7	105 08.8	Je. 14	14 29.8	67 10.8	22276	17	78.12	S. A. D.
Florissant.....	38 56.9	105 17	Je. 17	14 33.6	67 13.7	22227	17	78.12	S. A. D.
Edgerton.....	38 57.5	104 49.8	Je. 24	15 40.0	66 41.4	22782	19	56.13	W. W. M.
Lake George.....	38 58.8	105 21.3	Je. 18	13 57.2	67 10.0	22188	17	78.12	S. A. D.
New Raymer.....	40 37.6	103 51	Jy. 8	14 41.6	69 07.2	21041	17	78.12	S. A. D.
Crook.....	40 51.9	102 48.8	Jy. 11	13 44.2	69 26.4	20725	17	78.12	S. A. D.
Grover.....	40 52.4	104 11.8	Jy. 5	14 41.7	69 04.0	21114	17	78.12	S. A. D.
Julesburg.....	40 59.0	102 16.6	Jy. 12	13 43.2	69 44.1	20649	17	78.12	S. A. D.

FLORIDA.

Orlando.....	28 32.7	81 24.5	Je. 8	0 58.4	60 35.7	26372	29	31.12	J. R. B.
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GEORGIA.

Lagrange.....	33 02.7	85 02.2	My. 4	2 16.4	64 51.8	23908	19	56.13	W. W. M.
Palmetto.....	33 31.4	84 39.9	My. 2	2 05.2	65 30.3	23445	19	56.13	W. W. M.
Red Oak.....	33 37.6	84 29.7	My. 1	1 52.0	65 39.2	22307	19	56.13	W. W. M.
Blairsville.....	34 52.6	83 57.3	Ap. 12	1 22.0	66 54.8	22424	19	56.13	W. W. M.
Hiawassee.....	34 56.9	83 45.3	Ap. 15	1 19.8	66 58.4	22392	19	56.13	W. W. M.

HAWAII.

Honolulu Observa- tory.....	21 19.2	158 03.8	Year	9 48.5	39 27.5	28893	36	4 EI	F. N.
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ILLINOIS.

Seneca.....	41 19.5	88 35.8	Jy. 24	2 08.0	72 37.8	18341	19	56.13	W. W. M.
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Magnetic observations on land—Continued.

INDIANA.

Station.	Latitude.	Longitude.	Date.	Declination.	Dip.	Horizontal intensity.	Instruments.		Observer.
							M.	D. C.	
	° ' "	° ' "		<i>East.</i>	° ' "	γ			
Rushville.....	39 35.3	85 25.9	Au. 27	0 58.7	71 24.0	19009	19	56.13	W. W. M.
Cambridge City.....	39 49.5	85 11.1	Au. 30	2 01.6	71 06.6	19161	19	56.13	W. W. M.
Richmond.....	39 50.4	84 56.4	Au. 31	1 14.1	71 27.5	18953	19	56.13	W. W. M.
New Castle, aux. 5....	39 50.7	85 20.2	Au. 23	1 28.8	71 15.8	19123	19	56.1	W. W. M.
New Castle, aux. 1....	39 54.0	85 22.3	Au. 21	2 09.6	71 16.1	19093	19	56.1	W. W. M.
New Castle, aux. 4....	39 57.0	85 28.9	Au. 22	1 34.1	71 21.6	19073	19	56.1	W. W. M.
New Castle.....	39 57.9	85 22.2	Au. 20	2 01.2	71 14.3	19209	19	56.13	W. W. M.
New Castle, aux. 2....	39 58.6	85 17.4	Au. 21	1 30.5	71 33.9	18913	19	56.1	W. W. M.
New Castle, aux. 3....	40 01.4	85 21.6	Au. 22	1 29.6	71 29.3	19016	19	56.1	W. W. M.
Peru.....	40 45.4	86 05.0	Au. 16	0 55.2	72 03.4	18607	19	56.13	W. W. M.
North Manchester....	41 00.3	85 46.1	Au. 6	0 16.4	71 45.5	18844	19	56.13	W. W. M.
Rochester, aux. 3....	41 00.3	86 15.7	Au. 12	1 52.9	71 54.9	18603	19	56.1	W. W. M.
Rochester, aux. 5....	41 00.8	86 09.4	Au. 13	1 54.9	71 58.1	18704	19	56.1	W. W. M.
Rochester.....	41 03.0	86 12.8	Au. 8	2 15.7	72 01.6	18717	19	56.13	W. W. M.
Rochester, aux. 4....	41 04.3	86 07.3	Au. 12	1 34.3	72 10.5	18488	19	56.1	W. W. M.
Rochester, aux. 2....	41 04.7	86 18.3	Au. 10	1 38.6	72 01.0	18484	19	56.1	W. W. M.
Rochester, aux. 1....	41 07.5	86 14.0	Au. 9	2 04.2	72 04.9	18552	19	56.1	W. W. M.
Schneider.....	41 11.2	87 26.3	Jy. 30	2 14.4	72 18.2	18416	19	56.13	W. W. M.
Milford.....	41 24.6	85 51.3	Au. 5	1 13.9	72 19.4	18472	19	56.13	W. W. M.
Walkerton.....	41 27.6	86 29.1	Jy. 31	1 11.6	72 20.4	18418	19	56.13	W. W. M.

IOWA.

Neola.....	41 28.2	95 37.0	Jy. 2	9 52.6	71 19.8	19086	19	56.13	W. W. M.
Davenport.....	41 32.1	90 36.4	Jy. 22	5 01.8	72 08.1	18644	19	56.13	W. W. M.
Des Moines.....	41 35.6	93 33.7	Jy. 17	7 54.4	71 41.6	18908	19	56.13	W. W. M.
Grinnell.....	41 45.5	92 43.1	Jy. 19	8 18.6	72 11.4	18568	19	56.13	W. W. M.
Herdon.....	41 50.6	94 20.6	Jy. 9	8 04.0	71 51.6	18970	19	56.13	W. W. M.
Perry.....	41 50.6	94 05.3	Jy. 10	6 55.4	71 42.4	19061	19	56.13	W. W. M.
Madrid.....	41 52.2	93 49.4	Jy. 11	7 27.7	71 49.6	18819	19	56.13	W. W. M.
Manning.....	41 53.3	95 04.1	Jy. 6	9 19.7	71 36.8	19063	19	56.13	W. W. M.
Coon Rapids.....	41 53.5	94 40.3	Jy. 8	9 27.2	71 41.0	19044	19	56.13	W. W. M.
Cambridge.....	41 54.1	93 31.0	Jy. 12	7 59.5	72 01.8	18698	19	56.13	W. W. M.

KANSAS.

Baldwin.....	38 46.9	95 13.7	My. 20, 21	8 40.7	21243	17	S. A. D.
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LOUISIANA.

Alexandria.....	31 19.8	92 25.1	My. 16	7 12.0	62 07.3	25809	19	56.13	W. W. M.
Shreveport.....	32 31.0	93 45.9	My. 18	7 35.0	63 10.9	25252	19	56.13	W. W. M.

MARYLAND.

Cheltenham Observ- atory.....	38 44.0	76 50.5	Year.	<i>West.</i> 6 12.4	70 53.5	19213	26	26EI	G. H.
Do.....	38 44.0	76 50.5	Ja. 7-12	6 11.2	70 53.4	19236	20	78.12	G. H.
Do.....	38 44.0	76 50.5	Fe. 13-27	6 11.4	.. .. .	19227	40	.....	G. H.
Do.....	38 44.0	76 50.5	No. 4-6	6 14.0	.. .. .	19180	29	.....	G. H.
Do.....	38 44.0	76 50.5	No. 7-25	6 13.5	70 54.0	19175	19	56.13	G. H.

Magnetic observations on land—Continued.

MICHIGAN.

Station.	Latitude.	Longitude.	Date.	Declination.	Dip.	Horizontal intensity.	Instruments.		Observer.
							M.	D. C.	
Grand Rapids, aux. 7	42 50.6	85 47.4	Se 13	<i>East.</i> 1 01.6	73 31.8	17273	19	56.1	W. W. M.
Grand Rapids, aux. 6	42 51.4	85 36.7	Se 13	<i>West.</i> 0 25.7	73 15.1	17574	19	56.1	W. W. M.
Grand Rapids, aux. 1	42 53.9	85 43.4	Se 9	<i>East.</i> 1 15.6	73 16.1	17851	19	56.1	W. W. M.
Grand Rapids, old...	42 57.7	85 42.2	Se 5	1 19.0	74 10.6	17034	19	56.13	W. W. M.
Grand Rapids, aux. 4	42 57.7	85 33.7	Se 12	<i>West.</i> 2 02.8	73 51.7	17037	19	56.1	W. W. M.
Grand Rapids, new...	42 57.8	85 42.2	Se 6	<i>East.</i> 1 21.0	74 19.4	16902	19	56.13	W. W. M.
Grand Rapids, aux. 2	42 58.4	85 48.0	Se 10	2 25.3	73 49.3	16973	19	56.1	W. W. M.
Grand Rapids, aux. 5	42 59.9	85 35.8	Se 13	<i>West.</i> 1 46.6	74 16.5	16689	19	56.1	W. W. M.
Grand Rapids, aux. 3	43 03.0	85 41.7	Se 10	<i>East.</i> 0 13.9	74 16.3	16575	19	56.1	W. W. M.

MISSISSIPPI.

Brookhaven.....	31 35.5	90 27.7	My 14	6 05.4	62 48.4	25390	19	56.13	W. W. M.
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NEBRASKA.

Blue Hill.....	40 20.2	98 26.0	Je 3	10 44.2	69 59.4	20404	17	78.12	S. A. D.
Edgar.....	40 21.6	97 58.0	Je 1	10 54.0	69 57.8	20342	17	78.12	S. A. D.
Tobias.....	40 24.9	97 20.4	My 24, 25	10 36.4	70 14.4	20266	17	78.12	S. A. D.
Shickley.....	40 25.1	97 42.4	My 28, 29	11 32.6	69 58.0	20427	17	78.12	S. A. D.

NORTH CAROLINA.

Murphy, old.....	35 05.2	84 02.2	Ap 4	2 12.8	67 30.0	21987	19	56.13	W. W. M.
Murphy, new.....	35 05.4	84 02.0	Ap 5	1 39.0	67 30.8	21904	19	56.13	W. W. M.
Marion, aux. 3.....	35 36.9	81 59.4	Mh 29	<i>West.</i> 1 14.4	67 32.1	22041	19	56.1	W. W. M.
Marion, aux. 1.....	35 39.9	82 06.6	Mh 28	0 38.3	67 45.6	21828	19	56.1	W. W. M.
Marion, old.....	35 41.0	82 00.6	Mh 26	0 56.3	67 27.1	22084	19	56.13	W. W. M.
Marion, new.....	35 41.0	82 00.8	Mh 27	1 13.0	67 40.4	21928	19	56.13	W. W. M.
Marion, aux. 2.....	35 42.6	81 56.5	Mh 28	1 09.8	67 40.3	21842	19	56.1	W. W. M.
Marion, aux. 4.....	35 43.9	82 02.9	Mh 29	0 47.0	67 48.9	21794	19	56.1	W. W. M.

PORTO RICO.

Porto Rico Observatory.....	18 08.8	65 26.9	Year.	3 34.1	51 11.3	27976	31	1EI	W. M. H.
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TEXAS.

Fort Worth.....	32 42.4	97 22.0	My 28	<i>East.</i> 9 27.4	62 35.3	25670	19	56.13	W. W. M.
Greenville.....	33 08.3	96 05.9	My 21	9 01.9	63 19.2	25235	19	56.13	W. W. M.
Texarkana.....	33 25.8	94 02.3	Je 4, 5	7 54.5	63 54.8	24754	19	56.13	W. W. M.
Sherman.....	33 37.7	96 36.5	My 23	9 06.7	63 52.5	24839	19	56.13	W. W. M.

WYOMING.

Cheyenne, old.....	41 09.1	104 52	Jy 1	15 15.6	69 15.8	20938	17	78.12	S. A. D.
Cheyenne, new.....	41 09.1	104 52	Jy 2	15 18.4	69 15.6	20951	17	78.12	S. A. D.
Green River.....	41 31.6	109 27.9	Je 7-11	17 17.6	68 31.0	21362	17	78.12	S. A. D.

DESCRIPTIONS OF STATIONS.

Magnetic observers are instructed to mark each station (except auxiliary stations for development of local disturbance) in as permanent a manner as possible, either with a stone, a draintile filled with cement, or a post of some durable wood, so that it may be available for future occupation. They are also required to furnish a sufficiently detailed description to locate the station even if the marking should be destroyed, and to determine the bearings of two or three prominent objects in addition to the one used as a reference mark in the azimuth and declination observations. The information is given in abridged form on the following pages. Further details can usually be obtained upon application to the Superintendent of the Coast and Geodetic Survey.

The usual method of marking a station is by a stone post about 30 inches long and 6 inches square, set so as to project 2 or 3 inches above the ground. In the center of the top is set a circular bronze plate 3½ inches in diameter.

When the local authorities desire it, and are willing to bear the expense, a second stone is set to mark the true meridian.

The descriptions of stations are arranged alphabetically by States and by names of stations.

ALABAMA.

Mobile, Mobile County.—The station of 1915 was reoccupied. It is on the athletic grounds of the Spring Hill College, about 7 miles west of the courthouse. It is 59 feet and 53.6 feet from the picket fences on the south and west sides, respectively, and 230.2 feet from the lower left-hand corner of the west steps of the gymnasium. The station is marked by a Bedford limestone post, 6 by 6 by 30 inches, set flush with the ground and having a bronze disk in the top. The following true bearings were determined in 1915 and 1918:

Northwest edge of southeast corner post on veranda of main building (1915).....	57 11.8 E. of N.
Base of cross on main hall (center) (1915).....	44 35.7 E. of N.
Southwest corner of gymnasium (1915).....	23 41.5 W. of N.
Edge of southwest corner of cement porch base on main building (1918).....	34 23.7 E. of N.

A 6-inch vertical groove was cut in the outside parapet wall of the gymnasium porch, at a distance of 244.2 feet due north of the magnetic station to mark the north end of the meridian line.

Selma, Dallas County.—The station of 1915 was reoccupied. It is in the northeast corner of the county fair grounds, about 1½ miles north of the center of town. It is 151 feet west and 11.2 feet south of the fence around the grounds and 140 feet northeast of the fence around the inside of the race track. It is marked by a limestone post 6 by 8 by 33 inches, projecting 14 inches above the ground and lettered U. S. C. & G. S., 1903. The following true bearings were determined in 1915 and 1918:

First spire west of water tank (mark) (1915).....	4	18.2	W. of S.
Water tank (1915).....	2	44.6	E. of S.
Cupola of courthouse (1915).....	9	37.4	W. of S.
Baptist Church spire (1915).....	11	47.5	W. of S.
Methodist Episcopal Church spire (1915).....	13	28.5	W. of S.
Water tank 1½ miles distant (1918).....	41	49.2	W. of S.
South gable of large barn, one-fourth mile distant (1918).....	36	55.1	E. of N.
Brick chimney, 2 miles distant (1918).....	54	19.2	E. of S.

ALASKA.

Alitak Bay.—On the south side of the bay and almost directly across from the cannery is a small projection or point of land extending out into the bay. Observations were taken on the highest point of this promontory. The station was not marked.

The following true bearings were determined:

Southeast corner piling of cannery dock.....	49	29.7	E. of N.
South gable of main warehouse of cannery.....	47	03.2	E. of N.

Anchorage.—The station is located in the southeastern part of the block reserved for park purposes and in use as a ball park. It is 202.4 feet from the southeast corner of the south wing of the bleachers, 203.1 feet from the southeast corner of the east wing of the bleachers, 271.4 feet from the center of the grand stand, 71½ feet from the line of the street to the south, and 76 feet from the line of the street to the east. The station is marked by a stone approximately 6 by 6 by 24 inches, set flush with the surface of the ground, having a cross cut for a center mark and lettered U. S. The following true bearings were determined:

Central sharp point on rounded and serrated hump on mountain range to southeast.....	31	24.3	E. of S.
Small pyramidal mountain peak between two higher and rounded peaks.....	41	19.0	E. of S.
Bisection of V-shaped depression in serrated mountain ridge just to right of double pyramidal peak.....	64	37.2	E. of S.
Base of flagstaff on Anchorage fire hall.....	58	28.7	W. of N.

Chickaloon.—A suitable location for a permanent magnetic station could not be found. Chickaloon is situated in a narrow valley lined on either side by steep timber-covered bluffs about 100 feet high. The width of the valley is about 500 feet. In order to be at a safe distance from the railroad and coal mining machinery along the north edge of the valley, observations were taken near the south side of the valley, directly opposite the mouth of tunnel B, and distant 263 feet from the main line of the railroad. It is on a gravel flat of the river bottom which is overflowed during the high water of spring. The station was not marked. The following true bearings were determined:

Bisection of cleft in columnar projection on left-hand slope of Castle Mount.....	52	02.1	W. of N.
Small projection on summit of flat-topped column toward center of Castle Mount.....	33	27.4	W. of N.
Sharp point near center of low place in mountain range to west....	79	23.7	W. of N.

Chitina.—The station is on the point of a foothill of the mountain just west of the town, almost in the middle of the prolongation of the first street north of the railroad station. It is about 30 feet back from the point of the narrow ridge of the hill, this hill being about 75 feet above the level of the town. The station is marked by a

rough slab of rock about 3 feet long, 3 inches thick, and 10 to 12 inches wide, projecting about 3 inches above ground. A cross marks the center. The following true bearings were determined:

Small pyramidal mountain peak seen in a V-shaped opening between higher mountains.....	14	20.3	W. of S.
Second pyramidal peak about the same elevation.....	4	19.4	W. of S.

Circle.—The station of 1908 could not be reoccupied because of the erection of buildings in the vicinity. Observations were made near by and a new station was established in the cemetery, which is about one-third of a mile south and a little west from the wireless station, and on the east side of the Government road leading from Circle to Fairbanks. The station is 20 feet from the center of the road and on the left-hand side of the road going out from the village. It is marked by a spruce post 3 inches square and 3 feet long, extending 4 inches above the surface, and having a brass shell driven in the top as a center mark. The location is further marked by a strong stake bearing a signal notice. The following true bearing was determined:

Right-hand edge of upper platform of wireless tower.....	36	47.5	E. of N.
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Cordova.—The station is on the reservation for office quarters of the United States Forest Service, directly back of the buildings and about 80 feet from the northeast corner of the office building. It is marked by a rough stone about 2½ feet long set with the large end down, the projecting end being about 3 by 4 inches. A small depression chipped out marks the center. This stone projects about 4 inches above the surface. The following true bearings were determined:

South gable of dock warehouse.....	5	26.2	E. of N.
Bisection of small depression in pyramidal mountain peak, seen over Cordova wharf.....	10	02.1	E. of N.
Sharp mountain peak to right of center of timber-covered hill across the bay.....	23	31.4	W. of N.
Sharp projection on right-hand side of rounded mountain peak to the left of the center of timber-covered hill across the bay.....	27	13.1	W. of N.

Eagle (Fort Egbert).—The station of 1908 was reoccupied as nearly as could be determined. It is 57 feet north of the astronomic station and in the meridian line marked by the astronomic station and a post on the mountain north of the town. The mark used was the north monument of the meridian line, which is due north of the magnetic station. The astronomic station is marked by a 1-inch copper pipe set in the center of a cement block, which is set almost flush with the surface of the ground. The following true bearings were determined in 1908 and 1918:

Base of signal post on highest point of hill north of town.....	5	50.5	E. of N.
South gable of west wing of commandant's quarters.....	51	08.4	E. of N.
Tip of belfry on small church.....	11	03.6	E. of S.

Fairbanks.—The station is about one-half mile southwest of the town on a tract set aside as a race track and baseball park. It is in line with the easterly end of the main structure of bleachers, 280.8 feet from the southeasterly corner and 303.3 feet from the southwesterly corner. The station is marked by a cement post 6 by 6 by 30 inches set flush with the surface of the ground. The following true bearings were determined:

Base of flagstaff on public school building.....	86	23.3	E. of N.
Base of flagstaff on Detention Hospital.....	83	35.7	E. of S.
Spire of Presbyterian Church.....	80	30.1	E. of N.
Base of cross on Catholic Church.....	47	23.5	E. of N.

Fort Liscum.—The station is on the grounds of the Fort Liscum military reservation and is directly back of the post hospital building, being opposite a point about 2 feet from the left-hand edge of the wing of the building used as a kitchen. It is 215 feet from the southwest corner of the porch at the back of the kitchen. The station is marked by a heavy boulder set with the large end down and projecting about 2 inches above the surface of the ground. The projecting portion is approximately 6 by 6 inches and has a cross cut for a center mark. The following true bearings were determined:

Central apex of rough irregular W on highest point of mountain range across the bay.....	13	47.6 W. of N.
Small needle-like projection on left-hand slope of mountain peak to westward.....	44	18.1 W. of N.
Bisection of small flat-topped, tower-like point on second mountain range.....	35	44.5 W. of N.
Small projection between two rounded peaks seen over left-hand end of post hospital.....	21	02.4 E. of N.

Fort Yukon.—The station of 1908 was reoccupied. As it was not likely to be available for future use, a new station was established about one-eighth of a mile nearly north of the old station. This station is on the reservation for the school for natives maintained by the Federal Government. It is near the northeasterly corner of the reservation, 201.8 feet from the northeasterly corner of the original building of the Government school, 39.5 feet from the northerly boundary line of the reservation, 43.5 feet from the easterly line, and 54.6 feet from the corner post. The station is marked by a spruce post 4½ inches in diameter and 3½ feet long, projecting 4 inches above the surface of the ground, lettered U. S., and having a brass shell driven in the center. The following true bearings were determined:

Base of cross on Episcopal Mission Church.....	1	03.0 W. of S.
North gable of mission warehouse.....	17	56.4 E. of S.
North gable of main part of St. Stephen's Hospital.....	8	49.3 E. of S.

Holy Cross.—The station of 1908 was reoccupied. It is on the grounds of the Holy Cross Mission, on a slight slope just back of the buildings and near the cemetery, 77.6 feet and 56.7 feet from the southeast and northeast corners of the cemetery, respectively, and 55.9 feet from a fence east of the station, measured at right angles. The station is marked by a pine post 6 by 6 by 40 inches, projecting 4 inches above the surface of the ground, lettered on top U. S., and having a brass shell driven in center. The following true bearings were determined in 1908:

Base of cross on church (mark).....	81	03.4 E. of S.
Pyramidal mountain peak.....	68	50.8 E. of S.

Hot Springs.—The station is on the United States military telegraph reservation, 140.2 feet from the southwest corner of the west wing of the office quarters. It is also 76.0 feet from the turnstile post at the entrance to the grounds, 44.4 feet from a fence line to the south, 47.0 feet from the west boundary of the reservation and 30 feet from the bank of a backwater slough from the Tanana River. The station is marked by a boulder about 6 by 10 by 26 inches set almost flush with the surface of the ground, lettered U. S., and having a cross cut as a center mark. The following true bearings were determined:

South gable of Stanley road house.....	71	55.0 W. of S.
South gable of Mrs. Kashner's dwelling.....	85	19.6 W. of N.
South gable of Northern Commercial Co.'s main building.....	77	25.2 W. of N.
North gable of Morrison's store building.....	51	24.9 W. of S.

Kokrines.—The station of 1908 was reoccupied. It is within the reservation for the United States military telegraph office, about 240 feet back from the bank of the river. It is distant 211.0 feet from the southeast corner of the telegraph office, and on a line bearing about 35° east of north. The station is marked by a spruce post 4 inches in diameter, 4 feet long, letter on top U. S., and having a rifle shell driven in center of top. This post projects 10 inches above the surface of the ground. The following true bearings were determined in 1908:

Point of rock on mountain range to the westward (mark).....	64	39.8	W. of N.
Mountain peak.....	81	14.0	W. of N.
Mountain peak.....	82	45.9	W. of N.

Matanuska Junction.—The station is on the grounds of the Agricultural Experiment Station, located 2 miles northwest from the town. It is 208.0 feet directly north of the back door of the station office quarters and 115.8 feet from the middle of the graded road to the westward. The station is marked by a boulder set 12 inches below the surface of the ground and having a cross cut as a center mark. The following true bearings were determined:

Sharp hook-shaped projection on lateral face of rock on rounded mountain just to left of high range to southeast.....	54	29.0	E. of S.
Higher of two adjacent pyramidal-shaped points.....	46	05.7	E. of S.
Bisection of small hummock on middle one of three roughly pyramidal peaks.....	19	37.1	E. of S.

McCarthy.—The station is northeast of the town, on a bench about 20 feet above the level of the town. It is in the middle of the prolongation of Donohoe Street and 100.0 feet from a stone post marking the middle of the intersection of Donohoe Street with Regal Street. This bench land is used as a baseball ground. The location of the station is marked on the plat of the town and may be recovered by inquiring of the town authorities. The station is marked by a glacial boulder about 2 feet long and 10 inches square, set 20 inches below the surface of the ground. A second stone above this one is set flush with the surface. A cross cut in each stone marks the exact spot. The following true bearings were determined:

Right-hand point of highest peak of Mount Donohoe, seen over center of glacier.....	11	41.8	W. of N.
Small needle-like point on Mount Donohoe.....	9	07.9	W. of N.
Pyramidal point to left of high perpendicular cliff.....	17	58.7	E. of N.
Sharp point on range to east.....	75	15.3	E. of S.
Base of flagstaff on public school building.....	67	31.6	W. of S.

Montana.—Observations were secured at a point about 400 feet below (south) of the confluence of Montana Creek with the Susitna River and near the present bank of the Susitna. It is about 500 feet west of the railroad. The station was not marked.

Nenana.—The station is in the southwestern part of block 31, at present well on the outskirts of the town, which is set aside as a park and baseball ground. The station is 62.4 feet from the west line of the block, 31.4 feet from the south line, and 68.5 feet from the southwest corner. It is marked by a spruce block 24 inches long and 10 inches in diameter set 12 inches below the surface of the ground. A brass shell driven in the top marks the center. The following true bearings were determined:

Base on cross on Catholic Church.....	11	44.2	W. of N.
Base of flagstaff on Skof rooming house.....	25	15.7	W. of N.
South gable of Presbyterian Church.....	6	06.8	W. of N.
Base of flagstaff on Northern Commercial Co.'s store.....	18	20.7	W. of N.

Nulato.—The station of 1908 was reoccupied. It is on the grounds of the reservation for the military telegraph, 61 paces directly back from the telegraph office, 83.7 feet and 29.0 feet, respectively, from posts Nos. 3 and 4 on the north and west corners of the reservation. The station is marked with a wedge-shaped stone, set with the large end down, and roughly lettered U. S. The following true bearings were determined in 1918:

	o /
Base of cross on new Mission Church.....	30 31.0 W. of S.
False gable over first window on east side of church.....	30 44.6 W. of S.
Left-hand corner of dwelling house at wireless station (just underneath cornice).....	22 44.0 W. of N.

Rampart.—The station of 1908 was reoccupied. It is on grounds of the Agricultural Experiment Station and is just south of the house. This station is across the river from Rampart. The station is 54 feet and 63.1 feet from the southeast and southwest corners of the house, respectively, and 43.1 feet from the base of the flagpole. It is marked by a heavy glass bottle set about 3 inches below the surface of the ground. The following true bearings were determined in 1908:

	o /
Pyramidal mountain peak (mark).....	16 14.7 W. of S.
Highest point on outcrop of rocks.....	43 24.6 E. of S.
West gable of Northern Commercial Co.'s store.....	55 45.6 E. of S.
Small gable over doorway of United States military telegraph office.	68 13.3 E. of S.

Seward.—The station is about 1 mile north of the business part of the town, on Government land which has been reserved from sale. It is on a projecting point of land just beyond the sawmill and is about 30 feet above tide water. It is 18 feet from the brow of the hill to the southeast, 35 feet from the point of the hill to the east, 14 feet from the brow of the hill to the northeast, and 21 feet from a spruce tree 10 inches in diameter bearing about 20° west of north. It is also about 30 paces from the road. The station is marked by an irregular stone 32 inches long set with the large end down and projecting about 6 inches above the surface, the projecting portion being approximately 6 by 8 inches. The stone is roughly lettered U. S. C. & G. S., a cross marking the center. The following true bearings were determined:

	o /
Base of cross on Catholic Church.....	9 20.6 E. of S.
Pyramidal projection on left-hand slope of highest mountain across the bay.....	75 28.7 E. of N.
First sharp point to right of same mountain.....	79 11.7 E. of N.
Base of ornament on bellry of M. E. Church.....	2 47.7 E. of S.
Sharp point on small pyramidal peak on high mountain seen over timber-covered mountain slope.....	35 46.8 W. of S.

Tanana.—The station of 1908 was reoccupied. It is on the parade ground of Fort Gibbon, and in the northwest section. It is distant 193.1 feet and 196.5 feet from the southeast and northeast corners, respectively, of the hospital building, and 311.9 feet from the northwest corner of the guardhouse. The station is marked by an inverted glass bottle set about 4 inches underground. The following true bearings were determined:

	o /
Base of cross on bell tower of Catholic Church.....	68 26.2 E. of S.
North gable of Rodman Building (formerly North American Telegraph & Telephone Co.'s store).....	67 14.3 E. of S.
West gable of south wing of new Post Exchange.....	58 34.2 E. of S.

ARKANSAS.

Mena, Polk County.—The station of 1905 was reoccupied. It is in the southeast part of the courthouse grounds, 35.9 feet from the near edge of the cement sidewalk along the southeast side of the courthouse yard, 89.3 feet from the southeast corner of the courthouse, and 73.4 feet from the near edge of the cement sidewalk along the northeast side of the courthouse yard. It is marked by a limestone post 6 by 6 by 30 inches, lettered U. S. C. & G. S., 1905, and projects about 3 inches above the ground. The following true bearings were determined in 1905 and 1918:

Top of city water reservoir (1905).....	22 09.4 W. of N.
Center of disk on United States Geological Survey elevation stone, 250 feet distant (1918).....	18 54.1 W. of N.
Southwest gable on M. A. Stratton's residence on ridge one-half mile distant (1918).....	70 37.2 E. of N.
Center of I. O. O. F. links on stone set in side of the Star Building (1918).....	33 49.8 E. of S.
Center of disk on United States Geological Survey elevation stone 100 feet distant (1918).....	40 29.6 W. of S.

COLORADO.

Cather Springs, El Paso County.—The station is about 12 miles from Colorado Springs, on the automobile road to Cripple Creek and is about 1½ miles from the place called Cather Springs. The station is by the roadside, at the sharp turn in the road, and is about 10 feet southeast of the edge of the driveway, about 230 paces beyond the Government signpost where the Rock Creek Trail branches off from the road. The Hatton ranch house is about 120 paces to the west over the brow of the hill. The station is not marked.

Colorado Springs, El Paso County.—The station of 1886 was not found suitable for magnetic observations. Accordingly a new station was located on the athletic grounds of Colorado College, about 1 mile due north from the station of 1886. The athletic grounds are west of the college campus in the lowland next to Monument Creek. The station is toward the northwest corner of the grounds, about 110 feet north of the present north end of the bleachers. It is 54.2 feet east of the wire fence, 36.5 feet southeast from a large cottonwood tree, and 74.4 feet south by west from the nearer one of two cottonwood trees growing close together. The station is marked by a gray granite post lettered U. S. C. & G. S. and set flush with the surface to the ground. The following true bearings were determined:

Right-hand edge of observatory building at ground.....	43 42.2 E. of S.
Tower on Cliff House on Pikes Peak.....	87 29.9 W. of S.
Gable on Van Briggles Pottery Building.....	16 37.0 W. of N.
Small tower on Colorado College Building.....	88 16.6 E. of N.

Cripple Creek, Teller County.—The station is near the center of the Mount Pisgah Cemetery about 1 mile west of the town's center. It is about in line with the Catholic Church spire and the Grand Army of the Republic monument, and in the center of the first north and south alley west of the cabin. It is 59 feet west of the northwest corner of the cabin, 77 feet northwest of the G. W. Walters monument, 82 feet southwest of the F. R. Skipwith monument, 61 feet south of the Elizabeth Peterson monument. The station is marked by a Bedford limestone post 6 by 6 by 20 inches with brass plate in top and projecting about 3 inches above the ground. The following true bearings were determined in 1913:

Cross on Catholic Church spire (mark).....	86 50.9 E. of N.
Spire on cupola of high school.....	86 38.0 E. of S.
Southwest corner of Placer School building.....	83 10.8 E. of S.
Northwest corner of brick building in northeast part of town.....	74 54.4 E. of N.

Crook, Logan County.—The station is on the public-school grounds 155 feet northeast of the northeast corner of the building, 182 feet from the north fence, and 55.5 feet from the street line to the east. It is directly in line with the chimneys on the first two houses on the block to the south. The station is not marked. The following true bearings were determined:

Tip of railroad water tank (mark).....	23	43.3	W. of S.
Northeast corner high school.....	50	08.9	W. of S.
Center of chimney on distant farmhouse.....	42	07.9	W. of N.
Center of chimney on distant farmhouse.....	9	40.3	W. of N.
Right edge upper part of grain elevator.....	8	18.4	W. of S.

Divide, Teller County.—The station is on the rise just south of the railway station and about 120 yards from it. It is in line with the east end of the depot and the southwest corner of the fence about the house near the depot, and is about 82½ yards from this corner. It is 84 yards east of the deep railway cut on the line to Cripple Creek. The elevation of the station is probably somewhat less than 50 feet above the railway track at the depot. The summit of Pike's Peak is *not* visible. The station is not marked.

Edgerton, El Paso County.—The station was located in the pasture north of the road, about one-fourth mile east of the Denver & Rio Grande Railroad crossing, and about one-fourth mile southwest of the Santa Fe Railway crossing. It is 172.0 feet north of the south fence along the road, and 70.0 feet east of a north-and-south fence, along which the telephone line runs. The station was marked by a peg only.

Florissant, Teller County.—The station is on the slope of the hill west of the schoolhouse, north of the road leading to Lake George. It is in line with the schoolhouse cupola staff and what appears to be the highest point of Pike's Peak, and is 372.9 feet from the nearest corner of the schoolhouse. The station was marked by a wooden peg only.

Fountain, El Paso County.—The station was located on the vacant lot just south of the city park property, about 600 feet southeast of the high-school building, and about 105 feet east from the near edge of the cinder walk along the west front side of the lot. It is 38.5 feet south of the line of trees along the south side of the park, 68.5 feet north of the fence along the south side of the lot upon which it was located, and 32.7 feet east-northeast from a cottonwood tree in the lot. The station was marked by a brick buried in the ground. A small hole drilled in the end of the brick marks the center. The following true bearings were determined:

Center of chimney on a small house one-fourth mile distant.....	1	41.9	W. of S.
Center of small easternmost chimney on large brick building 600 feet distant.....	2	07.9	W. of N.
South gable on house on hill three-eighths mile distant.....	34	10.9	E. of N.

Glen Eyrie, El Paso County.—The station was located on the open space just south of the gate to the Eagle's Nest Inn, about 39 feet west of the stone curbing beside the road leading up to the gate. It is 132.9 feet from the near side of the concrete base of the west post at the gate. The station was marked by a red sandstone post 4 by 4 by 15 inches set flush with the ground. A hole drilled in the top marks the center. The following true bearings were determined:

East edge at base of old chimney one-eighth mile distant (mark)....	3	20.8	W. of S.
Outer tip of north gable on Castle Building.....	67	17.6	W. of S.
Pinnacle of rock one-fourth mile distant.....	6	49.3	E. of N.
Triangulation station on rock ridge one-eighth mile distant.....	71	19.2	E. of N.
Triangulation station on hill one-fourth mile distant.....	18	20.7	E. of S.

Grover, Weld County.—The station at Grover is on the grounds of the new Pawnee High School, at the west side of the town. The station is directly in line with the front of the school building (main part), 296.9 feet west from the southwest corner of the building, and 74.6 feet north of the street line (marked only by a row of stakes) of the main street of the town. The station is not marked. The following true bearings were determined

Right edge chimney on house (mark).....	1	13.0	E. of S.
Left edge chimney on house.....	83	11.4	W. of S.
Tip of cupola on old schoolhouse.....	16	16.2	E. of N.

Julesburg, Sedgwick County.—The station is in the north part of town, on vacant ground formerly used for a race track and baseball field. It is inside the race track, 20 paces from the edge of the track, and 63 paces from the nearest (northwest) corner of the grandstand. The station was not marked.

Lake George, Park County.—The station of 1913 was reoccupied. It is on the Government ranger station, about one-fourth mile east of the village, 122 feet northeast of the northeast corner of the ranger's house, 190 feet east of the west fence, 110 feet south of the barn, 81 feet north of a pine tree, and 125 feet north of the south fence. The station is marked by a Bedford limestone post, having a brass magnetic station marker in the top.

As the old station was found to be no longer suitable for magnetic observations, a new station was established, 119.6 feet east of the old station and directly in line with it and the first post from the corner in the fence on the west side of the yard. It is 127 feet from the fence on the south side of the field. The new station is not marked.

Love, Teller County.—The station is in the schoolhouse yard, about one-fourth mile beyond (from Cripple Creek) the Beaver Valley ranch house. It is near the southeast corner of the school yard, 24.5 feet from the south fence, 28.8 feet from the east fence, and 52.4 feet from the southeast corner of the log schoolhouse. The station was not marked.

Manitou, El Paso County.—This station is the station "Manitou A" of the Carnegie Institution. It is on Williams Hill back of the Cliff House, and about 250 feet above the street car line. It is north of the house on Williams Hill occupied by Mrs. Jarrett, and in line with the eastern side of it. It is 148.5 feet north of the westernmost corner of the house, 49.5 feet from a line of old fence posts that mark the north side of the yard, and 84.2 feet from a fence corner across the driveway northwest. The station was marked by a peg only.

Manitou Junction, El Paso County.—The station was located in the north front yard of G. R. Marriage's property. This is about 8 miles east of Colorado Springs and beyond the railroad crossing and up the slope of the hill. The station is south of the road. It is 40.5 feet from the north fence next to the road, 50.7 feet from the east fence, and about 125 feet north-northeast of Mr. Marriage's house. It was marked by a peg only.

New Raymer, Weld County.—The station is on the public school grounds north of the town. It is 173.2 feet northwest of the northwest corner of the building, 46.3 feet from the north fence, and 40.1 feet from the west fence about the school grounds. It is directly in line with the center of the street to the south. The station is not marked. The following true bearings were determined:

Right edge upper part of grain elevator (mark).....	3	13.6	W. of S.
Right edge chimney on distant farmhouse.....	49	58.9	W. of S.
Center of cross on church.....	66	34.9	W. of S.

Pikeview Station, El Paso County.—The station was located in the field about one-fourth mile east of the Denver & Rio Grande Railway station, just north of a small lake. It is 45 feet west-southwest from a large tile line that carries water from up the creek down into this lake; and 29.5 feet from the fence to the south-southeast. The station is marked by a peg only.

Rosemont, Teller County.—The station was located in the front yard of the school. It is 79.5 feet south-southeast of the southeast corner of the school building, 77.9 feet from the west fence, and 45.2 feet from the south fence. The station was marked by a peg only.

Wilson's Ranch, Teller County.—The station is about in line with the continuation of the middle of the road from the north, where the road turns to the west. It is in a small triangular piece of ground bounded on the north by a wire fence and on the southwest, and southeast by an irrigating ditch. It is southwest of Mr. Wilson's ranch house and is 84 feet south of the fence along the road. The station was not permanently marked.

FLORIDA.

Orlando, Orange County.—The station of 1903 being no longer suitable for magnetic observations, a new station was established in a pasture belonging to Mr. Dolley, about 1 mile west of the center of town. The station is reached by following West Central Avenue to the first right-angle turn made by the brick-paved road which is the continuation of that avenue. The station was in a lot southwest from this turn in the road, about 50 feet from the road, 325 feet north of Mr. Dolley's house, and about the same distance south of his son's house. The station was not marked.

GEORGIA.

Blairsville, Union County.—The station is located in the southwest corner of the county cemetery, about one-eighth mile east of the courthouse, and just north of the grounds of the Baptist Collegiate Institute. It is 24.3 feet from the south fence, 30.1 feet from the west fence, 72.3 feet southeast of the southeast corner of the base of the Thomas J. Lyon monument; and 41.5 feet southwest of the southwest corner of the Johnson P. Wellborn slab monument. The station is marked by a bronze disk set in a 7 by 7 by 27 inch concrete post projecting 1 inch above the ground. The following true bearings were determined:

Near edge on chimney of M. E. parsonage, three-eighths mile distant (mark)	16	51.2	W. of S.
Near gable on courthouse.....	83	52.8	W. of S.
M. E. Church steeple.....	64	01.8	W. of N.
Center of I. N. Miller's chimney.....	12	20.2	E. of N.
Cupola on Baptist Collegiate Institute building.....	47	10.4	E. of S.

Hiawassee, Towns County.—The station was located in the southwestern part of the school yard, about 1,000 feet northeast of the courthouse. The station is about 200 feet up the slope of the yard from the front gate, 48.0 feet from the fence along the northwest side of the yard, 149.9 feet from the fence along the southeast side of yard, and 159.6 feet from the nearest square corner of the school building. The station is marked by a bronze disk dated 1918, set in the top of a marble post 6 by 8 by 30 inches, set flush with the ground. The following true bearings were determined:

Cupola on courthouse, one-fourth mile distant (mark).....	48	01.9	W. of S.
Steeple of M. E. Church, one-fourth mile distant.....	81	53.2	W. of N.
Cupola on D. Nicholson's house, three-eighths mile distant.....	5	18.2	W. of N.
Cupola on school building.....	76	09.0	E. of N.
Near gable on Mr. Rice's house, one-fourth mile distant.....	25	39.2	E. of S.

Lagrange, Troup County.—The station of 1915 was reoccupied. It is in the eastern part of the grounds surrounding the Southern Female College, about one-fourth mile north of the town's center. It is 159 feet east from the southeast corner of the south college building, 15 feet west from the concrete walk east of the college grounds, and 88.6 feet northeast from the northeast corner of the brick foundation of a burned-out building. It is marked by a marble post 7 by 7 by 34 inches, projecting about 10 inches above the ground. The following true bearings were determined in 1918:

	° /	
North meridian stone (mark).....	0	01.9 E. of N.
Lower southwest corner of north college building.....	61	42.7 W. of N.
Water plug, 250 feet distant.....	3	51.9 E. of S.

A granite post 7 by 7 by 36 inches is set approximately in the meridian, 194 feet north of the magnetic station. It is 129.9 feet a little north of east from the northeast corner of the front porch of the north college building. This post is about 11 inches above ground and has a small hole in the top to mark the exact line.

Palmetto, Campbell County.—The station was located in the white people's cemetery about one-half mile northeast of the Atlanta & West Point Railroad depot, near the northeast corner of the cemetery. It is in the middle of the easternmost one of the north and south driveways. It is 82.0 feet southwest from the northeast corner post of the cemetery, 34.1 feet west of the fence which separates the white from the colored cemetery, and 130.6 feet east-northeast from the northeast corner of the pavilion in the cemetery. The station was marked by a 4 by 4 by 12 inch marble post set down flush with the ground. A small hole in the top marks the center. The following true bearings were determined:

	° /	
Schoolhouse steeple (mark).....	36	46.0 W. of S.
Steeple on church, three-eighths mile distant.....	85	09.0 W. of S.
Water tank at cotton mill, one-eighth mile distant.....	14	26.1 W. of N.
Railroad water tank, three-eighths mile distant.....	24	02.4 E. of N.
Steeple on Negro church, 500 feet distant.....	60	21.1 E. of S.

Red Oak, Campbell County.—The magnetic station was located in the northwestern part of the public school grounds, which are about 1,200 feet north of the Atlanta & West Point Railroad depot, and next to the road. It is 23.5 feet south of the north line of the school grounds, 71.2 feet northwest of the northwest corner of the school building, and 43.5 feet north of the line of the north side of the school building. The station was marked by a rough gray granite stone set flush with the top of the ground. The top of the stone is about 5 by 5 inches, and a small hole marks the center. The following true bearings were determined:

	° /	
Tip of water tower at old sanitarium, one-fourth mile distant (mark).....	9	17.7 W. of S.
Near corner of school building.....	53	05.6 E. of S.
Chimney on Col. J. B. Suttle's house.....	6	26.7 E. of S.

ILLINOIS.

Seneca, Lasalle County.—Observations were made in the northeast part of the Protestant cemetery, which is about one-eighth of a mile north of the Rock Island Railroad depot. The station is 50.6 feet east-southeast from the southeast corner of the Thos. Jenkinson 1907 monument, 63.3 feet northeast of the northeast corner of the William Cochrane 1902 monument, and 67 feet north of the main driveway through the cemetery. The station was not marked.

INDIANA.

Cambridge City, Wayne County.—Observations were made in the south side of the cemetery about 500 feet west of the north and south road along the east side of the cemetery. The cemetery is about one-half mile north of the schoolhouse. The station was 57.1 feet north of the south fence and 101.4 feet west-southwest from the southwest corner of the Gallaway monument just east of the cemetery driveway. The station was not permanently marked.

Milford, Kosciusko County.—Observations were made in the northwest part of the City Park, which is about one-half mile west of the center of town. The station was 43.9 feet from the fence along the west side of the park grounds and 133.5 feet south of the north fence. It was about 180 feet north of the near edge of the concrete road in front of the Park. The station was not marked permanently.

New Castle, Henry County.—The station of 1907 was in good condition and was reoccupied. The station is located on the grounds of the State Home for Epileptics about 2 miles north of the courthouse and is near the crest of the high grounds on which the buildings are located. It is 77.9 feet about southwest from a large sugar-maple tree on the side of the hill, 207.7 feet from the southeast corner of the doctor's residence, and 53.6 feet east of the fence along the east side of the driveway up to the doctor's residence. The station is marked by a Bedford limestone post, 8 by 8 by 30 inches, set flush with the surface of the ground and lettered U. S. C. & G. S., 1907. The following true bearings were determined:

Courthouse tower, 2 miles distant.....	5 45.6 W. of S.
Tip of water tank, 400 feet distant.....	80 08.6 W. of N.
Center of silo, 1½ miles away.....	27 28.9 E. of N.
Center of white name stone on brick water tower, five-eighths mile distant.....	89 41.7 E. of N.
Flagpole on schoolhouse, 2 miles distant.....	2 10.9 W. of S.

Observations were also made at 5 auxiliary stations. Station No. 1 was in the southwest corner of the yard of the Brenneman School, which is about 4½ miles south and one-eighth of a mile west of the primary station. Station No. 2 was in the northeast part of the yard of the Messick School which is three-fourths of a mile north and 4¼ miles east of the primary station. Station No. 3 was in the wheat field of W. Rutherford, which is designated the W. L. Gory farm on the county map. It is about one-half mile east and 4 miles north of the primary station. Station No. 4 was in the east side of the yard of the Cadiz School, which is about 1 mile south and 6 miles west of the primary station. Station No. 5 was in the east side of the yard of the Rich Square School which is about 8¼ miles south and 1¼ miles east of the primary station.

North Manchester, Wabash County.—Observations were made near the middle of the east side of the fairgrounds, about one-half mile north of the center of town. The station was about 250 feet north of the south fence, 45.9 feet west of the east fence, 103 feet from the fence around the inside of the race track, and 25.5 feet southwest of a large maple tree. The station was not permanently marked.

Peru, Miami County.—The station is in the northwest part of the city cemetery, which is about three-eighths of a mile west of the Wabash Hospital. It is in an alleyway about 19 feet north of the center of the driveway across the north side of the cemetery. It is 77.0 feet southwest from the southwest corner of the tool house, and about 74 feet south by east from the north fence around the cemetery; 31.4 feet west of the northwest corner of the Elmore B. Russel 1918 monument, and 65.1 feet northeast from the northeast corner of the Noah Ream monument. The station is marked by a 6 by 6 by 28 inch marble post projecting about 3 inches above the ground with a bronze disk dated 1918 set in the top. The following true bearings were determined:

Center of mouth of cannon on Government lot, 400 feet distant °		
(mark).....	30	21. 4 E. of S.
Water tank at old bag factory, three-fourths mile distant.....	63	16. 7 W. of S.
Near edge of house, 1 mile away.....	7	14. 2 W. of N.
Water tank, 1 mile away.....	63	31. 0 E. of N.
Tower on Wabash Railroad hospital building.....	89	32. 5 E. of S.

Richmond, Wayne County.—The old station of 1900 on the south side of Earlham College campus was readily found and was reoccupied. The station is about 1½ miles west of the courthouse, and is about 1,500 feet south of the car and interurban electric line along the street in front of the college. It is about 400 feet due south of the southwest corner of Lindley Hall. The marking stone measures 6 by 6 inches, projects about 1 foot above ground and is marked U. S. B. & G. S. with a cross in the center, and is now in the flower and shrubbery border between the campus proper and the basket-ball grounds just south. The following true bearings were determined.

Southwest corner of lower stone border on Lindley Hall (mark)...	0	38. 8 E. of N.
Southwest corner of lowest brick on power house, 150 feet distant..	88	36. 2 E. of N.
Tip of north gable on large vault in cemetery, 600 feet distant.....	48	42. 6 W. of S.
Letter I in David Lough monument, 500 feet distant.....	72	31. 4 W. of N.

Rochester, Fulton County.—The old station of 1909 in the southeast part of the grounds belonging to the old normal school was easily found and was reoccupied. The station is in the southeast corner of the Rochester Normal University campus, about three-fourths of a mile southeast from the courthouse. It is 237.8 feet from the southeast corner of the wall of the university building (erected 1895), and a line running east along the south wall of the building passes 16.5 feet north of the station. The station is marked by a Bedford stone 6 by 6 by 36 inches, projecting 8 inches above ground and lettered U. S. C. & G. S., 1909. The following true bearings were determined:

Center of courthouse tower (mark).....	28	07.1 W. of N:
Staff of brick schoolhouse tower.....	36	53.7 W. of N.
Northeast edge of the water table on the Normal University building	68	46.7 W. of N.

Observations were also made at 5 auxiliary stations. Station No. 1 was in the west side of the yard of the Sand Hill School and Church, which is about 5¼ miles north and 1 mile west of the primary station at Rochester. Station No. 2 was in the yard of the Germany School, which is about 2 miles north and 4¾ miles west of the primary station. Station No. 3 was in the north side of the yard of the Antioch School, which is about 3 miles south and 2½ miles west of the primary station. Station No. 4 was in the southwest part of the front yard of the Prill School, which is about 1½ miles north and 4¾ miles east of the primary station. Station No. 5 was in front of the building of the Mount Zion School, which is about 2½ miles south and 3 miles east of the primary station. None of the auxiliary stations were marked.

Rushville, Rush County.—The station is in the rear of the Circleville school yard, about one-half mile south-southeast of the courthouse and across the river. The station is 43.9 feet from the northwest fence about the school yard, 99.6 feet from the northeast fence, and 72.6 feet north-northeast of the corner of the school building. It is marked by a marble post 6 by 6 by 28 inches set flush with the surface of the ground, with a bronze disk dated 1918 set into the top. The following true bearings were determined:

Tip of courthouse tower (mark).....	25	18.1 W. of N.
Center of chimney on white cottage ½ mile distant.....	43	28.2 E. of S.
Tower of school building, 100 feet distant.....	20	12.4 W. of S.
Tip of steel water tank, 1 mile distant.....	41	47.6 W. of N.

Schneider, Lake County.—Observations were made in the lot on the hill just back of the Schneider school building, about one-half mile south and one-eighth mile west of the railroad crossings. The station is 152.2 feet west-southwest from the southwest corner of the school building, 84.5 feet west of the southwest corner of a small brick building, and 120.3 feet southwest of the southwest corner of another small brick building. The station was not marked.

Walkerton, St. Joseph County.—Observations were made on a vacant lot in the southwest part of town. The lot is about five-eighths of a mile south of the Baltimore & Ohio Railroad depot, northwest of the intersection of two roads. The station is 97 feet north of the center of the east and west road which runs out to Kunzes Lake, 77.5 feet west of the center of the roadway which runs north and south just west of Emil Anderson's house, and about 225 feet east of Washington street, which runs north to the Baltimore & Ohio Railroad and New York Central Railroad crossings. The station was not marked permanently.

IOWA.

Cambridge, Story County.—The observations were made in the southwest part of the First Lutheran Church yard, which is about three-fourths of a mile northwest of the crossing of the Chicago, Milwaukee & St. Paul Railway with the Rock Island Railway. The station was 34 feet north of a row of posts along the south side of the grounds, 69.7 feet east of a similar row along the west side, and 85.5 feet west-southwest of the southwest corner of the church building. It was marked by a small peg only.

Coon Rapids, Carroll County.—Observations were made in the southwest part of the city cemetery, which is about three-quarters of a mile northwest of the center of town. The station was 59.3 feet north of the south fence along the road and 90.1 feet east of the west fence. It was marked by a peg only.

Davenport, Scott County.—The station of 1888 could not be reoccupied. Therefore a new site was selected in the Fe Juary Park, about $1\frac{1}{4}$ miles west and one-half mile north of the county courthouse. The station is in the northwest part of the park, near the center of the oval just east of the buffalo pens. It is 88.8 feet southeast of the northeast corner post around the buffalo pens, 49.7 feet south of the inner edge of the driveway, 41.0 feet east of the same, and 55.4 feet west of the same. The station is marked by a limestone post 6 by 8 by 26 inches, set flush with the surface of the ground and lettered U. S. C. & G. S. on the top. The following true bearings were determined:

Edge of brick border on base of building, 400 feet away (mark)	24 16.6 W. of S.
Near edge of chimney on house on hill	74 10.0 W. of S.
Center of chimney on house one-fourth mile away	25 55.1 W. of N.
Center of iron corner fence post	1 33.4 W. of S.

Des Moines, Polk County.—The station of 1910 was reoccupied. It is in the State fair grounds, on the slope of the hill below and about 275 feet northwest of the poultry building, about on the line Grand Avenue would run if extended east through the grounds. It is 63 feet northwest of a large hickory tree, which stands between the station and the Polk County headquarters building, and 74.5 feet southwest of another hickory tree near a small building. The station is marked by a large rough stone lettered U. S. C. & G. S. The following true bearings were determined in 1910 and 1918:

Lower cupola on Drake Sanitarium (mark)	17 35.2 W. of N.
Higher cupola on Drake Sanitarium	16 34.1 W. of N.
Center of base of rod on poultry building	39 15.1 E. of S.
Northwest corner of foundation of building just north of Polk County headquarters	72 15.5 E. of N.
North gable of exposition building	43 22.3 W. of S.

Grinnell, Poweshiek County.—Observations were made in the northwest part of the Grinnell College athletic field, about one-half mile north of the railroad crossing. The station is inside of the race track, 113.5 feet south of the north fence around the grounds, and 142.8 feet east of the west fence. A concrete stone was planted as an azimuth mark, 505.1 feet south of the station at the request of the engineering professor. The center of this stone was used as a mark. Both stones are concrete and set flush with the surface of the ground. The following true bearings were determined:

	°	'	
Center of concrete azimuth marking stone.....	0	26.5	W. of S.
Upper southeast corner (edge of brick) of boys' dormitory.....	33	58.1	W. of S.
Southeast (near) edge of chimney on Prof. Evans's house.....	28	16.5	W. of N.
Lighting rod on cupola of church.....	49	57.2	E. of N.
Center of college heating plant chimney.....	8	10.8	E. of S.

Herndon, Guthrie County.—Observations were made in the northeast part of the school yard, which is about one-fourth of a mile south of the railroad crossings at Herndon. The station is 73.8 feet south of the north fence, 49.2 feet west of the east fence, and 69.5 feet northeast of the northeast corner of the school building. It was marked by a peg only.

Madrid, Boone County.—Observations were made in the west side of the large city park, which is about five-eighths of a mile southwest of the center of the town. The station was in an open place near the west fence, 33 feet from the west fence, 39 feet south-southwest of a large hickory tree, and about 166 feet south of the ladies' comfort station. It was marked by a peg only.

Manning, Carroll County.—Observations were made near the middle of the north part of the city cemetery which is about three quarters of a mile south of the city water tank. The station is about 20 feet south of the east and west driveway which enters at the gate next to the sexton's house, and about 350 feet east of the sexton's house. It is 49.9 feet south by west from the near corner of the Carl Knapp monument, 50.5 feet east-northeast from the near corner of the Henry Heckman monument, and 41.2 feet west by north from the near corner of the Peter Sievers monument. The station was marked by a peg only.

Neola, Pottawattamie County.—Observations were made in the northeast part of the Protestant cemetery, about 1 mile north of the business part of town. The station is the center of the concrete corner post marking lot No. 74. It is 75.5 feet from the north fence, 45.5 feet from the east fence, and 65.9 feet east of the Hall monument. The following true bearings were determined:

	°	'	
Steeple of Catholic Church (mark):.....	1	18.1	E. of S.
Tip top of city water tank.....	18	07.4	W. of S.
Steeple on country schoolhouse.....	69	39.5	W. of N.

Perry, Dallas County.—Observations were made in the northeast part of the high-school grounds, about five-eighths of a mile east of the center of town. The station is 230 feet east northeast of the northeast corner of the high school building, 81 feet from a telephone pole to the north, and 146 feet from a telephone pole along the road on the east side of the grounds. It was marked by a peg only.

KANSAS.

Baldwin, Douglas County.—The station in Brockway's field was reoccupied. It is 207.1 feet N. 83° 07' E. from Brockway's well, and 143 feet east from the southeast corner of the cellar which was used as the variation building of the Baldwin Observatory until October 23, 1909. The absolute house and the declination pier have been removed, as also the azimuth target in the south meridian. The station is marked

by a cement post set flush with the surface of the ground, and lettered, U. S. C. & G. S. 1909 on top. The following true bearing was determined in 1918:

	° /	
Chimney on J. T. Martin's house right edge (mark).....	37 30.2	E. of S.

LOUISIANA.

Alexandria, Rapides Parish.—The station of 1904 and 1914 was reoccupied. It is in the national cemetery at Pineville on the east side of Red River. It is marked by a marble post 6 inches square, projecting 3 inches above the ground. This post is 135 feet from the brick fence on the southeast side of the cemetery, and 223.8 feet from the brick fence on the northeast side. The following true bearings were determined in 1914 and 1918:

	° /	
Top of well house at superintendent's lodge (mark) (1914).....	46 28.6	W. of S.
Base of flagpole in cemetery (1914).....	74 28.0	W. of N.
Top of old cannon set vertically (1914).....	61 58.4	W. of S.
Flagpole in cemetery, 6 feet above ground (1918).....	74 28.3	W. of N.
North meridian cross marked on top of brick wall around grounds (1918).....	0 00.5	E. of N.

Shreveport, Caddo Parish.—The station of 1904 was reoccupied. It is in the northeastern part of the space inside the Caddo Downs race track, which is about 3 miles southwest of the courthouse. The inner fence about the race track is distant from the station 38.1 feet, measuring due north, and 34.4 feet measuring in the direction of the Mulhaupt House. There is a small pear orchard about 15 rods north and west of the station and across the race track. The station is marked by a Bedford limestone post 5 inches square, projecting 5 inches above the general surface, and having a hole filled with lead to mark the center. Two other similar stones mark the meridian, the south stone being 600 feet south of the magnetic station and 6 feet inside the inner fence of the race track, while the north stone is 940 feet north of the magnetic station and is 6 feet inside the high board fence surrounding the race-track grounds. In 1918 the view of the north meridian stone was reported cut off by a new clubhouse. The following true bearings were reported in 1918:

	° /	
South meridian stone.....	0 00.0	S.
Jewella Christian Church spire.....	77 01.6	W. of S.
Tip of water tank in fair grounds, 500 feet distant.....	64 41.2	W. of N.
Near gable on fair grounds clubhouse.....	4 02.1	W. of N.
Water tank 1 mile distant.....	61 41.6	E. of N.

MICHIGAN.

Grand Rapids, Kent County.—The old station in John Ball Park near the present swimming pool was reoccupied, but, as it was no longer well suited for magnetic observations, a new station was established 564 feet north-northeast of the old site. The location is 82 feet east-southeast of the path along the shrubbery, about 280 feet west-northwest from the willow trees next to the driveway to the east, about 465 feet north-northeast of the near side of the swimming pool, and approximately 500 feet north-northeast of the old black maple tree near the turn in Butterworth Avenue. A meridian stone was set 400.7 feet south. This is a sandstone and is set down flush with the surface of the ground. It is 72.8 feet northeast of a black walnut tree, which is itself 60 feet northeast of the center of the swimming pool. The old marking stone was set down flush with the surface of the ground at the new station. It is of Bedford limestone 5 by 6 by 30 inches and lettered U. S. C. & G. S., 1907. Some of the letters have been broken off. The following true bearings were determined:

Tip of ventilator on railroad shops, 1 mile distant (mark).....	3 45.7	W. of S.
Center of chimney at Grand Rapids Brewery, 1 $\frac{3}{4}$ miles distant.....	67 31.2	E. of N.
Steeple of Lutheran Church (near brewery).....	68 00.8	E. of N.
Center of right-hand chimney at Muskegon Power Co. plant.....	70 40.1	E. of S.
Near edge of chimney at greenhouse (near roof), 500 feet distant..	35 16.7	E. of S.

Observations were also made at seven auxiliary stations. No. 1 was in the south-east rear yard of the New Hall School, which is about 4 $\frac{1}{4}$ miles south and 1 $\frac{1}{8}$ miles west of the primary station. No. 2 was in the northwest part of the yard of the De Laney School, which is about three-fourths of a mile north and 5 $\frac{1}{4}$ miles west of the primary station. No. 3 was in the field across the road south of the Alpine Catholic Cemetery, which is about 6 miles north and one-half mile east of the primary station. No. 4 was in the field about 600 feet west of the building of the District School No. 2. It is about one-fourth mile north and 7 $\frac{3}{8}$ miles east of the primary station. No. 5 was in the southeast part of the yard of the Beckwith School, which is about 2 miles north and 5 miles east of the primary station. No. 6 was in the southwest part of the front yard of the James Fisk farm, about 1 $\frac{1}{2}$ miles northwest of Dutton. It is about 7 $\frac{1}{2}$ miles south and 5 miles east of the primary station. No. 7 was at the side of the road next to the northwest corner of the Metcalf farm, about 3 miles west of North Byron. It is about 8 $\frac{1}{2}$ miles south and 4 $\frac{3}{4}$ miles west of the primary station.

MISSISSIPPI.

Brookhaven, Lincoln County.—The station of 1914 was reoccupied. It is located in what is now the garden of J. H. Sumrall, about one-half mile north from the town's center. It is 120.2 feet from the fence on the south and 53.9 feet from a new fence on the east. It is marked by a 4-inch glazed pipe with a magnetic station marking plate set in the top, which projects about 6 inches above the ground. The following true bearings were determined in 1914 and 1918:

East gable of W. E. Swett's house (mark) (1914).....	23 28.1	W. of S.
North gable of A. T. Witbecks house (1914).....	42 26.2	W. of S.
South gable of Capt. Powell's house (1914).....	6 49.5	W. of N.
West gable of house of George Dunn, east-southeast across the rail- way (1918).....	60 04.6	E. of S.

The north point of a meridian line is set about 540 feet distant near the north fence of the pasture. It is marked by a limestone post 6 by 6 by 38 inches, projecting about 12 inches above the ground, and lettered U. S. C. & G. S., 1901.

NEBRASKA.

Blue Hill, Webster County.—The station is in the cemetery, one-half mile east of the northeast corner of the town. It is in an unoccupied part of the cemetery, east of the main driveway, where the ground begins to slope off toward the east and about 20 feet east of the row of cedar trees along the east side of the driveway. It is 125.6 feet south and a little east of the well and is directly in line with the city standpipe and the north edge of the Heedt monument. It is also directly in line with the middle of the Wibben monument and the south edge of the larger Harper monument, and 76.2 feet from the latter. The station was not permanently marked.

Edgar, Clay County.—The station is in the cemetery south of the town. It is in an unused part of the cemetery toward the south side. It lies 52.8 feet from the south fence, 76.7 feet east of the curbing on the east side of the main driveway, and 73.2 feet southwest of the southwest corner of the base of the Judy monument. The station was not permanently marked.

Shickley, Fillmore County.—The station is in the cemetery, about three-quarters of a mile east of the center of the town. It is in the vacant space toward the east side of the cemetery, just north of the main east and west driveway. It lies east, and directly in line with the south side of the caretaker's tool house. It is 36.4 feet from the east fence of the cemetery, 32.5 feet southeast of the southeast corner of the base of the Loyd Murphy monument, and 57.1 feet northeast from the northeast corner of the Lee monument. The station was not permanently marked.

Tobias, Saline County.—The station is in the yard of the Catholic Church in the north part of town. It lies directly north of the northeast corner of the addition to the church, and 55.3 feet from it. It is 71.2 feet from the east fence and 33.4 feet from the north fence about the church yard. The station was not permanently marked.

NORTH CAROLINA.

Marion, McDowell County.—The station of 1898 was found under a hedge on the east side of the courthouse grounds. Observations were made 13.8 feet east-northeast of this station in the front yard of the house to the east of the courthouse, but on account of the proximity to addition to the courthouse it was deemed best to establish a new station for future magnetic work on the high-school grounds about 1,000 feet to the southwest. This station is 166.0 feet from the southeast corner of the high-school building and 121.2 feet from the near edge of the concrete walk along the northeast side of the grounds. It is marked by a bronze disk set in the top of a granite post 6 by 6 by 24 inches. The following true bearings were determined:

Chimney on small house 1 mile distant (mark).....	7 26.2 W. of S.
Lutheran Church spire.....	50 54.8 E. of S.
Courthouse tower.....	82 09.3 E. of N.
Baptist Church spire.....	40 41.4 E. of N.
South corner of school building.....	71 27.9 W. of N.

Four auxiliary stations were also occupied. No. 1 is located on the northeast corner of the Greenlee School grounds about $5\frac{1}{2}$ miles west-southwest of the primary. No. 2 is about $4\frac{1}{2}$ miles northeast by east of the primary station on the grounds of the Nebo School, 150 feet east of the school building, 45 feet from the tennis court, and 80 feet from the side of the road. No. 3 is about $4\frac{3}{4}$ miles south-southeast of the primary station on the grounds of the Glenwood School, 150 feet east of the school building, and 110 feet north of the road along the south side of the grounds. No. 4 is about 4 miles northwest by north of the primary station on an open piece of ground across the road and about 500 feet east of the Tom Creek school house.

Murphy, Cherokee County.—The station of 1898 located on what was the high-school grounds, but now the residence property of P. E. Neison, was reoccupied as nearly as could be determined. The point occupied was about 125 feet from the house and 35 feet from the near edge of the concrete road in front. A new station was established in the northwestern part of the present high-school yard about three-fourths mile east-northeast of the Southern Railway depot, and three-eighths mile northeast of the courthouse. The station is 195.9 feet from the northwest front corner of the northwest wing of the high-school building and 194.8 feet from the outer edge of the corner stone of the high-school building, which is the southern front corner of the main part of the building. The following true bearings were determined:

Courthouse cupola (mark).....	44 26.4 W. of S.
Baptist Church steeple.....	89 58.4 W. of N.
Outer edge on northwest corner of white marble border on school building.....	35 03.9 E. of N.
Steeple on Presbyterian Church.....	4 37.4 E. of S.
Outer edge of corner stone on school building.....	72 46.2 E. of N.

TEXAS.

Fort Worth, Tarrant County.—The site of the station of 1888 could only be approximately determined and could not be occupied. A new station was established in the southwest part of the grounds belonging to the Texas Christian University, which is about 4 miles southwest of the old magnetic station and about $3\frac{3}{4}$ miles south-southwest of the courthouse. It lies about 800 feet west of the steps at the Bible College building. It is 51.4 feet east of the west fence about the university grounds and about 85 feet west-southwest of the bank of a ditch through this part of the grounds. The station is marked by a limestone post 5 by 7 by 30 inches projecting 2 inches above the ground. A bronze disk, dated 1918, is set into the top of the stone. The following true bearings were determined:

	o /	
Near edge at second story of chimney on women's dormitory (mark)	.44	29.4 E. of N.
Center of small opening (drain) near the middle of the top of the Bible College building	82	50.8 E. of S.
Wooden water tank, 1 mile distant	46	58.9 E. of S.
Large steel water tank, $1\frac{1}{2}$ miles distant	47	22.6 W. of N.
Chimney near middle of Country Club building	25	18.3 W. of N.

Greenville, Hunt County.—The old magnetic station was reoccupied. It is on the county fair grounds, about $1\frac{1}{4}$ miles southeast of the center of the town, and about midway between the extremities of the race track. It is 39 feet south of the outside fence around the race track at the south side of the oval. The station is marked by a limestone post 8 by 8 by 30 inches. In 1918 the bronze marking disk was missing and the top of the stone was found broken off. The pieces of the stone were fitted together and banked up with earth to form a small mound. The station will probably be suitable and available indefinitely. The following true bearings were determined in 1912 and 1918:

	o /	
Lower east side of flagpole on the grandstand (1912)	23	41.4 W. of N.
East gable of residence about 500 feet northwest of the northwest corner of the grounds (1912)	51	12.3 W. of N.
Peak of house 300 feet west of the Baptist Church (1918)	6	53.7 E. of N.
North side of silo, three-fourths mile distant (1918)	89	02.6 W. of S.
Steeple of Cavanaugh Methodist Episcopal Church (1918)	31	04.7 W. of N.

Sherman, Grayson County.—The magnetic station of 1881 could not be reoccupied. A new station was established in the southeast part of the Old West Hill Cemetery, which is about three-quarters of a mile southwest of the courthouse and the magnetic station of 1881. The station is in the north side of the first driveway in the cemetery, about 36 feet from the near side of the second driveway, which is graveled, and 300 feet from the south-southeast fence. It is 31.7 feet from the east-northeast fence, 17.8 feet north-northwest from the same corner of the Dan C. Blair 1903 monument, 95.9 feet southeast of the large Yarborough monument, and 65.8 feet south of the near side of the Woodward monument. The station is marked by a limestone post 5 by 7 by 30 inches, set flush with the surface of the ground. A bronze disk, dated 1918, is set into the top of the stone. A meridian stone was set 283.5 feet south, in the south side of a roadway. It is set almost flush with the surface of the ground. The following true bearings were determined:

	o /	
Tip of smaller and higher water tank at cotton mill three-fourths mile distant (mark)	30	51.0 E. of S.
Tip of large Birge monument 270 feet distant	73	14.5 W. of N.
Near edge of brick cupola on Kid Key College building	24	37.6 E. of N.
Courthouse steeple	52	04.5 E. of N.
Steeple of Catholic Church	80	48.5 E. of S.

Texarkana, Bowie County.—The marking stone of the station of 1912 had been destroyed, but a new mark was put in the position indicated by the bearings and distances of the former station. The station is in the eastern central part of the new baseball field, which is about 1 mile north of town. It is 265 feet from the north fence about the ball grounds, 36.8 feet from the inside of the east fence, and about 135 from the south fence. The station was marked by three slabs of broken concrete walk, set on edge, and buried down flush with the surface of the ground. A small hole drilled in the top of the middle one indicates the center. The following true bearings were determined:

North gable on house, 400 feet distant (mark).....	4 02.8 W. of S.
East gable of residence, 250 feet distant.....	32 01.9 W. of S.
Center of top chimney on residence, 600 feet distant.....	85 50.3 W. of N.
East gable on residence, 200 feet distant.....	67 03.6 W. of N.
Peak of south dormer window on residence, 600 feet distant.....	3 16.9 W. of N.

WYOMING.

Cheyenne, Laramie County.—The station of 1915 was reoccupied, but was found to be no longer suitable for magnetic observations on account of the change of surroundings. A new station was therefore established about 360 paces northwest of the old one. It is at Fort D. A. Russel in the field between the hospital buildings and the rifle range, 33 paces west of the roadway through the field to the rifle range. It is directly in line with the east fence of the horse corral, 106 paces north of the northeast corner. It is 80 paces from the west gate of the gate to the rifle range. The station was not marked. The following true bearings were determined:

Left edge main chimney on hospital, at roof.....	46 18.9 E. of S.
Tip of main ventilator on isolation hospital.....	38 51.7 E. of S.
Tip, Fort Russel water tank (mark).....	32 29.3 W. of S.
Right edge concrete filter house at reservoir.....	35 24.0 W. of N.

Green River, Sweetwater County.—The station of 1905 was reoccupied. It is on Government Island about one-fourth mile north of the center of the town in a V-shaped piece of land between two hills and east of a peculiar rock formation of nearly cylindrical form, on which stands a flagpole. It is about 60 feet from a hill to the west, 120 feet from a hill to the east, and 350 feet from hills to the north. It is 434.5 feet north of the northwest corner of the fence surrounding the cemetery and almost in line with this corner and the chimney of the second house east on the south side of the cemetery. It is marked by an oak stake 4 by 6 inches, showing about 4 inches above ground and having a cross sawed in the top. The following true bearings were determined:

Flagstaff on front of schoolhouse (mark).....	24 12.7 W. of S.
Northwest point on courthouse cupola.....	54 36.0 W. of S.
Flagstaff on southeast corner of brewhouse.....	50 37.7 W. of S.
Large smokestack at factory south of town.....	0 12.2 E. of S.
Cross on Catholic Church.....	48 34.8 W. of S.

