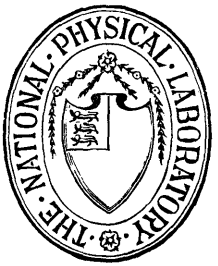

THE

NATIONAL PHYSICAL LABORATORY.

REPORT OF THE OBSERVATORY DEPARTMENT

FOR THE YEAR 1904.

WITH APPENDICES.

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1905.

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INTRODUCTION.

THE Report of the Observatory Department is in many respects complete in itself and appeals to a different class of workers to that interested in the Engineering and Physics Departments. It has, therefore, been thought desirable to issue it separately.

R. T. GLAZEBROOK.

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Caretaker, &c.—W. R. Corrin, Sen., with wife as housekeeper.

REPORT ON THE OBSERVATORY DEPARTMENT FOR THE YEAR ENDING DECEMBER 31, 1904, MADE BY THE SUPERINTENDENT TO THE DIRECTOR.

The work at the Kew Observatory in the Old Deer Park at Richmond, now forming the Observatory Department of the National Physical Laboratory, has been continued during the year 1904 as in the past.

This work may be considered under the following heads:—

I. Magnetic observations.
II. Meteorological observations.
III. Seismological observations.
IV. Experiments and Researches in connection with any of the departments.
V. Verification of instruments.
VI. Rating of Watches and Chronometers.
VII. Miscellaneous.

I. Magnetic Observations.

The magnetographs have been in constant operation throughout the year, and the usual scale value determinations were made in January.

The ordinates of the various photographic curves representing Declination, Horizontal Force, and Vertical Force were then found to be as follows:—

Declinometer: 1 cm. = 0° 8′·7.

Bifilar, January, 1904, for 1 cm. δH = 0·00050 C.G.S. unit.
Balance, January, 1904, for 1 cm. δV = 0·00050 C.G.S. unit.

In the case of the Horizontal Force instrument it was found necessary to slightly re-adjust the position of the magnet on June 22.

The curves during the past year have been free from any very large fluctuations.

The principal movements that were recorded took place on the following days:—

January 9–10, 28; February 4–7; April 1–2, 18–19; May 12–14, 28; June 15–16; July 6; August 3; September 25; October 7–8, 21; and November 4–5.

The hourly means and diurnal inequalities of the Declination and Horizontal Force for 1904 for the quiet days selected by the Astronomer Royal have been tabulated as usual, and the results will be found in Appendix I, together with the monthly means of the Inclination as derived from the absolute observations. Owing, however, to the disturbance of the vertical force produced by electric trams, it has been found impossible to tabulate the curves for this element satisfactorily. This has led to the omission of the tables of diurnal inequalities of vertical force and inclination published previous to 1902.

A correction has been applied to the horizontal force curves for the diurnal variation of temperature, use being made of the records from a Richard thermograph as well as of the eye observations of a thermometer.

The mean values at the noons preceding and succeeding the selected quiet days are also given, but these of course are not employed in calculating the daily means or inequalities.

The following are the mean results for the entire year:—

From curves	Mean Westerly Declination.....	16° 37'·9 W.
	Mean Horizontal Force	0·18504 C.G.S. unit.
From absolute observations, corrected	Mean Inclination	67° 5'·1 N.
	Mean Vertical Force	0·43774 C.G.S. unit.

The absolute observations have been reduced to the mean value for the day by applying corrections based on the diurnal variation observed in previous years.

Observations of absolute declination, horizontal intensity, and inclination have been made weekly as a rule.

A table of recent values of the magnetic elements at the Observatories whose publications are received at Kew will be found in Appendix IA to the present Report.

On February 4, owing to a combined flood and high tide, the river overflowed a considerable part of the Old Deer Park, and the water covered the floor of the magnetograph room to the depth of 6 inches. No serious damage was done, but some photographic trace was lost owing to a short stoppage of the clock and to water getting into the gas pipes.

Early in the year the Vertical Force Magnetograph was taken outside to the Experimental House, and experiments were made with a view to reducing the temperature co-efficient. The alterations made were successful so far as the temperature co-efficient was concerned, but they introduced defects of another character which have not been fully overcome.

In response to requests from several sources, photographic copies have been made of a considerable number of disturbed magnetic curves. Similar copies have heen received from various observatories, including Toronto, Potsdam, Wilhelmshaven, Zikawei, and O'Gyalla.

Considerable progress has been made in measuring and tabulating old Kew declination curves, the expense being defrayed from a grant made by the Government Grant Committee to the Superintendent.

A course of magnetic instruction has been given to Commander Creagh-Osborne, R.N., at the request of the Hydrographer, and to Lieut. A. P. Robinson, R.I.M., at the request of the Under Secretary for India.

On the application of the Argentine Embassy, facilities for taking observations with his magnetometer were afforded to Lieut. E. G. Plate on August 16 and 18.

On the return of the British Antarctic Expedition the magnetic instruments employed in the Expedition were brought to Kew and observations were made by Lieut. Armitage and Mr. L. Bernacchi, the Antarctic observers. During December Mr. Bernacchi has been engaged in the tabulation of the magnetic curves obtained in Victoria Land.

The tabulation of the hourly values of the magnetic curves obtained at Kew during the term days of the International Antarctic programme has been completed.

At the request of the Royal Cornwall Polytechnic Society the Falmouth Vertical Force curves for the selected "quiet" days during 1903 were measured and tabulated. The diurnal inequalities deduced for Vertical Force and Inclination appear satisfactory, so far as can be judged by comparison with corresponding results for Kew in years prior to the existence of electric tramways.

METEOROLOGICAL OBSERVATIONS.

The several self-recording instruments for the continuous registration of Atmospheric Pressure, Temperature of Air and Wet-bulb, Wind (direction, pressure and velocity), Bright Sunshine, and Rain have been maintained in regular operation throughout the year, and the standard eye observations for the control of the automatic records have been duly registered.

The tabulations of the meteorological traces have been regularly made, and these, as well as copies of the eye observations, with notes of weather, cloud, and sunshine, have been transmitted, as usual, to the Meteorological Office.

With the sanction of the Meteorological Council, data have been supplied to the Council of the Royal Meteorological Society, the Institute of Mining Engineers, and the editor of "Symons' Monthly Meteorological Magazine." On the initiative of the Meteorological Office, special cloud observations have been made with the Fineman nephoscope in connection with the International scheme of balloon ascents.

Bright Sunshine.—As explained in the Annual Report for 1901, Table III, Appendix II, in the present Report, gives the monthly and annual percentages according to both the "old" and the "new" points of view. This year, as in 1901 to 1903, the new method gives for the annual mean percentage a value greater than that given by the old, in the proportion roughly of 11 to 10, mainly due to the fact that the new method allows less weight than the old to the winter months.

Earth Thermometers.—The two Symons' earth-thermometers on the lawn, one at a depth of 1 foot and the other at a depth of 4 feet, have been read at 10 a.m., 4 p.m., and 10 p.m. daily throughout the year, and the 10 a.m. readings have been forwarded weekly to the Meteorological Office, together with the corresponding readings of the Solar Radiation and Terrestrial Radiation thermometers.

Electrograph.—This instrument worked generally in a satisfactory manner during the year.

New "leads" from the chloride of silver battery to the Electrometer were fitted in May, and the battery was overhauled, re-charged, &c., in July, but there has been no serious stoppage.

The portable Electrometer, "White No. 53," which is regularly used for taking eye observations at the fixed station on the observatory lawn, was compared with a battery of standard Clark cells in July and December, and its scale value was found to have remained constant.

Determinations of the scale value of the Electrograph were made on January 15, May 12, July 7 and 11, and September 27.

A series of curves—ten a month—have been selected as representative of the variations of potential on electrically "quiet" days, defined as days when irregular fluctuations of potential are fewer than usual. These curves have been tabulated and the results appear, with the permission of the Meteorological Office, in Appendix II, Tables IV and V. Owing presumably in large measure to the fewness of the selected days, the values deduced from the actual curve measurements show in some months a considerable non-cyclic element. This element has been eliminated from the diurnal inequality in the way customary in dealing with meteorological data.

Similar curves have also been selected and tabulated on corresponding lines for the years 1899, 1900, and 1901, and there are now six years' tabulations and results available for discussion, which it is hoped may be proceeded with during 1905.

Inspections.—In compliance with the request of the Meteorological Council, the following Observatories and Anemograph Stations have been visited and inspected:—Aberdeen, Deerness (Orkney), Glasgow, Fort William, and Yarmouth, by Mr. Baker; and Radcliffe Observatory (Oxford), Stonyhurst, Fleetwood, Manchester, Armagh, Dublin, Valencia, and Falmouth, by Mr. Constable.

At the request of the Meteorological Council, immediately after Christmas, Mr. Baker went to Fort William and dismounted the instruments belonging to the Meteorological Office, which are now stored at Kew.

III. Seismological Observations.

Professor Milne's "unfelt tremor" pattern of seismograph has been maintained in regular operation throughout the year; particulars of the time of occurrence and the amplitude in millimetres of the largest movements are given in Table I, Appendix III.

The largest disturbance recorded during the year took place on April 4, when the maximum amplitude exceeded 17 mm.

A detailed list of the movements recorded from January 1 to December 31, 1904, has been made and sent to Professor Milne, and will be found in the 'Report' of the British Association for 1904, "Seismological Investigations Committee's Report."

IV. Experimental Work.

Fog and Mist.—The observations of a series of distant objects, referred to in previous Reports, have been continued. A note is taken of the most distant of the selected objects which is visible at each observation hour.

Atmospheric Electricity.—The comparisons of the potential, at the point where the jet from the water-dropper breaks up, and at a fixed station on the Observatory lawn, referred to in previous Reports, have been continued, and the observations have been taken every day when possible, excluding Sundays and wet days. The ratios of the "curve" and the "fixed station" readings have been computed for each observation, and these throw considerable light upon the action of the self-recording electrometer, especially with reference to the insulation problem.

Earth Thermometers.—A number of observations were made with the Symons' pattern earth thermometers in the lawn, and others of similar type, with a view to ascertaining how the readings are likely to be affected under normal conditions by the changes of temperature to which these instruments are exposed during the time required to haul them up and read them.

Recording Meteorological Instruments.—Observations have been taken and experiments made with various self-recording instruments of new types by Messrs. Lander & Smith, of Canterbury, including a sun-shine recorder, an anemograph, a thermograph, and a rain gauge.

A Dines-Baxendell non-oscillating maximum pressure plate by Mr. Halliwell, of Southport was erected on the roof and its behaviour observed; its scale value was checked by direct experiment with weights.

Effects of Pressure on Watch Rates.—At the suggestion of Mr. T. D. Wright, experiments have been made as to the effects of reduced pressure on the rates of watches of various types. These experiments are still in progress. The watches employed were lent by Mr. Bonniksen, Messrs. Nicole, Nielsen & Co., Messrs. Usher & Cole, and Messrs. Wright & Craighead.

Magnetometer Magnets.—A number of experiments were made on the "pole-distance" and other properties of Collimator and "mirror" magnets, and the results were discussed in a paper* read before the Physical Society in May.

V. Verification of Instruments, exclusive of Watches and Chronometers.

The subjoined is a list of the instruments—exclusive of watches and chronometers—examined in the year 1904, compared with a corresponding return for 1903:—

	Number tested in the year ending December 31.	
	1903.	1904.
Air-meters	24	9
Anemometers	14	6
Aneroids	86	170
Artificial horizons	21	27
Barometers, Marine	103	116
„ Standard	112	108
„ Station	83	43
Binoculars	1,048	1,027
Compasses	9	29
Hydrometers	353	706
Inclinometers	8	9
Levels	16	5
Magnetographs	—	1
Magnets	15	5
Milk-test apparatus	89	202
Rain Gauges	67	12
Rain-measuring Glasses	131	32
Sextants	901	657
Sunshine Recorders	6	—
Telescopes	3,180	2,943
Theodolites	23	13
Thermometers, Clinical	19,393	15,903
„ Deep sea	56	41
„ High Range	42	42
„ Hypsometric	45	15
„ Low Range	51	53
„ Meteorological	2,851	3,157
„ Solar radiation	67	71
„ Standard	127	75
„ Other Forms	1	2
Unifilars	5	4
Miscellaneous	35	14
Total	28,962	25,797

Duplicate copies of corrections have been supplied in 43 cases.

* *Phil. Mag.*, August, 1904, pp. 113–145.

The number of instruments rejected in 1903 and 1904 on account of excessive error, or for other reasons, was as follows :—

	1903.	1904.
Thermometers, clinical	79	83
„ ordinary meteorological	80	98
Sextants	102	127
Telescopes	172	145
Binoculars	11	10
Various	79	128

There were at the end of the year in the Observatory, undergoing verification, 8 Barometers, 21 Aneroids, 668 Thermometers, 2 Hydrometers, 18 Sextants, 322 Telescopes, 41 Binoculars, 3 Unifilar Magnetometers, 1 Inclinometer, 17 various.

VI. Rating of Watches and Chronometers.

The number of watches sent for trial this year is 429, as compared with 458 in 1903.

The "especially good" class A certificate was obtained by 151 movements. The high degree of excellence to which attention was called in last year's Report has been fully maintained, and there have been some exceptionally fine performances.

The following figures show the percentage number of watches obtaining the distinction "especially good," as compared to the total number obtaining class A certificates :—

Year	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.
Percentage "especially good"	16·6	30·5	28·0	22·1	26·6	35·4	35·5	31·6	42·4	50·2

The 429 watches received were entered for trial as below :—

For class A, 378; class B, 24; and for the subsidiary trial, 27. Of these, 301 were awarded class A certificates, 21 obtained class B certificates, 24 passed the subsidiary test, and 83 failed from various causes to gain any certificate.

In Appendix IV will be found a table giving the results of trial of the 51 watches which gained the highest number of marks during the year. The first place was taken by the keyless fusee tourbillon-lever, minute and split seconds chronograph watch, No. 2,547, fitted with an "Invar" balance, and sent by H. Golay, London. This watch obtained 93·2 marks, which is the highest number yet obtained by an English lever watch.

It was very closely followed by the Bar-lever watch, No. 116,477, sent by Patek Philippe et Cie, of Geneva, which was awarded 93·0 marks.

There has been a marked increase in the number of movements obtaining over 90 marks, the total this year being 11. The lowest number of marks in the list of the first 51 performances this year is as high as 85·6.

The percentage of "especially good" certificates has again decidedly increased.

Marine Chronometers.—During the year, 41 chronometers were entered for the Kew A trials and 2 for the B trials; of these, 34 gained A certificates, 2 gained B certificates, and 7 failed.

Miscellaneous.—Two "speed-of-flight" chronograph watches have been tested for Messrs. Armstrong, Whitworth, & Co.

Two photometer-clocks, to be used in the testing of the illuminating power of coal-gas, have been examined.

A mean-time regulator, by Usher & Cole, London (intended for use in the Transvaal), has been rated for the Meteorological Office.

A four-legged gravity escapement centre-seconds clock was tested at various temperatures, but failed to pass.

The standard clock, Morrison 8702, presented by Lady Galton, was set up at Bushy House in February, and has been running regularly since that date. It is kept at a reduced pressure of about 28 inches of mercury, and the "leakage" of air and the variation of daily clock rate are but small.

VII. Miscellaneous.

Commissions.—The following instruments have been procured, examined, and forwarded to the Institutions on whose behalf they were purchased:—

For India.—10 granitine photographic dishes.

For Mauritius.—1 Sprengel mercury pump, set of spare tubes, and McLeod gauge; 1 standard barometer, Newman pattern; 6 tubes with mercury for Fortin standard barometers, and 6 for marine barometers.

For Toronto.—10 granitine photographic dishes and 2 ivory scales.

Paper.—Prepared photographic paper has been supplied to the Observatories at Hong Kong, Mauritius, St. Petersburg, Toronto, and Oxford (Radcliffe); and through the Meteorological Office to Aberdeen, Fort William, and Valencia.

Photographic paper has also been sent in quarterly instalments to the India Office for use at Colaba (Bombay), Calcutta, Madras, and Kodaikanal.

Anemograph and Sunshine Sheets have been sent to Hong Kong and Mauritius; and Seismograph rolls to Mauritius.

Pendulum Observations.—The pendulums employed in the British Antarctic Expedition have been swung by Mr. Constable to furnish data for comparison with those obtained before the Expedition set out. The observations are still incomplete.

Telescopes.—A considerable number of observations have been made in connection with the testing of various new forms of telescopes for the Admiralty.

Falmouth Magnetic Observations.—The Declination and Horizontal Force results obtained at Falmouth on the "quiet" days selected by the Astronomer Royal during the twelve years 1891 to 1902, have been discussed, and a paper dealing with the results has been communicated to the Royal Society.

Visit of the Council of the Royal Meteorological Society.—Captain Wilson Barker, the President, and other Members of the Council of the Royal Meteorological Society, with their friends, were shown over the Observatory on the afternoon of June 8.

Painting.—During the summer the whole outside of the main building was painted by H.M. Office of Works.

Library.—During the year the Library has received publications from:—

17 Scientific Societies and Institutions of Great Britain and Ireland,
105 Foreign and Colonial Scientific Establishments,

as well as from several private individuals.

The card catalogue has been proceeded with.

CHARLES CHREE,
Superintendent.

List of Instruments, Apparatus, &c., the Property of the National Physical Laboratory Committee, at the present date out of the custody of the Director, on Loan.

To whom lent.	Articles.	Date of loan.
The Science and Art Department, South Kensington.	Articles specified in the list in the Annual Report for 1893.....	1876
Professor W. Grylls Adams, F.R.S.	Unifilar Magnetometer, by Jones, No. 101, complete.....	1883
	Pair 9-inch Dip Needles with Bar Magnets ...	1887
Lord Rayleigh, F.R.S.	Standard Barometer (Adie, No. 655)	1885
New Zealand Government.	Unifilar Magnetometer, by Jones, marked N.A.B.C., complete.....	1899
	Dip Circle, by Barrow, with one pair of Needles and Bar Magnets.....	1899
	Tripod Stand	1899
Scottish Antarctic Expedition.	Dip Circle, by Barrow, No. 24, with two pairs of Needles, Bar Magnets, and a Tripod Stand	1902

APPENDIX I TO REPORT OF SUPERINTENDENT OF OBSERVATORY DEPARTMENT.

MAGNETIC OBSERVATIONS, 1904, KEW OBSERVATORY.

Latitude 51° 28′ 6″ N., and Longitude $0^h\ 1^m\ 15^s{\cdot}1$ W.

The results in the following Tables I to IV are deduced from the magnetograph curves, which have been standardised by observations of Declination and Horizontal Force. The observations were made with the Collimator Magnet K.C.I. and the Declinometer Magnet K.O. 90 in the 9-inch Unifilar Magnetometer, by Jones.

Inclination observations were also taken with the Inclinometer, No. 33, by Barrow with needles $3\frac{1}{2}$ inches in length. Table V gives the monthly means of these observations as actually taken, and also as corrected to the mean of the day from previous years' results. It also gives monthly values of the Vertical Force, calculated from the corrected values of the Inclination and the mean monthly values of the Horizontal Force.

The values of Inclination and Vertical Force are a little influenced by electric tram currents, which produce apparently a slightly enhanced value of Vertical Force throughout the day. The Declination and Horizontal Force inequalities are not absolutely above suspicion in this respect, but any uncertainty that may exist in their case is undoubtedly small.

The Declination and Horizontal Force values given in Tables I to IV are prepared in accordance with the suggestions made in the fifth report of the Committee of the British Association on comparing and reducing Magnetic Observations.

The following is a list of the days during the year 1904 which were selected by the Astronomer Royal, as suitable for the determination of the magnetic diurnal inequalities, and which have been employed in the preparation of the magnetic tables :—

January	7, 13, 14, 19, 23.
February	10, 12, 14, 19, 21.
March	10, 15, 18, 19, 22.
April	6, 14, 16, 23, 27.
May	5, 10, 16, 20, 25.
June	8, 9, 10, 20, 24.
July	4, 11, 12, 19, 25.
August	6, 11, 14, 24, 28.
September	4, 14, 15, 18, 29.
October	3, 12, 17, 20, 24.
November	8, 9, 12, 20, 28.
December	7, 10, 12, 23, 25.

Table I.—Hourly Means of Declination at Kew Observatory, as determined

Hours	Preceding noon.	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
	(16° + West.)						Winter.						
1904. Months.	′	′	′	′	′	′	′	′	′	′	′	′	′
Jan. ..	41·0	37·5	37·9	38·0	38·0	38·1	38·0	38·3	38·2	37·9	38·5	39·7	40·5
Feb. ..	41·7	37·0	36·8	36·9	37·3	37·4	37·4	37·1	37·0	36·8	36·9	38·3	39·5
March.	42·6	37·9	37·7	38·0	37·9	37·8	38·0	37·4	36·5	34·5	34·6	36·2	39·8
Oct. ..	41·7	39·0	38·6	38·8	38·9	39·1	39·3	39·0	38·9	38·1	37·6	38·8	40·4
Nov. ..	36·8	35·4	35·3	35·7	35·9	36·0	36·1	35·7	35·7	35·6	35·3	36·0	37·1
Dec. ..	38·4	35·6	35·5	35·8	35·7	35·7	35·8	35·5	35·5	35·5	35·4	36·0	36·8
Means	40·4	37·1	37·0	37·2	37·3	37·4	37·4	37·2	37·0	36·4	36·4	37·5	39·0
							Summer.						
	′	′	′	′	′	′	′	′	′	′	′	′	′
April..	43·1	36·9	36·5	36·1	36·2	36·4	36·2	35·9	34·8	33·3	33·7	35·8	39·2
May ..	42·2	36·4	36·1	35·8	35·5	35·4	34·1	33·2	32·4	32·6	34·3	36·7	40·4
June ..	41·4	37·1	36·3	35·7	36·0	35·1	33·8	32·0	31·7	31·4	33·4	35·3	39·2
July ..	42·4	36·9	36·7	36·4	36·1	35·6	34·8	33·7	33·2	33·1	34·3	36·7	39·6
Aug. ..	40·4	36·6	36·4	36·2	36·2	36·0	35·2	34·4	33·3	33·5	34·6	37·0	39·7
Sept...	43·2	41·0	40·5	40·6	41·0	41·2	41·3	41·1	39·9	39·2	39·2	39·7	41·8
Means	42·1	37·5	37·1	36·8	36·8	36·6	35·9	35·1	34·2	33·9	34·9	37·0	40·0

Table II.—Diurnal Inequality of the

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
					Summer Means.							
	′	′	′	′	′	′	′	′	′	′	′	′
	−0·4	−0·8	−1·1	−1·1	−1·3	−2·0	−2·8	−3·7	−4·0	−3·0	−0·9	+2·1
					Winter Means.							
	′	′	′	′	′	′	′	′	′	′	′	′
	−0·9	−1·0	−0·8	−0·7	−0·6	−0·6	−0·8	−1·0	−1·6	−1·6	−0·5	+1·0
					Annual Means.							
	′	′	′	′	′	′	′	′	′	′	′	′
	−0·7	−0·9	−0·9	−0·9	−1·0	−1·3	−1·8	−2·3	−2·8	−2·3	−0·7	+1·6

NOTE.—When the sign is + the magnet
" " − "

from the selected Quiet Days in 1904. (Mean for the Year = 16° 37′·9. West.)

Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.	Succeeding noon.
						Winter.							
′	′	′	′	′	′	′	′	′	′	′	′	′	′
41·4	41·7	41·0	39·8	39·3	39·3	39·0	38·8	38·7	38·6	38·4	38·3	38·1	42·3
41·5	42·1	41·9	40·6	39·6	39·0	38·6	38·4	38·1	37·7	36·9	36·5	36·6	41·3
43·4	44·7	44·1	42·3	39·9	38·8	38·7	38·6	38·7	38·9	38 8	38·6	38·6	43·7
41·3	41·3	40·4	39·4	38·5	37·9	37·8	37·9	37·9	37·7	37·7	38·3	38·6	41·0
38·0	38·1	37·4	37·0	36·8	36·8	36·3	36·3	35·8	35·4	35·2	35·6	36·1	38·9
37·4	38·0	38·1	37·6	37·8	37·7	37·2	37·6	37·4	37·5	37·7	38·2	38·1	40·6
40·5	41·0	40·5	39·5	38·7	38·3	37·9	37·9	37·8	37·6	37·5	37·6	37·7	41·3
						Summer.							
′	′	′	′	′	′	′	′	′	′	′	′	′	′
42·7	44·2	43·5	41·7	40·0	38·8	38·1	38·1	37·9	38·1	38 0	37·3	37·1	43·9
42·8	43·5	42·6	41·1	39·6	38·3	37·5	37·4	37·6	37·6	37·8	37 5	37·0	41·7
41 7	42·2	42·1	41·2	39·4	38·0	37·2	37·1	37·2	37·7	37·5	37·3	37·1	42·6
42·6	43·2	43·3	41·9	40·2	38·9	38·1	37·9	37 7	37·9	37·9	37·5	37·4	42·2
41·2	41·9	41·2	39·9	38·1	36·8	35·6	35·6	36·1	36·6	36·9	57·3	37·5	42·9
42 8	43·4	42·2	41·5	40 7	39·6	39·1	39·4	39 3	39·8	39·5	39·7	39·8	43 0
42·3	43·1	42·5	41·2	39·7	38·4	37·6	37·6	37·6	37·9	37·9	37·8	37·7	42·7

Kew Declination as derived from Table I.

Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
					Summer Means.							
′	′	′	′	′	′	′	′	′	′	′	′	′
+4·4	+5·2	+4·6	+3·3	+1·8	+0·5	−0·3	−0·3	−0·3	0·0	0·0	−0·1	−0·2
					Winter Means.							
′	′	′	′	′	′	′	′	′	′	′	′	′
·2·5	+3·0	+2·5	+1·5	+0·7	+0·3	−0·1	−0·1	−0·2	−0·4	−0·5	−0·4	−0·3
					Annual Means.							
′	′	′	′	′	′	′	′	′	′	′	′	′
+3·5	+4·1	+3·5	+2·4	+1·2	+0·4	−0·2	−0·2	−0·2	−0·2	−0·3	−0·3	−0·3

points to the west of its mean position.
„ east „ „

Table III.—Hourly Means of the Horizontal Force at Kew Observatory in C.G.S. (The Mean for the

Hours.. {	Preceding noon.	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
0·18000 +					Winter.								
1904. Months.													
Jan. ...	488	489	490	489	489	489	492	493	493	490	487	485	484
Feb. ...	482	494	491	487	489	490	493	495	495	493	488	487	485
March..	489	506	504	502	503	503	504	507	507	501	490	484	484
Oct. ...	491	510	508	506	507	507	509	510	507	502	493	486	489
Nov. ...	496	510	509	509	511	512	514	515	513	511	506	500	497
Dec. ...	500	509	508	507	508	510	512	513	513	511	507	504	502
Means..	491	503	502	500	501	502	504	506	505	501	495	491	490
					Summer.								
April...	479	506	505	503	502	501	502	503	500	495	488	479	474
May ...	480	504	504	503	504	503	503	498	493	486	482	478	481
June ...	496	517	515	510	510	509	511	506	497	492	487	486	490
July ...	496	516	514	512	513	511	510	506	501	494	490	491	496
Aug. ...	502	515	514	510	510	509	507	504	496	491	484	487	491
Sept. ...	496	514	512	506	509	508	510	511	507	503	495	489	492
Means..	492	512	511	507	508	507	507	505	499	494	488	485	487

Table IV.—Diurnal Inequality of the

Hours.	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
					Summer Means.							
	+ ·00005	+ ·00004	·00000	+ ·00001	·00000	·00000	− ·00002	− ·00008	− ·00013	− ·00019	− ·00022	− ·00020
					Winter Means.							
	+ ·00001	·00000	− ·00002	− ·00001	·00000	+ ·00002	+ ·00003	+ ·00003	− ·00001	− ·00007	− ·00011	− ·00012
					Annual Means.							
	+ ·00003	+ ·00002	− ·00001	·00000	·00000	+ ·00001	+ ·00001	− ·00003	− ·00007	− ·00013	− ·00016	− ·00016

NOTE.—When the sign is + the

units (corrected for Temperature) as determined from the selected Quiet Days in 1904. Year = 0·18504.)

Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.	Succeeding noon.
Winter.													
489	494	496	498	497	496	496	496	496	496	495	493	494	490
490	493	492	495	494	491	496	498	499	497	497	500	498	486
490	496	499	504	505	504	507	509	509	507	507	507	507	493
494	497	501	503	501	503	507	510	511	511	510	512	511	493
501	506	507	507	510	513	515	516	516	515	515	514	513	503
506	509	515	513	513	514	515	517	516	515	514	513	510	503
495	499	502	503	503	504	506	508	503	507	506	507	506	495
Summer.													
479	487	495	502	506	510	514	514	514	514	513	511	512	481
487	491	501	507	509	511	513	514	515	514	513	512	511	491
497	504	511	516	519	521	523	525	524	526	525	524	522	496
501	506	511	515	517	519	521	525	527	525	523	520	520	491
498	510	518	520	521	518	517	519	520	522	519	517	516	508
497	501	507	510	513	515	518	520	519	520	520	519	517	503
493	500	507	512	514	516	518	520	520	520	519	517	516	495

Kew Horizontal Force as deduced from Table III.

Noon.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Summer Means.												
−·00014	−·00007	·00000	+·00005	+·00007	+·00009	+·00011	+·00013	+·00013	+·00013	+·00012	+·00010	+·00009
Winter Means.												
−·00007	−·00003	·00000	+·00001	+·00001	+·00002	+·00004	+·00006	+·00006	+·00005	+·00004	+·00004	+·00003
Annual Means.												
−·00010	−·00005	·00000	+·00003	+·00004	+·00005	+·00007	+·00009	+·00009	+·00009	+·00008	+·00007	+·00006

reading is above the mean.

Table V.—Mean Monthly Values of Inclination and Vertical Force during the year 1904.

1904.	Mean time of Observation. p.m.	Inclination observed.	Inclination reduced to the mean value for the day.	Vertical force (mean value for the day).
	h. m.	° ′	° ′	
January	2 49	67 6·1	67 6·0	0·43777
February	3 22	67 6·1	67 6·0	0·43778
March.....	3 42	67 5·6	67 5·6	0·43784
April.....	3 48	67 5·1	67 5·2	0·43770
May	3 44	67 4·3	67 4·5	0·43746
June	4 2	67 4·7	67 5·0	0·43786
July	4 5	67 4·5	67 4·9	0·43782
August.....	3 45	67 4·1	67 4·3	0·43757
September	3 58	67 4·8	67 4·8	0·43774
October.....	3 38	67 5·1	67 4·9	0·43766
November.....	2 59	67 5·8	67 5·6	0·43805
December.....	2 48	67 4·5	67 4·3	0·43762
Mean for year	..	..	67 5·1	0·43774

APPENDIX Ia.

MEAN VALUES, for the years specified, of the Magnetic Elements at Observatories whose Publications are received at the National Physical Laboratory.

Place.	Latitude.	Longitude.	Year.	Declination.	Inclination.	Horizontal Force, C.G.S. Units.	Vertical Force, C.G.S. Units.
	° ′	° ′		° ′	° ′		
Pawlowsk	59 41 N.	30 29 E.	1902	0 45·9 E.	70 35·5 N.	·16563	·47012
*Katharinenburg	56 49 N.	60 38 E.	1902	10 13·4 E.	70 44·2 N.	·17763	·50827
Kasan	55 47 N.	49 8 E.	1897	7 54·8 E.	68 34·8 N.	·18616	·47454
Copenhagen ...	55 41 N.	12 34 E.	1900	10 12·2 W.	68 39·0 N.	·17513	·44803
Flensburg	54 47 N.	9 26 E.	1903	11 28·0 W.	68 12·5 N.	—	—
Barth	54 22 N.	12 45 E.	1903	9 52·9 W.	67 37·6 N.	·18261	·44363
Stonyhurst	53 51 N.	2 28 W.	1903	18 1·9 W.	68 49·6 N.	·17369	·44833
Hamburg.....	53 33 N.	9 59 E.	1903	11 10·2 W.	67 23·5 N.	·18126	·43527
Wilhelmshaven	53 32 N.	8 9 E.	1903	12 16·8 W.	67 36·9 N.	·18144	·44053
†Potsdam	52 23 N.	13 4 E.	1901	9 52·1 W.	66 22·8 N.	·18861	·43128
			1902	9 48·0 W.	66 20·8 N.	·18873	·43090
			1903	9 43·8 W.	66 20·0 N.	·18876	·43068
Irkutsk.....	52 16 N.	104 16 E.	1902	2 0·4 E.	70 18·5 N.	·20098	·56156
de Bilt(Utrecht)	52 5 N.	5 11 E.	1902	13 42·3 W.	66 52·8 N.	·18547	·43448
Valencia (Ireland).....	51 56 N.	10 15 W.	1904	21 15·2 W.	68 20·9 N.	·17840	·44939
Kew.....	51 28 N.	0 19 W.	1904	16 37·9 W.	67 5·1 N.	·18504	·43774
Greenwich.....	51 28 N.	0 0	1903	16 19·1 W.	67 0·9 N.	·18504	·43623
Uccle (Brussels)	50 48 N.	4 21 E.	1901	14 8·3 W.	66 7·8 N.	·18956	·42838
Falmouth	50 9 N.	5 5 W.	1904	18 20·0 W.	66 37·8 N.	·18759	·43414
Prague	50 5 N.	14 25 E.	1903	8 53·6 W.	—	·19885	—
St. Helier (Jersey).....	49 12 N.	2 5 W.	1904	16 45·0 W.	65 37·3 N.	—	—
Parc St. Maur (Paris)	48 49 N.	2 29 E.	1900	14 45·4 W.	64 53·5 N.	·19738	·42120

* The substitution of an inductor for an inclinometer has caused a discontinuity of about +2′·5 in Inclination, with corresponding change in Vertical Force, as compared to previous years.

† The introduction of a new instrument has caused a discontinuity of about −7′·5 in Inclination, with corresponding change in Vertical Force, as compared to previous years.

APPENDIX IA—*continued.*

Place.	Latitude.	Longitude.	Year.	Declination.	Inclination.	Horizontal Force, C.G.S. Units.	Vertical Force, C.G.S. Units.
Val Joyeux....	48° 49′ N.	2° 1′ E.	1901	15° 12′·0 W.	64° 58′·9 N.	·19680	·42167
Vienna.....	48 15 N.	16 21 E.	1898	8 24·1 W.	—	—	—
Munich.....	48 9 N.	11 37 E.	1900	10 27·9 W.	63 18·5 N.	·20610	·40993
*O'Gyalla (Pesth).....	47 53 N.	18 12 E.	1904	7 8·7 W.	62 27·9 N.	·21144	·40559
Odessa.....	46 26 N.	30 46 E.	1899	4 36·7 W.	62 18·2 N.	·21869	·41660
Pola.....	44 52 N.	15 51 E.	1903	9 10·7 W.	60 9·9 N.	·22225	·38753
Agincourt (Toronto).....	43 47 N.	79 16W.	1902	5 31·7 W.	74 32·1 N.	·16488	·59595
Nice	43 43 N.	7 16 E.	1899	12 4·0 W.	60 11·7 N.	·22390	·39087
Toulouse.....	43 37 N.	1 28 E.	1901	14 13·7 W.	60 56·5 N.	·21963	·39527
Perpignan.....	42 42 N.	2 53 E.	1900	13 37·3 W.	59 58·4 N.	·22441	·38828
Tiflis	41 43 N.	44 48 E.	1898	2 5·5 E.	55 50·6 N.	·25635	·37784
Capodimonte (Naples)	40 52 N.	14 15 E.	1902	—	56 17·1 N.	·24169	·36219
Madrid	40 25 N.	3 40W.	1900	15 42·4 W.	58 38·1 N.	—	—
			1901	15 35·6 W.	—	—	—
Coimbra.....	40 12 N.	8 25W.	1903	17 9·3 W.	59 11·9 N.	·22859	·38345
Lisbon.....	38 43 N.	9 9W.	1900	17 18·0 W.	57 54·8 N.	·23516	·37484
San Fernando..	36 28 N.	6 12W.	1902	15 51·0 W.	55 4·4 N.	·24650	·35300
			1903	15 48·4 W.	55 2·4 N.	·24699	·35326
Tokio.....	35 41 N.	139 45 E.	1899	4 33·7 W.	49 2·7 N.	·29856	·34400
Zi-ka-wei.....	31 12 N.	121 26 E.	1901	2 24·7 W.	45 41·6 N.	·32891	·33697
Havana.....	23 8 N.	82 25W.	1904	3 0·2 E.	53 3·7 N.	·30751	·40901
Hong Kong....	22 18 N.	114 10 E.	1903	0 13·5 E.	31 11·6 N.	·36830	·22299
Colaba (Bombay)	18 54 N.	72 49 E.	1903	0 17·5 E.	21 43·7 N.	·37409	·14908
Manila.....	14 35 N.	120 59 E.	1902	0 49·8 E.	16 7·7 N.	·38185	·11041
†Batavia	6 11 S.	106 49 E.	1902	1 2·4 E.	30 17·6 S.	·36717	·21450
Dar-es-salaam..	6 49 S.	39 18 E.	1903	7 35·2 W.	—	—	—
Mauritius	20 6 S.	57 33 E.	1903	9 15·9 W.	53 59·4 S.	·23680	·32585
Rio de Janeiro .	22 55 S.	43 11W.	1903	8 27·9 W.	13 35·4 S.	·24798	·05987
Santiago (Chile)	33 27 S.	70 42W.	1899	14 59·5 E.	—	—	—
			1900	14 51·8 E.	—	—	—
Melbourne.....	37 50 S.	144 58 E.	1901	8 26·7 E.	67 25·0 S.	·23305	·56024

* The Inclination and Vertical Force are means from first nine months of year only. There seems a slight discontinuity in Horizontal Force, due to the introduction of a new magnetometer.

† Use is made of magnetograph results from Buitenzorg (lat. 6° 35′ S., long. 106° 47′ E.), but the absolute values apply apparently to Batavia.

APPENDIX II.—Table I.

Mean Monthly Results of Temperature and Pressure for Kew Observatory. 1904.

Months.	Thermometer.								Barometer.*					Mean vapour tension.
	Mean.	Means of—			Absolute Extremes.				Mean.	Absolute Extremes.				
		Max.	Min.	Max. and Min.	Max.	Date.	Min.	Date.		Max.	Date.	Min.	Date.	
	°F.	°F.	°F.	°F.	°F.		°F.		ins.	ins.		ins.		in.
January ...	39·8	44·1	34·9	39·5	54·8	13th 1 P.M.	25·9	1st 2 A.M.	29·963	30·752	22nd 11 A.M.	28·989	14th 8 A.M.	·215
February ..	39·9	44·2	35·7	40·0	53·1	21st {2 „ 3 „}	29·0	29th 9 „	29·954	30·301	28th {9 „ 10 „}	28·642	9th 7 P.M.	·203
March.....	40·7	46·8	34·8	40·8	58·0	9th 3 „	27·0	18th 5 „	29·981	30·404	11th 9 „	29·287	30th 2 A.M.	·205
April.....	49·4	56·6	41·7	49·2	66·6	14th 2 „	36·2	18th 6 „	29·952	30·245	25th 10 P.M.	29·354	15th Noon	·262
May	53·8	60·8	46·5	53·7	73·6	26th 3 „	36·0	9th 3 „	29·958	30·260	13th 7 A.M.	29·500	7th 10 A.M.	·315
June	57·9	66·6	49·9	58·3	78·1	30th 3 „	44·5	4th {4 „ 5 „}	30·054	30·407	22nd 9 „	29·518	25th 4 „	·336
July	65·2	74·7	56·7	65·7	84·3	17th 5 „	50·9	4th {2 „ 4 „}	30·032	30·289	18th 8 „	29·588	25th 5 P.M.	·430
August	61·4	70·7	53·1	61·9	86·4	4th 1 „	43·9	25th 6 „	30·026	30·237	28th 9 „	29·645	17th 6 „	·384
September..	55·1	62·9	47·7	55·3	71·9	5th 3 „	38·0	26th 6 „	30·071	30·334	18th 9 „	29·638	14th 4 „	·338
October ...	51·0	56·9	44·4	50·7	65·9	18th 2 „	32·3	15th 6 „	30·108	30·530	13th 9 „	29·457	6th 2 A.M.	·323
November..	42·0	47·3	36·9	42·1	59·6	9th 3 „	24·1	26th 5 „	30·078	30·631	14th 8 P.M.	29·393	22nd {9 „ 10 „}	·231
December ..	41·0	44·9	35·9	40·4	55·0	17th 1 „	26·6	22nd 8 „	29·948	30·655	19th 10 A.M.	28·945	12th 6 „	·231
Means	49·8	56·4	43·2	49·8	..	..	..	..	30·010	..	..	..	..	·289
30-years' Means, 1871 to 1900	49·3	56·1	42·7	49·4	..	..	..	..	29·963	..	..	..	..	..

* Reduced to 32° at M.S.L.

This table has been compiled at the Meteorological Office from values intended for publication in the volume of "Hourly Means" for 1903.

APPENDIX II.—Table II.

Kew Observatory.

Months.	Mean amount of cloud (0=clear, 10=overcast).	Rainfall.*			Weather. Number of days on which were registered							Wind.† Number of days on which it was								
		Total.	Maximum.	Date.	Rain.‡	Snow.	Hail.	Thunderstorms.	Clear sky.	Overcast sky.	Gales.§	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.‖
1904.		ins.	ins.																	
January	7·9	2·370	0·650	30	21	0	0	0	2	19	1	3	0	4	3	7	8	5	1	5
February	7·7	2·245	0·380	9	20	5	0	0	0	17	3	2	2	4	3	2	9	5	2	0
March	8·0	1·310	0·250	29	16	2	2	2	1	20	0	5	8	5	2	2	5	2	2	3
April	6·8	0·910	0·250	22	10	0	0	1	2	14	0	2	2	1	1	2	7	11	4	1
May	7·6	2·890	0·770	26	17	0	0	1	0	18	0	4	1	4	2	2	8	8	2	4
June	7·0	0·870	0·275	1	8	0	0	0	1	15	0	7	8	2	0	1	5	4	2	2
July	5·6	2·030	0·560	25	9	0	0	1	6	8	1	1	1	6	0	2	14	6	1	3
August	6·0	1·935	0·940	31	10	0	0	2	3	7	0	3	1	2	1	3	8	9	4	6
September	5·6	1·465	0·280	7	13	0	0	0	6	10	0	2	4	6	2	5	4	3	4	6
October	7·4	1·555	0·270	6, 16	12	0	0	0	2	16	0	3	4	4	1	3	7	5	4	9
November	7·1	1·755	0·470	7	11	2	0	0	3	16	0	2	2	0	1	3	5	11	6	13
December	8·0	1·865	0·550	6	18	0	0	0	1	19	1	4	2	3	2	2	8	6	4	8
Totals and means...	7·1	21·200	..	..	165	9	2	7	27	179	6	38	35	41	18	34	88	75	36	60

* Measured at 10 A.M. daily by gauge 1·75 feet above ground. † As registered by the Robinson anemograph.
‡ The number of rainy days are those on which 0·01 inch rain or melted snow was recorded.
§ In a "gale" the mean wind velocity has exceeded 35 miles an hour in at least one hour of the twenty-four.
‖ In a "calm" the mean wind velocity for the twenty-four hours has not exceeded 5 miles an hour.

APPENDIX II—Table III.

Kew Observatory.

Months.	Bright Sunshine (by Campbell-Stokes Recorder).					Maximum temperature in sun's rays. (Black bulb *in vacuo*.)			Minimum temperature on the ground.			Horizontal movement of the air.* Miles per hour.		
	Total number of hours recorded.	Mean percentage of possible sunshine.		Greatest daily record.	Date.	Mean.	Highest.	Date. †	Mean.	Lowest.	Date. ‡	Average hourly velocity.	Greatest hourly velocity.	Date.
		Old method.	New method.											
1904.	h. m.			h. m.		°	°		°	°				
January	27 36	11	11	5 6	29	58	84	13	28	14	1	11·6	37	10
February	56 42	20	20	5 48	19	78	90	5, 13	29	17	19	13·7	39	8, 12
March	78 48	21	22	8 6	11	83	107	29	27	15	17	11·3	29	2
April	168 36	41	41	11 48	11, 25	108	122	14	35	21	26	13·1	31	3, 13
May	149 18	31	31	14 24	19	114	128	29	40	27	11	9·5	32	2
June	205 12	41	42	14 12	5	123	134	18	43	33	28	10·6	28	16
July	264 54	53	53	14 24	17	131	142	15	49	42	4, 6	9·8	35	12
August	239 12	53	53	14 6	3	126	142	3	44	31	25	8·4	30	14
September	159 0	42	42	12 6	5	111	127	5, 10	39	27	21	9·0	29	19, 21
October	68 48	21	21	8 0	25	89	110	18	38	21	15	7·8	29	17
November	52 48	20	20	7 48	12	72	102	11	30	15	26, 27	7·1	31	9
December	30 12	12	12	5 54	31	58	86	29	29	13	9	8·7	39	30
Totals and Means	1,501 6	31	34	..	..	..	..	..	..	..	..	10·1	..	..

* As indicated by a Robinson anemograph, 70 feet above the general surface of the ground, the original factor 3 being used.
† Read at 10 A.M., and entered to previous day. ‡ Read at 10 A.M., and entered to same day.

APPENDIX II.—Table IV.—Hourly Means of Atmospheric Electric Potential Kew Observatory, on selected "Quiet"

19

Month.	Mid.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.
January ...	166	158	158	159	157	160	168	170	177	197	218	210
February ..	189	172	145	136	133	140	159	172	186	213	220	219
March	160	154	144	121	101	107	129	154	162	182	186	186
April.....	168	144	130	121	121	131	150	173	177	175	173	151
May	145	145	142	123	116	113	118	146	151	144	137	135
June	98	92	83	80	83	95	110	122	131	136	141	134
July	135	126	113	106	98	107	126	146	178	192	179	142
August	136	121	107	103	106	118	124	139	160	166	156	132
September .	149	145	130	120	117	126	135	143	156	162	167	181
October....	124	120	113	114	114	120	133	162	177	183	184	176
November..	289	278	245	242	258	262	267	266	275	269	254	252
December ..	255	251	230	214	208	218	241	259	280	301	312	310

APPENDIX II.—Table V.—Diurnal Inequality of Atmospheric Electric Potential

19

Month, &c.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	Noon.	1 h.
January ...	−25	−26	−26	**−29**	−27	−20	−19	−13	+ 6	+26	+17	+ 9	+15
February ..	−19	−47	−55	**−57**	−50	−34	−15	0	+28	**+37**	+36	+19	+ 7
March.....	−21	−31	−55	**−75**	−69	−47	−21	−13	+ 7	+11	+11	+ 6	+ 2
April.....	−27	−40	**−48**	**−48**	−38	−19	+ 3	+ 7	+ 6	+ 4	−16	−31	−30
May	+ 4	+ 1	−17	−23	**−25**	−20	+ 9	+15	+ 9	+ 2	+ 1	− 9	−13
June	−19	−27	**−29**	−27	−15	0	+13	+22	+27	**+31**	+26	+13	0
July	− 9	−21	−26	**−33**	−24	− 6	+14	+44	**+57**	+46	+13	0	−13
August	− 3	−17	−20	−17	− 5	+ 2	+17	+37	**+44**	+34	+12	− 9	−23
September .	−13	−25	−33	−35	**−36**	−19	−11	0	+ 6	+11	+23	+ 4	−11
October....	−32	**−38**	−36	−36	−29	−14	+15	+32	+39	**+41**	+33	+21	+ 9
November..	+ 8	−24	−26	− 9	− 4	+ 2	+ 2	+12	+ 7	− 7	− 8	−25	**−28**
December ..	− 7	−29	−47	**−54**	−46	−24	− 8	+13	+31	**+41**	+38	+25	+13
Winter	−11	−31	**−39**	−37	−32	−19	−10	+ 3	+18	+24	+21	+ 7	+ 2
Equinox ...	−23	−34	−43	**−48**	−43	−25	− 4	+ 6	+15	+17	+13	0	− 7
Summer ...	− 7	−16	−23	**−25**	−17	− 6	+13	+29	**+34**	+28	+13	− 1	−12
Year	−14	−27	−35	**−37**	−31	−17	0	+13	+22	+23	+16	+ 2	− 6

* Principal maxima and

(in volts) from the Self-recording Kelvin Water-dropping Electrograph at
Days (usually 10 each Month).

04.

Noon.	1 h.	2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	Mid.
203	210	224	235	233	231	217	206	195	188	192	202	191
201	189	187	194	200	210	214	203	184	178	173	171	173
181	177	182	188	205	221	231	234	225	204	192	176	160
135	137	144	145	158	184	209	249	253	226	207	185	159
124	119	112	136	138	129	131	144	141	144	137	131	127
121	108	99	93	97	102	118	121	117	115	110	103	92
127	112	103	100	109	117	117	117	125	128	122	126	115
111	97	92	84	79	82	91	110	140	148	145	141	127
158	139	130	130	133	154	185	212	212	196	171	144	133
163	151	143	147	152	157	164	156	145	124	119	112	107
234	230	233	251	257	270	275	278	274	266	251	256	265
298	287	284	286	280	273	271	284	298	306	305	298	289

Gradient at Kew Observatory near the Ground in volts per metre of height.*

04.

2 h.	3 h.	4 h.	5 h.	6 h.	7 h.	8 h.	9 h.	10 h.	11 h.	Mid.	Range of inequality.	Monthly and seasonal mean absolute values.
+28	**+38**	+35	+32	+17	+ 5	− 7	−15	−12	− 3	−16	67	194
+ 5	+14	+21	+31	+36	+26	+ 6	+ 1	− 3	− 5	− 2	94	190
+ 7	+13	+30	+47	+57	**+60**	+51	+29	+17	+ 1	−15	135	177
−22	−21	− 8	+17	+41	+80	**+84**	+58	+41	+20	− 5	132	160
− 9	+ 5	+ 8	0	+ 3	+16	+14	**+18**	+12	+ 6	+ 3	43	130
− 8	−14	−10	− 5	+12	+15	+11	+ 9	+ 5	− 2	−13	60	108
−21	−22	−14	− 6	− 5	− 4	+ 6	+ 7	+ 3	+ 7	− 2	90	117
−27	−34	**−38**	−35	−27	− 7	+23	+30	+28	+25	+11	82	118
−19	−18	−14	+ 3	+31	**+54**	**+54**	+42	+21	− 2	−10	90	130
+ 1	+ 6	+12	+19	+26	+19	+ 8	−13	−18	−24	−29	79	148
−24	− 5	+ 2	+16	+22	**+26**	+23	+16	+ 2	+ 8	+18	54	259
+ 9	+10	+ 2	− 6	−10	+ 2	+14	+21	+18	+ 9	− 1	95	273
+ 5	+14	+15	**+18**	+16	+15	+ 9	+ 6	+ 1	+ 2	0	..	229
− 8	− 5	+ 5	+21	+39	**+53**	+49	+29	+15	− 1	−15	..	154
−16	−16	−14	−11	− 4	+ 5	+13	+16	+12	+ 9	0	..	118
− 6	− 2	+ 2	+ 9	+17	**+24**	**+24**	+17	+ 9	+ 3	− 5	..	167

minima are in heavy type.

APPENDIX III.—Table I.

Register of principal Seismograph Disturbances at Kew Observatory. 1904.

No. in Kew register.	Date.	Commencement.	Time of Max.	Max. Amplitude.	Duration.	Remarks.
		h. m.	h. m.	mm.	h. m.	
518	Jan. 20	15 8·2	15 37·0	2·6	1 58	
523	March 31	2 42·8	2 44·4	2·5	0 44	
525	April 4	10 5·9	10 37·5	>17·0	2 8	Traces overlap.
527	„ 8	11 59·4	12 15·5	1·0	0 39	
528	„ 10	10 4·7	10 5·8	0·9	0 6	Movement began suddenly.
535	May 1	15 58·8	16 34·6	1·6	1 54	
541	June 25	15 7·2	15 35·2 15 38·4	7·1	1 44	
543	„ 25	21 19·2	21 50·3	8·1	2 37	
544	„ 26	11 17·8	11 29·8	1·1	0 45	
547	„ 27	0 21·3	0 58·6	7·2	3 5	
550	July 23	1 40·6	1 52·0	0·6	1 25	
551	Aug. 8–9	23 40·5	0 39·5	0·7	1 13	Times somewhat approximate.
554	„ 24	21 23·3	21 59·5	6·0	2 8	Commencement ill-defined.
556	„ 27	22 14·8	22 39·2	3·7	2 7	
558	„ 30	12 7·4	12 26·7	3·1	1 29	
560	Sep. 11	6 22·7	6 29·1	1·1	0 57	
564	„ 19	6 20·8	6 34·4	1·0	0 55	
568	Oct. 3	3 19·4	3 59·2	3·0	2 11	
570	„ 8	19 26·3	19 36·3	1·3	0 29	
571	„ 9	13 57·2	14 4·2	2·1	0 46	
574	Nov. 6	4 54·0	5 10·7	1·4	0 41	
575	„ 22	2 21·3	2 34·0	0·7	0 34	
577	Dec. 2	2 48·2	3 10·0	0·9	0 51	
580	„ 20	6 7·3	6 34·2	3·8	1 43	Second maximum at 6h. 44m.

The times recorded are G.M.T., midnight = 0 or 24 hours.

The figures given above are obtained from the photographic records of a Milne Horizontal Pendulum; they represent E—W displacements.

The scale value has been 1 mm. = 0″·54 from January to June.

„ „ „ = 0″·55 from July to December.

APPENDIX IV.—Table I.

RESULTS OF WATCH TRIALS. Performance of the 51 Watches which obtained the highest number of marks during the year.

Watch deposited by	Number of watch.	Escapement, balance spring, &c.	Mean daily rate.					Mean variation of daily rate. ±	Mean change of rate for 1° F.	Difference between extreme gaining and losing rates.	Marks awarded for			Total Marks.
			Pendant up.	Pendant right.	Pendant left.	Dial up.	Dial down.				Daily variation of rate.	Change of rate with change of position.	Temperature compensation.	
											0—40	0—40	0—20	0—100.
			secs.	secs.	secs.	secs.	secs.	secs.	secs.	secs.				
H. Golay, London	2547	S.r., fusee, "Tourbillon lever," Invar balance, min. and split seconds, chronograph, d.o.	+1·0	+1·3	+1·2	+0·3	+2·2	0·2	0·01	3·0	35·3	38·2	19·2	93·2
Patek, Philippe & Co., Geneva	116477	D.r., g.b., s.o.	+0·6	−0·2	+0·3	+0·1	−0·3	0·2	0·03	2·2	35·9	38·8	18·3	93·0
,, ,,	119173	D.r., g.b., s.o.	+2·2	+0·9	+1·9	+1·7	+2·1	0·2	0·03	3·3	35·5	38·8	18·2	92·3
B. Bonniksen, Coventry	57329	S.r., g.b., s.o., "Karrusel" up and down indicator	+2·6	+2·7	+2·8	+3·9	+3·0	0·3	0·01	2·5	34·0	38·6	19·6	92·2
,, ,,	57308	S.r., g.b., s.o., "Karrusel"	+4·5	+4·4	+4·3	+4·1	+4·6	0·3	0·03	3·2	34·8	39·4	17·9	92·1
Patek, Philippe & Co., Geneva	119156	D.r., g.b., s.o.	+1·3	+1·6	+0·6	+2·2	+2·0	0·2	0·03	2·2	35·7	38·1	18·1	91·9
,, ,,	119171	D.r., g.b., s.o.	−0·5	−0·1	+0·4	+1·2	+1·3	0·2	0·03	2·5	36·2	37·5	18·1	91·8
Stauffer & Co., London	197987	D.r., g.b., s.o., "Karrusel"	−0·1	−0·0	−0·3	−0·4	+0·6	0·3	0·04	4·0	34·4	38·9	17·6	90·9
A. E. Fridlander, Coventry	25647	S.r., g.b., s.o., "Karrusel"	−0·9	+0·2	−0·0	−0·3	−0·1	0·2	0·06	4·2	35·5	38·8	16·1	90·4
R. Milne, Manchester	1389	S.r., g.b., s.o., "Karrusel"	+4·2	+2·3	+2·7	+3·0	+2·8	0·35	0·02	6·0	33·1	38·1	19·0	90·2
H. Golay, London	1586	S.r., g.b., s.o., "Karrusel"	−0·2	+0·2	−0·1	+1·0	+0·9	0·25	0·04	2·7	34·9	38·1	17·1	90·1
S. Smith & Son, London	188–258	S.r., g.b., s.o., "Karrusel"	−1·8	−1·5	−1·7	−0·2	−2·4	0·3	0·04	3·5	34·4	37·9	17·5	89·8
Carley & Clémence, Ltd., London	50857	S.r., g.b., d.o., "Karrusel"	+1·9	+2·4	+1·8	+2·8	+2·9	0·3	0·05	3·8	34·5	38·4	16·5	89·4
B. Bonniksen, Coventry	57202	S.r., g.b., s.o., "Karrusel"	+2·0	+2·2	+2·4	+2·4	+4·5	0·3	0·03	4·0	34·3	37·1	17·9	89·3
,, ,,	57196	S.r., g.b., s.o., "Karrusel"	−4·5	−3·7	−2·7	−2·9	−4·3	0·3	0·04	3·0	34·3	37·4	17·5	89·2
,, ,,	57310	S.r., g.b., s.o., "Karrusel"	−2·3	−2·8	−2·1	−1·2	−2·3	0·3	0·05	2·8	34·0	38·5	16·7	89·2
A. E. Fridlander, Coventry	25629	S.r.,g.b., s.o., "Karrusel" "non-magnetic"	+2·7	+1·4	+1·5	+1·4	+3·1	0·3	0·04	4·5	34·3	37·1	17·5	88·9
Newsome & Co., Coventry	130195	S.r., g.b., s.o., "Karrusel"	+1·0	+1·3	+2·1	+0·5	+1·1	0·35	0·04	4·2	33·0	38·4	17·3	88·7
S. Smith & Son, London	240–2	D.r., fusee, d.o., "Tourbillon" lever	+2·0	+0·9	+0·9	+1·6	+1·7	0·2	0·09	6·2	35·7	38·4	14·1	88·2
B. Bonniksen, Coventry	57203	S.r., g.b., s.o., "Karrusel"	−0·4	−0·3	+0·1	−1·5	+2·0	0·35	0·02	6·5	32·9	36·6	18·7	88·2
,, ,,	57206	S.r., g.b., s.o., "Karrusel"	−2·6	−2·4	−2·5	−0·4	−1·2	0·3	0·04	4·0	33·7	36·7	17·6	88·0
Patek, Philippe & Co., Geneva	116458	D.r., g.b., s.o.	−0·3	−0·4	−0·5	+0·8	+2·8	0·25	0·04	4·5	34·7	35·8	17·4	87·9
B. Bonniksen, Coventry	57228	S.r., g.b., s.o., "Karrusel"	+1·3	+1·2	+1·4	+1·2	+3·4	0·3	0·04	5·5	33·7	37·2	17·0	87·9
R. Milne, Manchester	1366	S.r., g.b., s.o., "Karrusel"	−1·2	−1·0	+0·2	+1·1	+1·3	0·35	0·02	4·2	33·0	36·2	18·7	87·9
Nicole, Nielsen & Co., London	11014	S.r., g.b., d.o., "Tourbillon"	+4·4	+3·0	+3·1	+2·1	+4·6	0·4	0·02	5·5	32·4	36·6	18·8	87·8
Patek, Philippe & Co., Geneva	114832	D.r., g.b., s.o.	−2·3	−1·8	−1·1	−0·0	−0·4	0·25	0·06	3·5	34·7	37·0	16·0	87·7
B. Bonniksen, Coventry	57226	S.r., g.b., s.o., "Karrusel"	+4·4	+4·5	+4·7	+5·6	+4·6	0·45	0·03	2·8	31·2	38·6	17·8	87·6
,, ,,	57225	S.r., g.b., s.o., "Karrusel"	−0·1	−0·2	−0·7	−0·8	+2·3	0·4	0·02	5·2	32·6	36·5	18·4	87·5

Table I—*continued.*

Watch deposited by	Number of watch.	Escapement, balance spring, &c.	Mean daily rate.					Mean variation of daily rate. ±	Mean change of rate for 1° F.	Difference between extreme gaining and losing rates.	Marks awarded for			Total Marks.
			Pendant up.	Pendant right.	Pendant left.	Dial up.	Dial down.				Daily variation of rate.	Change of rate with change of position.	Temperature compensation.	
											0—40	0—40	0—20	0—100.
			secs.	secs.	secs.	secs.	secs.	secs.	secs.	secs.				
S. Smith & Son, London	188–357	S.r., g.b., s.o., "Karrusel"	−2·5	−2·6	−2·1	+1·5	−0·8	0·25	0·03	4·7	34·7	34·7	18·0	87·4
Russell's, Ltd., Liverpool	88157	S.r., g.b., s.o.	+0·5	+0·6	+1·0	+1·5	+1·4	0·4	0·05	3·3	32·4	38·6	16·4	87·4
Patek, Philippe & Co., Geneva	119103	D.r., g.b., s.o.	−0·5	−0·2	−0·2	−0·0	−0·3	0·25	0·11	6·0	35·3	39·5	12·5	87·3
Newsome & Co., Coventry	147659	S.r., g.b., s.o.	−1·3	−2·3	−1·7	−1·2	−3·7	0·35	0·05	3·8	32·9	37·2	16·9	87·0
A. and N. C. S., Ltd., London	8871	S.r., g.b., s.o., "Karrusel"	+0·4	+0·7	+1·3	+1·6	+2·8	0·35	0·05	4·8	32·9	37·2	16·9	87·0
Usher & Cole, London	30983	S.r., fusee, s.o.	+0·6	−0·7	+0·8	−0·2	−0·5	0·3	0·07	5·0	34·0	37·7	15·2	86·9
B. Bonniksen, Coventry	57331	S.r., g.b., s.o., "Karrusel" up and down indicator	−0·7	−0·9	−1·4	−2·9	+1·6	0·4	0·02	5·5	32·4	35·8	18·7	86·9
W. E. Hurcomb, London	1679	S.r., g.b., s.o., "Karrusel"	+0·6	+0·5	+0·7	−0·1	−1·8	0·3	0·06	4·5	33·7	37·0	16·0	86·7
J. White & Son, Coventry	37474	S.r., g.b., s.o.	−0·2	−1·0	−3·6	−1·6	−2·1	0·3	0·05	6·7	33·7	36·3	16·5	86·5
B. Bonniksen, Coventry	57250	S.r., g.b., s.o., "Karrusel"	+3·3	+2·7	+3·2	+1·7	+4·0	0·4	0·05	6·5	32·3	37·5	16·6	86·4
W. Matthews, Coventry	40214	S.r., g.b., s.o.	−0·6	−3·5	−3·0	−0·7	−0·2	0·3	0·04	4·2	33·9	34·7	17·6	86·2
B. Bonniksen, Coventry	57307	S.r., g.b., s.o., "Karrusel"	+3·9	+3·7	+3·9	+5·5	+2·2	0·3	0·07	4·5	33·6	37·1	15·5	86·2
Barraud & Lunds, London	3 / 4743	D.r., fusee, s.o.	+2·1	+0·8	+1·6	+1·7	+3·0	0·35	0·07	6·3	33·2	37·7	15·1	86·0
Carley & Clémence, London	51527	S.r., g.b., d.o., "Karrusel"	−1·7	−1·2	−3·0	−2·2	−1·1	0·4	0·05	4·5	31·5	37·6	16·9	86·0
B. Bonniksen, Coventry	56957	S.r., g.b., s.o., "Karrusel"	−3·0	−3·3	−3·5	−3·5	−1·8	0·5	0·03	4·3	30·3	38·0	17·7	86·0
Waltham Watch Co., U.S.A.	8774959	D.r., g.b., s.o.	+3·8	+4·8	+5·3	+4·6	+4·1	0·4	0·07	5·2	32·3	38·2	15·4	85·9
W. Matthews, Coventry	40477	S.r., g.b., s.o., "Karrusel"	+0·1	−1·2	−1·0	+0·7	+1·5	0·35	0·05	4·5	33·0	36·4	16·4	85·8
Newsome & Co., Coventry	151018	S.r., g.b., s.o., "Karrusel"	−0·6	−1·2	−0·6	−1·7	−0·7	0·4	0·07	6·5	32·1	38·4	15·3	85·8
B. Bonniksen, Coventry	57333	S.r., g.b., s.o., "Karrusel" up and down indicator	+0·2	−1·0	+0·1	+1·8	−1·7	0·4	0·03	4·7	31·6	36·1	18·0	85·7
B. Bonniksen, Coventry	57309	S.r., g.b., s.o., "Karrusel"	+1·0	+0·7	+1·0	+1·6	+4·4	0·4	0·03	6·5	31·6	35·8	18·3	85·7
Chas. Frodsham & Co., London	08922	D.r., g.b., d.o., "Tourbillon" minute repeater—minute and split seconds—chronograph	−0·1	+0·7	+0·4	−0·6	+3·5	0·3	0·06	7·5	34·1	35·6	15·9	85·6
B. Bonniksen, Coventry	57004	S.r., g.b., s.o., "Karrusel"	+2·7	+3·0	+3·9	+5·4	+5·1	0·4	0·03	4·8	31·9	36·0	17·7	85·6
W. Richardson, Coventry	1592	S.r., g.b., s.o., "Karrusel"	+0·8	+1·1	+1·2	+1·3	+1·2	0·45	0·07	4·7	31·2	39·4	15·0	85·6

s.r. = single roller; d.r. = double roller.
s.o. = ,, overcoil; d.o. = ,, overcoil.

APPENDIX IV.—Table II.

Highest Marks obtained by Complicated Watches during the year.

Description of watch.	Number.	Deposited by	Marks awarded for			Total marks.
			Variation.	Position.	Temperature.	
			0—40	0—40	0—20	0—100.
Minute and split seconds chronograph, minute repeater, and Tourbillon	08922	Chas. Frodsham & Co., London	34·1	35·6	15·9	85·6
" " "	306-3	S. Smith and Son, London	31·6	37·2	16·1	84·9
" " "	08845	Chas. Frodsham & Co., London	32·7	33·9	15·1	81·7
Minute and split seconds chronograph	2547	H. Golay, London	35·8	38·2	19·2	93·2
" " "	200346	Stauffer and Co., London	30·3	34·4	15·5	80·2
" " "	187883	" " "	30·3	32·4	16·1	78·8
Minute and seconds chronograph	36935	W. Matthews, Coventry	26·5	37·5	18·0	~~80·2~~ 82·0
" " " (non-magnetic)	1530–1 82512	S. Smith and Son, London	25·9	35·8	18·8	80·5
" " "	124777	Newsome & Co., Coventry	28·2	34·2	17·9	80·3
Minute repeater	11137	Nicole, Nielsen & Co., London	31·7	35·3	11·5	78·5
" "	52811	E. Dent and Co., London	24·1	36·4	9·2	70·1
"Non-magnetic"	25629	A. E. Fridlander, Coventry	34·3	37·1	17·5	88·9
"	57037	B. Bonniksen, Coventry	29·3	32·0	18·1	79·4
"	235–479 15405	S. Smith & Son, London	24·3	33·9	19·3	77·5

APPENDIX V.

MAGNETIC OBSERVATIONS, 1903, FALMOUTH OBSERVATORY.

Latitude 50° 9′ 0″ N., Longitude 5° 4′ 35″ W., Height, 167 feet above mean sea level.

The Tables showing the magnetic diurnal inequalities at Falmouth in 1903, which appeared in last year's Report, were confined to Declination and Horizontal Force. The Vertical Force Curves for 1903 have now been measured, and the results appear in the following Tables I and II. A temperature correction has been applied. From the hourly means of Vertical Force in Table I, and the corresponding Horizontal Force data, given in last year's Report, hourly values have been calculated for the Inclination. These, and the corresponding diurnal inequalities, appear in Tables III and IV.

The results refer to the "quiet" days selected by the Astronomer Royal for 1903, specified in last year's Report. The time in all cases is Greenwich Mean Time, which is 20 minutes 18 seconds earlier than local time.

The mean values for the year, as deduced from the Photographic Curves, are as follows:—

Vertical Force, 0·43405 C.G.S.; Inclination, 66° 37′·6.

EDWARD KITTO,
Superintendent.

APPENDIX V.—Table I.—Hourly Means of the Vertical Force at Five selected Quiet Days in each Month

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
0·43000 + (C.G.S. units). Winter.													
1903.													
January	445	445	446	446	446	447	448	449	448	448	448	448	448
February	415	414	415	416	417	417	416	415	415	415	413	410	410
March	431	432	433	434	435	435	434	432	432	429	424	417	416
October	392	393	394	396	397	396	395	395	396	394	388	377	377
November ...	376	377	378	378	378	378	378	377	378	378	376	371	370
December	353	352	353	353	354	355	358	358	358	357	355	353	354
Means	402	402	403	404	405	405	405	404	404	403	401	396	396
Summer.													
1903.													
April	416	416	417	417	417	416	416	417	416	414	408	405	401
May	431	432	432	432	433	434	433	432	430	423	415	410	408
June	433	434	435	435	436	438	438	436	435	432	425	421	418
July	411	411	411	410	410	411	410	409	407	405	403	397	397
August	381	380	381	380	380	382	382	383	382	383	380	379	380
September ...	379	378	379	378	379	379	380	381	381	377	369	363	360
Means	408	408	409	409	409	410	410	410	409	406	400	396	394

Table II.—Diurnal Inequality of the Falmouth

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
Summer Means.													
	+ ·00001	+ ·00001	+ ·00002	+ ·00002	+ ·00002	+ ·00003	+ ·00003	+ ·00002	+ ·00001	− ·00002	− ·00007	− ·00011	− ·00013
Winter Means.													
	− ·00002	− ·00001	·00000	·00000	+ ·00001	+ ·00001	+ ·00001	+ ·00001	+ ·00001	·00000	− ·00003	− ·00008	− ·00008
Annual Means.													
	·00000	·00000	+ ·00001	+ ·00001	+ ·00002	+ ·00002	+ ·00002	+ ·00002	+ ·00001	− ·00001	− ·00005	− ·00009	− ·00010

NOTE.—When the sign is + the

Falmouth Observatory, determined from the Magnetograph Curves on during 1903. (Mean for the year = 0·43405.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10	11.	Mid.
Winter.											
448	451	455	455	455	454	455	454	454	453	453	453
411	414	418	420	421	420	418	416	415	414	413	413
419	426	430	433	434	433	432	430	429	428	429	429
380	386	393	395	397	395	394	391	390	388	388	388
372	375	378	378	379	378	378	378	378	377	378	376
356	358	361	365	368	366	364	363	362	361	358	358
398	402	406	408	409	408	407	405	405	403	403	403
Summer.											
402	406	412	415	417	418	418	417	416	416	417	417
413	421	428	432	433	433	432	430	429	428	429	430
423	431	436	438	441	441	441	438	437	437	436	437
400	404	408	411	414	414	415	413	413	411	411	410
381	384	388	390	392	393	392	393	394	394	395	395
362	366	372	374	375	374	374	374	374	373	373	373
397	402	407	410	412	412	412	411	410	410	410	410

Vertical Force as deduced from Table I.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Summer Means.											
−·00010	−·00005	·00000	+·00003	+·00005	+·00005	+·00005	+·00004	+·00003	+·00003	+·00003	+·00003
Winter Means.											
−·00006	−·00002	+·00002	+·00004	+·00005	+·00004	+·00003	+·00002	+·00001	·00000	·00000	−·00001
Annual Means.											
−·00008	−·00003	+·00001	+·00003	+·00005	+·00005	+·00004	+·00003	+·00002	+·00001	+·00001	+·00001

reading is above the mean.

Table III.—Hourly Means of Inclination at Falmouth
(Mean Value for the

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
	(66° +		)			Winter.							
1903.	′	′	′	′	′	′	′	′	′	′	′	′	′
January	38·8	38·8	38·8	38·8	38·8	38·8	38·6	38·7	38·8	39·0	39·4	39·6	39·6
February	37·8	37·7	37·7	37·7	37·7	37·6	37·5	37·4	37·4	37·9	38·2	38·4	38·4
March	37·9	38·0	37·9	38·0	37·9	37·9	37·8	37·8	37·9	38·4	38·7	38·6	38·6
October.....	37·6	37·7	37·8	37·7	37·7	37·7	37·5	37·5	37·7	38·3	38·6	38·6	38·4
November....	37·6	37·7	37·8	37·7	37·6	37·6	37·3	37·5	37·7	38·2	38·7	38·9	38·7
December....	36·5	36·5	36·5	36·4	36·5	36·4	36·4	36·4	36·4	36·8	37·1	37·1	36·9
Means	37·7	37·7	37·7	37·7	37·7	37·7	37·5	37·5	37·6	38·1	38·4	38·5	38·4
						Summer.							
1903.	′	′	′	′	′	′	′	′	′	′	′	′	′
April.....	37·3	37·5	37·5	37·5	37·5	37·4	37·3	37·3	37·7	38·1	38·7	39·1	39·0
May	38·0	38·0	38·0	38·1	38·2	38·4	38·5	38·8	39·1	39·3	39·1	38·8	38·5
June	37·5	37·5	37·5	37·6	37·7	37·8	38·1	38·4	38·9	39·1	38·8	38·6	38·2
July	36·7	36·8	36·8	36·8	37·0	37·0	37·3	37·8	38·1	38·3	38·3	38·0	37·6
August	36·1	36·3	36·3	36·3	36·4	36·5	36·8	37·2	37·6	38·0	37·9	37·7	37·2
September ..	36·5	36·6	36·9	36·9	36·9	36·9	37·1	37·4	37·9	38·2	38·2	37·8	37·1
Means	37·0	37·1	37·2	37·2	37·3	37·3	37·5	37·8	38·2	38·5	38·5	38·3	37·9

Table IV.—Diurnal Inequality of the Falmouth

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
						Summer Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·4	−0·3	−0·2	−0·2	−0·1	0·0	+0·1	+0·4	+0·8	+1·1	+1·1	+1·0	+0·6
						Winter Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·1	−0·1	−0·1	−0·1	−0·1	−0·2	−0·3	−0·3	−0·2	+0·3	+0·6	+0·7	+0·6
						Annual Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·2	−0·2	−0·1	−0·1	−0·1	−0·1	−0·1	+0·1	+0·3	+0·7	+0·9	+0·8	+0·6

NOTE.—When the sign is +

Observatory, calculated from the Horizontal and Vertical Forces. year = 66° 37′·6.)

1	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
					Winter.						
′	′	′	′	′	′	′	′	′	′	′	′
39·2	39·0	39·0	38·8	38·8	38·8	38·9	38·9	38·9	39·0	39·0	39·0
38·3	37·9	37·9	37·9	37·9	37·7	37·5	37·5	37·4	37·5	37·6	37·5
38·3	38·3	38·1	38·1	38·0	37·9	37·8	37·6	37·6	37·5	37·6	37·6
38·1	37·9	38·0	38·0	37·8	37·6	37·5	37·4	37·2	37·2	37·0	37·2
38·3	38·2	38·1	38·0	37·9	37·7	37·6	37·5	37·5	37·4	37·4	37·4
36·9	36·7	36·9	36·8	36·8	36·6	36·6	36·5	36·6	36·5	36·4	36·4
38·2	38·0	38·0	37·9	37·9	37·7	37·6	37·6	37·5	37·5	37·5	37·5
					Summer.						
′	′	′	′	′	′	′	′	′	′	′	′
38·6	38·1	37·7	37·6	37·3	37·2	37·2	37·3	37·3	37·3	37·2	37·2
38·3	38·3	38·1	37·9	37·8	37·5	37·4	37·4	37·4	37·5	37·7	37·8
38·0	37·8	37·6	37·3	37·3	37·2	37·1	37·0	37·0	37·1	37·1	37·3
37·1	36·8	36·6	36·6	36·5	36·5	36·4	36·3	36·5	36·5	36·5	36·3
36·8	36·6	36·6	36·6	36·6	36·5	36·2	36·1	36·1	36·2	36·3	36·3
36·8	36·7	36·8	36·9	36·7	36·4	36·2	36·3	36·3	36·3	36·3	36·3
37·6	37·4	37·2	37·1	37·0	36·9	36·8	36·7	36·8	36·8	36·9	36·9

Inclination as deduced from Table III.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
					Summer Means.						
′	′	′	′	′	′	′	′	′	′	′	′
+0·2	0·0	−0·1	−0·2	−0·3	−0·5	−0·6	−0·6	−0·6	−0·6	−0·5	−0·5
					Winter Means.						
′	′	′	′	′	′	′	′	′	′	′	′
+0·4	+0·2	+0·2	+0·1	0·0	−0·1	−0·2	−0·3	−0·3	−0·3	−0·3	−0·3
					Annual Means.						
′	′	′	′	′	′	′	′	′	′	′	′
+0·3	+0·1	0·0	−0·1	−0·2	−0·3	−0·4	−0·5	−0·5	−0·4	−0·4	−0·4

the reading is above the mean.

APPENDIX VI.

MAGNETIC OBSERVATIONS, 1904, FALMOUTH OBSERVATORY.

Latitude, 50° 9′ 0″ N.; Longitude, 5° 4′ 35″ W.; Height, 167 feet above mean sea level.

MAGNETICAL DEPARTMENT.

Photographic curves of magnetic Declination and of Horizontal and Vertical Force variations have been regularly taken during the year.

The scale values of the instruments were determined on 7th January, 1904. The following values of the ordinates of the photographic curves were then found:—

Declination, 1 cm. = 0° 11′·7.
Bifilar, 1 cm. δ H. = 0·00052 C.G.S. unit.
Balance, 1 cm. δ V. = 0·00060 C.G.S. unit.

The sensibility of the Vertical Force Magnet was increased and a second series of deflections made, the result being

Balance, 1 cm. δ V. = 0·00050 C.G.S. unit.

Deflections of the Vertical Force Magnet were again made on July 15, when the scale value was found to remain true at

1 cm. δ V. = 0·00050 C.G.S. unit.

The principal variations of the Magnetic Curves that were recorded took place on the following dates:—January 28; February 5; April 1, 2; May 13, 28; June 15, 16; July 6; August 3; September 25; October 21.

Observations with the Absolute Instruments have been made about four times a month, of which the following is a summary:—

Determinations of	Horizontal Intensity,	46.
,,	Inclination,	46.
,,	Declination,	46.

The mean values of the Magnetic Elements for the year 1904 are as follows:—

Declination, 18° 12′·0 W.; Horizontal Force, 0·18759 C.G.S.; Vertical Force, 0·43414 C.G.S.; Inclination, 66° 37′·8 N.

The results in the following Tables are deduced from the Magnetograph Curves which have been standardized by the absolute observations.

These were made with the Collimator Magnet 66A and the Declination Magnet 66C in the Unifilar Magnetometer No. 66, by Elliott Brothers, of London, and with the Inclinometer No. 86 by Dover, of Charlton, Kent, employing needles 1 and 2, which are 3½ inches in length.

The effects of temperature on the Horizontal Force Curves are very small and have been neglected, but a temperature correction has been determined and applied to the Vertical Force Curves.

The Tables are prepared in accordance with the suggestions made in the Fifth Report of the Committee of the British Association on comparing and reducing magnetic observations. The time given is Greenwich Mean Time, which is 20 minutes 18 seconds earlier than local time.

The results are derived from the "quiet" days selected by the Astronomer Royal, mentioned on p. 13 above.

EDWARD KITTO,
Superintendent and Magnetical Observer.

APPENDIX VI.—Table I.—Hourly Means of Declination at on Five selected Quiet Days

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
	(18° + West.)				Winter.								
	′	′	′	′	′	′	′	′	′	′	′	′	′
January	14·5	15·0	15·0	15·1	14·8	14·6	15·0	14·9	14·7	14·7	16·1	16·4	17·3
February	13·1	13·1	13·6	13·9	13·7	13·8	13·4	13·3	13·2	13·1	14·0	14·7	16·9
March	13·1	13·1	13·4	13·2	12·9	13·0	12·6	12·0	10·4	9·9	10·7	13·3	17·0
October.....	7·9	7·8	7·9	7·9	8·0	7·9	7·4	7·1	6·0	5·6	6·8	9·4	12·1
November....	8·6	8·9	9·0	9·4	9·4	9·2	8·7	8·5	8·2	7·7	8·5	9·9	11·5
December....	7·6	7·9	8·2	8·3	8·4	8·5	8·0	7·6	7·3	7·5	8·0	9·2	10·1
Means	10·8	11·0	11·2	11·3	11·2	11·2	10·9	10·6	10·0	9·8	10·7	12·2	14·2
					Summer.								
	′	′	′	′	′	′	′	′	′	′	′	′	′
April.....	13·4	13·3	12·7	12·8	12·8	12·6	12·1	11·2	9·6	9·4	10·8	13·6	16·6
May	14·3	14·0	13·8	13·5	13·2	12·1	10·9	9·8	9·8	10·8	12·8	16·3	18·9
June	13·1	12·4	11·9	12·1	11·4	10·0	8·0	7·8	7·7	9·0	11·1	13·4	16·4
July	10·7	10·7	10·3	10·0	9·8	8·8	7·3	6·7	6·2	7·1	9·0	11·6	14·6
August	9·7	9·6	9·3	8·9	8·7	7·7	6·6	5·7	5·4	6·7	9·6	12·4	15·0
September....	9·7	9·3	9·2	9·5	9·4	9·0	8·8	7·7	6·8	7·4	9·2	11·9	14·7
Means	11·8	11·6	11·2	11·1	10·9	10·0	9·0	8·2	7·6	8·4	10·4	13·2	16·0

Table II.—Diurnal Inequality of the Falmouth

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
	Summer Means.												
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·4	−0·6	−1·0	−1·1	−1·3	−2·2	−3·2	−4·0	−4·6	−3·8	−1·8	+1·0	+3·8
	Winter Means.												
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·9	−0·7	−0·5	−0·4	−0·5	−0·5	−0·8	−1·1	−1·7	−1·9	−1·0	+0·5	+2·5
	Annual Means.												
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·7	−0·7	−0·8	−0·8	−0·9	−1·3	−2·0	−2·6	−3·2	−2·9	−1·4	+0·8	+3·1

NOTE.—When the sign is + the magnet

Falmouth Observatory, determined from the Magnetograph Curves in each Month 1904.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Winter.											
′	′	′	′	′	′	′	′	′	′	′	′
18·2	18·0	16·8	15·9	15·7	15·6	15·0	14·9	14·8	14·7	14·6	15·0
17·8	17·6	16·8	15·7	14·8	14·4	13·8	13·8	13·5	12·9	12·5	12·6
19·2	19·4	17·8	15·6	14·0	13·4	13·6	13·5	13·4	13·5	13·4	13·5
13·1	13·0	12·1	10·8	9·4	8·9	8·3	8·1	7·3	7·3	7·5	7·5
12·0	11·7	10·7	10·1	9·8	9·1	8·7	8·6	8·2	8·1	8·2	8·7
11·2	11·0	10·1	9·7	9·4	8·6	8·3	8·1	7·9	7·9	8·0	8·3
15·3	15·1	14·1	13·0	12·2	11·7	11·3	11·2	10·9	10·7	10·7	10·9
Summer.											
′	′	′	′	′	′	′	′	′	′	′	′
18·8	19·1	17·9	16·1	14·8	14·0	13·8	13·5	13·5	13·6	13·3	13·2
19·9	19·5	18·6	16·9	15·8	15·0	14·6	14·7	14·6	14·8	14·6	14·5
18·0	18·3	17·4	15·8	14·5	13·7	13·3	13·2	13·6	13·5	13·4	13·3
15·9	16·1	15·2	14·1	12·4	11·4	11·2	11·1	11·0	11·0	10·9	10·8
16·2	16·5	15·1	12·8	11·2	10·2	9·9	10·1	9·7	9·5	9·6	9·6
16·1	16·0	14·6	13·1	11·8	11·1	11·0	10·5	10·5	10·1	9·9	9·9
17·5	17·6	16·5	14·8	13·4	12·6	12·3	12·2	12·2	12·1	12·0	11·9

Declination as deduced from Table I.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Summer Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+5·3	+5·4	+4·3	+2·6	+1·2	+0·4	+0·1	0·0	0·0	−0·1	−0·2	−0·3
Winter Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+3·6	+3·4	+2·4	+1·3	+0·5	0·0	−0·4	−0·5	−0·8	−1·0	−1·0	−0·8
Annual Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+4·5	+4·4	+3·4	+2·0	+0·9	+0·2	−0·2	−0·3	−0·4	−0·6	−0·6	−0·6

points to the West of its mean position.

Table III.—Hourly Means of the Horizontal Force at Falmouth
Five selected Quiet Days

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
0·18000 + (C.G.S. units).					Winter.								
1904.													
January.....	756	758	759	758	760	761	761	761	760	755	751	749	756
February	765	763	762	761	762	765	767	767	765	760	756	752	757
March.....	771	770	770	770	770	771	773	773	769	760	753	750	756
October	753	752	751	751	752	752	752	750	745	735	728	729	732
November ...	749	748	749	749	752	755	755	752	750	746	739	736	737
December	751	752	753	753	756	756	757	757	754	751	747	744	745
Means.....	758	757	757	757	759	760	761	760	757	751	746	743	747
Summer.													
1904.													
April.....	772	772	771	769	769	769	770	768	765	756	745	743	743
May	773	773	773	774	772	772	768	763	758	753	746	749	752
June	767	766	762	762	760	761	756	750	743	737	736	738	743
July	757	757	757	755	754	753	749	745	740	734	732	736	740
August.....	768	768	766	765	764	764	759	753	744	737	736	740	747
September....	763	761	758	759	759	761	761	759	753	744	738	737	739
Means.....	767	766	765	764	763	763	761	756	751	744	739	741	744

Table IV.—Diurnal Inequality of the Falmouth

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
Summer Means.													
	+ ·00006	+ ·00005	+ ·00004	+ ·00003	+ ·00002	+ ·00002	·00000	− ·00005	− ·00010	− ·00017	− ·00022	− ·00020	− ·00017
Winter Means.													
	+ ·00001	·00000	·00000	·00000	+ ·00002	+ ·00003	+ ·00004	+ ·00003	·00000	− ·00006	− ·00011	− ·00014	− ·00010
Annual Means.													
	+ ·00003	+ ·00003	+ ·00002	+ ·00002	+ ·00002	+ ·00003	+ ·00002	− ·00001	− ·00005	− ·00012	− ·00017	− ·00017	− ·00013

NOTE.—When the sign is + the

Observatory, determined from the Magnetograph Curves on in each Month, 1904.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Winter.											
761	765	765	765	765	764	763	763	762	762	762	762
758	762	764	763	762	766	767	768	767	767	769	771
763	766	771	772	774	772	774	774	773	773	774	774
736	742	743	741	743	747	751	752	752	752	754	753
742	744	743	746	751	753	754	754	754	753	751	751
750	756	756	755	757	758	760	760	758	758	756	754
751	756	757	757	759	760	761	762	761	761	761	761
Summer.											
750	762	768	773	776	779	779	778	778	778	776	778
757	767	772	775	779	780	782	783	782	782	779	779
752	759	763	767	770	772	774	774	775	774	772	770
744	750	755	757	759	761	765	767	766	763	761	760
760	771	772	773	769	769	771	774	774	771	769	768
746	751	754	758	761	765	766	767	768	768	768	766
752	760	764	767	769	771	773	774	774	773	771	770

Horizontal Force as deduced from Table III.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Summer Means.											
− ·00009	− ·00001	+ ·00003	+ ·00006	+ ·00008	+ ·00010	+ ·00012	+ ·00013	+ ·00013	+ ·00012	+ ·00010	+ ·00009
Winter Means.											
− ·00006	− ·00001	·00000	·00000	+ ·00002	+ ·00003	+ ·00004	+ ·00005	+ ·00004	+ ·00004	+ ·00004	+ ·00004
Annual Means.											
− ·00007	− ·00001	+ ·00001	+ ·00003	+ ·00005	+ ·00006	+ ·00008	+ ·00009	+ ·00008	+ ·00008	+ ·00007	+ ·00006

reading is above the mean.

Table V.—Hourly Means of the Vertical Force at Falmouth
Five selected Quiet Days in

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
0·43000 + (C.G.S. units).						Winter.							
1904.													
January	431	431	430	430	430	431	431	431	430	428	428	429	428
February	423	422	422	423	422	421	421	421	421	422	411	420	420
March	425	425	425	425	425	425	425	424	426	424	420	413	408
October	395	395	396	396	397	397	397	398	399	397	393	386	384
November ..	395	395	395	396	397	396	396	395	394	393	390	385	386
December	389	390	391	391	391	391	390	390	387	385	384	383	384
Means	410	410	410	410	410	410	410	410	409	408	404	403	402
						Summer.							
1904.													
April	445	445	445	445	446	447	447	447	447	444	444	433	429
May	432	432	432	433	433	434	434	433	431	427	422	415	415
June	425	424	424	423	424	424	425	425	424	421	417	412	409
July	421	420	420	420	420	421	422	420	419	417	411	406	403
August	406	407	407	408	409	409	410	409	407	402	393	387	386
September....	389	389	390	390	391	391	392	392	391	387	382	377	372
Means	420	420	420	420	420	421	422	421	420	416	411	405	402

Table VI.—Diurnal Inequality of the Falmouth

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
						Summer Means.							
	+ ·00002	+ ·00001	+ ·00002	+ ·00002	+ ·00002	+ ·00003	+ ·00004	+ ·00003	+ ·00002	− ·00002	− ·00007	− ·00013	− ·00016
						Winter Means.							
	+ ·00001	+ ·00001	+ ·00001	+ ·00001	+ ·00001	+ ·00001	+ ·00001	·00000	− ·00001	− ·00005	− ·00006	− ·00007	
						Annual Means.							
	+ ·00001	+ ·00001	+ ·00001	+ ·00001	+ ·00002	+ ·00002	+ ·00002	+ ·00001	− ·00001	− ·00006	− ·00010	− ·00012	

Observatory, determined from the Magnetograph Curves on each Month during 1904.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Winter.											
428	431	433	433	432	430	429	427	427	427	426	426
421	423	426	428	428	427	427	425	424	425	424	422
411	416	422	426	428	427	426	425	423	423	424	424
388	392	399	402	405	405	404	405	403	403	403	403
388	393	396	397	398	395	394	392	391	391	390	391
385	388	391	392	393	393	390	389	387	386	386	386
404	407	411	413	414	413	412	411	409	409	409	409
Summer.											
431	437	442	446	451	451	454	454	453	452	454	453
418	423	428	431	434	435	436	436	435	434	433	433
413	417	420	422	426	428	428	427	427	426	426	426
406	410	417	421	424	424	425	425	424	423	423	423
392	406	407	411	413	412	409	406	406	403	402	403
374	379	386	391	393	393	392	393	391	391	389	389
406	412	417	420	423	424	424	423	423	422	421	421

Vertical Force as deduced from Table V.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11	Mid.
Summer Means.											
− ·00012	− ·00006	− ·00001	+ ·00002	+ ·00005	+ ·00006	+ ·00006	+ ·00005	+ ·00005	+ ·00003	+ ·00003	+ ·00003
Winter Means.											
− ·00005	− ·00002	+ ·00002	+ ·00004	+ ·00005	+ ·00004	+ ·00003	+ ·00002	·00000	·00000	00000	·00000
Annual Means.											
− ·00009	− ·00004	·00000	+ ·00003	+ ·00005	+ ·00005	+ ·00004	+ ·00001	+ ·00002	+ ·00002	+ ·00001	+ ·00001

Table VII.—Hourly Means of Inclination at Falmouth

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon.
	(66° +)					Winter.							
1904.	′	′	′	′	′	′	′	′	′	′	′	′	′
January	38·6	38·4	38·3	38·4	38·3	38·2	38·2	38·2	38·3	38·5	38·8	39·0	38·5
February.....	37·7	37·8	37·9	38·0	37·9	37·7	37·5	37·5	37·7	38·0	38·3	38·5	38·2
March	37·4	37·4	37·4	37·4	37·4	37·4	37·2	37·2	37·5	38·1	38·4	38·4	37·9
October.....	37·7	37·8	37·9	37·9	37·8	37·8	37·8	38·0	38·4	39·0	39·3	39·1	38·8
November....	38·0	38·0	38·0	38·0	37·8	37·6	37·6	37·8	37·9	38·1	38·5	38·6	38·5
December....	37·7	37·6	37·6	37·6	37·4	37·4	37·3	37·3	37·4	37·6	37·8	38·0	37·9
Means....	37·8	37·8	37·8	37·9	37·8	37·7	37·6	37·7	37·9	38·2	38·5	38·6	38·3
						Summer.							
1904.	′	′	′	′	′	′	′	′	′	′	′	′	′
April.....	37·9	37·9	38·0	38·1	38·1	38·1	38·1	38·2	38·4	38·9	39·7	39·5	39·4
May	37·4	37·4	37·4	37·4	37·5	37·6	37·8	38·1	38·4	38·6	39·0	38·6	38·4
June	37·6	37·7	37·9	37·9	38·1	38·0	38·4	38·8	39·2	39·5	39·5	39·2	38·8
July	38·2	38·2	38·2	38·3	38·4	38·5	38·8	39·0	39·3	39·6	39·6	39·2	38·8
August	37·0	37·1	37·2	37·3	37·4	37·4	37·7	38·1	38·7	39·0	38·8	38·4	37·9
September ...	36·9	37·0	37·2	37·2	37·2	37·1	37·1	37·2	37·6	38·1	38·3	38·3	38·0
Means....	37·5	37·5	37·6	37·7	37·8	37·8	38·0	38·2	38·6	38·9	39·2	38·9	38·5

Table VIII.—Diurnal Inequality of the Falmouth

Hours	Mid.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Noon
						Summer Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·3	−0·3	−0·2	−0·1	0·0	0·0	+0·2	+0·4	+0·8	+1·1	+1·3	+1·0	+0·7
						Winter Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	0·0	0·0	0·0	0·0	−0·1	−0·2	−0·3	−0·2	0·0	+0·3	+0·6	+0·7	+0·4
						Annual Means.							
	′	′	′	′	′	′	′	′	′	′	′	′	′
	−0·2	−0·2	−0·1	−0·1	−0·1	−0·1	−0·1	+0·1	+0·4	+0·7	+1·0	+0·9	+0·6

Observatory, calculated from Tables III and V.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Winter.											
′	′	′	′	′	′	′	′	′	′	′	′
38·1	38·0	38·0	38·0	38·0	38·0	38·0	38·0	38·0	38·0	38·0	38·0
38·1	37·9	37·9	38·0	38·1	37·8	37·7	37·6	37·6	37·6	37·5	37·3
37·5	37·5	37·3	37·3	37·3	37·4	37·2	37·2	37·2	37·2	37·2	37·2
38·6	38·4	38·5	38·7	38·7	38·4	38·1	38·1	38·0	38·0	37·9	37·9
38·2	38·3	38·4	38·2	37·9	37·7	37·6	37·6	37·5	37·6	37·7	37·7
37·6	37·3	37·4	37·5	37·4	37·3	37·1	37·1	37·2	37·1	37·3	37·4
38·0	37·9	37·9	37·8	37·9	37·3	37·6	37·6	37·6	37·6	37·6	37·6
Summer.											
′	′	′	′	′	′	′	′	′	′	′	′
39·0	38·3	38·1	37·9	37·8	37·6	37·7	37·7	37·7	37·7	37·9	37·7
38·1	37·6	37·4	37·3	37·1	37·1	37·0	36·9	36·9	36·9	37·1	37·1
38·3	37·9	37·8	37·6	37·5	37·4	37·3	37·2	37·2	37·2	37·3	37·5
38·6	38·3	38·2	38·2	38·1	38·0	37·8	37·6	37·7	37·9	38·0	38·1
37·2	36·8	36·8	36·8	37·2	37·1	36·9	36·6	36·6	36·7	36·8	36·9
37·6	37·4	37·4	37·3	37·1	36·9	36·8	36·7	36·6	36·6	36·5	36·7
38·1	37·7	37·6	37·5	37·5	37·3	37·2	37·1	37·1	37·2	37·3	37·3

Inclination, as deduced from Table VII.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Mid.
Summer Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+0·3	−0·1	−0·2	−0·3	−0·4	−0·5	−0·6	−0·7	−0·7	−0·7	−0·6	−0·5
Winter Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+0·1	0·0	0·0	−0·1	0·0	−0·1	−0·2	−0·3	−0·3	−0·3	−0·3	−0·3
Annual Means.											
′	′	′	′	′	′	′	′	′	′	′	′
+0·2	0·0	−0·1	−0·2	−0·2	−0·3	−0·4	−0·5	−0·5	−0·5	−0·4	−0·4

APPENDIX VII.

MAGNETIC OBSERVATIONS MADE AT THE VALENCIA OBSERVATORY, CAHIRCIVEEN, 1904.

Latitude, 51° 56′ N. Longitude, 10° 15′ W.

No change has been made in the time or method of observing since last year, single sets of observations being taken as near the 1st and 15th of each month as was possible. The mean time of Declination is 10 a.m.; Force, noon; and Dip, 1 p.m.

The secular change is, Declination −3′·5; Inclination −1′·5; Horizontal Force +·00007 C.G.S. units.

J. E. CULLUM,
Observer and Superintendent.

APPENDIX VII.—Table I.—Declination at Valencia Observatory, 1904.
(Dover Unifilar 139.)

Date.	Declination, West.	Monthly Mean.	Remarks.
	° ′	° ′	
January 1 ..	21 23·3	—	
,, 15 ..	21 21·9	21 22·6	
February 1 ..	21 26·5	—	
,, 15 ..	21 19·5	—	
,, 16 ..	21 18·0	21 21·3	
March 1 ..	21 16·1	—	
,, 15 ..	21 14·8	21 15·5	
April 1 ..	21 24·8	—	
,, 16 ..	21 9·9	21 17·4	
May 1 ..	21 13·8	—	
,, 11 ..	21 14·5	21 14·2	
June 1 ..	21 13·9	—	
,, 15 ..	21 13·0	21 13·5	
July 1 ..	21 11·8	—	
,, 15 ..	21 13·0	21 12·4	
August 1 ..	21 12·7	—	
,, 2 ..	21 11·1	—	
,, 15 ..	21 14·1	21 12·6	
September 1 ..	21 12·5	—	
,, 15 ..	21 11·8	21 12·2	
October 1 ..	21 11·5	—	
,, 15 ..	21 11·9	21 11·7	
November 1 ..	21 14·1	—	
,, 15 ..	21 12·9	21 13·5	
December 2 ..	21 11·8	—	
,, 16 ..	21 19·8	21 15·8	
Mean ..	at 10 a.m., G.M.T.	21 15·2	

Table II.—Inclination at Valencia Observatory, 1904.
(Dover Circle 118.)

Date.	Mean of two needles.	Monthly mean.	Remarks.
	° ′	° ′	
January 1 ..	68 24·1	—	
„ 15 ..	68 21·7	68 22·9	
February 1 ..	68 22·9	—	
„ 16 ..	68 21·1	68 22·0	
March 1 ..	68 21·9	—	
„ 15 ..	68 21·7	68 21·8	
April 1 ..	68 23·8	—	
„ 16 ..	68 21·8	68 22·8	
May 1 ..	68 20·8	—	
„ 11 ..	68 20·2	68 20·5	
June 1 ..	68 21·6	—	
„ 15 ..	68 19·4	68 20·5	
July 1 ..	68 18·7	—	
„ 15 ..	68 18·6	68 18·7	
August 2 ..	68 20·9	—	
„ 15 ..	68 17·4	68 19·2	
September 1 ..	68 21·0	—	
„ 15 ..	68 21·3	68 21·2	
October 1 ..	68 18·8	—	
„ 15 ..	68 21·2	68 20·0	
November 1 ..	68 20·6	—	
„ 15 ..	68 20·7	68 20·7	
December 2 ..	68 20·8	—	
„ 16 ..	68 19·2	68 20·0	
Mean ..	at 1 p.m., G.M.T.	68 20·9	

Table III.—Magnetic Force (C.G.S.) at Valencia Observatory, 1904.
(Dover Unifilar 139, and Circle 118.)

Date.	H.F.	Mean.	V.F. (H.F. × Tan Dip).	T.F. (H.F. × Sec Dip).
January 1	0·17837	—	—	—
,, 15	0·17876	0·17857	0·45059	0·48469
February 1	0 17860	—	—	—
,, 16	0·17846	0·17853	0·45015	0·48426
March 1	0·17848	—	—	—
,, 15	0·17848	0·17848	0·44996	0·48406
April 1	0·17780	—	—	—
,, 16	0·17823	0·17802	0·44917	0·48317
May 1	0·17815	—	—	—
,, 11	0·17852	0·17834	0·44911	0·48321
June 1	0·17836	—	—	—
,, 15	0·17834	0·17835	0·44913	0·48324
July 1	0·17850	—	—	—
,, 15	0·17844	0·17847	0·44879	0·48293
August 2	0·17822	—	—	—
,, 15	0·17847	0·17835	0·44862	0·48277
September 1	0·17819	—	—	—
,, 15	0·17832	0·17826	0·44916	0·48324
October 1	0·17823	—	—	—
,, 15	0·17840	0·17834	0·44891	0·48304
November 1	0·17835	—	—	—
,, 15	0·17862	0·17849	0·44955	0·48369
December 2	0·17873	—	—	—
,, 16	0·17844	0·17859	0·44954	0·48372
Mean ..	at Noon, G.M.T.	0·17840	0·44939	0·48350