

1919.
NEW ZEALAND.

DEPARTMENT OF LANDS AND SURVEY:
SURVEYS
(ANNUAL REPORT ON).

Presented to both Houses of the General Assembly by Command of His Excellency.

The SURVEYOR-GENERAL to the HON. MINISTER OF LANDS.

SIR,—

Wellington, 14th July, 1919.

I have the honour to present herewith the report on survey operations for the year ended
31st March, 1919.

I have, &c.,

E. H. WILMOT, Surveyor-General.

The Hon. D. H. Guthrie, Minister of Lands.

REPORT.

THIS report deals with survey operations for the year in a general way only, leaving details to be found in the tables attached and in the reports supplied by the Chief Surveyors filed as departmental records.

Under the heading "Rural Surveys" in Table B, an area of 302,369 acres is shown as completed work, against 343,525 acres for last year. The decrease of 41,156 acres is due partly to the small field staff available, and partly to the fact that so many of the surveyors have been employed on the surveys of small estates for soldier settlement instead of on large blocks of Crown lands.

The area of Native lands surveyed during the year for the same reason shows a decrease from 271,481 acres to 241,927 acres. The cost of rural surveys remains the same as last year—1s. 6d. per acre—but Native surveys have gone up 1d., being this year 1s. 7d. per acre. The increase is in the cost of the work done by private surveyors, which amounted to 95 per cent. of the whole, and is no doubt accounted for by the difficulty of obtaining labour and the consequent high wages paid. A summary of the work executed during the year will be found in Table A.

TABLE A.

Class of Work.	Area.	Average Cost.	Total Cost.
	Acres.		£ s. d.
Triangulation, by staff surveyors	146,516	0·67d. per acre	414 13 5
Topographical, by staff surveyors	345,845	0·92d. „	1,327 2 11
Rural, by staff surveyors	289,063	1·50s. „	21,714 12 8
Rural, by staff surveyors (costs unobtainable)	45	..	..
Rural, by licensed surveyors	10,486	2·15s. per acre	1,128 18 9
Rural, by licensed surveyors (costs unobtainable)	2,775	..	..
Village and suburban, by staff surveyors ..	944·87	15·00s. per acre	712 9 6
Village and suburban, by staff surveyors (costs unobtainable)	257	..	..
Village and suburban, by licensed surveyors	107	14·53s. per acre	77 15 0
Town, by staff surveyors	172·74	37·77s. per section	173 15 5
	(in 92 sections)		
Town, by licensed surveyors	38·20	18·6s. „	106 18 9
	(in 115 sections)		
Native Land Court, by staff surveyors ..	13,119	18·35d. per acre	1,003 2 11
Native Land Court, by licensed surveyors ..	193,744	19·35d. „	15,623 10 11
Native Land Court, by licensed surveyors (fees paid by applicants)	35,064	..	..
Mining, by licensed surveyors (fees paid by applicants)	992·5	..	..
	Miles.		
Roads, by staff surveyors	124·33	£22·46 per mile	2,793 10 9
Roads, by staff surveyors (costs unobtainable)	3·25	..	..
Roads, by licensed surveyors	3·78	£43·30 per mile	163 14 0
Roads, by licensed surveyors (costs unobtainable)	5·7	..	..

TABLE B.

Land District.	Rural Surveys.	Native Land Court Surveys.
	Acres.	Acres.
Auckland	73,081	138,499
Hawke's Bay	23,099	49,496
Taranaki	19,711	26,264
Wellington	8,478	16,469
Nelson	12,493	5,228
Marlborough	1,849	3,732
Westland	3,238	..
Canterbury	67,427	717
Otago	85,484	..
Southland	7,509	1,522
Totals	302,369	241,927

MAJOR TRIANGULATION.

No field-work has been done, and further field data will be required before the computation-work can be proceeded with. In an appendix will be found an interesting report by the Chief Inspector of Surveys on the 8 in. micrometer theodolites used.

MINOR TRIANGULATION.

Although all work of this class except what is absolutely necessary for the proper location of and check on settlement-work has been stopped, 146,516 acres are shown under this heading, at a reasonable cost of under ¾d. per acre. The only districts in which this class of work was undertaken were Auckland and Nelson.

TOPOGRAPHICAL.

Under this heading 345,845 acres, at a cost of 0·92d. per acre, are shown. This work is done as a preliminary to settlement surveys, and this year was undertaken in Auckland, Otago, and Nelson.

STANDARD SURVEYS.

Work on these very useful surveys has been continued by Messrs. C. A. Mountfort, W. T. Neill, and H. M. Kensington, in Napier, Dunedin, and Auckland respectively. In Napier and Dunedin very

little now remains to be done, but in Auckland, owing to the growth of the city, many miles of streets are still without standard blocks. The high standard of accuracy so necessary in this class of work has been well maintained by the experienced officers above mentioned. After completing the Napier work Mr. Mountfort took up rural standard surveys in the neighbourhood of Feilding, where the trig. stations had in many cases become useless for checking work on account of the views between them, and from them, to check-points having become blocked by plantations and buildings.

SETTLEMENT SURVEYS.

Of these, which comprise Crown lands, land for settlements, and land for discharged soldiers, the bulk appears under the heading of "Rural" in Table A, the acreage there shown being 302,369 acres, while the remainder includes village and suburban and town lands totalling 1,309 acres. In Table B the rural acreage has been allocated to the various land districts.

NATIVE SURVEYS.

During the year staff surveyors completed the survey of 13,119 acres, while 228,808 acres was surveyed by private surveyors. The area surveyed in each land district is given in Table B. The surveys under this head have mostly been subdivision surveys of blocks of which the periphery surveys had been already completed.

GOLD-MINING SURVEYS.

The area returned under this heading is very small, being only 992 acres. The surveys were made by private surveyors, the fees being paid by applicants. The cost per acre cannot therefore be given.

COAL-MINING SURVEYS.

No surveys of coal-mining areas were made.

INSPECTIONS.

There being only one Inspector, the work of inspection has been carried on by Chief Draughtsmen and staff surveyors. In consequence there has not been so much of this very necessary work done as I could have wished. As pointed out in previous reports, absence of inspection has a tendency to induce carelessness in some surveyors, the more so as it is difficult for them to get good field hands. Generally speaking, I am pleased to note that the result of the inspections made has been to show that satisfactory work is being done, though an amount of remissness and carelessness has been revealed sufficient to show that more inspection-work is urgently required.

PROPOSED OPERATIONS FOR 1919-20.

Triangulation.—Owing to the depletion of the field staff and the need for economy during the war the major triangulation was for the time being discontinued, but it is hoped that a start may again be made some time during the coming year. No minor triangulation save such as may be absolutely necessary for the connection and control of settlement surveys will be undertaken.

Standard Surveys.—These surveys will probably be principally carried out in Auckland, though an endeavour will be made to organize a staff for this work so that in the near future it may be undertaken in a more comprehensive manner. The approximate cost of this class of work is about £50 per mile, and part of this cost—in ordinary cases two-fifths—is borne by the local body. The great value of these surveys is recognized by the City Councils of Auckland and Dunedin (in which cities for years past standard-survey work has been in progress), and they are only too pleased to contribute on these terms. In addition to the standard survey of Auckland, which will be continued by Mr. Kensington, the rural standard-survey work will be continued by Mr. C. A. Mountfort. In future all standard surveys will be controlled direct from Head Office.

Topographical Surveys.—Under an arrangement with the Defence Department the work initiated by Colonel Gibbon, of publishing topographical contour maps of the Dominion, is to be carried on by this Department. Up to the present it has not been possible to do so, but I hope during the ensuing year to be able to get together a small staff and make a beginning. The maps will be very useful to the travelling public, especially to motorists, and should meet with a ready sale, by means of which a large portion of the cost of production will be covered.

Settlement Surveys.—At the close of the year there were in the hands of the staff and temporary surveyors 596,856 acres of settlement lands and 75,670 acres of Native lands, while in the hands of private surveyors there were 30,826 acres and 287,977 acres respectively. The allocation of this work among the several land districts is shown in Table 4. As is always the case, and more particularly so at the end of last year, for reasons already given, these figures include a large acreage of which the field-work has been completed, but of which the mapping will not be finished till July or August, during which months many of the surveyors will be called in from the field to the office. In addition to the allocated work, Chief Surveyors had in sight 13,180 acres of settlement land and 3,970 acres of Native lands to be allocated later on. The work now in hand, together with that as yet unallocated, and the survey of estates that from time to time will be acquired for soldiers' settlements and for ordinary settlements, and of Crown lands to be offered for settlement, will occupy most of the staff surveyors fully for the ensuing year. As the urgency of providing land for discharged soldiers increases, it will probably be necessary to supplement the efforts of the staff by placing contracts in the hands of private surveyors.

HEAD OFFICE DRAUGHTING STAFF.

The calls for work for other Departments during this year have been fully up to the usual volume, and in spite of a diminishing staff have been met, although with difficulty.

Probably the map-work of the Department for publication has never been at so low an ebb, both in quantity and quality, as at the present time. Reproduction of maps has had to be made without revision as a temporary expedient, and the slowness with which printing has proceeded has prevented many maps from being put in hand at all.

Originals for new four-mile maps for the South Island have been completed and await printing, and the City of Wellington map has been brought up to date.

Town plans have continued to come in, and the number has been maintained, and no doubt will now increase with the change from war conditions. A general reorganization and overhaul of the publications will be carried out as soon as the projected replacement of staff can be effected.

DRAUGHTSMEN'S EXAMINATION.

This examination was held on the 3rd September, 1918, when ten candidates sat, two of whom, Mr. Saunders and Mr. Elvy, obtained second-grade certificates, and Cadet Nightingale passed the elementary stage, while several others have but one subject to complete to obtain this grade. Draughtsmen generally hardly seem as yet to realize the importance of this examination to their future prospects, more especially the younger men, the older men usually being already otherwise qualified for passing the salary bar of £300 per annum.

SURVEYORS' BOARD.

Examinations were held in September, 1918, and March, 1919. At the former eleven candidates sat, two passing; and at the March examination four sat and two passed. The return of many pupils and cadets from military service will bring a considerable increase in the number of candidates for the next ensuing examinations, and certain concessions have been agreed upon by the Associated Boards for this class of candidates.

TIDAL SURVEY.

The work for the year comprised the predictions for the year 1920 at the ports of Auckland and Wellington, and the completion of an additional harmonic analysis to determine the tidal constants at Auckland. The computations were carried out, as in former years, by Messrs. Gillespie and Williams.

The mean sea-level at New Plymouth was determined from a year's record by an automatic tide-gauge, and was referred to permanent bench-marks.

An inspection of the tidal stations at Auckland, New Plymouth, Wellington, Lyttelton, Dunedin, Bluff, and Westport was made by the Chief Inspector, and levels were taken to connect each of the automatic tide-gauges to a permanent bench-mark.

The work connected with the preparation of the necessary data to enable a tide-table to be prepared for the year 1921 for the ports of Auckland, Wellington, Lyttelton, Dunedin, Bluff, and Westport was commenced, and will be continued during next year. Dr. C. E. Adams, who was previously in charge of this work, having been promoted to the position of Government Astronomer, the control of the tidal survey was entrusted to Mr. W. T. Neill, Chief Inspector of Surveys, whose report appears in an appendix hereto.

MAGNETIC OBSERVATORY.

The work of the Magnetic Observatory at Christchurch has been carried on by Mr. H. F. Skey, B.Sc. Continuous records of the magnetic elements for the year have been obtained from the self-recording instruments at the Observatory, and also at the substation at Amberley. The Milne seismograph No. 16 has been kept in operation. In addition to the routine work of the Observatory meteorological observations have been taken and supplied regularly to the Dominion Meteorologist and to the local newspapers.

In Appendix II is given the hourly values of the magnetic declination and horizontal force, the vector diagrams, and diagrams showing the magnetic curves for the year. In the report by the Chief Inspector of Surveys (Appendix I) will be found further details as to the work of the Observatory.

If it is desired that the work of this Observatory shall be brought up to a proper standard of usefulness it will be necessary to increase the staff, and in any case it is essential that an understudy to the Director (Mr. Skey) should be appointed.

GENERAL.

During the past year the staff, both field and office, suffered severely by reason of deaths, retirements, and enlistments. The roll of honour has had added to it the names of Surveyors H. F. Edgecumbe, H. E. Girdlestone, and P. C. Gannaway; Survey Cadets A. E. R. Bagnall and A. D. Bines; and Draughtsmen T. L. Folley and O. D. Pearce. There also passed away after a long and painful illness, borne with wonderful fortitude, Mr. F. A. Thompson, Chief Surveyor of Nelson; Mr. A. N. Harrop, Chief Draughtsman, Hokitika, died suddenly; Surveyor R. M. McIvor was a victim of the influenza epidemic; and Cadet W. E. Gourley met his death by accident. The retirements were Mr. H. A. Farquhar, who was for many years senior draughtsman in Head Office, and Mr. A. M. Roberts, one of our surveyors. The enlistments comprised two surveyors, one draughtsman, and two draughting cadets. One draughtsman was also dismissed. The Department has thus lost permanently thirteen officers, and temporarily five officers. On the other hand, I am pleased to be able to report that three surveyors, four field cadets, and four draughtsmen have

returned from the front, most of them towards the close of the year, several being still on departmental leave of absence. At the close of the year there are still absent with the Expeditionary Forces five surveyors, five field cadets, two surveyor's assistants, eighteen draughtsmen, and two draughting cadets—in all thirty-two. It is anticipated that these will all return during the next six months.

During the coming year there will be numerous retirements of officers who have reached the age-limit, and of superannuated officers who have been kept on during the war, and it will be necessary to provide for bringing the staff up to normal by appointing a considerable number of cadets, both field and draughting, and by the appointment to permanent positions of certain temporary officers who have proved themselves capable men. It will also be necessary to employ temporary men during the year. In all appointments it is desirable that where practicable preference shall be given to returned soldiers.

It has appeared to me for some time past that a reorganizing of our office staff is very desirable, and accordingly I submitted a scheme which would in my opinion secure greater economy and efficiency, and, while not depriving the field staff of their recognized right to have a chance of rising to the higher positions in the Department, would permit of draughtsmen also rising to positions of responsibility and consequent adequate remuneration. Though the scheme was approved by the Public Service Commissioner, it has not been deemed feasible that it should be brought into operation while the war conditions still prevail, but I hope that as soon as things become comparatively normal it will be given a trial.

In conclusion, I am pleased to place on record the appreciation by the various Chief Surveyors of the manner in which their officers, both permanent and temporary, have carried out their duties during the year, and I desire to convey my thanks to the whole of the Survey staff for their good work during a very trying period.

Table 1.—RETURN OF FIELD-WORK EXECUTED BY HEAD OFFICE STAFF FROM 1ST APRIL, 1918, TO 31ST MARCH, 1919.

Land District.	Standard Surveys.				Rural Standard Surveys.				Other Work.
	Completed.		In Progress.		Completed.		In Progress.		
	Miles.	Cost per Mile.	Miles.	Cost per Mile.	Miles.	Cost per Mile.	Miles.	Cost per Mile.	
Auckland	..	..	69	£ 39·48	..	..	..	£ ..	£ s. d. 169 15 5
Hawke's Bay	..	..	38	50·86	..	..	43	30	43 15 10
Otago	..	..	40	48·24	..	..	..	..	..

NOTE.—The average cost of the standard surveys is about £44 10s. per mile.

Table 3.—RETURN OF FIELD-WORK EXECUTED BY STAFF AND CONTRACT SURVEYORS ON LANDS ADMINISTERED BY OTHER DEPARTMENTS FROM 1ST APRIL, 1918, TO 31ST MARCH, 1919.

Land District.	Bural.		Village and Suburban.			Town.			Roads, &c.		Native Land Survey.			Mining.		Other Work.	Total Cost of Completed Work from 1st April, 1918, to 31st March, 1919.
	Acres.	Cost per Acre.	Acres.	Number of Sections.	Cost per Acre.	Acres.	Number of Sections.	Cost per Section.	Miles.	Cost per Mile.	Acres.	Number of Sub-divisions.	Cost per Acre.	Acres.	Number of Sections.	Cost per Acre.	
Auckland..	..	s.	..	..	s.	..	..	..	..	..	104,499	801	d. 19-00	..	..	£ s. d. 221 19 4	8,396 4 5
Hawke's Bay	..	..	..	..	..	..	..	..	..	..	49,496	208	16-39	..	..	..	3,379 13 11
Taranaki ..	..	..	..	..	..	..	..	..	..	..	26,264	279	20-83	..	..	..	2,279 13 0
Wellington	..	..	..	..	..	..	..	..	..	..	16,469	182	24-65	..	..	..	1,692 0 0
Nelson ..	..	..	..	..	..	..	..	..	..	..	5,228	13	12-26	..	..	..	267 4 3
Marlborough	..	..	..	..	..	..	..	..	..	..	3,732	28	27-00	..	..	..	419 17 9
Westland..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Canterbury	..	..	..	..	..	..	..	..	..	..	653	43	83-20	..	..	..	226 7 11
Otago ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Southland	274	2-5	3	1	73-3	..	..	..	..	..	1,522	14	29-57	..	..	..	232 2 11
Means and totals ..	274	2-5	3	1	73-3	..	..	..	..	..	206,863	1,568	19-29	..	..	£ s. d. 221 19 4	168,893 4 2
Licensed surveyors (costs unobtainable)	..	..	..	..	..	..	..	..	..	..	35,064	..	..	992-5	8	..	..
	..	..	..	..	..	..	..	..	..	..	241,927	..	..	992-5	8	..	..

Table 4.—RETURN SHOWING SURVEYORS EMPLOYED AND THE WORK ON HAND ON 1ST APRIL, 1919.

Chief Surveyors.	Surveyors employed.			Work on Hand.						
	Staff.	Tempo- rary.	Contract.	Land District.	Trig.	Topo- graphy.	Settle- ment.	Town.	Native- land Sur- vey.	Roads.
H. M. Skeet ..	12	6	36	Auckland ..	Sq. Miles. 63	Acres. ..	Acres. 85,663	Acres. 691	Acres. 57,823	Miles. 120
W. F. Marsh ..	4	..	7	Hawke's Bay ..	..	..	30,865	..	33,275	7
G. H. Bullard ..	3	2	7	Taranaki ..	42	..	44,600	..	4,354	5.9
G. H. M. McClure	2	..	11	Wellington ..	100	..	8,196	145	41,465	5.2
H. D. McKellar ..	4	1	..	Nelson ..	..	..	31,526	..	..	15.5
H. J. Lowe ..	..	1	..	Marlborough ..	..	..	6,300	..	1,000	..
R. S. Galbraith ..	1	..	..	Westland ..	..	..	5	..	..	..
H. D. M. Haszard, F.R.G.S.	3	..	..	Canterbury ..	..	..	121,031	..	..	13
R. T. Sadd ..	4	..	..	Otago ..	..	..	265,894	..	404	..
T. Brook ..	1	..	2	Southland ..	..	..	*27,776	..	326	3.5
Total staff sur- veyors	34	10	63	..	205	..	621,856	836	138,647	170.1

* Also 400 acres of sawmill areas.

Table 5.—PRINCIPAL CLASSES OF OFFICE-WORK DONE FROM 1ST APRIL, 1918, TO 31ST MARCH, 1919.

District.	Plans placed on Instruments of Title.			Deeds and other Instruments passed.	Plans examined.	Deeds or other Instruments.	Maps drawn.		Lithos published.	Lithos sold.	
	Leases and Licenses.	Freehold.	Miscellaneous.				Standard Publications.	Sale Plans.			
Auckland ..	8,484	3,374	..	2,449	1,165	..	..	98	..	£	s. d.
Hawke's Bay ..	148	1,624	1,442	2,913	505	160	..	17	..	162	19 8
Taranaki ..	154	1,037	2,975	2,992	231	175	1	7	7	46	7 6
Wellington ..	350	2,742	1,084	2,176	368	..	3	6	..	31	11 10
Nelson ..	280	361	48	137	117	312	5	10	..	11	5 0
Marlborough ..	110	150	158	..	61	..	2	3	..	24	12 2
Westland ..	125	86	..	..	56	63	2	2	..	4	9 6
Canterbury ..	381	2,367	254	1,499	251	..	..	7	..	8	6 6
Otago ..	484	1,224	22	960	134	484	5	14	..	45	8 10
Southland ..	295	818	127	595	76	250	6	17	..	66	13 1
Totals ..	10,811	13,783	6,110	11,721	3,014	1,444	24	181	7	29	15 6

* Revised.

APPENDIX I.

EXTRACT FROM REPORT BY W. T. NEILL, CHIEF INSPECTOR OF SURVEYS.

TRIANGULATION.

The field-work of the major triangulation of the Dominion is at present held in abeyance, and, as a systematic reduction of the observations and the computation of the work cannot be commenced by the office staff until further data are available, no progress has been made with this work except the examination of the horizontal circles of the two 8 in. micrometer theodolites by Troughton and Simms, which were used on this triangulation. This was effected by a harmonic analysis of the readings of the graduated limb by the two opposite microscopes at each 10° division, and has for its object the determination of (1) the eccentricity (E), (2) the point on the graduated circle of the line of no eccentricity (ε), (3) the angular distance between the opposite microscopes (180° + C), (4) the mean uncertainty of any one residual.

If the centre of rotation of the vertical axis does not coincide with the centre of the graduated limb, the differences of the readings of the opposite microscopes at each division of the limb will range, by a regular periodic law, from a vanishing nothing to a maximum between the points on the limb indicated by the line of no eccentricity and 90° on each side of it.

The variable periodic quantity represented by the difference of the readings of opposite microscopes can be expressed by the formula

$$\mu = E \sin (Z + \epsilon)$$

and as the microscopes may not be exactly 180° apart a constant C added to the above formula gives

$$\begin{aligned} \mu &= E \sin (Z + \epsilon) + C \\ &= C + A \cos Z + B \sin Z \end{aligned}$$

if $A = E \sin \epsilon$, $B = E \cos \epsilon$, where Z is an angle found by dividing the circumference of the graduated limb by the number of observations, which is 36 in this case.

Four readings of the graduated limb at 90° apart will suffice to determine the three unknown quantities C, E, and ε in the above formula; but in order to determine the eccentricity with greater accuracy, and to eliminate errors in reading and accidental errors of graduation, the circle readings at each 10° division are used.

Each reading of a pair of opposite microscopes furnishes an equation of condition as above, and from these 18 equations the most probable value of the eccentricity is deduced by the method of least squares.

The results for theodolite No. 218 are— $E = 1.53''$; $\epsilon = 0^\circ 05'$; $C = -17''$. The angular distance between the microscopes is therefore $179^\circ 59' 43''$. The sum of the squares of the 36 residuals

is found to be 530.28". The mean uncertainty of each is therefore $\pm \sqrt{\frac{530.28}{35}} = \pm 3.89''$, and mean error of reading of one microscope $= \pm 3.89'' / \sqrt{2} = \pm 2.75''$.

For theodolite No. 219 the results are— $E = 3.53''$; $\epsilon = 103^\circ 12'$; $C = -23''$. The angular distance between the microscopes is therefore $179^\circ 59' 37''$. The sum of the squares of the residuals

is found to be 166.84". The mean uncertainty of each is therefore $\pm \sqrt{\frac{166.84}{35}} = \pm 2.18''$, and mean error of reading of one microscope $= \pm 2.18'' / \sqrt{2} = \pm 1.54''$.

TIDAL SURVEY.

During the first part of the year Messrs. Gillespie and Williams prepared the tide-tables for 1920 at the ports of Auckland and Wellington. The method of computing the predictions was that which was introduced by Dr. Adams, a brief description of which is given in the annual report for 1910-11, and a more detailed account in Appendix No. 7, Part II, U.S. Coast and Geodetic Report, 1894, under the title of a "Manual of Tides" (Chapter V, page 183), by Rollin A. Harris. The heights and times of high and low water were checked at intervals of a lunation by the formula given by Sir G. H. Darwin in the Admiralty Manual of Scientific Inquiry, page 89, and the diurnal inequality was examined to see that it followed the same rule as shown on the tide-gauge records. The diurnal inequality is a portion of the lunar tide which depends, at a given port, wholly upon the declination of the moon, the effect being a difference in height of the alternate tides when the declination of the moon is north or south of the Equator.

A simple explanation of this phenomenon is afforded by the equilibrium theory of the tides worked out by Newton. This theory is not entirely satisfactory, and in some respects it is inaccurate; nevertheless it furnishes a guide for the discussion of tidal observations, and its usefulness in explaining some of the peculiarities of the tides is generally recognized.

Referring to Fig. 1: E and M are the positions of the sun and new moon with respect to the Equator AB on 21st December, 1911. The shaded portion represents the form of the ocean due to the combined attractions of the disturbing bodies. At a port P in the Northern Hemisphere it is apparent that there is a difference in the height of the tide at P, and twelve hours later at P¹, and that in both hemispheres the difference increases with the latitude, but at ports on the Equator the successive tides are equal. When the new moon is on the meridian of a given place the tide under the moon occurs in the daytime, whilst the tide opposite the moon is the night tide. This

gives, in the Southern Hemisphere, when the moon's declination is south, the day tide at H higher than the night tide at H¹.

Seven days later when the moon is on the Equator the day and night tides are equal in height (Fig. 2) at all ports. Again, in fourteen days from the new moon the position of the moon is at M₂ (Fig. 1), and it is now full moon, during this interval of time, since the moon transits about fifty minutes later each day, the morning tide at the beginning of a lunation becomes the night tide at the end of it.

Further, a consequence of the inclination of the plane of the Equator being greater than the inclination of the plane of the moon's orbit to the place of the ecliptic is, for the Southern Hemisphere, that new moon occurs in the summer months south of and during the winter months north of the Equator, as is obvious from Fig. 3, which shows the relative positions in June and December.

These considerations give a general rule for the diurnal inequality as follows: That in both hemispheres the day tides are highest in the summer, and the night tides in the winter.

The tides on the New Zealand coast follow the general rule, but there are places where the diurnal inequality sometimes becomes so large that there is only one tide in the twenty-four hours, and at Singapore, although this port lies close to the Equator, the diurnal inequality is very large.

For the future the computation of the predictions will not be continued by the computing division at this office. Arrangements have been made to have the curves for six ports—viz., Auckland, Wellington, Lyttelton, Dunedin, Bluff, and Westport—run off by the tide-predicting machine at the National Physical Laboratory, England. The computing staff at this office will perform the analyses for these ports annually to determine the tidal constants required for setting the machine.

The harmonic analyses involve an enormous amount of numerical calculation. By the introduction of the printed computation forms the work is performed in a systematic and mechanical manner, but as it is found that certain abridgments of the numerical work can be introduced without impairing the accuracy of the results a certain amount of saving will be made in future reductions.

The tidal station at New Plymouth was visited, and the mean sea-level has been derived from the records of the automatic tide-gauge for a period of one year.

Inspections of the tidal stations at Auckland, Wellington, Lyttelton, Dunedin, Bluff, and Westport were made, and the automatic tide-gauges connected by levelling to standard tide-poles and to permanent bench-marks at these ports. My thanks are due to the Harbour Board authorities at these places for assistance in this part of the work.

A comptometer computing-machine was installed in the computing division during the year.

MAGNETIC SURVEY.

It is now twenty years since the field-work of the Magnetic Survey was undertaken in the Dominion, and in order to detect the secular changes in the magnetic elements it is desirable that a number of the original stations, particularly those in the immediate vicinity of the seaports, should be reobserved.

The Magnetic Observatory at Hagley Park, Christchurch, and the substation at Amberley, were visited in connection with a general inspection last March.

The work of the observatory in connection with the running of the recording instruments has been continuous, and valuable records of the magnetic elements have been secured.

The measurement of the curves and the reduction of the results for publication has fallen into arrears, principally on account of the observatory being understaffed. Prior to the war full tables of the hourly values of the declination and horizontal force were published in the annual report of this Department, but since 1914 the only results published were the monthly means for 1915 and 1916 of these elements and the seismological records for 1915 in the *New Zealand Journal of Science and Technology*. The full records together with the other arrears mentioned will soon be ready, and will be published when the present positions with respect to shortage of paper is relieved.

The mean annual values of the magnetic elements as far as they are available at present are shown in the table below:—

Table of the Mean Values of the Magnetic Elements at Christchurch Observatory.

Date.	Declination E. of N.	Annual Change.	Horizontal Force.	Annual Change.	Vertical Force.	Annual Change.	Inclination South.	Annual Change.	Date.
			C.G.S. Unit.	γ	C.G.S. Unit.	γ			
1902	16 15.1	+ 3.2	0.22694	— 25	0.55277	— 9	67 40.8	+ 1.5	1902
1903	16 18.3	+ 3.5	0.22669	— 25	0.55286	+ 19	67 42.3	+ 1.8	1903
1904	16 21.8		0.22644		0.55307		67 44.1		1904
		+ 2.63		— 22		+ 28		+ 1.78	
1910	16 37.6	+ 1.4	0.22511	— 27	0.55474	+ 23	67 54.8	+ 1.4	1910
1911	16 39.0	+ 2.5	0.22494	— 23	0.55497		67 56.2	+ 2.0	1911
1913	16 44.0	+ 0.8	0.22449	— 35	0.55478	+ 40	67 58.2		1913
1914	16 44.8	+ 2.2	0.22414	— 27					1914
1915	16 47.0	+ 2.8	0.22387	— 32		+ 2		+ 1.65	1915
1916	16 49.8	+ 3.2	0.22355	— 27					1916
		+							
1917	16 53.0	2.8	0.22328	— 23	0.55486	+ 34	68 04.8	+ 1.9	1917
1918	16 55.8		0.22305		0.55520		68 06.7		1918

The mean variation of the declination for the period 1902–18 is found to be increasing at the rate of 2.54' per annum.

APPENDIX No. II.

MAGNETIC OBSERVATORY, CHRISTCHURCH.

By H. F. SKEY, B.Sc.

DURING the year the Adie magnetographs at Christchurch and the Eschenhagen magnetographs at Amberley have been kept recording, and tables of the values at each hour of the year 1918 have been prepared from the resulting magnetograms for magnetic declination and magnetic horizontal force. Seasonal and yearly vector diagrams and mean monthly, seasonal, and year mean diurnal variations are shown in plotted curves. The increasing mean diurnal range is shown on the monthly diagram for the years 1917 and 1918.

The customary meteorological observations have been made daily, and published for public information. Milne seismograph No. 16 has been kept in good working-condition throughout the year, and the seismograms developed, but pressure of work has prevented the completion of the measurement of the records. The elimination of accidental errors in the vast amount of figuring involved in the compilation of the tables of hourly values has this time taken much longer than usual. The resulting mean values for 1918 are as follows:—

Magnetic declination	..	..	..	..	..	16° 55·7' E. of N.
Magnetic horizontal force	..	..	..	..	..	0·22304 c.g.s. unit.
Magnetic inclination	..	..	..	..	..	68° 06·7' S.
Northerly component	..	..	..	..	..	0·21338 c.g.s. unit.
Easterly component	..	..	..	..	..	0·06495 ,,
Vertical component	..	..	..	..	..	0·55516 ,,
Total magnetic force	..	..	..	..	..	0·59828 ,,

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME).
Magnetic Declination (east of north) : 16° + tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
January 1	0	52.5	56.8	59.6	59.9	59.9	59.2	57.1	55.5	54.3	54.7	54.5	54.2	53.7	53.8	54.3	54.4	54.8	53.6	51.4	49.3	46.8	45.6	47.9	51.1	54.0
" 2	1	54.3	58.2	59.4	59.8	59.1	58.7	56.7	55.5	54.2	54.8	54.6	54.3	54.3	54.2	54.2	54.3	54.6	54.2	51.4	48.8	47.5	46.4	47.5	51.4	54.1
" 3	2	54.8	58.8	59.9	59.8	57.7	57.1	55.9	54.8	54.8	54.3	53.6	53.6	55.4	50.9	54.3	53.1	51.4	54.3	51.4	48.5	47.0	45.7	49.9	51.2	53.7
" 4	3	53.1	56.5	57.1	58.2	57.4	55.5	54.8	53.7	53.6	54.3	53.7	54.3	54.3	53.7	56.6	54.8	54.2	52.0	50.8	49.8	48.6	48.6	51.2	54.1	53.8
" 5	4	52.6	56.1	57.6	58.2	58.2	56.6	54.8	53.7	52.9	52.3	53.1	52.0	53.5	52.1	53.0	51.9	51.4	54.3	51.8	50.5	48.5	48.5	49.9	52.4	53.4
" 6	5	55.6	58.8	61.1	61.2	60.5	58.7	56.6	55.8	52.7	52.6	52.0	53.7	54.2	53.7	56.1	53.6	54.5	54.2	50.1	48.1	46.1	47.5	49.9	53.5	54.2
" 7	6	55.9	58.5	59.9	60.3	59.1	56.3	54.4	53.7	53.9	53.6	54.1	54.1	54.6	54.4	54.7	54.6	53.9	53.0	52.0	49.9	48.2	48.5	49.5	52.6	54.2
" 8	7	54.8	57.0	57.9	58.1	57.1	55.9	54.2	54.3	53.7	53.1	53.1	53.7	53.9	53.7	53.7	53.3	53.1	53.0	50.9	49.2	48.6	48.5	49.8	53.7	53.6
" 9	8	56.5	59.9	59.9	59.1	58.2	56.5	54.8	54.3	54.3	54.4	54.4	54.2	54.3	54.3	54.3	54.2	53.1	53.0	50.9	50.3	49.8	50.3	51.4	55.8	54.6
" 10	9	58.8	62.7	62.7	61.4	60.5	58.1	55.9	54.8	54.2	55.4	54.3	54.2	54.3	51.9	51.7	51.7	52.0	50.7	48.6	47.5	47.5	47.0	49.4	53.5	54.1
" 11	10	55.9	59.3	61.1	61.1	59.9	58.2	55.5	53.7	53.1	53.7	53.6	53.1	55.3	53.7	53.7	53.1	53.1	52.6	50.9	48.6	48.1	48.3	51.4	56.5	54.3
" 12	11	58.8	61.7	62.7	62.1	59.3	57.4	55.4	54.3	53.7	54.3	53.7	53.9	49.1	48.1	48.6	52.0	52.0	49.6	47.6	47.2	47.4	45.4	47.0	49.2	52.9
" 13	12	54.8	58.2	61.5	62.1	59.9	59.3	55.4	54.8	53.9	52.0	53.5	54.3	54.3	54.4	58.8	56.6	54.2	53.0	50.9	49.2	47.9	48.8	50.2	52.6	54.6
" 14	13	55.4	57.6	59.8	58.2	59.9	57.6	54.3	54.3	54.3	54.4	54.3	54.3	53.7	54.2	54.8	55.4	54.5	54.4	51.7	50.3	47.0	47.0	50.0	54.5	54.2
" 15	14	58.2	61.0	62.1	62.2	59.8	55.4	53.1	53.1	53.1	53.1	52.6	52.0	54.2	54.3	54.8	54.8	55.4	54.3	52.0	51.1	47.5	46.5	49.2	54.3	54.4
" 16	15	54.8	61.0	62.1	61.6	60.9	57.7	54.4	54.3	53.3	51.9	52.8	54.2	54.3	54.6	54.8	55.4	54.3	53.7	51.7	49.8	47.3	46.4	47.9	49.3	54.2
" 17	16	53.1	57.1	61.1	62.2	61.6	58.8	55.9	54.4	53.7	53.9	53.5	54.3	54.3	54.2	54.8	54.3	53.9	54.3	53.0	50.9	49.2	48.1	49.8	51.4	54.5
" 18	17	53.1	57.0	60.5	61.0	60.5	58.8	56.5	55.4	54.4	54.3	53.5	53.3	53.9	53.9	53.8	54.1	53.7	53.7	53.1	51.4	49.2	47.5	49.1	52.6	54.3
" 19	18	54.3	57.1	59.3	59.8	58.9	57.6	56.4	55.4	54.3	54.3	53.6	53.7	54.3	54.3	53.1	53.1	53.1	53.1	52.6	50.3	49.9	49.0	49.3	52.0	54.1
" 20	19	54.8	57.6	60.0	61.0	60.9	59.9	58.2	56.6	56.4	55.9	54.9	53.1	52.0	52.0	52.6	52.6	52.6	52.0	50.9	49.2	48.6	47.6	49.8	53.1	54.3
" 21	20	56.5	59.9	62.3	62.2	60.9	58.8	56.9	56.4	55.9	55.9	55.3	54.6	53.1	54.2	53.1	58.8	51.4	52.2	53.1	50.8	50.3	49.8	50.3	52.6	55.2
" 22	21	55.6	56.5	58.9	58.7	57.6	56.6	55.5	55.9	55.9	55.5	54.3	54.3	53.7	54.8	53.1	53.0	53.1	52.1	50.9	49.2	49.2	49.6	53.1	56.5	54.3
" 23	22	57.6	58.8	59.3	59.3	58.2	56.5	54.4	54.2	54.3	54.3	54.3	54.2	54.3	53.7	53.1	53.1	53.1	52.6	51.0	48.6	47.5	46.3	48.5	51.0	53.7
" 24	23	54.3	59.3	59.9	59.9	58.2	56.5	54.3	54.3	54.8	55.4	54.8	54.6	53.7	53.1	53.1	51.0	50.8	50.9	52.0	49.9	50.8	50.1	51.4	54.8	54.1
" 25	24	57.1	59.3	61.0	60.0	58.9	56.5	54.4	54.3	54.3	54.3	53.7	54.2	55.5	54.7	54.3	54.2	53.1	53.1	51.4	49.5	48.1	47.0	48.5	52.6	54.2
" 26	25	55.9	58.8	61.0	60.5	58.2	56.4	54.6	54.3	53.7	53.7	54.3	54.3	54.3	54.3	54.3	54.3	53.7	52.7	51.4	50.9	48.8	48.8	50.3	53.7	54.7
" 27	26	58.4	62.7	63.3	63.3	61.1	58.9	56.5	54.8	53.9	54.3	53.0	53.1	53.1	51.0	53.5	53.8	53.1	52.9	50.9	49.6	48.8	48.1	51.4	53.1	54.7
" 28	27	54.4	57.0	58.8	58.8	58.2	55.9	54.3	53.3	53.3	54.2	54.2	54.3	54.3	54.3	54.3	54.2	53.7	54.3	51.4	49.6	49.9	49.8	52.0	54.6	54.1
" 29	28	57.6	60.0	60.7	60.0	58.8	57.5	56.6	56.4	56.5	54.2	54.4	54.3	54.3	54.8	53.7	52.1	54.3	51.0	50.9	51.4	51.2	48.8	52.6	55.1	54.9
" 30	29	56.2	58.2	57.3	57.1	57.5	56.5	55.9	55.4	53.7	49.8	48.1	49.2	53.5	49.8	50.5	50.8	49.0	52.6	52.6	49.8	49.6	50.9	53.7	52.6	52.9
" 31	30	57.5	59.3	58.8	57.7	56.5	55.4	54.8	54.8	54.8	52.3	48.8	51.9	54.3	56.2	49.5	49.8	53.0	51.9	57.1	54.3	53.1	52.0	52.7	57.1	54.3
Means	..	55.6	58.7	60.2	60.2	59.1	57.4	55.4	54.7	54.3	53.9	53.5	53.7	53.9	53.5	53.7	53.6	53.3	52.9	51.6	49.8	48.6	48.1	50.1	53.2	54.1

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME) — continued.
Magnetic Horizontal Force. 0-22000 C.G.S. + tabular γ.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
January 1	0	296	312	333	356	365	363	339	337	347	350	350	349	347	344	341	344	344	346	351	348	344	324	311	309	340
" 2	1	313	326	332	348	352	358	357	358	355	356	356	356	355	351	347	346	350	350	352	345	338	318	306	308	343
" 3	2	311	318	328	342	350	347	348	352	362	277	359	362	377	355	354	360	345	355	360	349	345	328	323	318	347
" 4	3	319	329	336	343	372	347	342	341	344	353	356	351	350	345	352	347	336	340	340	325	322	308	302	306	338
" 5	4	317	313	337	339	351	352	347	345	346	346	339	345	358	334	336	332	337	332	340	327	313	299	287	290	332
" 6	5	307	320	332	334	325	342	351	346	342	337	332	338	337	339	364	342	329	337	328	318	302	288	288	290	328
" 7	6	290	315	334	338	354	350	342	342	342	342	344	342	337	336	338	333	334	334	329	327	317	305	303	308	331
" 8	7	316	330	345	356	358	353	349	347	346	341	339	336	331	335	332	333	334	332	331	328	318	305	302	308	334
" 9	8	312	321	339	353	357	260	357	353	346	345	347	343	334	341	342	339	340	340	339	325	313	308	301	308	332
" 10	9	332	351	353	359	360	358	358	368	354	351	343	345	340	333	339	334	341	339	336	322	316	301	297	296	339
" 11	10	314	329	342	348	355	344	347	346	343	340	348	339	346	336	333	335	335	335	333	326	318	306	301	304	333
" 12	11	315	320	330	344	354	365	354	359	355	356	360	352	351	324	331	341	314	346	329	316	304	294	297	278	333
" 13	12	293	318	330	333	334	332	330	325	330	327	338	330	333	336	363	338	338	338	330	324	313	285	277	287	324
" 14	13	285	275	300	334	322	327	335	336	336	340	337	339	339	325	331	331	328	332	332	323	316	285	279	285	320
" 15	14	292	305	322	339	361	365	361	344	339	338	337	338	334	332	329	332	342	332	334	322	325	315	293	291	330
" 16	15	296	287	304	313	328	335	340	338	340	339	342	340	337	335	333	333	318	333	335	333	322	303	295	287	324
" 17	16	281	288	305	322	339	344	369	371	343	342	345	343	337	339	341	332	332	332	337	333	327	328	302	291	330
" 18	17	282	290	312	334	346	354	341	347	347	349	347	344	340	338	333	335	338	338	342	337	324	314	304	280	330
" 19	18	295	302	317	335	348	355	358	356	353	355	352	347	348	344	339	339	341	343	344	338	330	318	313	310	337
" 20	19	317	313	329	334	353	360	359	334	355	349	350	364	347	345	333	333	333	333	328	328	326	318	315	315	336
" 21	20	332	328	333	351	362	358	351	348	340	354	362	354	351	342	344	360	346	327	335	330	323	311	305	297	340
" 22	21	317	327	330	334	336	348	349	339	340	343	344	338	339	336	330	329	334	334	334	329	324	312	312	319	332
" 23	22	327	330	332	341	342	347	348	349	342	342	340	339	337	336	335	335	335	337	337	336	329	314	301	298	334
" 24	23	302	315	325	335	344	355	350	349	353	354	360	351	344	339	331	336	336	337	332	322	311	304	302	305	333
" 25	24	309	315	318	323	343	348	342	340	343	340	338	345	340	333	331	331	331	335	336	333	326	313	302	297	329
" 26	25	308	318	333	350	347	340	334	341	337	342	344	340	339	344	335	337	337	336	335	325	314	298	294	303	330
" 27	26	313	321	338	341	344	336	338	333	328	331	329	337	335	346	333	325	325	327	328	323	320	307	299	302	327
" 28	27	306	309	314	304	336	337	340	340	340	342	342	344	333	334	334	342	341	339	340	331	323	308	311	317	329
" 29	28	325	337	341	349	357	348	360	359	352	364	366	346	347	355	358	339	358	349	343	337	317	297	290	311	342
" 30	29	315	310	318	315	319	319	323	320	344	329	306	315	342	325	318	337	345	335	318	304	291	215	232	227	309
" 31	30	240	257	252	262	289	308	310	328	331	327	330	342	320	339	339	317	315	325	332	327	300	302	279	273	306
Means	..	306	314	326	336	342	344	345	344	345	342	345	344	342	339	339	337	336	337	336	326	320	304	298	297	331

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north): 16° + tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
February	1	57.6	58.2	59.3	57.6	57.1	55.9	55.4	54.3	53.1	53.3	53.1	53.0	53.7	54.3	54.6	55.3	54.8	54.3	54.8	53.5	50.9	50.0	52.0	53.1	54.6
"	2	53.5	55.4	57.1	57.6	55.9	56.5	55.9	55.4	54.8	54.3	53.1	53.7	53.7	54.1	54.3	54.4	53.3	53.0	54.2	51.4	50.1	49.8	50.9	51.4	53.9
"	3	53.3	58.2	61.0	61.1	59.8	57.6	56.6	55.9	55.4	53.9	53.0	54.3	54.3	54.3	53.1	54.3	53.6	53.6	52.6	51.0	50.2	49.2	50.9	52.1	54.6
"	4	53.1	56.5	58.8	58.8	58.2	57.1	55.5	55.3	54.8	55.4	54.8	54.3	54.3	54.3	54.3	53.7	54.2	54.8	52.2	50.9	49.6	48.6	51.4	52.6	54.3
"	5	53.9	57.1	57.6	56.5	56.5	55.9	55.3	54.5	55.1	55.4	53.5	50.3	48.6	49.2	52.1	51.8	52.6	53.7	52.0	49.8	48.6	47.4	49.2	51.4	52.8
"	6	53.1	54.8	57.6	58.2	62.2	61.0	60.5	58.9	56.5	55.4	55.4	54.9	54.8	53.3	53.1	51.4	52.0	52.0	53.1	52.6	52.0	51.4	53.7	54.8	55.1
"	7	57.1	58.2	57.6	58.2	57.7	57.0	56.5	56.4	54.3	55.9	55.4	53.3	53.7	53.7	54.1	53.1	52.0	52.0	52.0	49.9	49.2	49.2	50.9	52.6	54.3
"	8	53.8	56.9	57.6	55.9	54.8	54.8	54.4	54.5	54.4	54.8	54.8	54.4	54.3	54.4	53.7	53.1	52.6	52.6	51.8	50.9	50.3	50.9	53.1	55.9	53.9
"	9	57.6	59.9	58.7	56.6	56.5	56.5	55.9	55.8	55.8	55.9	55.4	56.6	54.3	54.4	54.3	54.2	53.7	53.4	52.0	50.9	47.6	49.2	53.1	58.2	54.9
"	10	58.9	61.0	61.6	58.8	57.5	55.9	54.3	54.8	52.6	53.3	54.3	54.4	54.1	54.3	53.7	53.3	52.6	54.3	52.6	49.8	49.8	49.8	52.1	55.9	54.6
"	11	58.8	62.2	61.1	59.3	57.6	55.9	54.2	54.3	54.3	51.4	53.7	54.3	54.3	55.3	54.2	55.7	54.4	53.4	52.6	47.5	50.3	49.3	51.0	53.1	54.5
"	12	53.9	55.9	59.2	59.9	54.8	56.4	54.3	54.4	52.1	53.0	60.5	57.1	48.8	49.8	53.7	54.3	52.0	52.0	55.5	55.9	56.5	53.7	52.0	53.4	54.6
"	13	54.3	55.8	58.7	59.1	57.6	55.9	56.5	54.8	48.6	52.1	50.3	50.9	52.6	53.3	52.5	52.7	53.1	53.1	54.2	50.9	50.2	47.5	50.9	52.1	53.2
"	14	56.2	59.9	61.6	61.6	58.8	58.8	57.6	56.4	54.3	54.3	55.1	52.0	54.3	54.4	55.4	54.3	54.3	54.2	52.6	49.9	50.1	47.5	49.8	52.0	54.8
"	15	56.2	60.5	62.6	61.6	59.9	57.6	55.2	55.9	55.7	55.4	54.3	53.7	54.6	53.3	54.8	53.3	57.6	60.1	53.7	49.8	48.6	41.9	45.8	50.6	54.8
"	16	53.7	57.1	60.9	62.5	61.0	59.3	57.7	57.1	54.8	53.3	54.2	52.8	51.4	53.1	53.7	54.3	54.3	54.1	53.1	51.7	49.8	49.8	49.9	51.4	54.6
"	17	53.7	56.9	59.3	60.3	60.5	60.0	58.8	56.5	55.9	55.9	54.4	54.3	54.2	54.2	54.3	53.1	53.1	53.5	53.1	50.9	48.1	48.1	48.6	51.9	54.6
"	18	53.6	55.5	57.1	58.2	58.8	58.1	57.5	56.5	54.3	55.8	55.3	55.2	54.3	54.3	53.1	53.1	53.0	53.0	52.6	50.9	49.5	48.1	49.8	51.9	54.6
"	19	53.0	54.9	56.7	57.5	58.3	58.8	58.0	56.5	55.4	55.5	55.1	54.8	54.3	54.3	54.3	54.2	53.7	53.7	52.6	51.4	49.9	49.2	51.2	53.8	54.4
"	20	55.7	56.7	56.9	57.1	56.3	55.4	55.9	56.5	56.4	56.5	55.9	55.4	54.3	54.3	53.8	53.7	53.1	54.3	53.9	51.8	49.9	48.6	51.9	55.9	54.6
"	21	58.0	58.8	59.3	58.8	59.0	58.8	57.1	57.6	56.5	55.9	53.0	54.4	54.8	55.1	54.1	54.2	53.7	53.1	52.0	51.0	49.9	49.8	51.4	54.8	55.1
"	22	57.3	59.0	59.9	58.9	57.5	55.8	54.8	55.4	54.7	55.4	54.7	54.8	54.7	54.7	54.2	54.2	54.3	53.7	53.4	51.6	50.3	48.9	49.1	52.0	54.6
"	23	54.3	57.7	59.9	59.9	58.0	57.1	56.5	55.4	54.5	53.7	53.9	51.3	54.3	54.3	53.9	52.3	53.1	51.6	49.8	50.9	48.6	48.6	49.9	53.3	54.0
"	24	56.5	58.9	59.9	58.8	58.3	56.5	54.3	54.3	54.4	52.7	53.1	54.3	53.7	52.7	53.5	54.3	54.1	53.1	52.0	50.3	48.1	47.5	49.0	51.4	53.8
"	25	53.7	57.1	57.6	57.6	57.5	56.5	56.4	56.5	55.5	55.4	54.8	54.3	54.3	54.3	54.3	54.3	53.7	51.2	53.1	51.4	49.2	47.5	49.2	53.1	54.2
"	26	56.5	59.4	61.0	59.9	58.7	56.5	54.8	55.1	54.8	54.8	52.6	53.9	54.3	54.4	54.3	54.3	54.4	54.6	54.3	52.6	50.3	48.6	49.4	53.4	54.7
"	27	57.6	60.0	61.0	60.9	59.0	55.5	55.9	55.9	55.4	55.4	54.8	54.3	54.4	54.3	54.3	54.2	53.7	53.1	51.4	49.8	45.8	45.6	45.8	50.9	54.1
"	28	53.7	57.1	61.6	60.2	60.7	58.8	54.8	55.4	51.4	51.4	50.6	52.0	52.0	52.0	47.5	48.8	52.0	53.3	52.1	49.9	51.4	52.1	49.9	52.1	53.4
Means	..	55.3	57.8	59.3	59.0	58.2	57.1	56.1	55.7	54.5	54.5	54.3	54.0	53.6	53.7	53.7	53.6	53.6	53.7	52.8	51.0	49.8	48.9	50.4	53.0	54.3

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Horizontal Force : 0.22000 C.G.S. + tabular γ.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
February	1	284	300	283	295	316	307	319	311	317	326	311	326	320	318	316	314	314	306	315	304	302	265	299	293	307
"	2	292	290	299	298	324	334	340	367	335	333	337	332	326	332	326	331	332	327	312	305	301	291	286	286	318
"	3	302	295	329	317	333	335	336	334	335	331	331	329	331	341	331	324	324	329	329	324	321	314	307	304	324
"	4	303	302	305	315	325	333	336	341	341	342	341	340	339	336	334	336	336	334	331	331	326	321	316	315	328
"	5	316	321	322	326	334	334	336	392	378	353	362	349	326	323	324	324	324	328	324	319	316	309	314	311	332
"	6	317	301	302	296	296	336	313	325	320	319	309	318	313	322	334	314	317	321	314	305	299	299	307	310	313
"	7	313	315	318	306	315	310	325	337	315	322	327	338	333	333	333	315	318	318	315	308	306	296	296	297	317
"	8	307	316	319	322	321	324	326	331	334	331	332	331	326	329	329	326	324	324	324	316	309	298	297	300	321
"	9	316	326	309	338	348	345	346	343	346	349	347	345	345	343	337	336	336	335	333	328	310	278	294	294	330
"	10	317	338	326	324	321	332	333	324	321	315	319	334	334	334	334	337	334	329	322	319	309	292	270	282	321
"	11	301	311	323	340	323	325	327	318	327	333	338	338	333	355	337	323	327	330	323	313	286	257	257	284	318
"	12	273	285	292	290	322	312	290	307	300	307	317	321	322	334	297	327	334	331	315	266	288	256	241	214	298
"	13	220	250	259	268	272	284	289	287	311	292	292	294	229	295	306	299	305	311	301	306	289	273	263	255	281
"	14	253	256	257	282	300	305	293	295	290	303	290	302	301	303	303	310	312	317	318	315	301	292	282	278	294
"	15	272	276	291	300	312	315	320	309	337	337	323	329	323	318	323	325	338	339	345	342	324	323	290	274	316
"	16	276	276	291	289	310	323	332	334	325	323	315	325	362	325	308	310	313	315	318	318	308	286	281	274	310
"	17	275	282	287	299	316	326	330	329	319	324	329	338	323	319	325	319	316	319	319	318	311	299	297	293	313
"	18	298	298	308	322	327	325	333	332	337	331	332	330	325	327	326	321	324	323	321	316	311	299	295	299	319
"	19	306	306	310	310	333	341	335	331	339	337	333	331	319	325	325	325	328	328	326	320	315	306	305	306	323
"	20	302	305	313	319	327	329	334	334	340	344	344	341	332	334	334	334	334	332	336	324	309	300	290	290	324
"	21	306	306	318	329	329	320	286	333	330	335	328	316	315	318	320	319	319	316	317	312	305	295	288	288	315
"	22	291	301	313	318	326	331	333	326	328	331	331	333	332	332	331	327	328	327	327	322	316	307	300	295	321
"	23	298	310	315	320	328	329	323	330	328	333	333	333	328	332	328	337	342	337	330	323	308	286	281	322	322
"	24	292	302	312	309	312	309	307	316	310	309	316	316	336	314	309	309	309	309	312	309	301	289	277	272	306
"	25	281	295	313	322	322	325	324	327	329	332	329	329	321	322	324	325	326	326	326	326	321	309	301	301	319
"	26	315	327	335	344	346	336	327	333	333	338	335	335	333	331	331	330	330	334	335	335	325	313	305	308	330
"	27	317	326	334	341	343	342	340	340	340	342	341	340	340	338	339	339	337	339	331	328	317	318	313	318	333
"	28	317	320	332	322	333	321	292	309	292	283	318	330	328	361	324	319	327	324	326	326	284	301	301	394	326
Means	..	295	301	308	313	322	325	322	328	327	327	327	329	325	328	325	323	325	325	323	317	308	296	291	290	317

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north): 16° + tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean
1918.																										
March 1	59	53.7	55.4	58.3	59.3	59.8	58.5	56.6	55.4	54.8	54.8	53.0	53.0	53.7	53.7	54.8	54.3	54.7	54.4	53.7	52.0	49.8	47.5	48.1	50.3	54.2
" 2	60	54.3	57.3	59.3	60.5	58.8	57.7	57.1	55.9	55.4	54.8	52.0	53.1	54.3	54.4	54.4	54.3	54.3	56.5	54.3	52.0	49.8	48.1	49.2	52.5	54.6
" 3	61	56.9	60.5	61.1	60.5	59.3	57.6	55.9	55.7	55.1	53.5	49.2	50.0	47.4	49.8	52.6	50.8	53.0	52.0	53.7	50.9	48.1	47.0	49.2	52.6	53.5
" 4	62	56.5	59.8	61.0	59.9	58.2	55.5	54.3	54.8	55.8	53.7	53.1	53.7	54.3	54.3	54.3	54.6	54.4	54.3	54.3	53.1	50.3	48.8	49.8	52.0	54.5
" 5	63	54.7	57.6	59.3	59.9	58.2	56.5	55.3	54.8	54.4	54.3	53.7	53.3	54.6	54.8	54.8	54.3	54.3	54.3	54.2	52.0	50.3	48.1	49.8	52.0	54.4
" 6	64	54.8	57.5	60.0	59.9	59.3	58.2	56.4	54.8	55.4	55.9	55.4	54.8	55.4	54.3	53.7	53.9	54.3	54.3	53.7	52.0	50.3	49.3	49.9	52.3	54.9
" 7	65	54.8	56.6	58.8	59.8	59.9	58.8	58.2	56.9	56.4	55.9	55.4	55.1	54.3	54.3	54.3	54.3	54.3	54.2	53.7	52.0	50.8	49.6	47.0	53.7	55.0
" 8	66	54.8	56.5	67.9	76.8	72.8	66.1	62.1	61.0	58.8	58.2	55.9	53.1	55.4	55.3	54.8	55.4	54.3	54.8	57.6	54.3	52.0	49.2	52.0	52.7	58.0
" 9	67	55.9	58.8	60.5	59.9	59.3	57.6	56.4	55.4	54.8	55.2	53.3	34.8	55.4	55.4	54.8	55.4	55.2	54.4	54.3	53.1	51.4	49.9	51.7	53.5	55.1
" 10	68	55.9	58.2	59.9	59.3	58.2	56.5	55.9	55.5	55.4	55.2	55.4	55.4	55.4	55.4	55.4	54.8	58.2	55.4	52.5	52.6	50.3	49.8	50.3	53.7	55.2
" 11	69	57.3	60.5	62.2	62.2	59.9	58.8	56.5	56.5	55.9	55.9	54.8	54.4	54.8	54.8	54.8	57.0	55.4	52.0	55.9	54.6	51.4	52.0	52.1	52.6	56.0
" 12	70	55.1	57.9	60.1	60.5	59.8	57.6	53.0	53.1	53.1	51.9	47.0	52.3	52.0	54.4	52.0	53.7	56.5	55.5	55.2	53.1	49.2	48.6	47.5	49.8	53.7
" 13	71	53.6	56.6	58.8	60.5	60.1	57.6	55.3	55.4	54.2	54.4	54.8	54.8	55.2	55.3	55.4	54.8	54.3	54.4	54.3	52.6	49.2	47.0	47.0	49.8	54.4
" 14	72	53.9	57.1	62.7	63.9	61.1	58.4	56.4	55.9	55.4	53.3	53.7	54.3	54.4	54.4	54.3	54.3	55.9	57.6	56.4	53.7	49.8	47.6	48.1	50.1	55.1
" 15	73	55.1	59.9	61.6	62.2	62.1	58.9	58.2	58.8	57.6	56.6	55.4	54.8	54.3	54.4	52.6	51.0	53.1	54.2	52.0	50.3	50.3	44.8	49.8	52.0	55.0
" 16	74	53.1	57.6	60.2	63.3	62.7	61.0	58.7	58.2	55.3	55.5	55.4	54.8	53.1	58.2	50.9	49.8	54.2	51.0	55.3	53.1	53.3	51.4	50.9	51.9	55.4
" 17	75	54.2	57.6	59.8	58.2	59.9	58.7	57.1	56.5	56.5	55.9	55.5	55.4	54.8	54.4	54.3	54.8	54.8	54.8	54.4	53.7	52.0	50.9	51.1	52.6	55.3
" 18	76	54.4	57.1	58.9	60.0	59.1	57.6	57.5	57.5	56.5	56.6	55.3	51.0	55.9	53.5	53.7	54.4	54.8	55.1	54.3	53.0	51.2	49.2	49.6	51.4	54.9
" 19	77	54.8	58.8	59.9	59.9	58.9	57.1	56.2	56.5	55.9	55.5	55.4	53.1	53.7	53.7	53.4	54.5	54.3	54.2	53.7	53.0	49.2	48.3	49.2	51.9	54.6
" 20	78	59.7	57.6	59.3	60.2	59.9	58.2	57.1	57.0	56.9	57.1	54.3	44.7	52.0	53.0	52.0	53.7	54.1	54.2	53.7	52.6	50.5	48.8	49.9	51.4	54.5
" 21	79	54.3	57.0	58.9	59.9	59.3	58.2	57.0	57.2	57.1	55.9	56.5	55.9	54.4	50.3	50.1	52.0	53.7	53.5	54.3	53.7	51.0	49.2	49.5	51.4	54.6
" 22	80	55.4	58.8	60.9	60.5	59.9	58.3	55.9	56.5	55.4	55.3	54.4	53.7	50.9	51.9	53.1	52.6	52.6	56.6	54.3	50.3	49.2	49.2	49.9	52.6	54.8
" 23	81	55.9	58.9	60.9	61.6	61.6	57.1	56.5	56.5	55.6	55.5	52.6	53.7	53.1	54.2	55.3	55.1	55.4	54.3	55.6	55.2	54.8	51.7	49.9	50.8	55.5
" 24	82	54.5	57.6	59.9	60.5	59.3	57.6	57.1	57.1	55.4	52.3	53.7	54.8	54.9	55.4	55.4	55.3	55.2	54.8	54.4	53.3	51.4	49.8	50.3	52.6	55.1
" 25	83	55.5	59.3	60.9	60.5	58.8	57.1	55.4	55.9	55.4	55.4	55.4	55.1	54.8	55.3	55.2	55.4	55.4	55.3	54.5	53.1	51.9	50.3	50.1	51.9	55.4
" 26	84	54.4	57.1	59.0	59.3	58.2	57.0	55.9	56.5	55.4	55.5	52.3	51.4	53.1	54.3	54.9	54.8	56.5	55.9	54.3	53.3	51.4	49.8	50.8	53.3	54.8
" 27	85	58.2	60.5	61.0	60.5	58.8	57.0	55.5	54.8	53.7	53.0	52.0	52.6	53.0	54.3	53.9	53.1	55.4	55.9	54.3	54.3	52.6	51.4	50.8	53.5	55.0
" 28	86	55.5	58.8	60.1	59.9	57.6	55.9	54.8	54.3	54.8	54.8	54.3	54.3	54.3	54.4	54.3	52.6	54.2	53.7	53.9	53.5	53.1	52.6	52.6	53.7	54.9
" 29	87	56.5	59.8	60.9	59.9	58.8	57.6	56.5	55.4	54.4	52.6	54.4	54.4	54.3	54.6	54.9	54.3	54.2	54.8	54.9	54.8	52.3	50.9	51.0	53.5	54.5
" 30	88	56.5	58.7	59.9	59.9	58.8	57.1	55.9	55.4	52.8	54.2	54.3	54.3	54.8	54.8	55.4	54.3	55.9	54.8	54.3	53.1	52.6	50.3	50.8	51.6	55.0
" 31	89	54.8	57.3	58.9	59.3	58.8	57.6	56.6	56.5	55.9	55.5	54.3	54.4	54.3	52.1	52.6	54.8	54.3	54.4	54.3	53.7	53.1	50.9	50.3	50.9	54.8
Means	..	55.3	58.2	60.4	61.6	59.9	58.0	56.5	56.2	55.5	55.0	54.0	53.6	53.9	54.2	53.9	54.0	54.7	54.6	54.4	53.0	51.1	49.3	49.9	52.1	54.9

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.

Magnetic Horizontal Force : 0.22000 C.G.S. + tabular γ .

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
March 1	59	285	290	290	298	317	319	332	322	324	321	339	322	322	315	319	320	321	323	324	321	316	304	291	284	313
"	60	231	309	312	327	329	329	329	327	331	336	332	328	324	327	327	329	329	331	334	329	309	299	287	279	320
"	61	283	287	297	316	327	326	313	324	320	319	322	346	300	322	317	324	329	316	312	314	309	302	278	268	311
"	62	274	290	308	325	323	322	323	329	328	328	328	328	320	318	320	320	323	321	323	320	311	301	291	286	315
"	63	290	295	303	311	321	326	327	329	336	338	338	338	328	329	326	326	325	326	328	326	319	305	299	294	320
"	64	298	305	312	322	332	330	332	325	327	330	339	339	339	330	332	331	328	330	332	330	325	317	310	308	325
"	65	315	323	318	321	323	333	336	336	336	333	333	333	333	328	326	328	328	330	333	332	323	321	333	316	328
"	66	307	270	212	212	261	274	257	247	255	258	264	281	273	265	263	264	266	267	258	262	265	265	261	256	261
"	67	254	257	269	283	291	293	293	293	310	305	305	306	326	301	300	300	301	301	302	301	294	283	277	270	292
"	68	274	276	283	298	300	305	305	305	307	307	310	310	310	310	310	330	322	322	307	300	291	278	266	276	300
"	69	265	289	294	291	305	316	304	307	318	323	323	326	326	321	321	333	323	321	308	298	307	296	279	277	307
"	70	273	263	270	293	300	320	273	266	278	293	307	283	293	288	310	315	300	305	305	298	273	276	274	262	288
"	71	238	262	286	299	309	306	304	305	311	314	315	314	314	309	316	311	314	316	314	316	306	294	277	267	301
"	72	264	280	290	304	314	321	319	321	322	323	319	324	326	324	319	314	314	318	329	328	319	299	280	265	310
"	73	261	273	249	319	342	352	347	329	324	334	325	328	320	319	322	320	310	312	344	334	310	298	290	282	314
"	74	279	296	289	308	299	307	306	318	316	322	317	319	322	386	336	309	361	317	293	312	318	271	264	254	309
"	75	262	272	278	288	295	307	310	314	314	311	314	313	311	310	309	309	309	309	314	310	307	292	282	287	309
"	76	291	294	300	306	317	329	322	322	323	323	322	315	325	301	305	308	309	310	310	306	298	290	285	281	308
"	77	278	286	297	305	314	316	319	319	321	324	320	320	320	325	313	312	317	317	315	313	308	304	299	299	311
"	78	295	298	302	312	322	327	328	326	331	329	333	335	322	318	318	315	313	312	315	312	305	299	295	298	315
"	79	307	311	315	319	319	323	323	324	323	325	325	325	317	312	318	317	314	313	307	305	293	288	276	280	312
"	80	274	278	277	298	309	314	304	318	318	321	322	320	325	347	312	338	319	294	314	314	306	294	279	274	307
"	81	270	278	286	281	302	304	320	319	320	325	324	320	324	316	317	319	320	320	320	319	302	302	290	278	307
"	82	272	273	282	299	306	303	306	306	302	321	310	316	314	319	314	314	314	314	314	311	310	307	287	279	304
"	83	282	288	299	308	317	319	314	319	319	324	323	327	322	321	321	321	321	321	321	320	318	299	287	284	312
"	84	287	294	302	313	322	329	331	335	329	327	327	325	320	315	317	323	333	329	328	324	319	319	285	276	313
"	85	288	293	301	310	322	315	312	305	305	319	310	310	310	309	325	310	310	315	327	330	315	288	288	283	308
"	86	288	294	303	313	314	315	315	312	318	322	322	322	325	334	329	321	319	324	324	323	311	302	282	281	313
"	87	286	285	296	300	296	315	315	306	291	310	315	318	320	331	324	319	317	319	321	317	311	300	292	285	308
"	88	274	283	298	303	308	316	320	321	315	315	320	318	318	320	321	321	321	321	323	316	303	302	296	284	310
"	89	283	289	298	308	317	328	329	323	294	311	314	323	319	337	318	316	318	319	319	319	317	310	301	283	309
Means	..	278	286	291	303	312	317	315	315	315	319	320	320	315	320	317	317	318	316	317	315	307	297	286	281	308

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north) · 16° + tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
April 1	90	54.8	57.6	59.9	59.9	58.8	57.4	56.5	56.1	55.9	55.7	55.4	53.0	52.6	54.3	53.7	54.7	55.1	55.1	54.9	54.2	51.8	50.6	48.5	50.6	54.9
" 2	91	54.8	57.9	60.5	61.2	61.6	59.1	55.1	54.1	54.6	53.7	54.1	52.9	51.3	53.7	53.4	55.6	54.2	54.7	54.3	53.4	50.6	49.4	49.2	52.2	54.7
" 3	92	55.3	58.0	59.6	60.2	59.2	57.4	55.9	56.2	55.9	55.9	55.2	51.8	54.7	54.8	55.1	55.2	55.2	55.3	55.3	54.5	51.1	49.9	48.1	51.0	55.2
" 4	93	55.7	60.5	61.4	63.1	62.6	61.1	57.7	57.3	55.5	54.5	55.2	54.8	53.9	54.4	54.4	54.3	55.9	55.5	56.2	54.9	52.8	51.4	51.1	52.2	56.0
" 5	94	55.5	57.7	58.2	61.4	61.6	60.5	57.2	54.5	53.7	54.8	52.3	51.4	48.5	51.9	54.2	54.1	58.2	56.4	58.4	57.1	55.9	54.4	52.0	53.7	55.6
" 6	95	57.1	59.7	62.5	62.3	63.3	59.4	57.2	56.9	54.8	52.6	44.1	48.6	48.1	40.8	48.8	51.4	54.2	55.7	56.5	55.4	53.3	53.7	51.3	51.4	54.1
" 7	96	54.8	59.3	60.0	63.5	63.3	58.7	58.3	55.7	55.5	54.2	53.3	52.8	53.3	53.7	56.5	55.3	56.1	55.7	55.4	54.5	52.6	50.3	49.9	51.8	55.6
" 8	97	54.8	57.9	59.8	60.8	59.8	58.0	56.3	56.3	55.9	55.3	54.3	54.5	54.8	53.9	54.3	55.1	55.2	55.4	55.9	59.8	55.8	52.6	52.0	52.9	55.9
" 9	98	54.8	57.5	59.7	59.7	58.4	57.9	57.6	56.4	55.7	55.6	54.6	50.9	54.4	55.5	53.9	55.2	54.1	54.4	54.3	53.3	52.1	51.7	50.3	52.2	55.0
" 10	99	55.9	58.9	60.5	60.6	58.7	56.6	54.8	54.4	54.4	55.1	54.8	54.1	55.2	55.1	55.9	55.2	56.3	55.5	54.4	53.6	51.8	50.3	50.3	51.4	55.2
" 11	100	54.8	57.5	61.1	62.3	60.5	59.3	55.4	54.3	55.9	54.8	55.5	52.8	49.8	47.5	51.7	43.0	47.5	53.3	55.4	57.7	54.5	52.1	54.8	55.1	54.4
" 12	101	57.9	60.7	61.1	60.5	59.3	56.9	55.8	55.5	55.1	46.5	53.0	54.2	54.6	54.8	54.2	55.3	55.2	54.4	55.9	55.6	52.6	51.3	51.4	53.1	55.2
" 13	102	56.2	58.2	60.0	59.9	59.3	58.2	57.1	56.4	55.5	55.9	55.3	55.1	55.3	54.7	55.3	55.3	55.3	55.2	54.8	54.4	53.1	51.4	51.0	51.4	55.6
" 14	103	54.6	57.6	59.3	59.3	58.5	57.9	57.2	56.5	56.3	55.6	54.9	55.3	54.7	54.8	54.7	54.5	54.5	54.8	54.8	54.6	53.5	51.8	51.2	51.0	55.3
" 15	104	53.9	57.7	61.2	61.8	60.5	58.2	56.6	55.9	55.9	55.2	54.8	54.7	54.4	53.4	53.7	54.7	55.3	55.2	54.4	55.2	53.7	53.3	52.3	53.0	55.6
" 16	105	54.5	56.7	58.4	58.7	57.5	56.6	56.2	56.1	55.9	56.1	54.8	54.3	54.5	54.3	54.2	54.2	54.1	55.2	54.2	54.3	53.5	52.3	51.3	51.9	55.0
" 17	106	54.5	56.7	58.7	59.0	58.2	57.1	56.2	55.9	55.7	55.9	55.5	55.2	55.1	55.1	55.1	55.1	55.2	54.6	55.2	54.8	53.4	51.6	51.6	52.6	55.3
" 18	107	54.8	58.2	59.8	60.2	59.8	58.2	56.7	55.9	55.7	55.6	55.4	55.1	55.2	55.2	54.7	51.8	53.5	53.8	54.7	54.3	53.5	52.1	51.8	52.3	55.3
" 19	108	54.9	59.1	59.8	59.8	60.5	62.3	62.7	61.4	55.9	55.7	54.5	43.4	50.9	53.0	55.8	56.6	54.9	55.9	55.5	54.4	54.4	52.6	51.7	52.2	55.3
" 20	109	54.1	55.9	57.4	58.2	58.1	57.2	55.9	55.6	55.5	55.6	55.2	54.1	54.2	54.8	54.9	55.2	55.4	55.3	55.4	54.9	54.5	53.5	52.6	52.2	55.2
" 21	110	54.1	56.4	58.2	58.4	58.2	57.1	56.4	55.7	55.6	55.2	54.8	54.8	54.8	54.7	55.3	55.7	55.8	55.7	55.5	54.9	53.7	53.4	53.1	53.7	55.5
" 22	111	55.8	58.2	59.2	59.3	58.2	57.1	55.5	55.1	54.6	54.5	54.7	53.4	54.1	54.7	55.3	55.4	55.4	55.6	55.5	55.4	54.3	52.8	52.2	53.4	55.4
" 23	112	55.1	59.1	60.9	57.9	59.9	59.3	56.4	57.2	55.9	44.3	53.1	53.9	55.4	53.9	55.1	55.5	55.3	55.4	55.5	55.9	54.6	53.4	52.6	53.1	55.4
" 24	113	55.2	57.6	59.2	58.8	58.2	56.9	55.9	55.7	55.6	52.6	54.6	53.8	53.7	54.4	54.4	55.4	55.5	55.4	55.4	54.9	54.1	52.6	52.3	53.1	55.2
" 25	114	55.6	58.3	60.6	61.0	59.6	58.5	56.9	55.9	55.5	55.3	54.6	54.6	54.6	54.2	55.5	55.9	57.5	55.4	55.2	56.4	55.9	53.7	53.7	54.8	56.2
" 26	115	54.8	58.2	59.3	59.9	59.3	57.9	54.8	55.3	50.3	51.4	49.4	51.4	51.4	52.0	52.3	53.7	54.3	53.7	56.5	55.1	53.7	52.0	51.0	52.7	54.2
" 27	116	55.4	57.6	59.3	59.3	60.1	58.5	57.1	55.9	55.6	51.7	53.7	52.6	54.2	55.5	55.7	55.3	56.3	55.9	55.4	54.8	54.2	53.9	52.9	53.1	55.6
" 28	117	55.9	58.3	60.1	60.2	59.3	58.0	57.4	57.1	57.3	55.9	54.8	54.8	54.8	54.4	55.4	55.2	55.1	55.1	55.1	54.8	53.7	52.7	52.2	52.7	55.9
" 29	118	54.7	57.3	58.2	58.2	57.9	56.9	56.1	55.9	55.7	55.6	55.3	55.2	55.1	55.3	55.4	55.4	55.4	55.4	55.3	54.7	53.9	52.6	51.4	53.5	55.4
" 30	119	55.9	58.2	59.3	59.3	58.2	58.2	56.9	52.6	52.6	51.0	50.6	51.2	50.3	54.8	55.6	54.4	57.3	56.2	58.3	58.2	56.7	55.6	54.1	55.2	55.5
Means	..	55.2	58.1	59.8	60.2	59.6	58.2	56.7	55.6	55.2	54.1	53.9	53.3	53.5	53.7	54.5	54.5	55.1	55.2	55.4	55.2	53.6	52.3	51.6	52.7	55.3

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Horizontal Force : 0-22000 C.G.S. + tabular γ .

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
April 1	90	264	277	293	310	320	322	320	317	317	326	326	331	332	324	326	326	326	327	328	325	319	304	297	289	314
" 2	91	281	283	291	293	302	302	286	307	315	317	319	313	307	315	316	321	319	317	323	323	314	307	294	284	306
" 3	92	288	294	300	310	318	322	324	327	333	333	332	332	319	323	323	320	322	325	325	328	324	317	300	275	317
" 4	93	269	271	284	293	301	298	298	301	289	305	316	317	318	319	325	314	314	314	319	320	317	325	278	268	303
" 5	94	249	271	269	284	294	281	272	290	294	305	315	310	295	297	299	302	316	322	310	302	295	282	266	242	290
" 6	95	231	226	225	251	246	272	261	282	291	275	276	251	255	308	295	298	274	291	275	284	283	264	256	243	267
" 7	96	208	222	234	248	273	272	262	273	276	267	277	278	283	286	292	293	292	295	299	301	297	291	275	252	263
" 8	97	246	245	265	275	291	293	290	304	306	304	299	306	306	312	317	311	313	316	318	311	324	302	276	265	296
" 9	98	265	269	277	288	302	306	283	295	309	309	304	318	299	309	324	313	307	307	311	311	307	295	284	270	298
" 10	99	270	277	283	295	299	298	303	299	297	302	317	328	314	309	315	309	306	311	313	313	311	311	303	287	303
" 11	100	258	27	293	307	302	305	297	312	317	322	326	314	306	297	303	309	293	280	293	278	261	227	232	222	289
" 12	101	224	221	253	266	271	269	275	276	282	293	284	290	293	291	299	301	305	307	301	304	298	295	281	273	281
" 13	102	263	263	272	283	294	298	301	305	307	305	306	306	308	308	306	307	308	308	309	307	306	294	275	262	296
" 14	103	274	278	287	292	298	305	306	310	308	312	308	310	310	305	306	306	309	309	309	310	308	302	297	287	302
" 15	104	276	275	291	303	302	317	319	320	319	320	314	322	318	317	313	315	316	317	318	317	316	310	301	294	310
" 16	105	292	292	296	302	309	314	317	319	321	321	320	320	321	322	318	318	313	313	323	322	322	313	298	296	313
" 17	106	291	290	295	300	311	314	313	319	321	324	323	323	323	321	322	323	324	322	329	325	331	321	306	295	315
" 18	107	293	288	293	296	301	308	313	323	327	328	331	330	324	325	324	317	306	313	321	329	338	318	305	286	314
" 19	108	267	266	292	296	295	273	268	310	297	307	310	317	325	291	283	285	288	287	292	296	296	292	284	281	299
" 20	109	271	272	279	282	292	296	304	309	309	310	308	314	310	307	307	308	310	312	314	314	314	310	304	298	302
" 21	110	298	296	294	299	307	309	313	313	316	316	316	317	323	322	322	326	327	327	329	333	330	320	308	395	315
" 22	111	289	288	292	295	305	316	312	308	312	319	317	317	317	316	317	319	319	317	321	322	324	315	301	287	310
" 23	112	288	300	297	292	305	305	309	310	300	271	290	309	308	310	306	319	311	309	310	305	319	307	299	294	303
" 24	113	287	288	289	294	305	305	308	312	309	306	310	310	306	311	314	310	309	313	316	314	318	314	306	298	306
" 25	114	298	293	269	304	300	313	316	318	322	332	322	321	321	326	326	324	325	333	332	328	313	299	257	219	309
" 26	115	233	233	233	248	252	247	254	254	273	318	311	292	285	297	287	298	297	293	291	297	285	284	283	277	276
" 27	116	272	277	282	280	278	287	287	294	300	294	298	299	305	305	306	307	310	310	311	312	312	309	296	288	297
" 28	117	289	291	297	302	311	312	313	316	313	308	308	313	312	309	308	316	314	311	313	309	307	294	285	285	306
" 29	118	290	289	294	298	304	311	310	314	318	318	317	316	316	314	313	314	314	315	316	314	316	311	317	315	311
" 30	119	304	306	310	311	304	285	285	244	26	271	272	295	305	290	291	293	293	304	299	311	301	293	294	282	292
Means	..	271	274	281	290	296	299	297	303	305	308	309	311	307	310	310	311	309	311	312	312	310	301	289	277	300

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north): $16^{\circ} +$ tabular minutes.

Day of Month.		No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																											
May	1	120	57.6	59.0	60.5	58.0	60.5	58.7	49.8	55.9	54.6	54.1	54.5	53.8	54.1	55.6	55.8	55.5	55.5	55.3	55.7	54.6	52.6	52.2	53.4	55.5	
"	2	121	55.2	58.2	60.7	60.1	60.1	58.0	56.2	55.9	55.4	55.6	54.5	54.6	55.2	55.5	55.7	55.6	55.5	55.3	54.8	53.9	52.3	52.2	53.4	55.8	
"	3	122	55.3	57.3	60.1	60.1	59.0	55.7	55.7	55.9	55.6	55.4	54.3	52.5	54.7	55.2	55.3	57.5	55.7	55.6	55.4	54.9	53.8	53.1	52.2	55.5	
"	4	123	54.1	57.1	59.6	59.3	59.0	57.1	53.0	55.6	54.5	53.7	53.7	49.2	50.9	50.3	52.6	53.3	55.4	56.2	56.6	55.3	54.4	53.1	52.2	54.5	
"	5	124	53.3	56.5	58.0	59.3	59.9	59.7	58.5	58.0	52.0	55.5	55.2	55.3	54.8	55.5	54.2	53.0	54.8	56.4	56.7	55.5	53.9	53.4	53.5	54.4	
"	6	125	55.9	57.6	59.1	58.2	57.4	56.9	55.9	55.9	56.1	55.9	55.7	55.5	55.5	54.6	54.8	55.7	55.8	55.9	55.5	54.8	53.9	52.7	52.3	51.7	
"	7	126	54.3	57.0	59.2	59.3	59.1	57.3	56.7	55.9	55.9	55.9	55.7	55.3	55.5	55.9	55.8	55.8	55.5	55.3	54.7	54.4	53.1	51.7	51.7	55.5	
"	8	127	53.6	56.3	58.5	59.2	58.2	57.1	56.2	55.9	55.9	55.9	54.9	55.1	55.4	55.5	55.9	57.1	55.9	55.9	55.3	54.7	53.8	52.5	52.6	53.1	
"	9	128	55.7	58.9	60.2	59.8	58.3	57.1	55.9	55.8	55.8	55.7	55.1	54.9	54.9	55.4	55.4	55.5	55.5	55.5	55.2	54.3	53.7	53.4	52.2	52.7	
"	10	129	54.2	57.0	60.2	60.7	60.8	59.2	57.1	56.1	55.4	55.1	54.8	54.3	54.9	55.7	55.7	55.5	55.4	55.5	55.3	54.8	54.9	53.7	53.0	52.9	
"	11	130	53.7	57.1	58.8	59.1	58.0	57.2	56.1	55.9	55.3	54.7	52.7	52.0	53.7	54.8	54.8	55.8	55.4	56.9	56.1	55.3	54.3	56.1	53.5	53.1	
"	12	131	54.7	57.5	60.7	60.5	59.3	57.9	56.3	56.2	56.6	55.4	53.7	50.9	53.1	53.0	54.3	53.5	55.1	55.6	55.4	54.9	54.5	53.3	51.9	52.2	
"	13	132	54.3	57.6	58.3	60.2	60.3	59.9	57.1	56.1	55.8	55.3	53.1	54.2	54.3	54.5	54.7	54.4	57.0	55.2	54.9	55.3	54.8	53.5	52.6	53.4	
"	14	133	54.8	56.3	58.7	58.9	58.8	57.6	56.1	55.8	54.9	55.9	53.0	53.6	53.8	56.4	54.8	55.7	56.5	55.4	55.4	55.4	54.6	53.4	53.5	54.3	
"	15	134	55.3	56.1	58.1	58.3	58.0	57.1	54.5	54.6	54.9	52.8	53.3	51.3	52.7	53.6	55.1	54.9	57.1	61.1	58.7	58.0	56.4	56.3	55.2	55.8	
"	16	135	55.8	57.4	58.4	58.2	58.1	56.7	55.7	55.9	55.8	55.5	54.9	54.7	54.6	54.9	55.4	55.9	56.4	55.4	55.9	60.5	61.2	57.0	61.4	57.9	
"	17	136	57.0	59.1	59.9	62.8	61.6	59.9	57.3	54.6	54.3	52.8	51.6	48.8	48.9	47.0	51.6	58.2	55.9	56.3	56.1	56.3	56.1	55.7	55.9	56.8	
"	18	137	58.0	58.1	60.1	58.4	57.2	48.8	55.3	55.2	54.8	49.6	51.7	54.8	51.9	55.3	54.6	59.4	58.2	58.1	57.1	56.3	55.4	55.9	57.1	55.7	
"	19	138	56.3	57.7	58.8	56.9	56.4	55.4	54.9	53.5	55.5	48.5	52.3	54.7	54.2	57.1	56.9	55.4	58.2	56.1	56.4	56.2	56.4	55.8	54.8	55.6	
"	20	139	55.3	57.6	57.1	57.7	56.3	54.9	53.6	53.5	54.9	54.5	52.7	52.3	54.2	54.9	55.4	57.9	57.3	56.4	56.4	56.1	56.1	55.9	55.1	54.7	
"	21	140	56.3	56.7	57.3	57.6	57.1	52.1	53.1	53.3	54.6	53.5	52.1	53.8	54.4	55.2	57.1	55.9	55.7	55.3	54.8	54.6	53.9	53.9	54.7	54.9	
"	22	141	55.3	57.1	58.0	58.2	57.1	56.1	55.6	55.9	55.1	55.3	54.9	55.3	54.9	55.5	55.6	55.5	55.9	55.7	55.3	55.1	53.7	53.7	54.8	55.6	
"	23	142	56.5	57.1	57.3	58.0	57.2	56.7	55.6	54.3	55.9	54.8	52.5	53.5	53.7	54.9	55.4	55.4	55.8	55.8	55.5	55.3	54.8	54.3	53.5	53.6	
"	24	143	53.7	55.3	57.6	58.3	58.2	56.2	55.4	56.4	55.8	54.9	54.6	54.6	54.8	54.9	55.5	55.7	55.9	55.9	55.8	55.7	55.1	53.8	53.7	54.5	
"	25	144	54.8	55.9	57.6	58.4	58.2	56.3	55.9	55.9	55.4	55.3	53.7	53.5	54.1	54.4	55.4	56.4	56.9	55.9	56.5	55.5	55.4	54.6	53.7	53.5	
"	26	145	54.2	56.1	58.1	58.8	58.7	57.0	56.2	55.9	55.8	55.3	55.3	53.0	54.6	54.6	55.3	55.7	55.9	55.8	55.5	54.3	54.3	53.6	54.1	55.6	
"	27	146	54.8	56.1	57.5	57.6	57.6	56.6	55.4	55.5	55.3	55.5	55.3	54.9	55.3	55.4	55.2	56.1	55.9	55.8	55.5	54.9	54.3	53.5	53.6	55.6	
"	28	147	53.8	54.8	57.7	58.2	57.9	56.4	55.4	55.9	55.9	56.1	55.1	54.9	54.8	53.6	54.8	55.5	55.9	56.1	56.1	55.9	55.7	55.1	54.6	55.6	
"	29	148	55.5	56.9	58.2	58.4	57.2	57.5	57.6	58.3	59.1	55.7	54.7	54.8	54.7	52.6	54.8	52.0	54.2	54.7	55.2	56.1	60.1	58.2	57.0	56.6	
"	30	149	57.5	57.0	58.2	58.4	57.1	55.9	55.6	55.8	54.8	50.9	53.5	53.8	54.6	51.4	54.3	54.6	55.5	56.1	56.7	55.8	55.9	54.6	54.6	55.1	
"	31	150	55.5	55.9	57.3	57.9	57.3	56.5	55.4	55.9	55.4	55.6	54.6	54.9	54.8	54.9	55.4	55.5	55.7	55.8	55.6	56.7	54.9	54.8	54.6	55.6	
Means	..	..	55.2	56.7	58.6	58.9	58.4	56.9	55.6	55.7	55.4	54.5	54.0	53.7	54.1	54.5	55.1	55.6	56.0	56.0	55.9	55.7	55.2	54.3	53.9	54.1	55.6

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Horizontal Force : 0-22000 C.G.S. + tabular γ .

Day of Month.		No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																											
May	1	120	260	261	266	285	270	281	301	281	284	290	299	306	304	298	298	299	301	305	307	303	297	293	291	284	290
"	2	121	275	262	264	275	287	303	304	300	299	306	308	310	311	310	309	309	313	313	315	315	315	306	294	287	300
"	3	122	271	268	283	282	295	298	309	317	317	317	315	312	310	308	312	322	320	310	312	317	318	311	298	288	305
"	4	123	283	291	288	287	296	282	290	281	274	288	288	287	288	283	295	297	298	299	300	300	307	304	299	291	299
"	5	124	292	297	282	280	274	269	272	264	288	290	305	307	305	314	318	314	311	309	303	318	316	314	307	299	298
"	6	125	303	299	299	295	295	301	306	311	313	321	316	318	319	311	305	308	309	309	313	314	317	312	306	297	308
"	7	126	292	288	291	297	302	303	305	307	312	317	318	318	310	318	317	319	317	318	320	320	320	318	310	303	310
"	8	127	293	287	294	298	306	312	310	308	309	306	314	319	319	314	314	324	321	318	320	320	321	314	308	302	310
"	9	128	306	300	293	304	319	321	320	324	320	323	321	322	323	319	320	317	316	320	323	322	324	319	310	307	316
"	10	129	295	288	293	301	313	309	321	321	325	326	319	321	321	316	318	316	316	318	322	321	330	329	321	313	316
"	11	130	305	298	302	307	317	322	322	324	321	311	300	310	307	308	312	311	312	314	314	320	319	311	316	301	312
"	12	131	283	277	278	279	301	312	315	315	310	297	303	306	308	305	305	307	309	309	311	312	318	315	311	298	304
"	13	132	298	287	285	299	313	304	313	316	319	320	311	315	313	316	314	313	328	319	316	314	317	316	314	313	311
"	14	133	309	308	309	314	315	319	315	325	312	310	328	306	302	305	319	310	313	315	317	320	321	316	308	300	313
"	15	134	293	291	298	302	311	316	311	311	305	295	299	297	309	308	310	326	323	306	329	323	318	308	327	319	310
"	16	135	297	268	283	290	296	306	303	299	306	312	316	321	311	318	319	323	325	327	332	334	307	291	258	229	303
"	17	136	218	222	213	240	210	229	198	219	210	234	242	260	266	274	249	255	258	265	270	272	254	217	259	244	241
"	18	137	238	255	253	245	273	263	273	273	282	331	278	299	297	292	282	279	287	282	290	286	293	284	251	258	277
"	19	138	274	279	254	273	278	284	290	298	291	302	288	292	293	298	301	311	287	292	296	289	301	298	291	281	289
"	20	139	272	263	280	285	278	289	295	305	295	294	303	301	298	296	298	306	303	300	302	294	297	301	291	279	293
"	21	140	280	269	281	287	286	295	284	291	299	292	309	309	300	301	312	302	298	300	302	300	305	306	306	295	296
"	22	141	293	287	286	297	302	307	303	297	287	301	307	314	311	308	308	307	308	307	311	312	318	321	320	303	305
"	23	142	290	299	297	305	310	309	311	309	314	305	305	315	304	305	309	305	309	309	313	314	319	323	324	319	309
"	24	143	308	302	299	303	308	312	308	312	308	316	307	306	309	319	316	317	321	322	323	323	325	326	325	319	314
"	25	144	310	306	304	308	308	309	312	313	317	317	304	306	304	304	307	309	313	312	309	313	313	313	308	299	309
"	26	145	394	292	288	290	301	309	309	309	313	313	309	312	307	314	312	313	312	313	314	316	319	319	314	305	312
"	27	146	295	298	303	305	310	316	315	316	317	317	321	319	316	312	312	310	313	319	319	320	324	325	323	319	314
"	28	147	311	311	311	312	318	323	320	322	321	314	318	317	315	315	315	315	316	317	319	321	327	328	328	324	318
"	29	148	317	306	307	312	319	328	318	303	295	307	320	307	310	308	313	321	313	315	320	322	318	322	314	308	313
"	30	149	312	289	288	291	292	307	309	310	292	315	308	302	325	302	299	306	303	307	316	308	311	313	306	303	305
"	31	150	301	299	298	299	306	309	312	306	306	303	304	306	308	307	308	308	309	310	312	312	318	317	317	307	308
Means		..	292	285	286	292	297	302	302	303	302	306	306	308	307	307	307	309	309	309	312	312	313	309	305	297	303

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north) : 16° + tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
June 1	151	55.4	55.9	57.0	58.1	58.8	57.0	55.9	56.1	55.3	55.4	55.1	54.6	54.5	54.8	54.9	55.7	55.9	55.9	55.9	55.7	55.2	54.8	54.3	53.4	55.5
" 2	152	54.6	57.1	58.8	58.7	58.1	56.9	55.8	55.9	55.7	55.3	55.2	55.2	55.4	55.2	55.9	54.9	55.5	55.8	55.6	55.3	54.8	54.6	53.5	54.6	55.8
" 3	153	55.4	57.1	58.8	59.1	58.2	57.3	57.1	56.6	55.9	55.8	55.4	54.8	54.9	55.4	55.4	55.4	55.4	55.9	55.4	55.3	55.1	54.3	53.7	53.9	55.9
" 4	154	54.8	56.2	58.7	58.8	57.6	56.4	55.9	55.9	55.9	55.9	55.9	55.9	55.4	55.6	56.3	56.4	56.5	56.5	55.9	55.5	54.8	54.3	53.7	53.7	55.9
" 5	155	54.5	56.2	59.2	59.8	58.8	57.1	55.9	55.9	55.5	55.9	55.9	55.9	55.9	55.9	56.2	56.3	55.9	55.9	55.4	55.4	55.4	54.3	54.3	54.8	56.1
" 6	156	55.3	55.9	56.5	57.9	57.1	56.6	55.5	56.4	56.4	55.9	55.4	55.4	55.3	55.4	55.4	55.4	55.9	55.4	55.5	55.4	55.4	54.8	54.4	55.3	55.6
" 7	157	55.9	57.1	60.1	59.3	57.6	57.3	56.6	56.5	54.3	55.4	54.8	54.4	54.3	55.4	55.5	55.5	55.4	55.3	55.9	54.9	54.3	53.7	53.7	53.7	55.7
" 8	158	55.5	55.9	58.2	58.9	58.2	57.1	56.5	55.9	55.5	55.5	55.4	55.4	53.3	54.3	55.4	56.4	55.7	55.4	55.4	55.4	55.3	54.8	54.8	54.8	55.8
" 9	159	55.4	57.1	57.7	58.8	58.4	56.7	55.9	55.7	55.4	55.4	55.3	55.4	55.4	55.4	55.4	54.4	55.9	55.3	55.4	56.9	55.4	55.4	58.2	58.8	56.3
" 10	160	58.1	59.3	60.4	58.8	60.0	59.6	58.2	56.9	50.9	45.2	43.0	46.4	56.5	53.1	49.6	57.1	57.1	59.3	58.8	59.9	60.0	59.9	57.1	58.2	56.0
" 11	161	57.6	57.3	57.7	56.9	57.5	57.1	55.9	55.5	55.7	55.9	53.1	51.4	53.7	55.5	54.2	55.4	58.8	57.3	56.5	56.5	55.9	54.4	54.3	54.9	55.8
" 12	162	54.8	56.6	55.4	56.5	56.6	55.5	56.5	56.5	53.9	52.0	55.3	55.3	54.1	54.8	55.4	56.5	56.5	58.2	59.9	58.7	58.8	56.5	56.6	56.5	56.1
" 13	163	57.1	56.5	55.9	57.6	57.5	56.5	55.5	55.9	55.5	55.5	55.4	55.4	55.4	55.4	55.9	56.4	56.5	56.5	56.4	55.9	55.9	55.5	54.8	54.8	56.0
" 14	164	55.4	57.1	58.7	59.7	57.1	57.0	51.2	56.5	53.7	53.8	53.1	53.1	52.1	55.4	52.1	53.7	55.9	56.5	56.5	55.9	55.9	54.8	54.8	54.8	55.2
" 15	165	55.9	55.9	57.6	57.1	57.1	51.3	54.8	56.5	40.8	54.2	55.3	53.7	54.3	54.2	55.4	58.8	57.7	58.2	59.3	57.6	58.2	57.6	57.1	57.6	55.7
" 16	166	58.2	58.8	59.3	59.3	53.1	46.4	56.4	56.5	53.7	53.3	53.7	53.7	54.3	53.9	56.4	55.4	54.4	57.1	56.5	58.7	58.2	57.5	56.2	57.1	55.8
" 17	167	57.1	58.2	58.2	57.5	57.2	53.1	49.2	54.2	55.4	54.3	55.4	55.4	55.3	54.8	55.1	57.1	55.9	56.5	56.5	58.5	57.1	55.4	55.9	57.6	55.8
" 18	168	57.1	57.4	58.4	56.5	57.2	54.3	55.5	55.5	54.3	54.8	55.1	55.3	55.4	55.7	56.5	56.6	56.5	56.2	56.2	55.9	55.7	54.8	54.3	54.3	55.8
" 19	169	55.5	57.6	58.8	57.7	57.3	55.9	54.8	55.8	52.6	55.4	55.4	55.4	55.4	55.4	55.4	55.9	56.5	56.4	55.9	55.7	55.4	54.8	54.3	54.3	55.7
" 20	170	55.4	57.1	58.7	58.8	57.6	56.4	55.4	55.9	55.9	56.4	55.5	51.8	54.2	54.8	55.9	57.4	56.5	56.5	55.9	55.5	55.4	54.8	54.3	54.8	56.0
" 21	171	56.3	57.1	58.5	59.3	57.7	56.2	55.4	55.9	55.4	55.4	55.3	55.4	55.4	55.4	55.4	56.5	55.6	55.5	55.4	55.9	55.4	54.8	53.7	55.4	55.9
" 22	172	56.8	57.7	58.2	58.9	58.2	58.2	56.5	55.3	56.5	52.5	54.8	55.4	55.4	55.9	56.5	56.5	56.5	56.5	56.4	56.5	55.4	54.8	54.3	53.1	56.1
" 23	173	54.3	55.9	52.0	57.6	57.6	56.5	55.9	55.9	55.4	55.4	55.4	55.8	55.4	55.9	56.5	56.5	56.5	56.5	55.9	55.4	55.4	54.3	53.7	54.3	55.6
" 24	174	55.9	57.9	59.3	59.3	58.8	57.1	56.5	57.1	57.1	56.6	58.1	58.2	54.6	55.4	55.9	55.9	56.5	56.5	55.9	55.4	55.4	54.2	54.3	54.3	56.5
" 25	175	55.5	56.5	57.7	59.3	58.2	56.2	55.7	55.6	55.4	55.4	55.4	54.9	55.4	55.4	55.9	56.4	56.4	56.4	56.3	55.7	55.7	55.3	54.8	51.4	56.0
" 26	176	55.4	57.1	58.7	59.3	58.8	57.6	56.5	56.4	55.9	55.9	55.4	55.1	55.4	54.3	53.3	54.3	55.3	55.9	55.4	56.5	56.5	55.9	56.5	55.4	56.1
" 27	177	55.5	56.5	58.2	58.7	57.9	57.6	55.9	55.9	55.9	55.1	54.8	54.8	54.8	55.4	55.4	55.9	56.4	56.4	56.2	55.9	56.4	55.4	54.3	54.8	56.1
" 28	178	54.8	55.9	57.1	58.2	58.4	57.2	57.4	57.6	56.4	55.5	55.4	55.5	55.4	55.4	55.5	55.9	56.4	56.4	56.4	55.9	55.9	55.4	55.4	55.4	56.2
" 29	179	56.5	56.9	57.2	58.2	58.7	59.9	57.1	56.7	55.9	55.4	55.2	55.2	55.2	55.4	55.4	55.4	55.7	55.9	55.5	55.5	55.5	55.5	55.2	54.8	56.2
" 30	180	55.1	56.5	58.2	58.8	58.8	57.5	56.5	56.5	56.4	55.5	55.4	55.4	55.4	55.4	55.5	55.9	56.2	56.4	56.5	56.4	55.9	55.5	55.0	55.8	56.3
Means	..	55.8	56.9	58.0	58.4	57.7	56.3	55.7	56.1	54.8	54.9	54.8	54.8	54.9	55.1	55.3	56.0	56.2	56.4	56.3	56.2	56.0	55.3	54.9	55.2	55.9

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.

Magnetic Horizontal Force : 0.22000 C.G.S. + tabular γ .

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
June 1	151	297	294	296	302	313	317	318	317	317	317	316	314	313	313	312	314	313	316	318	319	321	320	319	309	313
" 2	152	303	301	297	298	306	313	316	317	316	313	311	313	311	313	314	315	315	317	319	321	319	322	317	297	312
" 3	153	290	294	303	309	314	314	316	319	321	322	319	317	316	316	315	315	316	318	318	318	321	319	317	315	314
" 4	154	307	305	305	310	317	322	319	320	322	326	320	321	319	322	322	322	322	324	327	327	329	329	324	319	320
" 5	155	309	296	299	299	301	309	312	316	316	320	318	318	314	321	321	322	325	325	327	325	327	325	330	323	317
" 6	156	313	312	311	314	316	320	319	316	316	321	321	316	311	313	315	315	317	317	320	320	320	317	320	312	316
" 7	157	306	299	304	321	315	315	312	313	319	321	316	309	309	316	318	318	318	315	318	318	313	313	316	316	314
" 8	158	310	308	312	307	312	319	321	318	320	317	316	314	308	305	315	315	315	315	317	320	320	320	322	311	315
" 9	159	306	306	307	311	316	321	323	323	323	323	322	325	324	324	319	320	324	322	320	308	322	305	317	312	318
" 10	160	307	305	282	289	302	309	287	292	285	236	346	240	218	231	226	240	248	260	265	277	275	255	243	255	270
" 11	161	264	273	263	266	285	288	286	285	303	287	285	281	278	305	277	286	288	293	295	293	297	293	298	285	286
" 12	162	273	262	248	245	243	269	266	282	267	282	287	290	289	290	304	296	289	297	309	305	297	284	292	287	281
" 13	163	266	276	261	281	291	301	301	301	301	304	306	303	303	302	303	303	303	308	306	306	308	306	297	284	297
" 14	164	283	278	279	269	271	280	295	275	291	284	296	278	286	298	281	301	286	288	292	293	296	301	303	301	288
" 15	165	291	282	269	282	293	280	299	277	262	299	292	324	299	295	304	311	299	294	302	299	295	297	285	263	291
" 16	166	276	261	261	279	290	288	288	296	300	315	297	293	308	303	306	303	303	293	304	303	306	301	298	294	294
" 17	167	247	275	276	286	296	291	291	293	293	304	301	301	315	303	303	301	306	301	305	294	303	291	281	284	294
" 18	168	287	289	287	291	294	296	299	302	297	306	304	307	307	311	310	310	309	308	311	310	310	313	314	306	303
" 19	169	300	285	290	297	306	303	304	304	297	308	304	305	307	308	305	305	306	308	310	309	310	312	308	308	304
" 20	170	304	298	299	305	310	313	311	311	312	303	301	301	302	303	306	309	311	311	316	311	307	313	318	307	308
" 21	171	288	285	288	295	305	309	308	307	312	311	307	307	305	307	305	307	312	307	317	314	312	305	305	304	305
" 22	172	303	302	297	308	315	312	306	304	298	298	303	308	310	312	313	311	312	313	316	315	313	313	316	310	309
" 23	173	309	306	303	303	306	313	314	315	314	315	306	309	308	311	312	312	312	312	312	312	314	311	312	307	310
" 24	174	296	291	294	304	315	318	315	311	301	301	304	291	301	309	311	309	306	301	311	311	310	309	306	301	305
" 25	175	300	297	300	307	315	316	310	312	314	314	314	310	309	314	319	319	319	320	322	322	321	322	324	320	314
" 26	176	315	310	309	311	311	308	311	315	314	313	313	309	305	309	305	300	315	319	319	315	316	309	307	287	310
" 27	177	273	283	285	283	286	288	297	298	298	299	298	301	304	315	310	309	310	313	315	315	317	318	315	314	302
" 28	178	311	302	299	299	306	310	308	307	310	314	312	310	309	312	312	312	312	313	315	316	316	318	321	311	311
" 29	179	304	297	295	302	308	317	317	317	317	320	320	317	317	315	315	315	317	319	320	322	327	327	325	323	316
" 30	180	321	309	308	308	310	315	318	317	317	317	316	317	316	313	316	316	316	317	317	315	311	311	311	308	314
Means	..	295	293	291	296	302	306	306	306	306	307	309	305	304	307	306	308	308	309	312	311	312	309	309	302	305

TABLE OF HOURLY TABLES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east by north): 16°—tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.	
1918.																											
July 1	181	57.1	57.1	57.1	58.2	57.6	56.5	56.5	56.4	56.5	55.3	54.4	55.4	55.4	55.9	56.5	56.4	56.4	56.5	56.5	55.9	56.5	55.9	55.4	55.9	56.3	
" 2	182	56.5	57.3	57.7	58.8	58.7	58.8	56.4	56.5	56.3	55.9	55.4	55.9	55.9	56.5	56.5	56.5	56.5	57.1	57.1	55.9	55.9	55.4	55.4	54.3	56.5	
" 3	183	54.8	57.1	58.9	59.3	58.8	57.1	56.5	56.5	56.4	55.4	55.4	55.4	54.8	55.4	55.9	56.5	57.1	57.1	57.1	56.7	56.5	55.4	54.4	54.3	56.0	
" 4	184	55.4	56.9	58.9	58.5	58.1	57.0	57.3	56.2	56.7	55.4	54.8	55.4	55.4	54.8	51.4	54.2	55.6	55.9	56.5	55.9	55.6	55.6	55.6	55.9	56.0	
" 5	185	55.7	55.9	57.7	58.2	57.6	57.1	56.2	56.4	56.5	55.3	54.4	55.4	55.4	55.9	56.5	56.4	56.4	56.5	56.5	55.9	56.5	55.9	55.4	55.7	56.3	
" 6	186	55.8	57.6	58.0	58.8	58.7	56.5	56.4	56.5	56.3	55.9	55.4	55.9	55.9	56.5	56.5	56.5	56.5	57.1	57.1	55.9	55.9	55.4	54.3	54.1	56.3	
" 7	187	55.9	58.2	58.9	59.3	58.8	57.1	56.5	56.5	56.6	55.4	55.4	55.4	54.8	55.4	55.9	56.5	57.1	57.1	57.1	56.7	56.5	55.4	54.6	54.8	56.5	
" 8	188	57.1	57.1	58.2	61.0	58.8	59.1	56.5	56.5	55.3	55.4	55.4	54.3	54.3	54.8	56.5	57.1	57.6	57.6	58.2	59.1	57.6	54.8	54.8	55.3	56.7	
" 9	189	55.9	58.2	59.1	59.9	59.9	58.2	56.5	56.9	56.6	55.4	55.5	54.3	53.7	54.6	55.4	55.5	55.9	56.3	55.9	55.9	56.6	57.6	55.5	55.9	56.5	
" 10	190	56.5	58.2	57.9	59.3	59.3	56.5	56.5	56.5	56.5	55.5	55.9	55.7	55.7	56.4	56.5	56.5	56.5	56.5	56.5	56.4	55.9	55.3	56.5	55.2	56.6	
" 11	191	57.1	57.6	58.2	59.9	60.0	58.8	57.1	57.5	56.4	56.5	55.4	55.4	54.3	55.4	56.4	56.4	57.6	57.1	56.6	57.1	59.3	58.2	56.7	56.8		
" 12	192	57.1	58.2	59.9	59.3	57.1	55.7	56.5	56.4	56.3	55.4	53.7	54.3	55.4	56.4	56.5	58.9	57.1	57.5	57.7	57.1	56.5	55.4	54.8	55.4	56.6	
" 13	193	54.8	56.9	58.2	59.9	59.3	57.1	56.2	56.4	55.9	55.4	54.8	55.4	53.1	52.6	55.3	56.6	57.4	57.1	57.1	56.6	56.5	55.9	54.8	54.3	54.5	
" 14	194	55.9	58.1	59.0	59.9	58.8	57.1	56.6	56.5	55.9	55.7	55.4	55.9	55.9	56.5	56.5	56.6	57.1	57.1	57.1	57.6	56.6	54.8	53.7	56.1	56.7	
" 15	195	56.8	58.8	58.8	58.2	57.6	53.1	55.5	50.9	54.2	55.7	54.8	54.8	53.5	53.0	54.8	56.5	57.1	56.5	56.6	56.5	55.5	54.9	53.7	54.3	55.7	
" 16	196	55.4	56.8	59.2	60.5	59.3	57.3	56.5	56.5	55.9	55.9	54.3	55.3	54.4	55.4	55.9	56.5	57.1	57.1	56.5	58.2	56.7	55.9	54.8	55.0	56.5	
" 17	197	54.9	55.8	58.7	58.9	58.8	57.3	56.5	56.9	56.5	56.5	56.5	56.5	55.9	55.9	56.4	56.6	57.1	57.1	57.1	56.5	56.5	55.4	54.8	54.4	56.6	
" 18	198	54.8	56.5	58.4	60.5	60.5	59.3	58.9	56.6	55.9	55.9	55.4	52.3	54.8	55.3	56.4	56.5	56.6	56.5	56.5	56.4	55.9	55.4	54.8	54.8	56.5	
" 19	199	54.8	55.9	56.5	58.2	58.7	56.5	55.5	55.5	55.7	55.5	54.6	55.4	55.5	55.9	56.5	56.5	56.5	56.5	56.4	55.9	55.9	53.9	53.7	54.3	55.8	
" 20	200	54.8	56.4	58.2	59.8	58.8	56.6	56.4	56.5	55.9	55.9	55.4	55.5	55.9	56.5	56.5	56.5	56.5	56.5	56.5	56.5	55.9	55.3	53.7	53.7	56.3	
" 21	201	54.8	58.2	58.8	58.9	58.7	57.5	56.5	57.6	57.1	56.5	56.4	55.9	55.9	55.9	55.9	56.5	56.2	56.2	56.2	55.9	55.4	54.8	54.2	54.8	56.4	
" 22	202	55.9	58.2	59.2	59.2	58.2	56.5	56.1	55.9	55.9	55.9	55.4	55.5	55.9	55.9	56.4	55.9	56.1	55.9	55.4	55.5	55.4	54.3	54.8	56.2		
" 23	203	55.9	56.2	57.6	58.0	58.5	57.6	56.6	57.1	57.1	56.6	55.9	55.4	53.1	55.4	55.9	56.6	56.7	56.5	56.5	56.3	55.7	54.8	54.2	53.3	56.2	
" 24	204	55.5	57.1	58.8	59.3	59.3	58.8	57.1	54.8	56.5	56.6	55.9	55.9	55.9	56.4	56.5	56.6	56.5	56.5	56.5	55.4	56.5	54.9	54.3	55.1	56.6	
" 25	205	55.4	57.1	57.6	59.3	59.3	59.3	56.9	57.6	57.6	57.1	57.1	55.4	54.3	53.3	52.6	52.6	53.1	55.9	54.3	60.5	56.5	55.4	55.4	54.3	56.2	
" 26	206	55.4	56.6	58.2	58.8	59.9	59.0	57.6	57.1	56.5	56.9	56.5	55.7	55.9	55.9	55.4	55.9	56.5	56.2	56.2	57.1	55.9	57.1	55.4	55.9	56.8	
" 27	207	56.3	57.6	60.1	59.1	59.0	58.7	57.1	57.1	56.5	56.5	55.9	56.5	54.3	54.3	55.4	55.4	55.4	57.1	56.5	56.5	56.5	55.7	55.4	55.3	56.6	
" 28	208	57.1	58.7	62.2	60.5	59.9	60.3	59.9	58.2	57.1	55.6	54.3	52.6	51.4	52.6	52.6	55.5	56.5	57.6	58.8	58.9	62.2	60.0	60.5	59.3	57.6	
" 29	209	58.5	58.4	59.3	59.3	62.1	61.8	59.3	55.4	57.6	55.8	55.3	52.0	53.1	54.4	53.7	55.4	55.7	55.1	59.9	57.6	60.0	58.2	55.4	55.9	57.1	
" 30	210	56.3	59.3	59.9	60.7	58.8	58.2	57.6	49.2	57.5	56.4	55.3	52.1	54.3	54.8	54.3	59.8	56.9	55.4	55.4	56.6	57.5	56.5	55.4	56.5	56.4	
" 31	211	56.8	58.2	59.9	61.1	58.8	57.6	58.3	56.5	57.6	54.2	56.4	55.5	55.4	54.1	52.0	55.5	55.9	57.2	57.3	56.5	57.6	56.4	55.9	55.7	56.7	
Means	..	56.0	57.4	58.7	59.4	59.0	57.8	56.8	56.3	56.3	55.8	55.1	55.0	54.9	55.2	55.4	56.3	56.5	56.7	56.7	56.7	56.7	55.8	55.1	55.2	56.4	

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Horizontal Force : 0.22000 C.G.S. + tabular γ .

Day of Month.		No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
4—C. 1A.	1918.																										
	July 1	181	298	293	293	301	313	315	317	315	313	313	320	313	330	291	300	307	308	310	308	308	313	313	315	315	309
	" 2	182	297	297	299	317	314	319	315	318	317	317	317	314	309	312	312	311	307	312	314	317	314	312	302	302	311
	" 3	183	300	295	290	290	288	304	307	299	307	312	300	304	302	306	303	316	308	308	311	311	311	310	316	311	305
	" 4	184	305	288	290	293	304	311	302	305	307	308	305	310	307	305	310	305	302	300	305	310	310	310	310	312	305
	" 5	185	310	301	295	300	305	307	310	307	302	286	290	307	309	310	310	307	309	310	310	310	315	312	315	310	306
	" 6	186	306	297	295	297	305	312	307	310	307	310	310	309	307	310	315	314	310	305	307	312	315	315	312	297	308
	" 7	187	291	290	295	300	307	307	312	314	309	306	307	310	310	311	310	309	309	310	315	317	324	330	337	334	311
	" 8	188	326	315	302	295	283	290	297	288	287	278	285	291	310	302	305	305	307	310	315	320	307	300	302	293	301
	" 9	189	286	281	289	298	306	303	303	301	301	207	307	309	297	304	307	308	305	310	315	317	310	290	303	296	302
	" 10	190	282	286	284	294	292	301	311	313	311	314	313	313	309	313	314	317	316	318	322	323	318	313	289	288	306
	" 11	191	268	270	282	292	290	277	287	287	295	299	294	295	290	297	299	300	307	304	302	303	299	297	297	292	293
	" 12	192	262	266	271	284	288	303	303	305	308	305	305	285	300	303	308	286	308	308	308	313	320	308	308	293	298
	" 13	193	285	290	282	287	299	304	307	309	310	310	312	316	319	307	292	307	302	311	312	313	315	312	307	299	304
	" 14	194	291	291	289	296	305	313	312	310	311	310	309	308	308	307	309	309	309	314	318	319	326	324	290	297	307
	" 15	195	298	295	285	293	298	295	303	298	289	283	312	310	315	300	298	304	301	301	304	304	309	305	301	292	300
	" 16	196	273	283	274	291	297	303	305	310	307	321	317	314	299	307	298	308	312	240	340	321	322	320	317	306	308
	" 17	197	297	297	295	300	310	314	315	312	312	315	315	315	307	314	312	312	315	317	317	322	329	332	329	329	314
	" 18	198	322	311	296	284	294	298	291	288	285	297	297	309	302	311	306	306	308	311	313	312	315	317	317	315	304
	" 19	199	304	296	290	294	305	309	309	309	311	309	311	311	305	307	311	308	309	309	309	309	314	315	311	301	307
	" 20	200	292	290	292	305	314	317	316	315	310	313	313	315	318	319	320	319	320	321	322	322	325	322	321	310	314
	" 21	201	296	299	304	307	313	313	311	311	309	309	311	311	311	311	310	310	310	310	310	312	314	314	314	307	309
	" 22	202	294	294	294	301	313	316	313	313	311	308	308	308	313	314	313	311	313	308	313	313	318	313	312	325	310
	" 23	203	297	297	297	299	309	317	317	314	309	295	309	312	317	304	307	312	312	313	314	315	324	322	322	312	310
	" 24	204	297	297	297	297	307	309	307	306	312	314	314	314	312	309	309	309	314	314	317	317	317	318	314	314	310
	" 25	205	298	298	295	296	310	322	323	303	303	305	297	301	302	306	302	292	294	287	294	316	292	294	302	292	301
	" 26	206	285	283	285	285	285	278	285	298	300	300	293	293	288	298	295	293	303	298	290	300	298	300	293	285	295
	" 27	207	280	280	274	275	284	296	289	295	295	293	293	285	283	291	284	286	289	289	295	295	297	299	300	292	289
	" 28	208	269	286	276	274	282	283	282	286	293	288	288	296	306	303	296	299	300	305	319	314	283	265	238	246	287
	" 29	209	254	245	263	275	265	254	269	277	283	287	287	285	282	286	311	289	289	289	309	301	291	289	284	283	281
	" 30	210	281	265	267	281	280	298	273	257	273	278	278	279	283	282	286	313	287	286	289	291	290	286	285	275	282
	" 31	211	277	277	275	280	279	290	274	291	293	291	299	293	292	294	296	294	296	294	293	294	288	291	306	297	290
	Means	..	291	289	288	293	298	302	302	302	303	303	304	305	305	304	305	306	306	307	310	311	310	308	306	301	302

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north): 16° + tabular minutes.

Day of Month.		No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																											
August	1	212	56.4	58.1	60.5	60.9	60.1	58.5	56.5	56.9	57.1	55.9	55.5	55.5	55.4	55.3	54.1	55.9	55.9	55.9	56.5	56.3	56.5	54.8	54.2	54.8	56.6
"	2	213	55.7	56.9	58.8	60.0	59.8	58.8	57.1	57.1	57.4	55.9	55.4	55.4	55.7	56.5	57.5	57.6	56.7	56.5	56.4	56.5	59.9	57.6	57.6	56.9	57.2
"	3	214	57.9	58.8	60.0	57.5	58.8	57.1	56.5	56.9	55.9	55.9	55.9	52.1	55.3	55.9	56.4	57.6	55.5	57.4	57.6	57.6	56.5	55.4	54.3	53.1	56.5
"	4	215	53.7	56.5	58.9	58.8	58.8	57.5	56.9	57.0	56.6	56.6	55.3	55.1	55.4	55.3	54.8	55.4	56.5	57.1	56.5	56.9	57.7	57.1	54.4	53.1	56.3
"	5	216	53.9	56.7	58.8	59.9	59.8	58.8	57.1	57.5	56.7	56.5	56.4	55.7	55.3	53.1	56.4	56.9	55.9	56.5	56.6	56.5	56.5	56.5	54.9	55.9	56.6
"	6	217	57.6	60.0	60.7	61.0	60.9	58.9	57.6	56.5	55.4	52.0	54.8	55.9	55.9	55.9	55.9	56.9	56.5	56.5	56.4	55.9	53.9	54.3	53.8	54.3	56.6
"	7	218	57.6	58.6	59.8	59.8	59.3	57.1	55.9	57.5	51.4	56.2	55.6	53.1	51.7	54.3	55.9	56.5	57.1	56.5	57.1	57.6	61.6	55.4	54.1	53.2	56.4
"	8	219	53.7	55.4	58.7	59.0	58.2	58.2	53.1	54.8	55.7	56.5	57.1	57.5	52.1	53.7	56.5	58.7	60.5	57.6	57.4	56.5	54.8	54.2	55.5	56.4	56.4
"	9	220	54.7	58.0	59.9	60.5	59.3	57.6	54.8	52.5	54.3	54.6	55.4	55.4	55.4	55.6	55.6	56.2	59.3	58.8	57.5	58.2	57.0	55.4	56.6	55.7	56.6
"	10	221	56.5	57.1	58.8	59.9	59.3	57.3	56.5	56.6	56.4	56.4	55.5	55.4	55.5	56.5	56.5	56.6	57.1	56.5	56.5	55.3	54.3	53.1	52.5	56.3	56.3
"	11	222	53.7	56.1	58.9	57.6	59.3	58.2	56.6	56.9	53.7	51.4	55.4	55.4	55.9	53.1	52.0	55.3	55.5	56.5	57.5	58.2	57.1	55.4	54.3	54.4	55.7
"	12	223	54.8	55.4	57.3	58.8	55.4	56.4	55.3	53.1	56.6	56.4	55.4	52.2	54.3	55.3	55.9	55.9	56.5	56.6	56.5	55.5	53.5	52.0	52.6	55.3	55.3
"	13	224	54.4	57.1	59.1	60.0	59.8	57.6	55.9	56.6	55.8	55.4	55.5	55.5	55.5	59.3	55.9	56.5	57.1	57.6	56.5	55.5	54.8	54.7	54.3	56.5	56.5
"	14	225	55.8	57.6	60.7	60.8	59.7	58.5	56.5	57.1	57.1	56.9	53.1	55.9	53.1	54.4	55.9	56.3	55.9	58.7	56.9	56.4	55.4	54.8	53.3	53.7	56.4
"	15	226	54.8	56.5	60.2	60.5	59.9	58.3	56.5	56.9	56.5	56.5	56.5	56.4	56.4	56.4	56.5	56.9	58.9	59.3	58.2	57.6	56.5	59.9	55.5	55.9	57.4
"	16	227	56.0	57.0	59.9	62.1	58.7	58.9	59.4	55.9	57.0	52.0	45.9	46.5	48.5	51.4	53.9	54.8	55.9	57.1	56.9	56.5	54.8	53.1	52.6	53.1	54.9
"	17	228	54.8	57.1	58.8	59.8	59.9	58.3	56.6	57.1	56.4	56.5	55.9	55.9	56.5	56.5	56.5	56.5	56.5	56.5	56.4	55.1	53.1	52.0	52.0	56.3	56.3
"	18	229	54.0	58.2	59.8	59.9	59.9	58.8	57.5	57.5	57.1	56.5	56.4	56.5	56.5	56.5	56.5	56.6	57.1	57.0	56.5	56.3	54.5	51.6	51.4	51.9	56.4
"	19	230	54.1	57.0	58.9	60.0	59.9	58.7	56.6	56.7	56.5	56.6	56.6	56.5	56.5	56.6	56.5	56.5	56.6	56.6	55.9	54.8	53.1	52.8	53.1	56.4	56.4
"	20	231	54.8	58.2	59.3	59.8	53.1	59.8	58.8	58.8	56.5	57.1	55.1	54.4	54.8	54.3	55.4	56.5	56.5	55.9	55.9	55.4	55.4	53.5	53.1	54.4	56.1
"	21	232	57.6	59.4	61.6	62.7	62.3	59.3	56.7	56.6	56.5	56.5	56.5	56.6	56.5	56.5	56.4	56.5	56.3	55.9	56.1	55.4	54.8	53.1	52.6	52.7	56.9
"	22	233	54.3	57.2	58.8	60.8	61.2	59.4	58.2	59.1	58.2	57.1	55.9	55.7	55.9	54.7	56.1	56.3	56.1	56.3	55.8	55.2	57.4	53.5	52.9	53.1	56.6
"	23	234	55.3	58.2	60.7	61.6	62.2	59.8	57.6	57.1	57.1	57.1	55.1	54.3	55.5	55.8	56.5	57.1	56.3	58.2	56.6	55.9	55.4	54.3	53.5	54.4	56.9
"	24	235	55.7	58.3	58.8	59.8	60.2	59.3	58.8	56.5	58.2	52.8	54.4	53.7	52.8	52.6	54.4	55.9	55.9	53.3	55.4	54.6	54.9	54.3	55.5	55.4	55.9
"	25	236	57.2	58.8	61.6	62.7	62.2	61.0	58.8	58.8	57.1	56.5	53.7	49.2	46.4	55.4	53.3	55.4	54.8	55.4	56.6	55.9	55.1	53.1	52.6	52.6	56.0
"	26	237	54.6	57.7	61.1	61.0	63.3	61.0	61.6	58.8	50.9	57.5	57.6	59.3	54.3	53.7	54.3	54.3	59.9	57.1	56.5	56.5	55.4	53.3	53.1	53.7	56.9
"	27	238	55.9	58.5	59.2	62.2	57.6	57.6	58.8	54.8	57.1	55.9	57.6	51.4	48.1	58.8	54.8	54.5	56.5	55.4	56.5	57.0	56.5	54.4	54.4	55.1	56.6
"	28	239	55.9	58.1	59.3	60.5	59.6	58.2	57.1	57.1	57.1	55.8	53.1	55.3	53.7	52.2	55.9	56.5	56.5	57.1	56.5	55.9	55.4	54.2	54.4	54.8	56.3
"	29	240	56.2	58.4	60.9	60.5	59.3	58.3	57.6	57.6	57.6	57.1	54.8	54.3	55.4	56.5	56.5	56.5	57.1	56.5	55.9	55.3	54.3	54.3	54.3	54.3	56.7
"	30	241	56.4	57.6	59.8	59.9	59.2	58.2	57.6	57.6	57.9	57.6	56.5	54.8	55.4	56.5	55.9	55.4	56.5	56.5	56.5	54.8	53.7	53.1	53.1	54.0	56.6
"	31	242	55.6	58.2	59.3	60.2	59.6	58.8	57.6	57.5	57.1	56.5	54.7	55.9	56.1	56.5	56.6	56.6	57.4	55.4	55.6	60.5	58.1	58.8	58.2	54.3	57.3
Means	..	..	55.5	57.6	59.6	60.3	59.6	58.5	57.2	56.8	56.3	55.9	55.2	54.7	54.4	55.3	55.7	56.3	56.8	56.7	56.6	56.1	54.7	54.0	54.0	54.0	56.4

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Horizontal Force : 0.22000 C.G.S. + tabular γ .

Day of Month.		No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																											
August	1	212	286	276	282	288	293	296	297	298	298	302	304	301	300	299	307	305	306	306	303	302	309	309	309	304	299
"	2	213	293	279	279	291	300	304	316	296	272	285	290	298	302	305	306	308	306	306	306	309	305	300	290	285	297
"	3	214	270	256	264	256	266	263	281	299	299	303	296	295	301	293	296	313	305	293	296	298	303	300	301	288	289
"	4	215	288	290	283	287	290	297	302	303	303	299	302	301	300	300	319	309	308	308	308	315	317	300	320	308	302
"	5	216	290	286	291	292	301	304	307	288	312	314	314	312	301	334	298	302	303	302	312	307	311	304	304	296	304
"	6	217	291	283	276	283	286	291	305	293	302	308	300	303	298	299	323	300	303	303	305	308	312	303	296	288	298
"	7	218	279	276	283	288	300	312	307	300	303	314	305	308	290	290	290	304	308	310	313	323	325	315	306	296	302
"	8	219	267	282	287	287	294	298	287	306	279	316	309	315	299	297	297	304	303	304	304	297	309	306	291	265	296
"	9	220	266	259	271	281	305	313	305	315	303	323	302	310	315	307	307	304	301	302	312	304	310	307	275	297	296
"	10	221	288	267	274	287	310	307	310	313	313	315	318	313	313	311	311	313	313	315	316	318	321	311	305	304	207
"	11	222	289	273	282	271	294	304	309	309	300	309	297	302	324	307	320	296	305	305	307	320	309	315	303	298	302
"	12	223	298	284	295	298	304	302	286	300	302	306	310	328	313	302	303	307	309	312	314	317	318	317	311	304	306
"	13	224	298	292	291	298	307	309	310	310	308	320	309	312	310	308	313	308	308	313	312	313	314	310	293	293	307
"	14	225	295	281	286	294	310	315	317	322	321	315	320	311	315	313	305	308	308	308	313	307	415	303	284	271	305
"	15	226	266	272	278	283	293	304	301	312	318	318	320	318	320	313	313	315	342	371	323	325	288	295	290	290	307
"	16	227	260	254	258	238	246	280	282	297	285	260	242	263	225	287	267	265	268	273	277	281	285	285	281	272	268
"	17	228	261	264	269	273	281	285	283	292	294	299	299	297	294	296	298	299	299	299	301	304	306	301	294	283	290
"	18	229	276	276	268	269	283	295	298	300	295	300	301	304	303	304	304	305	305	305	307	310	312	307	307	302	297
"	19	230	292	280	283	292	305	312	311	313	313	315	315	314	312	310	310	311	311	311	313	316	316	318	311	301	308
"	20	231	294	287	295	297	314	314	307	302	307	297	307	298	298	301	293	299	298	298	299	299	305	298	292	281	299
"	21	232	267	263	272	282	302	311	314	289	309	316	314	309	309	309	309	309	309	309	309	309	316	309	304	302	302
"	22	233	293	288	294	301	305	313	314	308	305	310	311	310	310	310	311	314	314	314	314	315	317	310	298	285	311
"	23	234	281	276	279	284	302	308	313	315	313	314	321	319	309	308	312	313	313	313	313	313	315	313	313	308	307
"	24	235	304	292	296	307	311	316	309	311	287	285	288	310	299	298	301	299	310	315	313	310	308	286	271	261	299
"	25	236	259	263	263	273	256	283	289	292	251	260	275	275	297	271	271	274	299	291	293	295	301	296	293	288	278
"	26	237	280	272	265	269	270	274	285	277	319	289	295	326	299	294	294	302	285	294	299	299	304	331	302	289	292
"	27	238	287	287	281	292	287	289	295	329	289	287	310	304	270	270	299	282	287	285	287	295	295	295	292	287	291
"	28	239	276	269	282	289	297	306	307	310	309	310	309	307	307	309	295	297	299	302	304	305	305	329	299	302	301
"	29	240	295	284	287	289	299	307	308	311	304	311	310	307	299	304	305	304	306	307	305	309	309	310	307	304	303
"	30	241	295	288	292	298	308	308	312	311	310	312	306	312	308	310	315	311	308	307	310	315	322	319	320	317	309
"	31	242	308	299	299	305	307	313	311	315	317	305	313	311	311	314	316	316	331	331	328	314	340	327	321	311	315
Means	..	284	277	281	288	294	302	301	302	304	301	304	303	306	302	302	303	303	305	307	307	308	310	307	299	293	300

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north): 16° + tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.	
1918.																											
September 1	243	57.1	62.7	62.7	62.7	61.5	58.8	58.1	57.2	50.3	47.9	52.0	50.9	52.8	57.1	57.1	60.0	56.7	57.3	58.8	59.3	57.6	54.9	52.0	54.3	56.7	
"	244	56.9	59.4	59.3	59.9	58.8	57.6	56.6	56.6	49.9	55.9	55.4	56.2	56.5	56.6	58.9	57.1	57.1	57.1	57.6	57.1	56.5	54.8	53.1	52.2	53.7	56.4
"	245	56.0	57.0	57.5	58.8	58.8	57.1	55.3	52.0	55.4	54.8	56.5	53.7	55.4	55.9	56.5	57.6	61.0	59.9	56.5	55.7	55.4	54.4	53.1	52.0	56.1	
"	246	54.1	57.1	59.3	60.7	60.5	56.5	51.4	57.2	57.1	56.5	55.4	49.2	47.0	58.2	56.5	56.4	58.2	57.6	56.5	55.6	55.3	54.3	53.3	53.6	55.7	
"	247	56.0	58.2	59.8	61.1	60.5	58.8	55.4	54.4	56.3	59.9	54.3	52.0	56.5	56.5	57.1	62.2	59.9	59.9	58.8	57.5	55.9	54.2	53.1	53.1	57.2	
"	248	54.6	56.9	58.8	60.5	59.3	58.0	56.5	56.5	53.7	55.4	55.4	55.3	56.5	55.4	55.9	58.2	60.9	58.7	58.2	57.6	55.4	53.1	52.6	53.1	56.6	
"	249	55.8	57.6	58.8	61.6	60.0	58.9	57.6	56.5	56.5	53.1	53.7	56.5	53.1	55.4	56.3	57.1	57.6	58.8	57.3	57.6	55.9	52.6	50.9	51.4	56.3	
"	250	54.3	58.2	58.9	60.5	62.2	58.8	57.6	57.1	55.8	49.5	53.1	55.1	57.6	56.6	57.5	56.5	58.8	58.8	56.6	58.2	58.2	54.3	53.7	53.3	56.7	
"	251	56.1	58.2	57.6	59.0	59.3	58.2	56.4	52.6	56.5	57.1	57.1	56.6	56.5	57.1	57.1	57.6	57.1	57.1	57.1	57.3	55.9	54.4	52.0	53.7	56.6	
"	252	55.7	57.6	59.2	60.0	60.2	58.8	57.1	57.1	57.6	57.3	57.1	56.5	55.8	56.5	56.5	56.6	56.5	56.5	56.5	55.9	55.1	53.5	53.7	53.1	56.7	
"	253	55.4	57.5	58.8	60.2	59.9	58.8	57.1	57.1	57.0	57.1	56.7	56.4	56.5	55.8	56.4	56.5	56.6	56.5	57.2	56.3	54.8	53.7	52.6	53.1	56.6	
"	254	53.7	55.9	57.6	58.8	58.8	58.8	57.7	58.2	57.6	57.6	57.1	57.1	56.5	56.5	56.5	57.1	56.5	57.1	56.5	55.9	54.3	53.1	52.6	53.1	56.4	
"	255	55.0	56.9	58.8	60.5	60.9	59.3	58.3	58.2	58.2	57.6	56.5	55.9	55.8	52.0	52.8	53.8	57.5	56.5	56.5	55.5	53.7	52.0	51.6	53.1	56.1	
"	256	54.8	57.2	58.9	60.1	60.0	58.8	58.2	58.1	58.2	59.3	54.1	53.7	52.0	53.1	53.7	54.3	55.3	56.5	56.5	56.5	55.4	54.0	52.5	52.4	56.0	
"	257	53.8	57.6	59.9	61.6	61.0	58.8	57.6	57.6	57.6	57.6	56.7	55.4	55.2	56.5	56.5	57.1	56.6	56.5	56.5	56.5	54.3	52.0	51.0	52.4	56.5	
"	258	55.9	59.3	62.7	64.4	62.5	60.5	58.7	57.6	57.6	56.6	56.5	55.9	55.9	55.5	55.9	55.4	55.2	54.8	56.5	55.4	53.7	51.4	51.0	52.0	56.7	
"	259	57.1	57.1	60.0	61.4	63.3	57.1	59.3	59.1	57.6	57.1	53.7	50.3	49.4	52.0	54.8	58.0	56.5	56.4	57.5	56.3	54.8	53.7	52.9	53.1	56.2	
"	260	54.8	56.5	58.9	60.0	59.9	60.5	58.3	56.5	54.4	56.5	53.7	55.4	56.5	55.4	55.4	54.6	56.3	56.4	56.5	55.5	53.7	52.3	52.2	53.1	56.0	
"	261	55.1	57.6	61.6	64.4	65.0	63.8	58.8	58.8	58.2	53.1	50.8	54.4	57.1	56.9	53.7	57.1	56.2	57.6	57.7	55.5	55.4	52.6	53.7	55.4	57.1	
"	262	57.7	61.3	63.3	65.6	59.8	59.9	54.5	56.5	56.6	55.9	53.1	51.0	52.6	52.0	55.9	55.4	59.3	57.6	56.9	56.2	54.3	52.2	50.6	53.1	56.3	
"	263	58.2	58.2	59.4	62.7	60.5	62.5	61.5	54.8	40.2	46.5	44.1	46.4	41.3	45.8	39.1	52.1	58.2	54.8	55.4	56.5	55.4	53.7	55.9	58.2	53.4	
"	264	57.2	58.8	60.5	62.2	60.9	61.0	59.9	57.6	57.6	57.5	56.9	56.9	56.4	55.4	57.1	57.1	57.6	58.0	60.5	57.1	53.0	52.6	51.4	52.6	57.3	
"	265	54.8	58.2	61.0	62.7	63.7	62.7	59.3	58.7	57.6	57.6	56.6	56.5	56.5	56.6	56.5	58.8	57.6	57.6	57.7	55.5	53.3	50.9	50.5	53.0	57.2	
"	266	55.8	59.1	61.5	62.6	61.2	61.0	59.3	56.3	54.3	55.7	54.8	51.1	52.0	55.4	55.6	55.4	59.9	56.5	56.5	54.8	55.4	52.0	52.6	53.7	56.4	
"	267	55.9	59.3	61.6	62.6	62.2	61.0	58.2	58.9	55.9	57.1	56.5	55.9	55.9	54.8	56.5	55.4	55.4	56.4	55.4	54.3	52.6	50.9	51.9	54.8	56.6	
"	268	58.8	58.8	60.5	61.0	60.9	60.5	59.0	58.2	57.1	57.6	57.1	56.5	56.5	55.5	55.9	56.5	56.7	56.4	57.6	55.5	53.1	51.1	52.0	53.4	56.9	
"	269	54.8	57.6	60.1	62.7	63.3	62.1	59.9	58.9	57.5	57.5	56.5	55.7	54.2	53.7	54.3	54.3	57.6	56.5	55.9	54.3	53.1	51.4	52.6	54.3	56.6	
"	270	55.7	58.2	59.3	60.0	61.0	60.9	59.8	58.2	57.6	56.6	54.8	55.4	55.9	53.1	51.4	54.5	59.3	58.8	60.5	57.6	54.3	51.4	52.6	53.7	56.7	
"	271	56.5	58.8	59.4	61.0	60.5	58.8	58.2	57.1	57.1	55.5	54.8	55.4	56.5	55.9	56.5	56.5	57.1	57.1	58.8	57.1	54.8	52.7	53.7	52.7	56.8	
"	272	57.1	58.5	59.9	61.1	59.9	57.6	55.5	55.4	55.9	53.1	53.1	56.7	54.5	56.5	59.3	57.5	57.6	61.0	55.9	54.3	52.9	51.4	53.1	55.1	56.4	
Means	..	55.8	58.2	59.9	61.3	60.9	59.5	57.7	57.0	55.8	55.7	54.8	54.5	54.5	55.1	55.4	56.6	57.6	57.4	57.2	56.2	54.7	52.8	52.5	53.5	56.4	

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.

Magnetic Horizontal Force: 0-22000 C.G.S. + tabular γ .

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
September 1	243	288	261	268	278	286	293	283	300	267	306	287	285	284	292	309	293	299	308	298	291	306	296	267	291	289
" 2	244	263	273	284	292	300	302	305	302	295	307	308	307	310	308	309	308	311	308	311	316	318	315	311	306	303
" 3	245	277	282	272	296	304	285	285	282	299	326	302	338	311	314	315	305	330	315	306	310	305	298	293	288	302
" 4	246	275	260	269	274	292	296	301	296	292	318	326	309	294	308	299	302	302	304	304	303	299	287	282	267	294
" 5	247	267	251	275	294	306	309	301	300	301	323	330	308	311	306	303	304	297	302	312	297	309	304	297	297	300
" 6	248	269	293	298	300	299	309	314	314	307	308	312	328	328	320	312	312	327	322	301	316	313	311	296	278	309
" 7	249	273	293	293	293	302	315	313	317	311	322	313	317	313	308	310	306	305	303	313	313	313	327	310	302	308
" 8	250	285	267	279	297	280	284	298	305	296	350	286	295	308	302	302	310	310	308	311	296	309	296	294	284	298
" 9	251	278	276	273	293	305	308	308	325	317	317	312	319	320	310	312	317	315	320	322	324	321	315	301	289	308
" 10	252	284	281	284	299	309	309	313	313	313	318	315	313	314	311	313	316	316	318	321	319	322	313	299	294	309
" 11	253	290	282	278	289	305	312	315	320	320	319	319	318	317	317	317	314	314	319	322	322	324	319	313	304	311
" 12	254	303	298	296	296	304	308	313	313	316	319	319	313	318	315	319	319	319	323	324	326	329	329	331	331	316
" 13	255	322	313	312	309	311	313	313	315	304	310	310	310	311	300	300	295	317	325	305	308	306	308	305	303	309
" 14	256	298	292	289	297	306	309	321	320	321	321	321	296	297	304	306	301	316	301	306	304	310	311	310	292	307
" 15	257	286	281	280	283	291	296	305	307	304	301	300	305	310	307	312	313	311	310	318	319	319	306	292	287	302
" 16	258	279	288	286	292	288	300	307	308	309	315	316	322	320	314	313	313	315	328	316	311	311	297	280	278	304
" 17	259	264	264	271	288	295	286	294	294	303	309	307	302	282	295	289	286	323	294	287	293	291	284	277	277	290
" 18	260	278	288	293	303	308	297	275	241	238	260	294	286	283	308	293	295	293	295	296	296	294	284	290	286	286
" 19	261	293	290	300	278	266	303	290	278	260	264	293	292	295	291	280	315	286	286	286	286	288	268	278	273	287
" 20	262	261	254	288	292	298	285	283	282	283	295	269	277	280	288	280	287	283	293	289	289	291	286	270	274	283
" 21	263	272	263	272	281	272	280	280	292	272	258	243	223	204	270	228	231	263	272	279	260	243	236	214	232	256
" 22	264	243	254	259	242	256	261	260	278	278	278	276	278	281	281	281	308	311	286	266	271	288	273	269	261	272
" 23	265	257	247	237	251	271	271	273	273	289	287	290	289	291	290	289	290	299	295	289	290	287	280	268	263	278
" 24	266	254	257	264	279	288	302	291	298	267	294	316	296	298	294	290	293	311	290	284	289	283	280	271	268	286
" 25	267	263	263	268	277	291	303	291	287	314	295	292	299	299	302	319	304	295	296	299	297	297	295	285	280	292
" 26	268	280	277	282	292	299	304	305	308	309	309	310	308	307	304	307	304	304	309	310	319	317	311	302	292	303
" 27	269	281	276	281	294	301	302	298	301	295	295	301	306	307	304	304	299	287	305	305	305	298	288	283	279	296
" 28	270	277	282	284	289	297	260	310	310	311	295	307	302	320	302	302	302	318	312	325	316	299	301	279	272	299
" 29	271	260	277	288	300	312	307	307	296	297	297	297	305	304	302	305	305	308	315	313	318	301	290	275	274	299
" 30	272	262	245	262	272	293	319	309	304	294	326	322	328	303	311	322	312	298	288	307	305	295	280	264	261	295
Means	..	276	274	280	287	295	298	299	299	296	305	303	302	301	303	301	302	306	305	304	304	303	296	287	283	296

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—*continued*.
Magnetic Declination (east of north): 16 + tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
October 1	273	57.1	59.1	62.2	60.1	60.2	58.2	55.7	56.5	53.1	43.1	52.0	55.7	57.6	57.4	57.1	57.3	57.6	56.4	55.9	54.3	56.5	53.1	53.3	53.1	55.9
" 2	274	55.6	59.2	60.9	61.0	59.9	58.2	56.4	52.6	56.9	53.7	52.6	51.4	55.4	57.1	59.9	59.3	58.8	59.1	56.5	54.3	54.2	51.0	52.6	53.7	56.3
" 3	275	56.6	58.2	60.5	61.4	59.8	54.5	56.5	57.6	55.9	49.9	53.7	55.5	56.5	57.6	56.5	60.5	59.0	58.8	58.2	54.3	53.2	49.4	49.8	52.6	56.1
" 4	276	55.6	59.3	61.6	62.2	61.0	57.3	58.2	54.2	54.3	54.2	54.3	55.4	56.5	57.6	57.1	61.0	58.2	57.1	57.1	54.8	52.3	49.8	49.8	52.0	56.4
" 5	277	55.0	58.2	61.6	61.6	61.0	59.9	57.5	57.3	54.0	54.8	55.9	55.4	55.5	55.9	55.5	58.8	57.1	56.5	56.5	54.3	52.0	51.4	50.3	50.3	56.1
" 6	278	54.8	58.8	61.4	62.7	61.7	58.9	58.2	57.6	54.8	55.5	55.3	56.5	57.6	56.6	56.5	56.5	56.4	56.4	55.4	53.1	53.1	50.3	50.5	52.4	56.3
" 7	279	55.4	60.5	62.8	64.4	62.9	59.9	57.9	55.4	57.1	57.1	55.4	55.9	55.9	56.5	56.4	55.9	57.1	57.9	56.4	54.3	51.0	50.3	51.4	54.3	56.8
" 8	280	57.7	60.5	63.3	63.3	62.2	59.9	59.4	59.1	58.2	54.8	57.6	56.5	54.3	54.4	55.9	54.8	53.1	57.6	54.3	61.0	57.6	54.8	57.6	58.8	57.8
" 9	281	65.0	64.4	67.2	68.7	67.8	65.0	61.7	58.2	59.6	57.6	56.5	47.6	53.7	56.5	56.5	56.5	56.6	56.5	55.9	54.3	52.0	50.9	51.4	53.1	58.1
" 10	282	55.9	58.8	61.0	57.6	53.1	58.8	57.6	54.8	56.5	56.5	56.5	56.5	55.9	56.4	56.0	55.9	55.9	56.5	55.4	54.3	52.0	49.8	51.4	53.1	55.7
" 11	283	55.9	59.3	62.2	62.2	61.4	59.6	58.2	58.2	57.6	57.3	56.6	56.6	56.5	56.4	56.4	56.4	56.3	56.3	56.1	54.6	52.6	51.7	51.3	52.8	56.8
" 12	284	55.5	59.2	61.8	63.1	62.2	60.9	59.3	58.3	57.0	57.0	57.1	56.5	56.4	57.4	56.4	55.9	56.6	55.9	55.6	54.7	52.7	50.5	50.8	52.7	56.8
" 13	285	55.8	59.2	62.2	62.5	61.6	59.4	57.9	57.6	57.2	57.1	56.9	56.6	56.5	56.9	56.2	56.1	56.1	55.8	55.4	54.4	52.0	50.5	51.1	54.3	56.6
" 14	286	56.6	58.8	61.6	61.7	60.8	59.2	58.2	57.6	57.6	57.4	56.5	56.5	56.6	56.5	57.6	58.5	56.5	56.4	55.9	55.1	53.1	53.4	53.0	54.9	57.1
" 15	287	57.8	60.2	61.6	62.4	61.6	61.0	59.8	59.3	59.3	59.9	57.6	54.8	50.1	52.6	54.8	53.1	52.6	48.9	51.4	50.9	50.9	51.4	53.3	55.9	55.6
" 16	288	59.1	61.8	65.3	67.7	67.8	62.7	62.7	57.6	53.1	52.6	52.6	55.4	47.4	46.4	42.1	52.0	52.0	53.0	52.0	52.1	52.0	50.3	50.8	51.4	55.4
" 17	289	58.2	58.8	59.9	59.3	60.5	60.1	59.9	52.6	52.6	56.6	56.6	54.3	56.5	54.8	59.9	55.3	56.9	55.9	54.3	53.7	53.7	51.4	53.1	55.9	56.3
" 18	290	58.2	60.5	62.2	62.2	60.5	58.8	55.4	55.4	55.9	55.9	54.3	52.6	55.4	55.3	57.6	55.3	55.4	53.6	55.9	54.8	50.3	50.8	52.0	53.7	55.9
" 19	291	55.5	57.9	60.5	62.1	61.0	59.3	57.3	57.5	57.1	55.3	56.4	56.5	57.1	56.6	57.6	64.3	52.1	55.5	54.3	53.7	52.0	50.3	50.8	55.9	56.5
" 20	292	58.2	59.9	62.2	62.3	61.6	60.5	58.8	57.6	56.5	49.9	49.8	53.1	54.8	55.9	56.5	56.5	57.6	56.4	55.1	53.7	52.0	50.9	51.0	53.1	56.0
" 21	293	55.1	59.0	62.2	63.3	62.7	61.6	59.8	57.6	57.1	57.3	57.1	57.1	56.5	55.4	56.6	56.6	56.5	56.5	55.5	53.7	52.0	50.3	50.8	51.4	56.7
" 22	294	55.6	59.0	62.2	63.3	62.7	61.6	59.9	58.8	55.9	56.6	56.5	57.6	54.8	55.5	56.5	55.8	57.0	56.4	56.5	53.1	49.8	48.1	49.3	52.6	56.5
" 23	295	55.9	60.5	63.3	63.6	63.3	61.1	59.3	58.7	58.2	55.4	55.3	55.4	53.1	53.1	52.9	53.7	54.3	56.6	54.8	52.6	51.4	49.8	51.5	53.7	56.1
" 24	296	56.8	59.5	62.2	63.3	63.3	62.3	61.0	56.5	56.5	57.1	55.4	55.4	52.0	58.3	54.2	55.5	55.6	55.9	55.4	53.6	52.6	53.5	52.3	53.5	56.7
" 25	297	55.6	57.2	59.3	60.5	60.5	59.9	58.2	57.6	58.2	57.6	57.1	55.4	54.8	55.9	55.9	55.7	56.5	57.6	55.4	55.4	52.6	52.7	52.6	54.8	56.6
" 26	298	57.1	58.9	58.9	59.7	58.8	58.5	57.1	57.1	57.1	57.6	57.1	57.3	56.5	56.5	57.6	55.9	55.5	55.3	56.5	55.4	53.1	52.6	52.6	53.1	56.5
" 27	299	57.0	58.8	60.5	61.0	60.9	59.9	58.8	57.6	57.7	57.5	57.1	56.9	56.5	56.5	56.5	56.5	57.1	56.5	55.4	53.1	52.0	50.9	51.4	54.8	56.7
" 28	300	56.8	59.8	61.0	60.6	59.4	58.2	57.6	57.1	57.5	57.1	56.5	56.4	52.6	56.5	57.6	57.6	53.1	55.9	54.8	53.1	51.4	51.4	51.9	55.4	56.2
" 29	301	58.5	60.0	61.6	62.2	60.9	58.8	57.1	57.1	57.1	57.1	56.6	56.6	56.6	57.1	56.6	57.6	57.1	56.5	54.2	54.2	51.0	49.2	50.0	54.2	56.6
" 30	302	57.1	59.9	61.1	61.6	59.9	59.3	57.4	56.6	56.5	56.6	56.5	55.4	55.4	55.4	56.5	56.5	57.5	56.4	54.4	52.0	50.2	49.8	49.8	54.3	56.1
" 31	303	57.1	58.1	61.0	62.3	61.6	61.6	60.5	56.6	54.3	56.5	53.8	54.7	50.9	53.7	57.6	56.6	55.8	54.4	53.7	52.0	49.8	50.1	52.0	54.6	55.8
Means	..	56.8	59.5	61.8	62.3	61.3	59.8	58.5	56.8	56.5	55.6	55.6	55.4	55.0	55.8	56.2	56.6	56.2	56.1	55.4	54.0	52.3	51.0	51.7	53.9	56.4

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.

Magnetic Horizontal Force : 0.22000 C.G.S. + tabular γ .

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918.																										
October 1	273	272	275	282	280	292	309	309	309	321	331	324	294	309	333	302	304	307	307	309	306	277	289	280	271	300
" 2	274	256	280	285	300	314	305	303	326	311	317	325	300	309	308	310	312	312	298	312	310	299	294	285	276	301
" 3	275	266	288	298	310	311	295	289	300	308	330	310	308	315	315	310	312	305	308	303	305	286	278	271	254	299
" 4	276	270	267	303	298	291	296	298	289	291	293	318	303	304	306	307	300	307	312	309	302	280	312	268	261	295
" 5	277	265	279	288	302	317	320	313	308	306	313	311	315	313	315	320	315	320	320	320	318	320	281	269	262	305
" 6	278	263	264	279	294	303	316	308	311	315	316	313	313	320	315	313	314	314	322	319	314	300	286	277	272	302
" 7	279	279	285	294	307	271	310	316	314	319	315	311	311	311	321	317	310	307	311	314	315	312	300	293	289	305
" 8	280	289	291	301	311	322	328	325	307	312	307	304	316	316	303	307	307	325	342	294	247	275	252	235	230	298
" 9	281	241	263	256	268	276	294	275	298	307	294	298	295	289	291	295	295	297	299	293	300	287	278	276	271	285
" 10	282	266	265	281	293	290	304	307	308	306	313	306	311	306	304	304	304	304	305	307	307	306	294	284	274	298
" 11	283	266	273	286	295	305	316	315	314	316	317	317	314	305	309	309	309	311	313	315	313	305	300	293	285	305
" 12	284	280	277	282	299	312	326	320	319	314	321	321	321	316	317	314	315	315	311	311	311	311	301	290	268	294
" 13	285	266	287	293	299	314	316	316	316	316	316	316	318	316	319	315	314	314	316	317	316	316	308	291	280	308
" 14	286	282	287	296	303	313	318	317	321	322	323	321	323	323	316	318	322	319	324	325	324	318	313	308	307	315
" 15	287	310	316	329	336	340	340	315	320	326	315	324	322	309	295	300	306	306	308	309	304	295	298	281	286	312
" 16	288	286	286	306	344	276	308	268	299	235	203	247	198	215	249	167	251	222	245	229	229	215	233	240	242	250
" 17	289	252	250	250	263	268	268	258	247	253	257	264	277	271	267	275	291	283	268	272	273	233	240	232	247	261
" 18	290	244	256	271	277	283	292	279	265	273	280	273	288	301	278	293	283	282	300	287	299	275	255	253	256	277
" 19	291	256	266	271	288	282	292	290	277	282	299	286	290	290	295	306	300	314	285	285	292	284	275	232	225	282
" 20	292	230	257	267	282	279	279	284	282	279	282	261	279	275	278	284	289	284	286	284	275	269	262	256	252	273
" 21	293	242	244	252	274	284	289	270	298	286	290	292	294	300	310	298	306	306	305	314	307	287	273	263	261	285
" 22	294	255	255	275	283	280	289	305	299	298	297	298	305	307	294	306	297	292	299	301	302	289	274	264	258	288
" 23	295	262	274	279	294	308	301	306	309	313	327	300	302	302	294	302	299	296	299	318	310	306	285	271	268	297
" 24	296	267	266	272	289	295	303	305	317	326	299	294	298	304	312	311	300	301	305	309	311	292	288	285	277	297
" 25	297	274	281	296	311	316	316	318	315	317	317	308	313	310	291	297	304	301	304	307	305	303	293	287	282	303
" 26	298	275	290	300	305	310	311	312	313	310	310	315	312	311	306	306	305	304	308	309	310	307	300	289	275	304
" 27	299	286	291	299	309	306	307	300	302	304	303	306	306	320	309	308	309	309	312	313	310	301	296	285	278	303
" 28	300	293	306	318	321	323	321	313	314	317	319	319	325	304	298	313	322	313	295	309	306	307	292	279	270	308
" 29	301	288	296	291	313	313	313	308	308	307	308	313	312	313	306	306	312	310	313	308	305	295	291	265	269	303
" 30	302	274	256	251	277	311	310	310	313	314	310	314	321	314	316	308	309	307	314	317	315	305	301	291	274	301
" 31	303	276	294	304	321	309	312	279	301	278	259	272	291	303	277	279	316	289	296	290	290	281	281	276	278	290
Means	..	266	276	286	298	300	307	301	304	303	303	303	302	303	302	300	304	302	304	303	301	291	285	273	268	295

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north) : 16° + tabular minutes.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918. November 1	..	57.2	58.7	59.8	59.4	59.3	59.7	58.7	57.3	56.5	57.1	54.3	55.4	55.9	56.5	56.5	56.7	57.2	56.9	54.8	52.1	49.6	49.2	50.3	53.3	55.9
"	2	57.7	61.5	63.8	62.7	62.2	61.4	58.9	58.2	57.1	53.7	55.9	56.5	56.4	56.5	57.6	56.5	58.1	58.2	55.9	54.3	52.5	51.7	52.9	54.7	57.3
"	3	58.2	61.6	62.2	62.4	61.6	60.0	58.3	57.7	57.2	56.4	55.8	56.2	56.5	57.0	57.0	57.1	57.0	56.5	55.5	54.2	51.7	50.5	50.9	54.8	56.9
"	4	58.4	62.2	63.8	63.5	62.3	60.6	58.4	58.1	57.5	57.1	57.1	56.4	56.6	57.0	56.6	56.6	56.4	56.1	54.4	52.6	50.2	48.1	49.2	53.5	56.8
"	5	57.6	59.7	62.3	62.5	61.0	59.3	58.2	57.6	57.1	57.1	55.4	56.7	57.1	56.4	56.3	56.3	55.9	55.4	54.3	52.5	50.6	49.5	50.7	54.8	56.4
"	6	57.6	60.3	61.6	61.0	60.5	59.3	58.2	57.3	57.6	57.6	57.3	56.6	56.6	56.5	56.4	56.2	56.5	55.3	53.0	52.0	49.9	49.2	51.0	54.1	56.3
"	7	57.5	59.9	62.4	62.3	61.1	60.3	59.3	58.5	58.2	57.4	57.1	54.9	55.3	56.5	56.5	56.3	56.4	55.8	54.4	52.6	51.0	50.6	51.4	54.3	56.7
"	8	57.1	60.3	56.1	61.5	61.0	60.1	59.0	58.2	58.1	58.0	57.7	57.0	56.5	56.5	55.9	55.5	55.5	55.3	54.4	52.9	51.6	50.7	51.3	53.8	56.4
"	9	57.6	59.9	61.6	61.4	61.0	60.5	59.1	58.4	58.2	57.5	57.2	56.6	56.3	55.4	56.3	56.5	57.2	56.6	55.2	52.9	51.9	49.8	52.0	53.9	56.8
"	10	57.6	60.1	60.8	61.1	60.8	59.2	58.2	57.7	57.9	57.2	56.5	54.8	54.8	53.4	54.7	55.8	54.3	51.9	54.4	53.4	52.0	52.6	53.0	55.4	56.2
"	11	58.2	61.0	65.6	66.4	67.2	63.3	62.2	60.5	50.3	52.6	53.1	54.9	54.8	54.1	55.4	53.9	53.0	55.4	53.0	53.1	52.6	52.2	51.6	54.7	56.6
"	12	55.9	58.8	60.0	61.1	62.2	63.1	58.9	58.2	53.8	49.8	52.6	51.8	49.6	49.6	52.1	55.4	56.4	54.9	58.0	54.7	52.9	52.8	51.1	52.8	55.3
"	13	55.4	58.4	60.2	61.5	60.2	60.9	60.3	56.4	54.3	58.8	57.6	56.4	55.4	55.3	54.9	55.1	55.8	58.2	59.2	58.2	52.9	49.0	50.1	53.0	56.3
"	14	55.9	59.2	61.1	61.6	61.7	60.3	59.0	58.2	57.7	54.8	57.1	50.9	54.4	54.7	56.3	55.7	55.5	55.2	57.2	56.4	55.4	51.6	50.7	52.6	56.4
"	15	55.9	59.4	61.0	61.8	61.6	61.1	59.8	58.8	55.4	55.9	55.9	55.8	55.9	54.9	56.5	56.3	54.4	59.4	57.6	54.8	52.0	47.0	47.0	51.7	56.2
"	16	54.9	58.8	62.1	63.3	63.3	60.3	60.0	57.6	55.4	54.5	53.7	51.6	53.8	52.2	52.0	55.7	57.6	56.5	56.6	55.2	51.1	50.2	49.8	53.1	55.8
"	17	55.4	59.2	61.7	62.6	62.7	61.5	59.4	58.8	58.2	56.3	53.4	53.0	53.7	55.9	53.4	57.6	56.3	55.3	55.3	54.6	52.6	51.1	51.9	54.2	56.4
"	18	55.5	58.8	60.5	62.2	61.5	60.5	59.8	57.5	57.1	57.1	57.5	56.1	55.8	55.6	58.8	56.5	55.5	55.2	53.3	52.6	49.6	48.8	51.3	52.7	56.2
"	19	54.9	58.9	62.3	62.7	61.7	60.5	59.3	58.4	58.2	57.6	57.5	55.1	54.2	54.8	55.4	54.5	55.3	55.4	53.4	53.1	48.6	50.9	52.0	53.1	56.2
"	20	55.6	59.7	62.7	63.3	62.6	62.2	60.9	59.9	58.5	57.9	57.1	55.2	55.9	56.3	56.4	56.4	56.5	55.8	54.3	52.0	49.8	49.1	50.5	53.3	56.7
"	21	57.1	61.0	63.3	63.8	63.6	63.6	62.0	59.9	58.8	57.7	58.1	54.3	55.3	52.8	55.3	55.8	55.7	55.3	54.8	53.7	50.8	50.3	50.9	53.9	57.0
"	22	57.6	60.1	62.3	63.4	62.7	61.5	60.6	59.9	58.8	58.3	56.1	56.5	56.1	56.5	56.7	56.6	57.1	57.3	55.9	52.9	48.6	48.5	50.5	54.2	57.0
"	23	56.6	60.0	62.7	64.2	65.6	66.4	61.1	57.1	53.8	52.8	50.3	63.3	50.7	48.9	52.6	55.6	51.4	55.4	56.5	54.8	52.0	52.8	53.7	58.8	56.5
"	24	60.0	60.9	60.1	59.3	57.7	56.5	57.5	57.4	57.2	55.6	55.4	55.9	51.0	52.0	55.4	57.4	57.1	54.8	54.2	54.6	52.6	52.2	52.1	54.3	55.9
"	25	57.1	59.9	60.9	62.1	60.3	58.2	57.2	57.0	57.0	57.4	57.2	57.5	57.0	56.9	57.6	57.2	57.1	58.1	53.1	53.1	50.3	49.8	52.8	55.4	56.8
"	26	58.7	62.1	62.8	62.7	60.6	58.9	57.7	57.7	57.1	57.2	56.9	56.7	56.6	56.5	56.5	56.6	56.4	55.5	54.2	52.2	50.6	50.2	51.4	55.3	56.7
"	27	58.1	59.1	59.3	58.9	58.9	57.9	57.7	56.5	55.9	55.5	56.5	56.4	56.6	56.5	56.6	56.7	56.5	56.1	54.8	53.1	51.1	50.2	52.1	55.4	56.1
"	28	58.0	59.8	61.1	61.6	61.0	59.9	58.4	58.1	58.1	57.3	58.2	56.5	55.4	59.6	55.8	55.8	55.5	54.9	53.3	51.0	50.3	49.9	52.0	55.7	56.6
"	29	58.5	60.1	61.5	61.6	61.1	60.1	58.4	57.9	57.6	57.6	57.1	56.9	56.5	55.6	54.3	53.3	53.7	53.3	56.9	57.6	55.2	55.7	56.5	57.1	57.3
"	30	59.3	62.6	64.1	63.2	61.6	59.7	57.6	56.6	56.4	56.6	57.2	56.2	55.9	53.7	56.9	56.1	57.0	57.6	60.5	56.3	53.0	51.9	53.1	54.9	57.4
Means	..	57.2	60.1	61.7	62.2	61.6	60.6	59.1	58.0	56.8	56.3	56.1	55.7	55.2	55.1	55.8	56.1	55.9	56.0	55.4	53.8	51.4	50.5	51.5	54.3	56.5

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Horizontal Force : 0.22000 + tabular γ .

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918. November 1	304	282	285	294	299	312	310	303	308	309	331	310	304	304	302	302	301	307	308	313	307	291	275	274	264	300
"	305	270	280	292	292	316	312	313	319	302	303	304	309	309	306	317	309	309	309	312	310	302	289	282	277	301
"	306	283	296	315	320	315	314	305	308	308	308	310	311	311	310	310	313	315	316	317	315	303	290	281	277	306
"	307	277	287	299	308	315	317	319	312	316	319	321	323	319	318	319	320	321	324	325	326	313	288	274	271	310
"	308	281	302	315	320	323	325	317	313	313	316	322	321	318	317	316	314	315	314	313	313	307	299	290	289	311
"	309	288	293	311	313	320	326	322	321	323	326	319	318	313	315	315	313	317	317	320	317	302	295	287	282	311
"	310	288	301	317	327	331	331	328	326	330	325	314	310	310	310	317	317	319	319	320	319	311	305	291	285	315
"	311	281	285	294	305	315	321	319	324	324	324	321	322	322	321	316	324	316	318	324	321	312	304	294	287	312
"	312	271	293	308	323	323	325	323	324	328	329	330	316	316	319	316	318	314	322	320	316	310	293	281	275	313
"	313	281	295	307	317	320	320	322	323	331	333	323	313	314	313	312	324	318	317	319	315	305	305	289	297	313
"	314	291	313	298	293	330	327	296	296	278	313	276	298	298	313	305	301	300	297	315	292	271	275	261	241	295
"	315	256	255	243	291	290	305	302	295	292	312	290	275	309	307	288	279	285	282	265	280	265	265	253	253	281
"	316	258	267	277	300	293	304	304	297	312	287	290	295	290	236	298	289	290	298	292	293	268	269	238	253	283
"	317	254	274	268	290	299	322	307	298	299	299	300	300	288	301	300	294	294	299	293	276	273	271	258	269	288
"	318	274	269	292	291	328	328	311	296	306	301	296	299	302	304	321	321	306	296	319	301	289	257	235	247	295
"	319	247	257	279	274	313	296	299	305	290	290	285	292	294	302	297	288	294	287	278	292	281	255	248	260	283
"	320	273	274	280	292	295	316	320	306	310	308	311	300	291	303	300	299	295	298	291	291	289	279	271	262	294
"	321	259	271	281	300	297	315	315	307	298	297	296	294	297	310	309	308	301	305	301	305	292	283	278	270	295
"	322	269	259	286	299	313	320	313	316	307	305	315	316	309	312	306	323	306	310	315	312	303	291	283	275	303
"	323	267	273	280	297	312	323	320	320	322	320	309	320	318	317	317	315	319	327	328	322	308	294	280	274	308
"	324	281	294	296	308	323	341	308	321	318	311	321	311	303	303	304	303	303	307	311	308	291	279	269	259	303
"	325	265	278	300	311	317	323	315	327	327	329	318	313	315	311	310	310	314	317	320	315	300	277	263	268	306
"	326	281	285	295	294	226	302	283	293	276	257	252	254	244	253	281	277	259	262	255	252	300	270	271	271	300
"	327	269	284	294	300	291	298	286	294	299	301	292	290	223	229	306	282	282	287	286	260	264	236	246	233	277
"	328	231	245	268	282	292	297	284	291	290	296	296	297	298	297	297	297	299	295	301	294	279	258	257	257	283
"	329	267	284	287	299	306	308	304	297	301	301	311	302	305	306	303	303	304	307	307	302	290	277	267	254	295
"	330	277	298	308	311	321	316	303	304	301	302	306	308	308	305	303	306	305	307	305	300	270	278	271	271	300
"	331	282	296	308	315	318	315	313	312	312	311	319	312	307	322	311	318	302	308	310	303	299	279	266	256	304
"	332	276	294	297	305	305	320	315	314	311	318	316	329	329	332	340	354	342	342	339	322	309	305	276	281	315
"	333	266	255	264	304	299	302	289	288	286	290	294	297	302	299	299	299	303	292	295	287	282	272	271	271	288
Means	..	272	281	292	303	309	316	309	308	307	304	306	306	302	303	308	307	305	306	307	302	291	280	269	267	298

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Declination (east of north): 16 + tabular minutes.

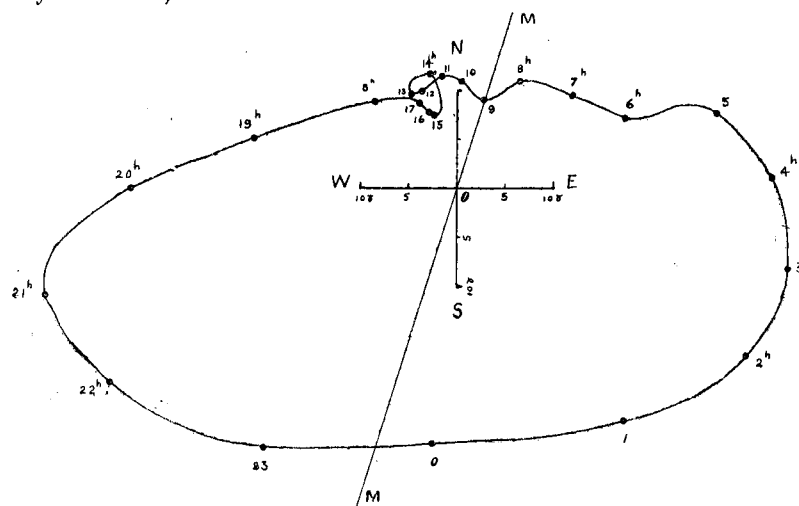
Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918. December 1	334	57.7	60.5	62.3	63.3	63.1	62.2	61.1	59.6	58.9	54.2	56.6	55.5	52.0	49.9	50.8	50.3	50.3	53.0	54.8	56.5	54.4	57.9	57.6	56.6	56.6
" 2	335	58.8	59.9	60.2	61.0	60.5	59.4	57.9	57.1	57.1	55.9	56.5	56.4	56.3	56.2	56.2	56.3	56.1	55.8	54.3	52.8	50.8	49.9	50.3	52.6	56.2
" 3	336	55.8	59.2	61.4	62.2	62.7	62.2	60.5	58.8	58.1	56.5	51.4	51.2	48.5	50.5	54.1	54.6	58.7	56.9	55.8	52.2	52.0	52.8	51.2	52.8	55.8
" 4	337	55.9	60.2	62.1	62.1	61.6	60.5	59.3	57.3	57.5	56.5	53.5	55.3	54.5	55.8	55.7	57.1	57.6	55.8	55.4	53.7	51.4	50.9	51.6	53.1	56.4
" 5	338	54.9	56.9	58.2	59.7	59.8	59.9	59.2	58.1	57.9	57.1	57.2	56.5	56.6	55.9	56.5	56.3	55.9	55.7	54.9	53.0	50.8	50.1	50.9	53.1	56.0
" 6	339	57.0	59.9	61.7	62.1	61.0	60.6	59.2	58.5	58.2	57.6	57.1	57.0	56.6	56.5	56.4	56.1	55.8	54.8	54.2	53.3	50.9	50.1	51.4	54.5	56.7
" 7	340	57.6	60.2	60.9	61.5	61.0	60.9	59.3	58.5	58.7	55.1	56.7	56.6	56.5	51.4	52.3	53.1	53.9	53.3	53.0	52.1	52.6	50.8	52.0	53.1	55.9
" 8	341	54.7	58.8	62.5	66.5	65.4	67.3	67.9	65.0	61.6	57.0	52.7	49.8	44.1	34.8	46.5	43.6	52.0	52.8	58.2	53.1	52.0	50.9	52.8	55.1	55.2
" 9	342	56.4	60.3	61.6	63.3	65.3	60.5	63.4	62.7	58.2	57.9	52.0	52.6	51.4	50.5	48.5	55.3	54.7	55.5	55.3	55.3	54.4	55.7	53.7	53.3	56.6
" 10	343	53.7	57.0	59.3	61.0	62.6	61.1	59.9	56.5	58.8	55.8	54.8	53.7	54.3	50.9	54.7	54.2	58.7	57.0	56.4	52.5	50.9	50.3	51.4	52.0	55.7
" 11	344	54.2	57.3	59.9	61.6	62.7	61.5	60.7	59.3	58.2	57.7	57.5	55.8	54.8	55.4	55.3	57.7	56.7	56.7	55.5	54.4	56.2	52.0	51.2	52.9	56.9
" 12	345	55.3	56.9	58.5	59.3	59.7	60.6	60.1	59.0	58.1	57.9	57.9	56.9	56.9	55.9	55.3	54.8	55.4	54.7	53.0	52.0	50.9	51.3	51.0	53.7	56.0
" 13	346	57.1	58.2	59.3	57.3	59.6	60.9	59.3	59.9	58.4	58.8	57.2	56.9	56.6	58.2	55.3	55.1	55.7	57.9	58.4	53.7	52.5	52.7	54.3	55.2	57.0
" 14	347	56.6	57.5	58.4	59.8	60.0	60.0	59.3	58.0	57.1	56.3	55.9	55.3	56.9	58.2	55.3	54.5	54.4	55.4	54.5	52.8	52.3	53.1	54.1	55.9	56.3
" 15	348	58.7	60.6	61.6	60.1	60.5	60.1	59.8	59.1	55.5	56.6	57.1	57.3	55.7	55.9	54.3	54.3	54.6	53.7	53.7	52.7	52.1	51.6	52.3	54.8	56.4
" 16	349	58.0	61.7	62.7	62.5	61.6	60.5	59.3	58.7	55.9	57.1	57.4	57.1	57.0	55.1	55.9	54.3	54.4	53.5	53.1	50.8	49.8	49.3	50.3	52.2	56.2
" 17	350	56.6	61.8	65.5	65.5	64.0	60.9	59.1	57.6	57.1	57.5	51.7	54.7	55.9	55.8	56.4	56.5	57.5	57.3	54.4	51.2	49.2	47.9	50.5	54.3	56.6
" 18	351	58.4	63.4	66.2	65.7	63.1	61.2	59.3	57.1	55.3	55.4	55.5	56.3	56.2	56.5	56.5	56.5	55.9	54.7	54.3	50.7	47.2	45.2	48.6	51.4	56.3
" 19	352	57.1	62.5	65.6	66.6	66.1	62.7	59.9	57.1	57.1	54.3	52.6	42.1	48.5	53.9	55.9	55.4	55.7	51.7	55.5	52.9	50.9	49.8	51.3	52.8	55.8
" 20	353	58.4	58.8	60.3	62.5	61.0	59.7	58.5	57.9	57.6	57.1	57.1	55.9	54.3	57.1	55.8	56.4	56.6	56.6	53.9	54.8	53.6	50.3	50.2	55.9	56.7
" 21	354	57.9	59.3	60.6	61.4	61.6	59.2	57.1	57.0	55.9	53.7	52.6	54.4	54.6	55.9	55.7	56.6	55.9	54.5	54.1	53.7	51.1	51.4	51.3	52.9	55.8
" 22	355	54.4	57.2	58.4	59.3	61.0	61.2	59.9	58.7	57.2	57.1	57.1	57.2	57.1	56.9	56.5	56.7	55.9	55.2	53.7	52.0	49.6	50.3	51.2	54.4	56.2
" 23	356	56.5	58.8	61.1	62.2	60.8	60.6	59.0	58.8	57.1	58.1	58.2	55.9	54.5	55.7	55.9	55.7	56.2	58.2	56.4	55.7	53.5	53.1	52.6	54.7	57.1
" 24	357	56.4	57.5	58.2	58.3	57.1	58.0	57.9	58.2	57.3	57.1	56.7	57.1	55.6	57.3	52.6	54.4	54.8	54.8	56.5	54.1	52.6	51.6	51.9	53.4	55.8
" 25	358	54.8	56.3	57.7	58.2	59.1	59.8	61.6	62.5	60.5	59.1	55.8	56.5	54.5	53.3	51.2	64.4	51.3	48.1	55.4	60.9	55.8	49.1	52.3	54.8	56.4
" 26	359	54.6	56.7	57.7	59.3	58.2	57.1	55.9	54.8	55.8	54.3	52.2	53.7	56.4	61.7	55.3	54.8	54.6	53.5	53.8	53.0	51.8	52.6	54.8	55.9	55.4
" 27	360	57.1	59.1	61.2	61.2	60.5	59.0	58.2	58.0	58.2	58.4	57.3	57.3	57.3	57.3	57.1	57.1	57.1	56.6	56.1	53.9	52.6	51.2	51.4	53.9	57.0
" 28	361	56.7	59.6	60.5	60.7	59.8	58.7	58.4	57.6	57.3	57.6	57.5	57.7	55.9	55.4	57.1	57.1	56.6	56.6	56.5	54.8	52.6	50.9	52.0	55.3	56.8
" 29	362	58.8	62.2	62.8	62.9	62.4	60.7	59.9	58.7	58.4	58.2	58.2	57.7	56.6	54.8	57.1	56.6	55.7	55.6	55.3	53.8	52.7	51.4	51.4	53.4	57.3
" 30	363	55.9	59.3	61.4	61.6	61.8	60.7	59.3	59.3	58.4	58.1	57.9	57.3	56.9	56.6	56.4	55.9	55.9	55.5	55.2	54.1	52.2	50.8	50.2	54.6	56.9
" 31	364	55.1	57.4	60.1	61.4	60.5	60.5	59.6	59.6	58.8	57.6	57.6	57.3	55.9	53.3	53.7	55.4	56.2	55.1	57.7	54.3	52.0	51.0	52.0	53.1	56.5
Means	..	56.5	59.2	60.9	61.6	61.4	60.6	59.7	58.4	57.7	56.8	55.8	55.3	54.8	54.6	54.7	55.4	55.5	55.0	55.1	53.6	52.0	51.2	51.9	53.9	56.3

TABLE OF HOURLY VALUES (GREENWICH MEAN CIVIL TIME)—continued.
Magnetic Horizontal Force : 0.22000 C.G.S. + tabular γ.

Day of Month.	No. of Day.	0h.	1h.	2h.	3h.	4h.	5h.	6h.	7h.	8h.	9h.	10h.	11h.	12h.	13h.	14h.	15h.	16h.	17h.	18h.	19h.	20h.	21h.	22h.	23h.	Mean.
1918. December 1	334	264	263	271	283	299	309	309	301	302	314	297	301	314	294	302	308	335	292	281	256	254	200	215	243	284
" 2	335	241	268	275	280	282	290	287	295	295	291	301	302	304	300	299	294	297	298	297	295	281	274	260	259	286
" 3	336	267	280	297	297	315	321	308	327	320	276	266	268	257	265	277	284	303	313	295	287	280	260	242	258	286
" 4	337	269	272	289	301	315	303	296	299	303	299	298	293	298	296	297	296	304	305	297	299	293	276	261	261	293
" 5	338	261	268	282	295	307	312	307	301	304	302	305	306	310	308	309	308	311	312	313	311	304	300	291	291	301
" 6	339	292	303	308	317	323	322	319	317	316	316	316	318	317	316	316	315	316	317	315	308	304	296	287	282	311
" 7	340	283	291	298	315	325	331	335	336	332	325	332	322	327	334	318	308	312	316	306	272	270	255	244	240	306
" 8	341	250	256	235	261	288	299	309	334	287	273	257	261	301	258	319	268	256	250	247	251	231	219	205	225	264
" 9	342	228	253	275	296	311	364	318	303	300	316	297	277	287	296	313	289	288	297	275	267	262	246	269	248	286
" 10	343	241	248	260	272	290	312	309	309	397	299	310	299	307	285	295	290	287	286	291	279	246	264	259	254	283
" 11	344	253	260	272	300	332	320	311	312	316	306	304	300	318	304	298	298	300	303	302	289	283	292	280	283	297
" 12	345	284	276	277	293	305	315	304	313	319	311	312	309	301	303	326	307	307	303	298	298	287	286	274	264	299
" 13	346	269	291	295	302	322	310	306	314	313	314	313	307	302	314	309	300	295	302	308	296	286	264	286	274	300
" 14	347	282	288	292	305	299	304	309	317	306	298	296	292	294	303	315	303	293	296	295	291	294	274	272	272	295
" 15	348	285	295	312	317	305	310	307	307	319	305	303	303	303	301	311	301	301	304	304	298	289	283	277	268	300
" 16	349	276	290	301	307	320	323	319	318	325	307	308	309	312	318	315	303	304	304	312	309	310	307	285	279	307
" 17	350	270	273	286	317	303	323	318	312	313	300	315	298	295	300	298	295	299	307	304	303	300	283	266	264	298
" 18	351	267	269	282	304	315	329	316	308	316	316	308	308	326	324	319	314	316	312	318	318	313	293	274	267	306
" 19	352	271	282	292	315	333	328	315	307	309	302	291	329	295	276	314	294	288	293	291	295	287	273	286	279	298
" 20	353	266	269	284	276	308	313	310	311	318	325	308	315	310	303	315	293	315	325	301	291	280	275	264	222	296
" 21	354	238	258	272	292	311	330	301	303	299	306	306	298	292	300	305	307	310	315	314	298	208	299	278	261	296
" 22	355	269	272	291	286	301	300	320	314	306	303	308	309	307	305	303	308	305	310	312	313	314	296	290	285	301
" 23	356	282	277	284	285	297	322	326	308	303	302	325	297	302	296	298	302	302	303	308	300	290	275	259	251	296
" 24	357	257	273	296	312	319	329	323	315	317	312	315	313	321	312	317	306	307	310	309	312	312	304	293	279	307
" 25	358	281	290	293	297	335	327	330	332	323	327	335	327	334	318	430	308	264	291	264	193	173	141	180	185	282
" 26	359	185	193	220	225	232	259	280	264	267	267	267	277	270	290	284	293	282	285	272	279	261	208	220	237	255
" 27	360	236	241	243	268	279	290	284	280	275	274	272	271	271	271	269	269	269	271	275	279	275	270	255	250	268
" 28	361	256	269	282	294	298	296	293	282	283	284	286	289	284	285	280	283	284	284	284	279	272	263	257	254	280
" 29	362	260	277	278	285	285	291	295	295	294	294	291	291	289	289	283	286	285	284	285	283	274	266	259	261	283
" 30	363	265	267	276	294	307	309	307	300	295	297	302	301	297	301	299	300	300	302	303	298	288	288	281	287	294
" 31	364	292	302	307	316	318	320	316	322	320	321	322	325	325	302	299	290	293	288	301	293	283	283	281	273	304
Means	..	263	271	281	294	306	313	309	308	308	303	302	301	302	299	307	297	298	299	296	288	281	268	263	260	292

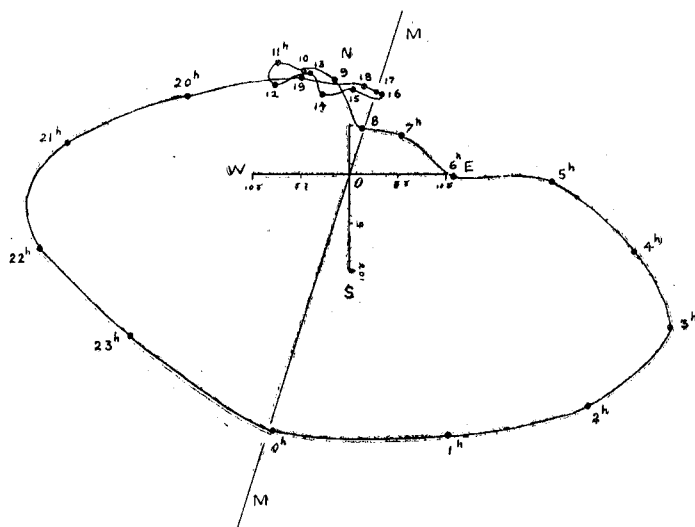
MEAN DIURNAL HORIZONTAL DISTURBING FORCES, 1918, AT CHRISTCHURCH.

O^h = Greenwich midnight. N.S. = Geographical meridian. M.M. = Magnetic meridian. (All days included.)



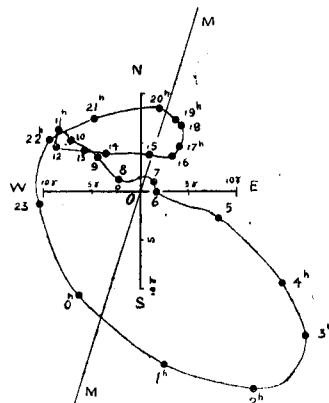
$$O \text{ (origin)} = \begin{Bmatrix} N. 0.21344 \\ E. 0.06493 \end{Bmatrix} \text{ c.g.s.}$$

VECTOR DIAGRAM FOR SUMMER MONTHS, 1918 (ALL DAYS).



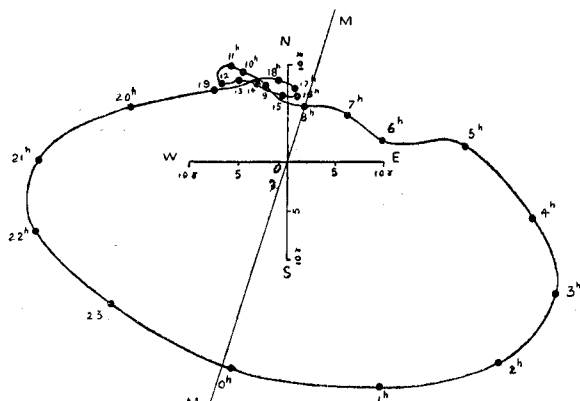
$$O \text{ (origin)} = \begin{Bmatrix} N. 0.21333 \\ E. 0.06494 \end{Bmatrix} \text{ c.g.s.}$$

VECTOR DIAGRAM FOR EQUINOCTIAL MONTHS, 1918 (ALL DAYS).



$$O \text{ (origin)} = \begin{Bmatrix} N. 0.21335 \\ E. 0.06496 \end{Bmatrix} \text{ c.g.s.}$$

VECTOR DIAGRAM FOR WINTER MONTHS, 1918 (ALL DAYS).



$$O \text{ (origin)} = \begin{Bmatrix} N. 0.21338 \\ E. 0.06495 \end{Bmatrix} \text{ c.g.s.}$$

VECTOR DIAGRAM FOR YEAR 1918 (ALL DAYS).

FIGURE 1.

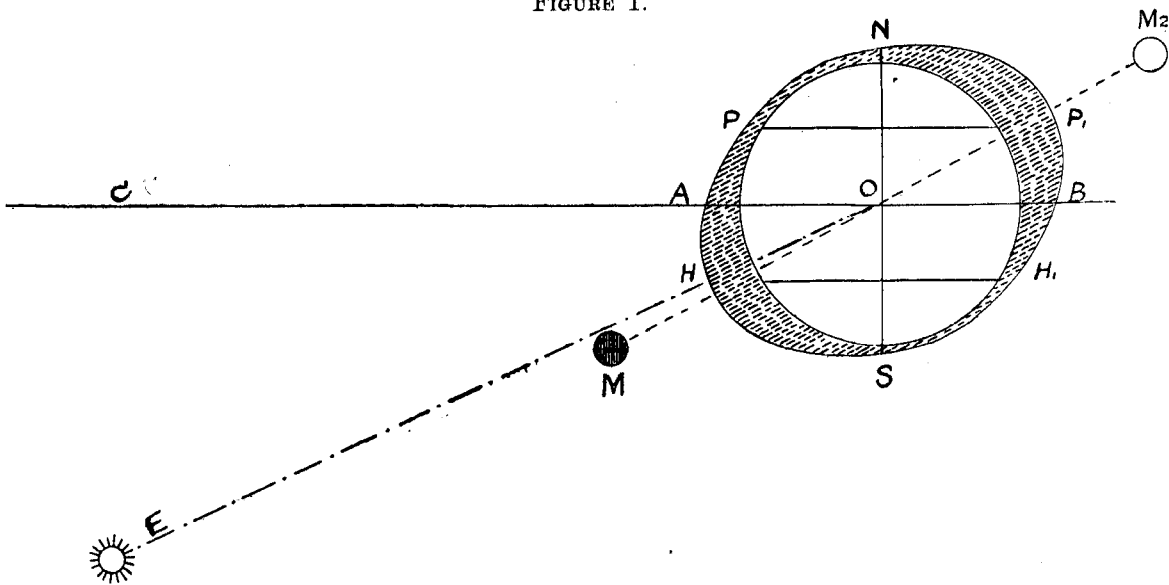


FIGURE 2.

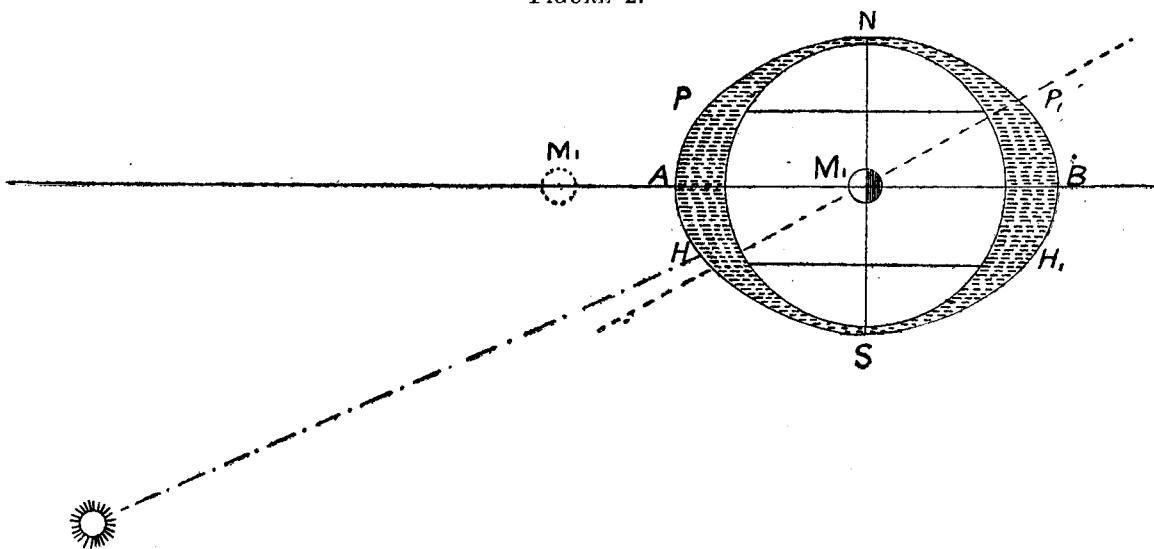
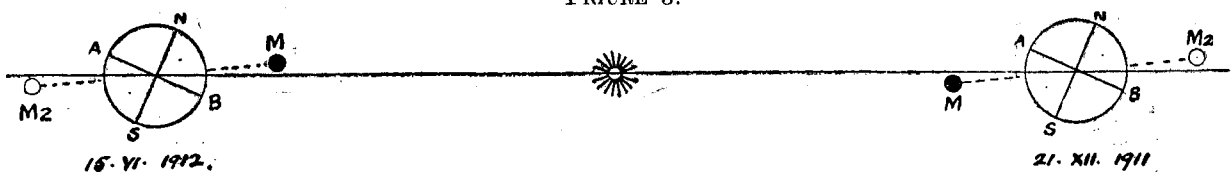


FIGURE 3.



Approximate Cost of Paper.—Preparation, not given; printing (1,100 copies, including diagrams, &c.), £72 10s.

1. 1000000

2. 1000000

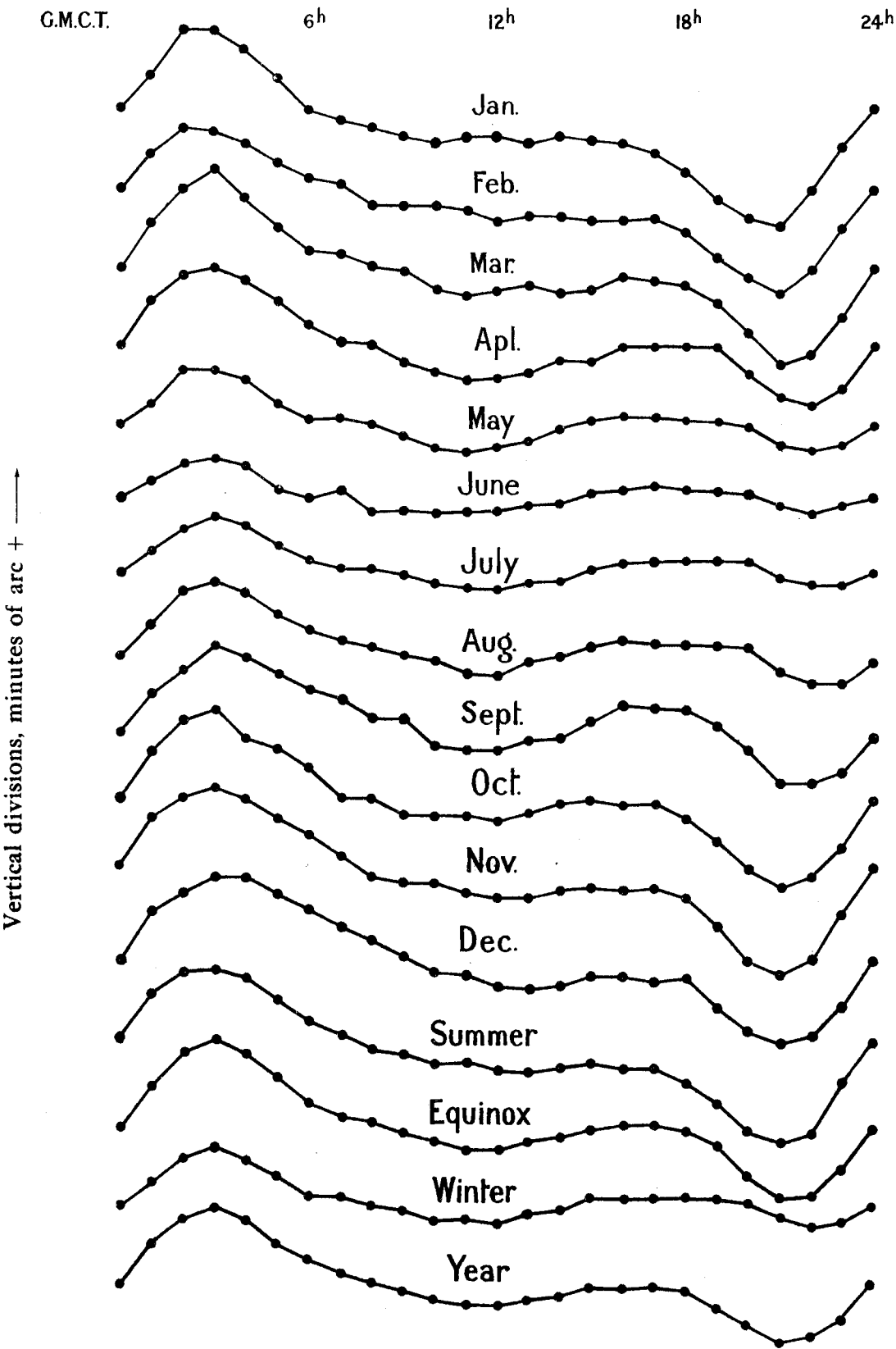


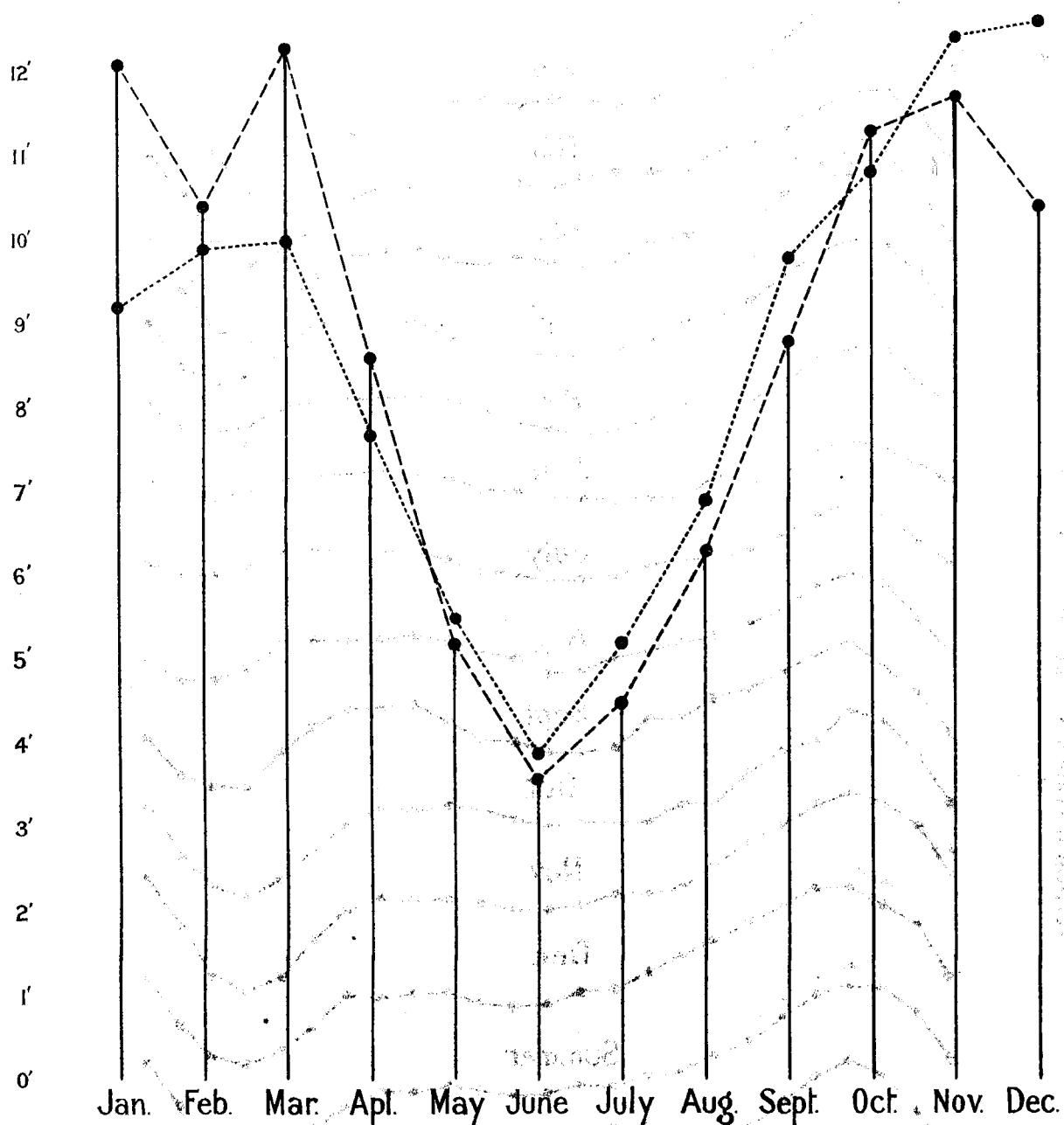
3. 1000000

4. 1000000

MEAN MONTHLY CURVES OF MAGNETIC DECLINATION.

1918



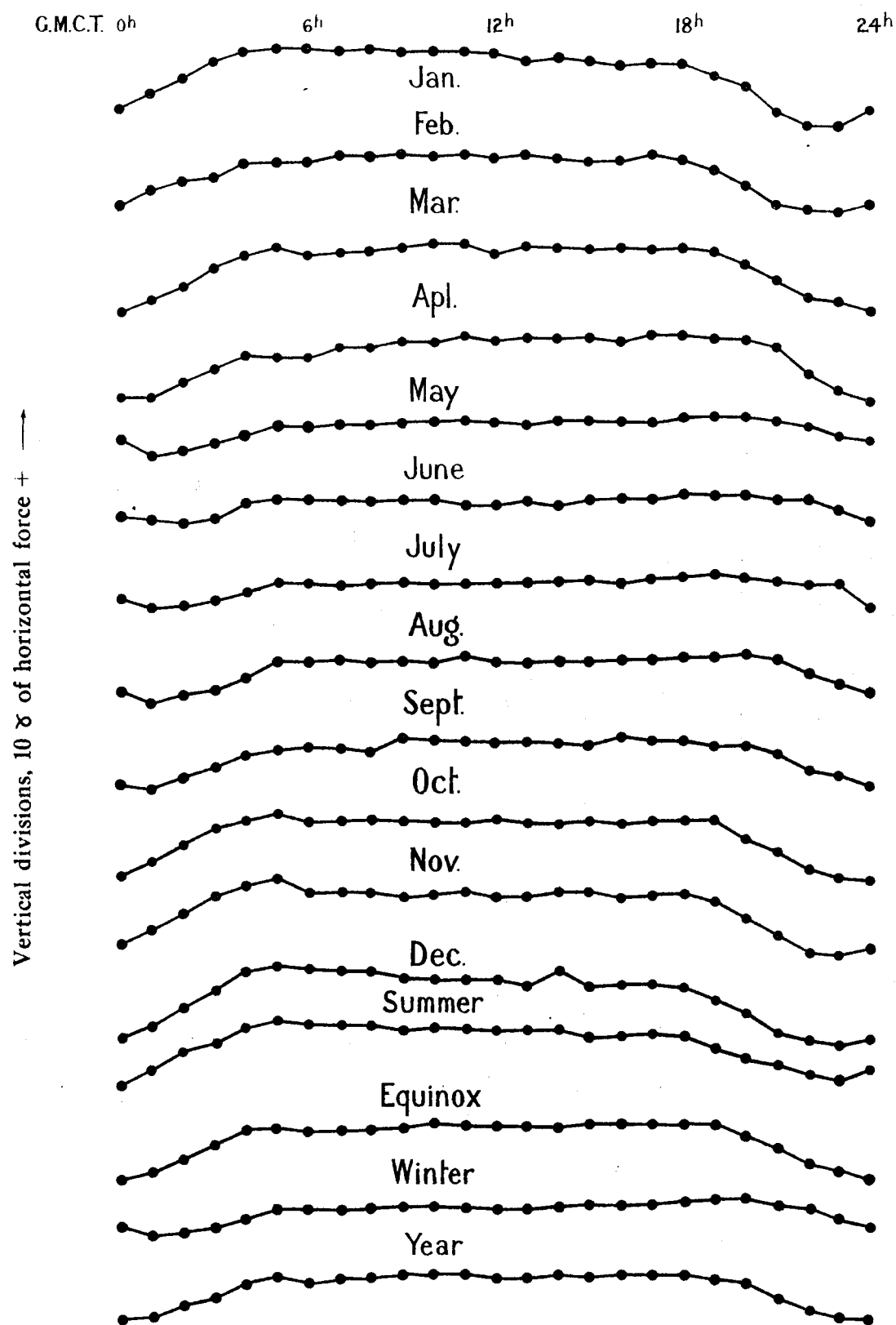


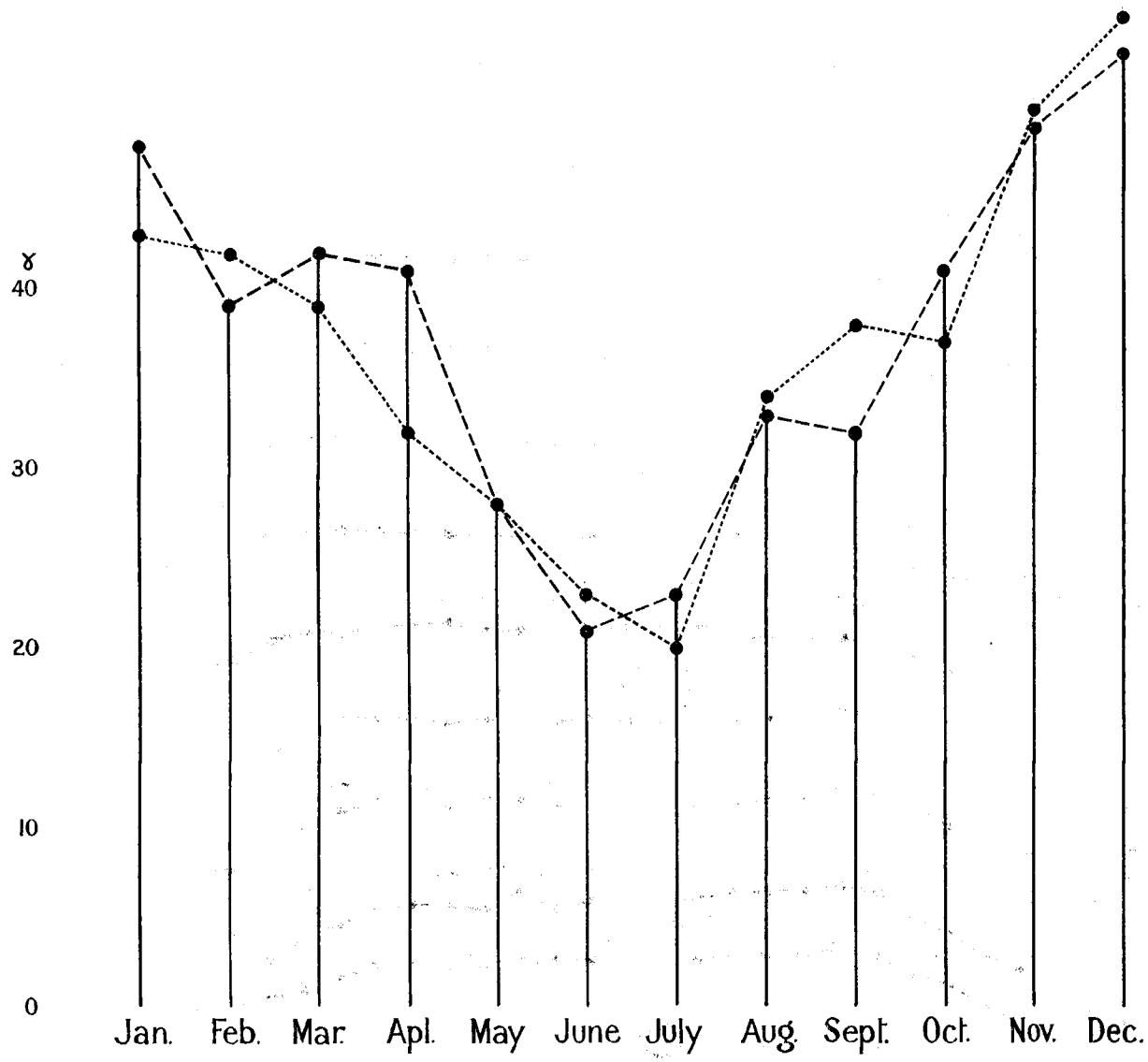
CURVE SHOWING MEAN DIURNAL RANGE OF DECLINATION
AT CHRISTCHURCH.

For 1918, thus ----- For 1917, thus

MEAN MONTHLY CURVES OF MAGNETIC HORIZONTAL FORCE.

1918





CURVE SHOWING MEAN DIURNAL RANGE OF DECLINATION
AT CHRISTCHURCH.

For 1918, thus ----- For 1917, thus