COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Report No. 27

MAGNETIC RESULTS FROM MACQUARIE ISLAND, 1952

By

P. M. McGREGOR

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Issued under the Authority of Senator the Hon. W. H. Spooner, M.M.,
Minister for National Development

LIST OF REPORTS

1. Preliminary Report on the Geophysical Survey of the Collie Coal Basin — N.G. Chamberlain, 1948.

2. Observations on the Stratigraphy and Palaeontology of Devonian, Western Portion of Kimberley Division, Western Australia — Curt Teichert, 1949.

3. Preliminary Report on Geology and Coal Resources of Oaklands — Coorabin Coalfield, New South Wales — E. K. Sturmfels, 1950.

4. Geology of the Nerrima Dome, Kimberley Division, Western Australia — D. J. Guppy, J. O. Cuthbert and A. W. Lindner, 1950.

5. Observations of Terrestrial Magnetism at Heard, Kerguelen and Macquarie Islands, 1947-1948 (Carried out in co-operation with the Australian National Antarctic Research Expedition, 1947-1948) — N. G. Chamberlain, 1952.

6. Geology of New Occidental, New Cobar and Chesney Mines, Cobar, New South Wales — C. J. Sullivan, 1951.

7. Mount Chalmers Copper and Gold Mine, Queensland — N. H. Fisher and H. B. Owen, 1952.

8. The Ashford Coal Province, New South Wales — H. B. Owen, G. M. Burton and L. W. Williams, 1954.

9. The Mineral Deposits and Mining Industry of Papua-New Guinea — P. B. Nye and N. H. Fisher, 1954.

10. Geological Reconnaissance of South-Western Portion of Northern Territory — G. F. Joklik, 1952.

11. The Nelson Bore, South-Western Victoria: Micropalaeontology and Stratigraphical Succession — I. Crespin, 1954.

12. Stratigraphy and Micropalaeontology of the Marine Tertiary Rocks between Adelaide and Aldinga, South Australia — I. Crespin, 1954.

13. The Geology of Dampier Peninsula, Western Australia — R. O. Brunnschweiler.

14. A Provisional Isogonic Map of Australia and New Guinea showing Predicted Values for the Period 1955.5 — F. W. Wood and I. B. Everingham, 1953.

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21. Magnetic Results from Heard Island, 1952 — L. N. Ingall, 1955.

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26. The Mount Langila Eruption of 1952 — G. A. Taylor, J. G. Best and M. A. Reynolds.

27. Magnetic Results from Macquarie Island, 1952 — P. M. McGregor, 1956.

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Minister—SENATOR THE HON. W. H. SPOONER, M.M.

Secretary—H. G. RAGGATT, C.B.E.

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PREFACE

The geomagnetic work at Macquarie Island which is described in this report was planned and carried out by the Bureau of Mineral Resources, Geology and Geophysics, Department of National Development, and was made possible by the Australian National Antarctic Research Expedition (A.N.A.R.E.), which established a scientific research station at the Island in 1947-48. The instruments used in making the geomagnetic observations were supplied by the Bureau of Mineral Resources, but the observatory buildings and living accommodation were provided by the A.N.A.R.E., which is responsible for the general administration of the research station.

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A B S T R A C T

This report describes the Macquarie Island Magnetic Observatory, the staffing and operation of which is the responsibility of the Bureau of Mineral Resources, Geology and Geophysics, Department of National Development, Commonwealth of Australia.

Details are given of the observatory site and buildings, and of the instruments used at the observatory, which came into full-scale continuous operation in April 1952. The greater part of the report consists of the presentation in tabular form of the magnetic observations made at Macquarie Island during the period April to December, 1952.

INTRODUCTION

During the summer of 1947-48 the Australian National Antarctic Research Expedition of the Antarctic Division of the Department of External Affairs established a scientific research station on Macquarie Island. This base has been continuously manned since then, and the research activities include a programme in geomagnetism, which is conducted by the Geophysical Section of the Bureau of Mineral Resources, Geology and Geophysics. The magnetic observatory started continuous operation in March 1952.

Macquarie Island is a sub-antarctic island situated about 900 miles south-south-east of Tasmania. It was discovered in 1810 by Captain Fred Hasselborough in the sealing brig "Perseverance". Despite visits by members of antarctic expeditions under Bellingshausen in 1821, Wilkes in 1840, Scott in 1901 and J.K. Davis of Shackleton's party in 1909, the first magnetic measurements were not made until 1911 (Webb, 1925). In that year (1911), a base was established on the island by the Australian Antarctic Expedition under Mawson. This station was closed down in 1915 and the next magnetic observations were made by A.E. Kennedy of the British-Australian-New Zealand Antarctic Expedition which visited the island in 1930 (Farr, 1944). During the establishment of the present station in March 1948, magnetic observations were made by N.G. Chamberlain of the Bureau of Mineral Resources (Chamberlain, 1952). Continuous occupation by geophysicists engaged in magnetic observations has been maintained since April 1950.

OBSERVATORY SITE AND BUILDINGS

To select a suitable site for the magnetic observatory, a vertical-intensity variometer survey was made in April 1949, by A.E. Bunbury (Jacka, 1953). Taking into account the need for accessibility and for convenience in erecting buildings, a site was selected where natural magnetic disturbances are a minimum. The selected site is about 1,200 feet south-south-west of the main station area, and its co-ordinates are:-

Geographic - latitude 54° 30'S.
longitude 158°57'E.

Geomagnetic - latitude -61°
longitude 243°

The observatory buildings are on a level grassy area, about 25 ft. above sea level and more than 300 ft. from the nearest camp building.

Climatic conditions are severe, but in general do not hamper the operation of the observatory. The average temperature during 1952 was about 39°F, with a minimum of 25°F and a maximum of 52°F. Wind, mainly from the west, has an average velocity of 16 m.p.h. with occasional gusts of over 100 m.p.h. There are few calm days.

The absolute and variometer huts are pre-fabricated buildings consisting of a frame with roof, floor and wall panels made of 2.1/2 inch sheets of "Onazote", faced with bondwood. The huts are guyed to the ground to prevent any movement during very strong winds. Both buildings were erected by expedition members during relief operations in April 1950.

The variometer hut (Plate 1, Fig.1) measures 12ft. x 18ft. and is divided into three sections, namely, the porch, 6ft. x 6ft., the control room, 6ft. x 6ft., and the variometer room, 12ft. x 12ft. The porch serves as the entrance and light trap. In the control room are the time-marking clock and the panel with the recorder and scale-value control units. The piers for the variometers and recorder are situated in the northern half of the variometer room, the recorder being on the west of the variometers, as indicated on the floor plan. A general view of the variometer hut is shown in the photograph in Plate 2 (Fig.1). The arrangement of the variometers and recorder is shown in Plate 3 (Fig.1).

A small elevated structure, situated about 80 feet east of the variometer hut, houses batteries and a trickle charger to supply the required D.C. power to the magnetograph.

The absolute hut (Plate 1, Fig.2) measures 12ft. x 12ft., and contains seven windows and two skylights. This hut is well lit and provides ample space for making absolute observations. Two piers in the northern half of the hut, one under each skylight, are used for making the absolute observations. The eastern pier, station E, is used for

observing horizontal intensity and declination with the Q.H.Ms., and the western pier, station Ew, for observing vertical intensity with the B.M.Z. A general view of the absolute hut is shown on Plate 2 (Fig.2). The two piers supporting the B.M.Z. and Q.H.M. instruments are shown in Plate 3 (Fig.2).

PROGRAMME OF INVESTIGATION AND STAFF

Some intermittent recordings of horizontal intensity and periodic absolute observations were made by Flower in 1950 (Oldham, 1953). The continuous recording magnetograph was installed in 1951 (Oldham, 1953) and regular controlled recordings commenced in April 1952 (McGregor, 1954). The variometers are controlled by semi-absolute magnetic observations made every seven to ten days. The data obtained are treated by normal observatory techniques and preliminary results are sent by radiogram to the Head Office of the Bureau in Melbourne for monthly publication.

The observatory is operated and maintained by one observer who is relieved after about twelve months' duty. The observers, with their periods of office, since continuous staffing of the observatory commenced, have been:-

April	1950 -	May	1951	W.R. Flower.
May	1951 -	April	1952	W.H. Oldham.
April	1952 -	April	1953	P.M. McGregor.
April	1953 -	December	1953	P.B. Tenni.
December	1953 -	December	1954	C.L. Robertson.
December	1954 -	December	1955	P.E. Mann.

SEMI-ABSOLUTE INSTRUMENTS

Quartz horizontal-force magnetometers (Q.H.Ms.).

General.

Control of the values of declination and horizontal intensity recorded in 1952, was obtained by Q.H.Ms. Nos.177 and 178. The instruments (Plate 3, Fig.2) are of La Cour design and with them it is possible to determine only semi-absolute values of these two magnetic elements. A description of the instruments is given by La Cour (1936).

Yearly comparisons against absolute instruments at the Toolangi Magnetic Observatory enable a check to be kept on drift and any sudden changes in constants.

Procedure for the determination of H.

Horizontal intensity is measured with the Q.H.M. by applying a torsion of 2π radians, and observing the angle $\emptyset$ through which the magnet is deflected from the meridian position. This torsion, if applied first in a positive and then in a negative direction, gives twice the required angle ($\emptyset$) and this eliminates any possible error due to residual torsion.

Horizontal intensity observations were generally made once a week, if magnetic conditions permitted, together with observations of declination and vertical intensity. A determination comprised two measurements of H, at an interval of about 5 minutes. Q.H.M. No.177 was used for the first few months and thereafter No.177 and No.178 were used alternately. The Q.H.Ms. drifted during the year and the corrections to Internation Magnetic Standard (I.M.S.) ranged from -7 gammas to -12 gammas for Q.H.M. No.177 and from -5 gammas to -9 gammas for Q.H.M. No.178. Details concerning these corrections to I.M.S. are given below.

The verniers on the horizontal circle are calibrated to 30 seconds, but it was the practice to estimate readings to 1/10 of a minute. An attached thermometer, which was read at every setting of the magnet, allows a correction to be made for the temperature (t) of the magnet. An induction correction has to be applied and this is dependent upon the angle $\emptyset$ between the axis of the magnet and the meridian.

The formula used for the computation of H is:-

$$\log H = C - \log \sin \emptyset + c_1 t - c_2 H \cos \emptyset$$

where C = a constant depending on the torsion coefficient of the suspension, the moment of the magnet and the torsion angle (2π).

c_1 = temperature coefficient of the magnet;

t = temperature;

c_2 = induction coefficient of the magnet;

$\emptyset$ = deflection angle for 2π torsion in the fibre.

C, c_1 and c_2 are given by the manufacturers of the instruments and were determined by intercomparisons made at Rude Skove.

Procedure for the determination of D.

Declination can be measured with the Q.H.M. provided the collimation error and the error due to residual torsion are known. The total of these two errors may be determined by comparison observations against a standard instrument. The correction is applied to the circle reading obtained when the magnet is in the "zero torsion" position and this, combined with readings made by sighting on an azimuth mark, enables the observer to calculate the declination.

Observations were made at intervals of about a week, if magnetic conditions permitted. Q.H.M. No.177 was used for the first few months, and thereafter No.177 and No.178 were used alternately.

An observation consisted of two sets, one before and one after the H observations. Each set consisted of three settings on the magnet together with azimuth mark readings. Corrections of +0.8 minutes for Q.H.M. No.177 and -9.8 minutes for Q.H.M. No.178 were applied to reduce observed values of declination to I.M.S. The determination of these corrections to I.M.S. is described below.

The small horizontal circle, open scale and high scale value of the telescope make the determination of declination with the Q.H.M. less accurate than with an absolute magnetometer.

Magnetometric zero balance (B.M.Z.).

General.

Vertical intensity was measured directly with B.M.Z. No.64 (Plate 3, Fig.2). This instrument, which is fully described by La Cour (1942), comprises an indicating magnet with optical system, and two other magnets to neutralise the vertical field on the indicator. The upper fixed "field" magnet neutralises the greater part of the field by producing an opposing field (Z_c), while the lower adjustable "turn" magnet allows for final exact compensation by producing an additional field (Z_t). The vertical intensity is then the total of the fields due to the two magnets. Corrections for temperature (t) and the rate of change of temperature (Δt) have to be applied.

The indicating magnet is so fashioned that it is exactly horizontal when in a neutral field. The scale division in the eyepiece against which the indicating mark rests when the magnet is horizontal, is the "neutral division". This is controlled by a prism, which bears against a spring, in the optical path, and is liable to sudden small changes, thereby necessitating frequent determinations of the "neutral division". There was a probable change in the constant Z_c (or Z_t) during transport of the B.M.Z. during field work in November 1952.

Procedure for the determination of Z.

Determination of this element consisted of two sets of observations, one before and one after the declination observations. A set consisted of the following operations:-

Firstly, determination of the "south" position, i.e. the orientation of the B.M.Z. in which the indicating magnet is most sensitive.

Secondly, a check determination of the "neutral division" by taking readings at "north" and "south" positions.

Thirdly, four readings, at two-minute intervals, of time, temperature and turn magnet.

No correction to I.M.S. was applied to the observed values because no intercomparisons have been made (see below).

The formula used in the computation of Z is:-

$$Z = Z_c + Z_t - \alpha t - 2\alpha\Delta t$$

where Z_c = constant field produced by the fixed magnet;

Z_t = variable field produced by the turn magnet;

t = temperature of fixed magnet;

Δt = rate of change of temperature shown by the fixed magnet thermometer;

= temperature coefficient of B.M.Z. as a whole; combines the temperature coefficients of both magnets and the materials of the B.M.Z.

COMPARISON OF SEMI-ABSOLUTE INSTRUMENTS

The Q.H.M. and B.M.Z. instruments used for magnetograph base-line control are semi-absolute types and liable to drift. Frequent intercomparisons are therefore necessary to keep track of their correction to I.M.S.

A set of Q.H.Ms. comprises three tubes, each with magnet and mirror assembly, which are used with one circle and telescope. All three instruments (Nos.177,178 and 179) were at the island in April 1952. Simultaneous intercomparisons in horizontal intensity between No.179 and each of the other two in turn, were made at this time (Ervin, 1953). This gave the differences between the three instruments. No.179 was then returned to Australia and compared with Askania magnetometer No.508810 at the Toolangi Magnetic Observatory to determine its I.M.S. correction. From this it was possible to calculate the I.M.S. corrections as at April 1952, for the two instruments left at the island.

Prior to the relief operations in April 1953, No.179 was again compared at Toolangi and its drift determined. At the island, intercomparisons during the year between Nos.177 and 178, using the magnetograph base-lines as a reference, enabled a record to be kept of their differences. During the relief operations in 1953, No.178 was replaced by No.179. The former was subsequently compared with the magnetometer at Toolangi, and No.179 was compared at the island with No.177. From the results of these intercomparisons, drift curves were drawn for all three Q.H.Ms. The corrections to be applied throughout 1952 were obtained from these curves.

The drifts of the three Q.H.Ms. in 1952 were as follows, No.177, five gammas; No.178, four gammas; No.179, five gammas. These drifts were all in the same direction and represented a numerical increase in the negative correction to I.M.S. for all three instruments. The drifts correspond to decreases in the moments of the magnets, i.e. to changes in the constant C in the formula for the computation of H.

For declination, it is desirable to observe the I.M.S. correction directly rather than to compute it, as the correction for residual torsion depends on the horizontal intensity. The declination correction for Q.H.M. No.177 was determined at Macquarie Island in April 1952, by comparison with Askania declinometer No.508810 from Toolangi

Observatory. This gave a correction to I.M.S. of +0.8 minutes of arc. Subsequent use of Nos.177 and 178 during the year, including sets of intercomparisons, gave an I.M.S. correction of -9.8 minutes of arc for Q.H.M. No.178.

VARIATION INSTRUMENTS

General.

The magnetograph is of La Cour design, of normal sensitivity, and has a recording speed of 15mm per hour. It comprises a declinometer, horizontal-intensity variometer and vertical-intensity balance. The arrangement of the variometers and recorder is shown in Plate 3, Fig.1. A complete description of the three variometers and recorder can be found in the literature (La Cour, 1930), (La Cour and Laursen, 1930).

Time marks are put on the magnetograms by means of contacts on the pendulum clock which close every five minutes. The hour is marked using two extra contacts; one before the hour and one after the hour. When these contacts close they light a separate time-mark lamp, which is placed behind the recorder lamp. Time marks are obtained from all mirrors in each variometer. Hence there is a set of time marks on the record parallel to each base line and a set that follows each magnet spot. Those from the temperature mirrors have been made too weak to record. Both sets of time marks are essential because the magnet spots identify the central main trace and are free from parallax. They are therefore used whenever possible. However, during disturbed periods when the main traces go off scale and reserve traces are recorded, the base-line time marks must be used.

Daily chronometer comparisons were made with time signals from radio station WWV. This allowed the pendulum clock to be kept well within plus or minus half a minute, even though temperature variations were large enough to produce erratic rates.

Temperature control of the magnetographs was effected by making daily readings of the thermometers in the H and Z variometers. The thermal strips with attached prisms, which provide temperature compensation in the H and Z variometers, give a photographic record of temperature changes. As the external temperature fluctuations were often rapid and up to 5°C. in a day, it was necessary to obtain hourly temperatures from the photographic temperature record.

Horizontal-intensity variometer.

Scale values.

Determination of scale values was made as often as possible and averaged once every ten days. A standard Helmholtz-Gaugain coil giving a uniform central field of 7.49 gammas per milliampere was used. Positive and negative currents of 15mA for intervals of a few minutes each were used to produce a spot on each side of the normal trace on the magnetogram.

Table 2 gives the observed scale values for 1952. There were no scale-value changes and the adopted value is the mean of the observed values. No variation of scale value with ordinate has been used.

Temperature compensation.

In the La Cour H variometer, movements of the horizontal intensity trace due to the effect of temperature on the magnet can be compensated by means of a bimetallic strip of adjustable length, with a prism at the end. When the strip is of correct length and operates in the correct sense, movements of the recording spot, due to movements of the magnet caused by temperature, are exactly counteracted by the motion of the prism. Thus it is possible for there to be no variation of recorded ordinate with temperature.

However, when the initial observed base lines were plotted against temperature it was found that the H variometer had a large temperature coefficient. Several adjustments were made in 1952 and 1953 to reduce this coefficient. Until 20th July, 1952, one degree Centigrade increase in temperature decreased the ordinate by 13.5 gammas. Thereafter, for the remainder of 1952, a temperature increase of one degree Centigrade increased the ordinate by 5.6 gammas.

Orientation.

When the H variometer was originally assembled the magnet was aligned approximately in the magnetic prime vertical. No opportunity presented itself during 1952 to make accurate tests for any departure from true orientation.

Base lines.

Table 7 shows the observed and adopted base-line values for H, corrected to I.M.S.

Because of the irregular intervals between the absolute determinations, it was not possible to use an exact statistical method for the adoption of base-line values. Generally, the time of shifts was fixed first, in most cases by reference to the log of adjustments, but in a few cases by inspection of the plotted values only. The mean of the observed values for each period was taken as the adopted base line. Periods of adjustments of some days duration in July and August were uncontrolled and are indicated in foot-notes to the tables.

Because the H variometer had a large temperature coefficient during 1952 and because of frequent large temperature fluctuations, it was essential to calibrate the H temperature scalings. The corrections were derived directly from a graph prepared in terms of temperature ordinates. Analysis of plotted values of temperature ordinate against simultaneous thermometer readings revealed that, corresponding to a given temperature, four spontaneous shifts occurred in the temperature ordinate during the period August to November, 1952.

The total shift over this period increased the temperature ordinate at 0°C. from 49.75mm to 51.21mm as determined by least squares analysis. This is equivalent to 18 gammas in the H base line. Although the range of the observed base lines over this period is of the same order, it was only possible on one occasion to make a base-line change at the same time as a shift occurred in the temperature curve. Thorough examination has not revealed the reason for these shifts.

Declination variometer.

Scale values.

The dimensions of the optical components and the distances between the different elements were obtained in 1952. Two series of torsion observations were made to determine the scale value. As a check, one determination was made with the Helmholtz-Gaugain coil from the H variometer. The results and the adopted values are shown in Table 1.

Orientation.

When the variometer was installed, the magnet was aligned approximately in the magnetic meridian. There was no opportunity to test the orientation during 1952, but torsion observations for D scale values showed no appreciable misalignment of the magnet.

Base lines.

The observed and adopted base-line values are listed in Table 5. A statistical method for the adoption of base-line values could not be used because of the irregular intervals between the absolute determinations. In most instances the times of shifts were fixed by reference to the log of adjustments and in others by inspection of the plotted values only. The mean of observed values for each period was taken as the adopted base-line value for that period.

Adjustments were made over periods of several days during July and August, and base lines were uncontrolled during those periods.

Vertical-intensity variometer.

Scale values.

A coil similar to that on the H variometer is used for scale-value determinations. These were made concurrently with the H scale-value determinations, using the same controls.

The observed and adopted scale values are shown in Table 3. There is one scale-value change, and this was selected by analysis to give the same weighted value for the year as the mean observed value. A gradual drift occurred during the latter part of the year, with increasing scale value. This was probably due to the effect of moisture on the knife-edges. A modification to the balance was made in 1953 to enable frequent changes of the drying agent to be made without disturbing the elements in the optical path.

Temperature compensation.

An optical arrangement similar to that in the H variometer allows for exact temperature compensation in the Z balance. Analysis of all base-line observations showed that this instrument was fully compensated during the year.

Orientation.

When the Z variometer was installed the magnet was aligned horizontally. No accurate test could be made in 1952 to check the orientation.

Base lines.

Table 9 shows the observed and adopted base-line values of the Z variometer. These values indicate a drift in the B.M.Z. during the period August 1952 to January 1953. There were no adjustments to the Z balance during this period but a base-line change coincides with resumption of normal absolutes following use of the B.M.Z. in the field in November 1952. This has been ascribed above to a change in the constants of the B.M.Z. The difference between absolutes preceding and following the field observations is 12 gammas; the increase in base-lines from August 1952 to January 1953 is of the order of 30 gammas. The B.M.Z. therefore drifted by about 18 gammas during the period, i.e. at a rate of about 3 1/2 gammas per month.

Two base lines have been adopted for this interval, assuming that the change occurred during the field work. The scatter about the two adopted values for this period is of the order of 5 or 6 gammas, which is not excessive, as a single base-line determination has an accuracy of about ±4 gammas.

Magnetogram scalings.

Mean ordinate scalings of all elements were made for intervals bounded by successive hour marks. The time used was G.M.T. and the results were tabulated on standard forms. Scalings were also made of the instantaneous maxima and minima for each Greenwich day and the times of occurrence. Horizontal and vertical intensity scalings were made in millimetres, and declination scalings were converted directly to minutes of arc using an appropriate table.

Shrinkage correction.

All scalings for tabulations, base lines and other determinations are corrected for shrinkage or expansion of the photographic paper. Immediately after the record was removed from the recorder drum each morning it was marked in three places, on the reverse side, with a pricker bar. The pins in the bar are so arranged that they can be easily identified, and the distance between different pins is known. Thus at any subsequent date, measurement of the pin marks on the magnetogram determines the amount of shrinkage or expansion relative to the time at which the trace was recorded.

BASIC HOURLY VALUES AND ASSOCIATED MEANS

Basic hourly values.

Hourly values of magnetic declination, horizontal intensity and vertical intensity are given in Tables 15 to 23, 24 to 32 and 33 to 41 respectively. The values are the means for successive hourly periods commencing at 00 hours G.M.T.

The values for vertical intensity are expressed in a numerical sense without sign; the vertical intensity is algebraically negative at Macquarie Island. Declination is easterly at this station and therefore positive; the listed values are therefore also correct algebraically.

Scalings, tabulations and means were carried out by the observer at the island and were subsequently checked by computing staff at the Melbourne office of the Bureau under C.A. van der Waal. Base lines and scale values were computed and checked in the same manner. When the observer (P.M. McGregor) returned to Melbourne with Q.H.M. No.178, the I.M.S. corrections were determined as detailed above. When these were obtained, the H temperature coefficient was determined and the final base-line values were adopted.

The scaled mean hourly ordinates of H and Z were reduced to intensity values by the computing staff at Melbourne. Declination values were derived by applying the base-line values to the already reduced mean hourly scalings.

Maxima and Minima.

The instantaneous values of the extremes of the elements, their time of occurrence and the range for the Greenwich day are shown in the tables which list the mean hourly values. During periods of disturbance, it was often impossible to identify the maximum or minimum, and many of these values are therefore missing, especially those for declination. In such instances the daily range in declination can be assumed to be over 100 minutes of arc.

Computed means.

The mean hourly values for "all days", as well as the mean of the ten least disturbed days, the five international quiet days and the five international disturbed days are also given in Tables 15 to 41. The daily mean values are listed before the maximum and minimum values.

MONTHLY AND ANNUAL MEANS

Monthly means (Table 11) were computed using the mean hourly values of the magnetic elements. The annual means (Table 12) were computed from the monthly mean values.

MAGNETIC ACTIVITY

Lists of K-indices have been published in the monthly Geophysical Observatory Report of the Bureau of Mineral Resources, and are not included in this report. Principal magnetic storms are given in Table 13 and times of sudden commencements and impulses in Table 14. Storms and sudden commencements have previously been published in the Bureau's monthly Geophysical Observatory Report and in the Journal of Geophysical Research (1953). In classifying storms, the degree of activity has been assigned by inspection, with particular reference to the frequency of occurrence of high K-indices, rather than to the maximum K-index alone. Auroral disturbances of short duration occur frequently on otherwise quiet days, and give rise to K-indices of 6 or 7 for one or two three-hourly periods. In most "polar" storms it is only during this time that high K-indices are observed, and the normal disturbances level is less than these indices suggest.

ACKNOWLEDGEMENTS

The assistance is hereby acknowledged of those officers of the Geophysical Section of the Bureau of Mineral Resources who assisted in the production and presentation of the results tabulated in this report.

Prior to sailing for Macquarie Island in 1952, the author discussed and clarified with L.N. Ingall and R.E. Ervin the methods and practices used. On the author's return, the analysis of the data was simplified by help from these officers and also from L.S. Prior. The corrections to the Q.H.Ms. are based mainly on work carried out by R.E. Ervin, W.H. Oldham and P.B. Tenni. Production of the tables in their final form is due to C.A. van der Waal and the computing staff.

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TABLE 1

Observed and adopted D scale-values

Date	Observed D	Adopted D	Method used for determination
1952	'/mm	'/mm	
April 21	0.888	0.890	Torsion head deflections
July 10	0.890	0.890	" " "
July 10	0.914	0.890	Helmholtz coil

TABLE 2

Observed and adopted H scale-values

Determinations with Helmholtz coil

Date	Observed h	Adopted h	Adopted value used to	Date	Observed h	Adopted h	Adopted value used to
1952	γ/mm	γ/mm		1952	γ/mm	γ/mm	
April 15	11.56	12.40		August 26	12.37	12.40	
" 21	12.44	12.40		" 29	12.37	12.40	
" 24	12.18	12.40		Sept. 12	12.31	12.40	
May 14	12.72	12.40		" 16	12.51	12.40	
" 23	12.72	12.40		" 18	12.44	12.40	
June 5	12.72	12.40		Oct. 27	12.72	12.40	
" 6	12.58	12.40		" 28	12.86	12.40	
" 9	12.58	12.40		Nov. 4	12.44	12.40	
" 26	12.65	12.40		" 11	12.51	12.40	
July 4	12.37	12.40		" 26	12.24	12.40	
" 21	13.09	12.40		Dec. 1	12.18	12.40	
Aug. 7	12.65	12.40		" 16	12.79	12.40	
" 22	12.31	12.40		" 23	12.37	12.40	

TABLE 3

Observed and adopted Z scale-values

Determinations with Helmholtz coil

Date	Observed Z	Adopted Z	Adopted value used to	Date	Observed Z	Adopted Z	Adopted value used to
1952	γ/mm	γ/mm		1952	γ/mm	γ/mm	
April 15	13.24	13.50		Aug. 29	13.63	13.62	
" 21	13.47	13.50		Sept. 12	13.72	13.62	
" 24	13.47	13.50		" 16	13.55	13.62	
May 14	13.63	13.50		" 18	13.47	13.62	
" 23	13.55	13.50		Oct. 27	13.55	13.62	
June 6	13.47	13.50		" 28	13.55	13.62	
" 9	13.39	13.50		Nov. 4	13.88	13.62	
" 26	13.39	13.50		" 11	13.39	13.62	
July 4	13.47	13.50	24h July 8	" 26	13.72	13.62	
" 21	13.32	13.62		Dec. 1	13.39	13.62	
Aug. 7	13.80	13.62		" 16	13.80	13.62	
" 22	13.39	13.62		" 23	13.63	13.62	
" 26	13.47	13.62					

TABLE 4

Abrupt changes in the adopted Z scale-values

Date	Change from preceding value	Cause of change
1952	γ/mm	
July 19	+0.12	Analysis

TABLE 5

Observed and adopted base-line values for D variometer

(Observed values determined with Elliott Magnetometer)
(East declination)

Date	Observed	Adopted	Adopted value used to	Date	Observed	Adopted	Adopted value used to
1952	° '	° '		1952	° '	° '	
April 16	23 24.2	23 24.2	24h, April 17	Sept. 16	23 35.6	23 35.3	
" 24	21.6	23.1		" 18	35.0	35.3	
May 14	22.4	23.1		" 25	35.6	35.3	
" 15	23.0	23.1			35.4	35.3	
" 23	23.6	23.1		Oct. 3	35.0	35.3	
June 5	22.7	23.1		" 13	35.4	35.3	
" 18	23.1	23.1		" 30	34.4	35.3	
" 24	23.2	23.1			34.9	35.3	
" 29	22.8	23.1			35.7	35.3	
July 3	23.5	23.1	24h, July 8		34.4	35.3	24h, Oct. 31
" 11	35.6	35.8		Nov. 4	33.4	34.0	
Aug. 5	35.9	35.8	24h, August 12		35.0	34.0	
" 20	38.4	35.3		" 11	33.4	34.0	
	37.8	35.3		" 26	34.0	34.0	
" 23	36.4	35.3		Dec. 1	34.8	34.0	
" 26	36.9	35.3		" 8	33.0	34.0	
" 29	35.4	35.3		" 16	33.0	34.0	
Sept. 12	33.4	35.3		" 23	33.2	34.0	

TABLE 6

Abrupt changes in the adopted D base-line values

(East declination reckoned as positive; changes below taken algebraically)

Date	Change from preceding value	Cause of change
1952	'	
April 18	-01.1	Scale value observation
July 9	+12.7	Fibre change, scale value observation
ø Aug. 19	- 0.5	Adjustments to declinometer
Nov. 1	+ 0.7	Analysis

ø Period 00h August 13 to 24h August 18 was uncontrolled by base-lines

TABLE 7

Observed and adopted base-line values for H variometer
(Observed values determined with QHM's Nos.177,178 & 179)

Date	Observed	Adopted	Adopted value used to	Date	Observed	Adopted	Adopted value used to
1952	Y	Y		1952	Y	Y	
April 16	12878	12878		Sept. 12	13178	13178	
" 24	12878	12878	24h, April 30	" 16	13182	13178	
May 14	12864	12867		" 18	13176	13178	24h, Sept.21
" 15	12870	12867		" 25	13176	13170	
" 22	12866	12867			13172	13170	
" 23	12862	12867		Oct. 3	13171	13170	
June 5	12866	12867		" 13	13166	13170	
" 9	12870	12867		" 30	13168	13170	
" 16	12800	12867			13168	13170	
" 18	12872	12867		Nov. 4	13168	13170	
" 24	12864	12867		" 11	13154	13170	
" 29	12869	12867			13152	13170	
July 3	12870	12867		" 26	13179	13170	
" 11	12864	12867	24h, July 28	Dec. 1	13174	13170	
Aug. 5	13048	13048	24h, Aug. 12	" 8	13171	13170	
" 20	13196	13194		" 16	13167	13170	
	13198	13194			13167	13170	
" 23	13189	13194	24h, Aug. 23	" 19	13164	13170	
" 26	13174	13178		" 23	13175	13170	
" 29	13178	13178					

TABLE 8

Abrupt changes in the adopted H base-line values

(Horizontal intensity is reckoned as positive; changes below taken algebraically)

Date	Change from preceding value	Cause of change
1952	Y	
May 1	- 11	Analysis
ø August 1	+ 81	Compensator adjustment
ø " 19	+146	Variometer adjustments
" 24	- 16	Analysis
Sept. 22	- 8	Analysis - corresponding shift in temperature ordinate

ø Periods 00h July 29 to 24h July 31 and 00h August 13 to 24h August 18 were uncontrolled by base-lines

TABLE 9

Observed and adopted base-line values for Z variometer
(Observed values determined with BMZ No.64)

Date	Observed	Adopted	Adopted value used to	Date	Observed	Adopted	Adopted value used to
1952	γ	γ			γ	γ	
April 21	-64282	-64300		Sept. 16	-64358	-64356	
" 24	-64298	-64300		" 18	-64358	-64356	
May 15	-64302	-64300		" 24	-64356	-64356	
" 23	-64302	-64300			-64356	-64356	
June 5	-64298	-64300		Oct. 3	-64308	-64356	
" 24	-64298	-64300		" 13	-64340	-64356	
" 27	-64296	-64300		" 23	-64363	-64356	
July 3	-64296	-64300		" 30	-64358	-64356	
" 11	-64300	-64300		Nov. 4	-64356	-64356	
Aug. 5	-64308	-64300	24h, August 12	" 11	-64356	-64356	24h, Nov. 17
" 20	-64350	-64356		" 25	-64368	-64372	
" 23	-64354	-64356		Dec. 1	-64366	-64372	
" 26	-64348	-64356		" 8	-64370	-64372	
" 29	-64352	-64356		" 11	-64376	-64372	
	-64358	-64356		" 16	-64374	-64372	
Sept. 12	-64360	-64356		" 23	-64374	-64372	

TABLE 10

Abrupt changes in the adopted Z base-line values
(Vertical intensity is reckoned as negative; changes below taken algebraically)

Date	Change from preceding value	Cause of change
1952	γ	
ø August 19	-56	Adjustments to balance
Nov. 18	-16	Consequent to field use of BMZ

ø Period 00h August 13 to 24h August 18 was uncontrolled by base-lines

TABLE 11

Summary of monthly mean values

Month	D	H	Z	D	H	Z
1952	° '	γ	γ	° '	γ	γ
	All Days			Ten least disturbed days		
April	24 02.9	13346	-64563	24 02.8	13370	-64564
May	24 03.1	13341	-64560	24 03.5	13374	-64563
June	23 59.9	13361	-64558	23 59.6	13374	-64562
July	24 05.0	13363	-64548	24 05.0	13372	-64553
August	24 05.2	13371	-64544	x	x	x
September	24 05.3	13348	-64546	24 05.2	13364	-64545
October	24 05.8	13345	-64536	24 06.1	13366	-64539
November	24 05.7	13354	-64534	24 05.4	13379	-64534
December	24 06.2	13348	-64538	24 06.0	13367	-64538
	Five international quiet days			Five international disturbed days		
April	24 02.7	13376	-64564	x	x	x
May	24 03.2	13371	-64564	x	13261	-64553
June	23 59.8	13375	-64559	24 00.9	13313	-64566
July	24 05.2	x	-64548	x	13326	-64529
August	x	x	x	x	x	x
September	24 05.3	13370	-64546	x	13310	-64554
October	24 06.1	13366	-64531	x	13303	-64543
November	24 05.6	13381	-64534	24 06.1	13315	-64541
December	24 06.1	13372	-64540	24 08.9	13301	-64543

x Insufficient data

TABLE 12

Summary of annual mean values
(from April to December)

1952	D	H	Z
	° '	γ	γ
All days	24 04.3	13353	-64547
Ten least disturbed days	24 04.2	13371	-64550
Five international quiet days	24 04.2	13373	-64548
Five international disturbed days	x	13304	-64547

x Insufficient data

TABLE 13

Principal magnetic storms

Greenwich Date		Storm time G.M.T. of beginning		Storm time G.M.T. of ending		Sudden commencement Type	Sudden commencement Amplitudes D	H	Z	Degree of activity ø	Maximal activity on K-scale 0- 9 Gr. day	Gr. 3-hour period	K-index	Ranges D	H	Z
1952		h	m	d	h		'	γ	γ					'	γ	γ
March	30	13	19	10	17	SSC	+ 7	+118	- 97	A	30	6	8		2039	1130
											3	6				
April	21	05	..	22	15	....	...	...	...	C	21	5	7		1231	715
April	27	22	14	08	22	SSC	+ 3	- 25	+ 19	B	29	4	8	100	1611	1098
											7	5				
a May	18	00	..	20	18	....	...	...	...	C	18	4,6	6		821	611
											19	4,6				
b May	26	08	..	31	..	....	...	...	...	B	27	4	7		1166	(593)
											28	5				
											30	3				
June	8	05	..	11	18	....	...	...	...	C	9	5	7	71	1230	658
June	14	07	..	17	20	....	...	...	...	C	14	4	7		828	498
c June	22	07	..	24	21	....	...	...	...	B	24	4,5,6	7		(1075)	(505)
July	5	04	..	05	16	....	...	...	...	A	5	6	8	(120)	1453	1088
July	20	11	06	22	13	PSC	+20	-545	+408	B	21	6	8	149	1406	570
d August	17	04	..	20	14	....	...	...	...	C	17	4	7		(1034)	513
											20	4				
e August	31	22	..	03	19	....	...	...	...	B	1	4	7	(87)	(1245)	(585)
Sept.	7	17	..	10	16	....	...	...	...	A	8	3,5,6	7	(102)	1518	836
											9	4				
Sept.	28	03	30	30	19	....	...	...	...	A	29	5	8		1752	1038
Oct.	3	12	06	06	19	PSC	+ 9	-192	+163	A	5	3	8		1286	599
Oct.	25	10	17	27	14	....	...	...	...	C	26	5,6	7		1586	744
Oct.	29	09	..	02	18	....	...	...	...	B	30	6	7	143	1442	860
											31	5,6				
											1	5				
Nov.	26	06	..	29	00	....	...	...	...	A	27	4,5	8		1504	713
Dec.	1	08	30	05	15	....	...	...	...	B	2	5,6	7	137	1154	543
											4	4				
Dec.	13	04	..	13	17	....	...	...	...	C	13	4	7	99	833	318
Dec.	24	01	15	25	17	SSC	- 3	+ 11	- 12	C	24	5	7	80	926	500
Dec.	28	11	55	02	20	PSC	(- 4)	-120	+ 91	B	29	6,7	7		1636	676
											30	6				
											31	5,6				

ø Severe storm classified A. Moderately severe storm classified B. Moderate storm classified C.
a Commencement obscured during record changing.
b Record incomplete on May 31 from 06h.
c Record incomplete on June 23 from 10h.
d Records incomplete during adjustments to variometers on August 18, 19.
e Record incomplete on September 2 from 04h.

TABLE 14

Sudden Commencements
(From April to December)

Month	Day	Time	Type
		h m	
March	30	13 19	Storm Sudden Commencement
April	23	09 45	Polar Sudden Commencement
	27	22 14	Storm Sudden Commencement
	28	10 52	Polar Sudden Commencement
May	13	13 05	Polar Sudden Commencement
	19	04 16	Polar Sudden Commencement
June		Nil	
July	01	20 32	Storm Sudden Commencement (Small initial impulse)
	11	04 24	Polar Sudden Commencement
	20	11 06	Polar Sudden Commencement
	28	06 40	Sudden Impulse
August		Nil	
September	19	20 59	Sudden Impulse
	20	19 41	Storm Sudden Commencement
October	03	12 06	Polar Sudden Commencement
	09	05 28	Sudden Impulse
	21	10 10	Storm Sudden Commencement (Small initial impulse)
	26	02 04	Polar Sudden Commencement
November	05	13 16	Polar Sudden Commencement
	15	04 54	Sudden Impulse
	17	08 34	Polar Sudden Commencement
	18	03 25	Sudden Impulse
December	08	14 23	Polar Sudden Commencement
	12	12 24	Polar Sudden Commencement
	13	20 01	Sudden Impulse
	24	01 15	Storm Sudden Commencement
	28	11 55	Polar Sudden Commencement

TABLE 15

HOURLY VALUES OF DECLINATION

APRIL 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m	Minimum h	m	Range
1																																
2	≠																															
3	≠																															
4									Continuous recording started 7th April, 1952																								
5																																
6																																
7		(574)	634	667	634	669	589	400	436	614	631	(748	016)	649	703	704	685	642	680	698	632	626	625	602	573	643	(11	01	1488)	07	20	271	(1217)
8		529	589	687	659	630	579	590	562	662	683	(865)	631	552	711	866	685	615	580	663	694	813	756	702	629	664				07	30	(359)	
9		564	627	619	598	653	640	640	600	493	592	624	625	636	606	625	609	610	674	667	610	626	620	606	580	614	17	03	913	08	30	402	511
10			495	501	583	547	566	570	654	655	658	690	839	651	738	646	651	634	635	629	619	611	607	600	624	626	10	55	1071	01	37	384	687
11	*		662	676	671	643	651	656	636	537	602	555	610	735	618	654	645	631	620	619	618	635	618	609	597	607	629	11	57	1032	12	18	304	728
12	* ✓		633	651	638	655	675	675	561	626	618	654	598	595	612	629	631	636	636	634	632	617	615	617	594	594	626	09	03	801	06	21	456	345
13			604	631	653	616	608	690	675	659	643	640	618	635	605	610	633	635	626	618	601	634	641	615	588	593	628	12	43	716	04	22	457	259
14	*		625	651	665	673	671	662	654	651	655	646	669	634	638	634	617	653	663	637	602	610	598	607	599	608	638	10	39	757	18	12	548	209
15			638	659	680	691	691	680	(689)	642	610	642	546	538	691	681	536	554	626	585	599	608	607	599	583	589	624	13	01	(1168)	10	30	391	(777)
16			618	637	669	697	691	692	615	669	634	637	629	617	634	658	643	565	602	589	609	628	629	629	626	617	635	13	45	831	06	19	497	334
17	*		634	657	670	642	576	537	634	665	543	529	629	613	632	630	634	636	627	633	625	624	619	608	596	601	616	10	18	699	08	49	294	405
18			616	643	660	665	658		641	643	641	633	625	613	609	588	651	639	625	640	632	559	581	613	627	614		14	31	688	19	55	535	153
19			616	633	681	629	624	658	643	615	598	606	616	665	593			688	671	590	559	777	682	670	660	635							
20	* ✓		641	661	680	687	667	598	605	650	617	651	607	635	625	626	627	619	659	646	620	591	604	618	632	652	634	09	09	742	06	43	437	305
21	≠	(658)	661	695	697	696	640	580	633	609	599	618	583	680			599	(716 | 476)	395	518	706	645	629	608								
22			610	643	658	680	606	627	534	528	614	683	749	645	626	624	633	636	623	622	616	599	596	610	599	592	623							
23	*		(619)	632	667	696	679	676	642	623	623	629		623	605	616	620	649	633	607	610	617	615	607	595	596							
24	*		615	643	659	661	660	656	643	640	638	632	618	617	622	623	617	651	648	587	625	607	600	603	670	603	631	16	07	841	17	05	487	354
25	* ✓		616	643	660	674	665	656	645	640	634	628	623	(498)	604	611	625	625	633	643	624	612	608	597	580	575	622	03	15	680	11	38	(305)	(375)
26	* ✓		607	642	673	688	678	662	648	643	643	641	598	578	594	613	632	636	630	630	623	591	605	615	591	592	627	03	30	694	10	28	500	194
27	* ✓		620	643	669	675	670	653	648	642	634	632	622	619	611	607	621	623	627	623	616	614	608	599	577	580	626	03	29	687	22	22	560	127
28			605	652	684	671	588	607	591	545	591	635	666	(679	683	469	567	630	658	572)	663	659	605	622	623	595	619							
29	≠		625	590	661	651	596	590	615	(654)	555	559	694	(738	658)	601	549	510	(827	632	751)	705	759	694	696	563	645							
30	≠		568	562	542	674	623	489	584	526	(382)	697	(765)	769	694	666	738	616	658	661	653	563	659	655	617	482	618							
Mean			613	631	655	660	645	629	612	612	605	629	553	629	630	632	639	628	646	617	622	622	635	627	616	596	629							
Mean	*		627	650	665	669	659	643	632	632	621	620	619	615	616	624	627	636	638	626	620	612	609	608	603	601	628							338
Mean	✓		623	648	664	676	671	649	621	640	629	641	610	585	609	617	627	628	637	635	623	605	608	609	595	599	627							
Mean	≠													Insufficient data																			

DESIGNATIONS

* Ten least disturbed days

✓ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 16

HOURLY VALUES OF DECLINATION

MAY 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h m		Minimum h m		Range
1	≠		427	562		589	605	617	652	547	(603)	560	(792	632)		605	711	725	651	644	661	661	635	645	626	572						
2	≠	(445)	501	538		506	640	548	607	(547	471)	671		(712)		660	(721)	804	669	649	643	651	704	638	550						
3	≠	557	527	553		557	578	400	599	518	603	634	(614)	671	661	669	690	934	700	731	680	801	988	805	574	523	649	(10 | 44 | 1228)	05	08	159	(1069)
4		532	613	638		624	530	599	646	514	542	550	(694 | 738)	614	761	629	570	679	652	640	676	740	698	649	585	630						
5		576	469	639		694	661	560	609	661	(583	599	587)	599	656	704	653	629	642	643	614	643	617	652	648	615	623			09	35	106	
6		640	671	700		677	664	572	585	(712)	685	738	663	599	602	569	620	624	700	656	626	613	606	612	629	630	641	07	31	965	10	21	300	665
7	≠	629	648	658		661	632	632	718	627	798		697	715	532	(716)					(783	801	792)	703	730	681							
8		635	612	554		633	660	661	596	585	607	569	614	614	487	593	624	739	679	593	614	630	639	632	615	615	617	15	59	818	12	18	409	409
9	✱ ✓	638	667	672		670	661	652	651	651	642	632	632	632	631	635	638	640	642	643	642	634	632	630	630	635	643	02	23	679	13 21	28 58	622	057
10	✱ ✓	656	674	684		672	664	648	640	640	640	630	625	625	632	614	633	643	640	637	632	625	624	619	612	615	638	03	02	705	12	40	589	116
11		632	648	661		666	664	649	640	643	635	631	635																			
12	✱	648	674	691		704	733	694	653	624	621	621	631	632	633	632	640	636	638	669	625	615	620	621	617	619	645	04	33	756	07	56	558	198
13	✱	643	661	668		668	660	652	651	662	634	606	594	615	614	667	617	646	644	633	623	607	616	651	625	617	636	13	21	(898)	13	45	442	456
14	✱	(634)	675	703		704	687	677	629	645	632	616	584	594	625	638	640	642	646	640	638	632	631	628	623	616	641	02	24	726	10	28	474	252
15	✱ ✓	624	635	651		657	653	645	640	638	633	628	623	615	607	562	602	598	615	625	624	623	629	624	619	603	624	02	36	666	13	40	522	144
16	✱ ✓	617	643	661		661	659	651	646	648	643	635	630	624	596	599	594	613	620	620	622	623	629	622	614	621	629	(02	55)	671	11	10	568	103
17	✱	630	643	659		666	660	656	661	657	643	635	627	624	618	623	614	624	624	616	624	617	632	614	598	612	632	03	18	669	22	30	574	095
18		604	635	682		688	685	704	697	623	595	616	(694 | 596)	624	605	596	565	607	657	640	633	649	640	627	615	637						
19		615	629	667		688	643	675	678	592	478	474	580	612	643	625	617	615	727	725	643	624	624	633	617	615	627	17	26	812	08	48	231	581
20		633	667	665		676	656	654	632	592	562	549	627	611	509	555	649	703	637	643	633	625	627	633	633	624	625	15	01	834	08	56	403	431
21		638	660	676		667	682	701	644	624	551	425	592	625	516	624	596	622	624	625	623	623	630	623	615	624	618	13	06	772	09	14	238	534
22	✱ ✓	640	655	661		660	656	630	630	616	612	615	587	581	615	626	632	632	640	639	634	630	625	624	614	605	627	02	29	668	10	14	522	146
23	✱	611	626	643		654	648	641	634	632	637	629	612	640	631	628	638	642	649	614	626	635	640	625	625	616	632	16	05	686	10	50	583	103
24		625	657	674		643	648	656	607	594	604	632	624	607	465	570	604	607	586	624	616	623	621	630	633	622	616	03	54	687	12	50	356	331
25		633	664	705		731	696	642	656	649	553	571	550	595	648	693	651	639	634	642	637	632	625	623	615	615	637	03	46	746	(10	22)	473	273
26		631	651	661		659	649	643	634	635	648	632	562	598	605		551	551	661	627	612	650	657	(792)	769	649	614						
27	≠																															
28		657	663	658		661	651	648	642	614	568	525	678	656		655	631		702	625	651	683	685	694	671	590				09	52	364	
29		540	612	631		616	550	621	560	527	569	632	605	712	661	674	624	661	642	783	674	682	728	783	688	644	642	09	26		08	41	323	
30		648	609	595		521	643	570	551	652	(720)		591	666	621	614	634	630	649	640	642	648	642	649	631	625							
31		(578)	607	594		647	618	(478)																								
Mean		620	628	652		655	649	633	632	617	608	598	624	627	605	630	628	645	649	648	634	642	654	654	631	612	631						
Mean ✱		634	655	669		672	668	655	644	641	634	625	614	618	620	622	625	632	636	634	629	624	628	626	618	616	635							196
Mean ✓		635	655	666		664	659	645	641	639	634	628	619	615	616	607	620	625	631	633	631	627	628	624	618	616	632							
Mean ≠														Insufficient data																			

DESIGNATIONS

✱ Ten least disturbed days

✓ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 17

HOURLY VALUES OF DECLINATION

JUNE 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1		581	603	612	595	602	591	597	615	555	494	582	564	586	598	598	598	598	597	589	588	594	603	593	587	588	07	10	630	09	00	391	239
2 *		597	603	599	590	596	586	606	594	590	590	580	580	573	575	559	590	597	590	587	603	615	603	590	586	591	(12	45)	635	(12	05	496	139
3		601	616	629	615	618	621	615	605	602	594	587	587	587	592	594	591	595	594	595	596	608	611	596	587	602	(04	57)	643	(17	56	572	71
4 *		592	591	614	623	620	605	602	595	597	583	580	565	572	582	594	615	606	589	580	597	598	603	600	601	596	15	15	642	11	35	542	100
5		603	612	631	647	643	619	614	588	566	573	604	623	575	591	595	706	576	592	551	566	589	599	601	596	602	15	38	813	07	57	488	325
6 * ≠		593	599	615	623	614	600	596	580	589	583	582	583	591	595	595	599	600	599	593	589	590	588	583	586	594	02	50	627	09	51	563	64
7 * ≠		594	604	619	619	605	597	598	603	601	580	590	580	559	581	591	596	597	598	601	580	589	599	593	590	594	02	41	631	12	14	540	91
8		597	614	618	613	611	618	613	621	682	670	615	706	588	583	599	564	582	579	581	580	610	655	595	573	611	10	55	925	10	42	340	585
9 ≠		587	599	626	615	668	661	602	612	587	587	553	546	685	671	589	527	595	574	581	596	594	603	597	595	602	13	45	845	14	58	294	551
10		592	607	602	611	587	596	566	548	571	587	534	528	588	572	718	629	596	600	587	594	613	654	666	624	599			810			468	342
11		589	573	598	604	589	606	542	540	605	575	509	515	573	572	598	623	587	566	590	595	603	608	612	611	583	14	51	666	06	59	353	313
12 *		610	598	618	610	613	608	619	572	608	558	580	580	603	569	570	604	605	599	594	597	598	603	596	590	596	12	43	659	07	31	459	200
13 * ≠		588	590	601	605	607	613	611	599	604	594	585	581	587	597	594	597	599	597	597	599	597	605	614	613	599	23	06	623	11	43	580	43
14 ≠		604	604	609	614	619	606	633	631	457	622	538	540	494	543	589	607	521	581	619	564	573	638	656	587	586	09	24	824	11	49	270	554
15		608	605	620	632	596	631	623	634	603	549		526	469	504	572	573	594	587	599	591	609	614	606	603								
16		604	603	619	620	594	572	456	590	587		582	635	587	587	629	645	616	563	580	594	604	607	597	589								
17		592	594	589	605	571	597	617	498	585	608	601	550	606	612	582	580	574	572	587	589	612	594	591	587	587	09	53	(845)	10	01	357	(488)
18		588	632	628	628	591	607	603	603	595	592	587	559	563	587	603	587	611	597	600	600	598	594	595	587	597	12	05	715	11	05	502	213
19 *		585	606	619	626	625	618	609	601	594	587	583	576	516	587	595	614	595	596	595	595	597	598	594	588	596	03	08	632	12	24	467	165
20 * ≠		587	606	616	623	616	610	608	605	593	590	591	588	580	579	583	595	601	595	591	595	595	592	594	597	597	03	31	629	12	23	536	93
21 * ≠		608	618	626	635	627	613	608	610	602	597	601	599	563	574	595	604	608	597	597	601	601	596	594	593	603	03	43	637	12	09	537	100
22		595	603	607	618	612	617	623	626	618	598	581	570	479	494	534	564	579	683	556	682	666	688	630	617	602	(19	35)	816	12	14	399	417
23 ≠		627	629	645	621	596	621	637	623	595	604																						
24 ≠		630	543	521	589	641	551	493	569	532	429	615	572	716	647		556	595	606	599	620	622	628	633	593								
25		(577)	584	601	609	613	(594)	594	579	543	580	587	566	625	671		513	509	532	566	587	590	608	607	598								
26		585	584	587	598	594	592	601	583	532	563	578	687	572	581	599	606	609	611	602	609	611	603	597	590	595	11	39	970	14	25	410	560
27		595	608	603	613	603	625	574	559	618	570	553	569	572	534	580	587	636	602	599	602	629	625	619	609	595	13	59	704	06	57	368	336
28 *		612	604	613	615	612	603	602	603	603	595	564	551	543	574	574	587	595	596	602	606	603	599	594	593	594	00	00	627	11	13	452	175
29		597	603	606	610	604	606	605	607	559	610	583	597	600	574	581	605	596	595	594	609	692	716	661	674	612	21	22	785	08	23	494	291
30 ≠		701	614	627	539	706	745	793	(841	785)	761	655	603	673	591	548	658	668	650	642	627	615	602	598	589	660							
Mean		600	601	609	612	614	611	601	600	592	586	581	580	580	583	591	597	595	594	592	598	607	615	607	598	599							269
Mean *		597	602	614	617	614	605	606	596	598	586	584	578	569	581	585	600	600	596	594	596	598	599	595	594	596							117
Mean ≠		594	603	615	621	614	607	604	599	598	589	590	586	576	585	592	598	601	597	596	593	594	596	596	596	598							
Mean ≠ c		630	590	596	589	658	641	630	663	590	600	590	565	642	613	(575)	587	596	603	610	602	601	618	621	591	609							

c Means of 4 values

DESIGNATIONS

* Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 18

HOURLY VALUES OF DECLINATION

JULY 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1			642	651	661	659	656	659	656	660	659	655	649	646	648	649	650	653	654	652	651	652	644	648	666	671	654	20	36	822	20	38	481	341
2	* ≠		662	671	680	680	675	676	676	671	676	617	645	646	643	650	655	651	651	649	644	642	641	642	644	649	656	08	15	714	09	16	572	142
3			658	667	668	667	667	663	657	657	652	645	642	635	616	627	600	586	641	651	631	613	649	649	658	650	644	14	06	685	14	59	536	149
4			661	669	676	678	677	667	676	671	652	602	638	604	624	573	606	634	609	623	641	642	635	649	634	641	641	(12	53)	708	13	14	528	180
5	≠		638	660	664	694	716	622	704	511	713	822	629		696	356	526	626	394		(729	903)	742	792	785	705		09	14	(1087)				
6	≠		658	665	676	675	599	587	687	427	518	647	607	670	625	635	635	640	651	647	647	643	640	641	635	626	628	(10	56)	910	(07	52)	-09	919
7	*		640	664	656	676	652	659	666	676	535	679	635	617	642	649	652	647	677	733	657	649	658	652	641	625	647	(17	50)	772	08	35	391	381
8			633	657	671	685	677	675	638	652	672	661	605	629	621	721	525	566	614	650	538	539	651	647	640	633	642				(13	55)	363	
9	≠							676	688	605	637	625	778	623	655	665	610	636	659	633	624	625	653	670	677	645		09	56	1123	09 14	28 39	316	807
10			654	659	667	681	664	(669)	591	603	615	645	484	584	693	590	661	518	643	615	637	645	663	669	653	652	631	12	28	855	15	07	183	672
11			670	661	663	680	598	669	687	693	671	634	616	643	629	610	574	636	662	661	655	661	658	654	640	634	648	05	48	726	04	39	456	270
12	*		627	644	669	678	689	675	699	627	677	654	554	659	625	625	636	653	654	654	653	653	651	652	652	641	651	06	55	714	10	38	455	259
13			636	651	661	669	669	669	662	661	660	653	645	644	638	625	596	750	625	615	634	654	662	663	652	643	652	15	35	879	14	32	556	323
14			642	652	682	685	685	652	638	696	655	643	536	672	807	591	563	589	631	625	627	643	662	656	645	648	647	12	16	941	10	11	290	651
15			658	689	685	682	637	705	689	664	655	656	653	616	643	636	610	634	645	641	653	652	646	645	657	699	656	10	06	751	09	36	450	301
16	*		657	653	669	664	653	642	640	654	668	685	572	620	643	600	612	639	655	643	645	645	655	650	637	634	643	09	55	884	13	02	358	526
17	*		644	661	669	688	691	680	700	681	661	633	625	642	652	645	624	591	637	656	654	645	637	644	638	635	652	06	28	718	15	24	554	164
18	*		651	664	678	688	680	677	681	678	669	670	659	616	544	583	596	589	625	654	637	641	645	642	645	645	644	10	09	787	12	25	485	302
19	* ≠		652	661	663	664	661	656	660	662	654	650	645	637	637	623	634	645	652	642	654	653	643	636	626	640	648	01	48	674	12	58	592	82
20	≠		645	653	661	669	690	672	680	687	682	661	685	(992)	664	625	579	699	652	674	636	669	696	685	672	679	680	11	17	1405	16	14	440	965
21	≠		665	654	618	582	539	661	645	418	542	671	557	378	758	963	619	865	645	644	689	714	732	711	645	676	650	13	19	1281	11	03	56	1337
22			686	670	669	647	598	636	643	621	627	644	821	715	639	651	677	696	672	673	652	644	665	671	660	643	663	10	00	1106	08	11	539	567
23			643	649	666	664	663	661	671	615	592	607	601	641	645	658	687	696	691	669	663	643	651	670	671	669	654	14	45	735	09	40	493	242
24			661	660	664	671	672	671	661	661	657	633	608	626	620	636	650	669	695	709	640	636	657	653	648	654	655	16	56	758	09	25	578	180
25			654	669	671	684	677	671	665	672	664	651	669	616	671	652	617	661	682	688	685	669	687	697	697	653	668	10	39	827	10	56	522	305
26			644	643	637	637	677	686	539	560	637	626	618	643	659	694	629	651	641	666	661	669	662	654	643	643	642	13	25	814	06	43	400	414
27			648	659	662	669	677	668	660	659	654	650	643	631	695	596	618	655	661	669	659	641	652	668	677	694	653	23	24	713	12	58	545	168
28	* ≠		651	661	677	688	688	688	676	659	653	645	640	633	635	644	651	653	654	653	651	645	643	644	639	637	655	03	01	700	09	52	614	86
29	* ≠				(644)	671	669	667	659	658	654	651	650	645	645	650	650	653	661	652	641	642	643	641	625	631	650	04	28	(680)	22	50	(617)	(63)
30	* ≠		(652)	669	677	685	685	672	663	659	653	643	629	635	633	628	645	654	658	653	652	652	645	642	625	620	651	04	15	690	23	16	601	89
31			642	662	689	706	698	690	691	669	633	632	645	493	589	616	661	610	625	662	642	633	645	653	625	636	644	11	03	847	11	28	216	631
Mean			651	661	666	672	663	665	662	636	644	652	627	635	649	637	621	647	642	656	649	654	659	661	653	650	650							397
Mean	* a		648	661	671	679	675	669	673	663	650	653	623	634	628	627	634	636	651	660	650	647	646	645	639	636	650							209
Mean	≠ c		654	666	674	679	677	673	669	663	659	639	640	638	637	636	646	651	654	649	650	648	643	641	634	636	652							
Mean	≠														Insufficient data																			

a Means of 9 values c Means of 4 values

DESIGNATIONS

* Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 19

HOURLY VALUES OF DECLINATION

AUGUST 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1			645	660	677	681	654	696	706	663	693	661	634	634	579	629	646	645	655	652	645	653	678	653	652	653	656	06	32	729	12	32	527	202
2									(690)	706	669	656	627	593	611	623	635	652	657	664	636	635	645	648	629	627								
3	≠		634	655	677	705	727	675	714	660	603	622	600	616	669	640	541	540	661	658	653	654	643	645	616	620	643	13	31	830	08	48	258	572
4			642	653	681	680	697	694	681	652	698	650	597	611	645	635	634	637	678	671	645	672	699	686	658	645	660	08	26	739	10	47	491	248
5			649	660	670	708	707	678	689	685	563	697	708	699	604	633	643	548	734	735	643	645	643	642	633	627	664	09	22	862	08	51	470	392
6			607	653	692	726	676	677	732	572	663	624	669	631	619	634	714	735	699	661	650	662	651	642	632	632	661	10	47	927	07	47	321	606
7			649	694	693	716	703	686	678	671	527	642	649	637	774	625	615	645	661	659	671	654	659	659	645	643	661	12	34	919				
8			640	675	688	694	706	659	636	685	653	632	636	666	719	630	645	659	659	654	654	642	659	651	651	634	659	12	44	894	13	27	499	395
9	*		649	664	677	690	697	695	684	670	659	656	640	644	633	614	627	657	667	665	667	663	685	679	671	667	663	12	20	706	12	39	579	127
10			650	641	680	702	758	757	731	694	671	593	614	601	534	610	602	583	592	626	651	649	643	637	644	641	646	12	43	889	12	20	-18	907
11			649	677	698	702	734	730	704	680	676	659	614	669	637	645	659	665	660	657	654	653	652	633	653	634	666	10	56	811	10	34	414	397
12	≠		639	645	645	685	686	685	685	707	654	652	552	595	645	659	683	742	645	661	633	658	703	680	695	672	663	15	23	794	10	38	394	400
13	*																																	
14	* ≠																																	
15																																		
16	* ≠																																	
17	≠																																	
18	≠																																	
19								605	646	640	600	548	611	629	626	672	671	648	751	704	625	623	631	622	608	605					08	37	434	
20			612	631	645	642	681	561	595	615	600	578	697	611	603	648	676	658	653	663	670	665	655	647	643	631	637	10	38	860	11	14	169	691
21	*		648	672	691	691	696	682	667	664	654	653	640	620	635	637	639	642	648	646	638	640	635	620	611	610	649	02	45	709	23	54	601	108
22	*		640	656	666	664	669	666	656	656	654	654	645	632	631	640	653	648	640	644	639	631	624	623	656	660	648	22	45	687	21	15	610	77
23			647	664	686	690	694	675	658	658	652	648	644	631	627	640	645	646	648	657	640	636	629	625	618	612	649	02	25	733	(23	42)	612	121
24	*		636	663	684	688	688	674	664	664	649	611	622	632	634	640	636	637	643	645	640	636	631	631	627	625	646	02	53	708	09	08	557	151
25	* ≠		637	648	664	664	665	668	664	656	647	640	646	637	632	631	645	639	641	640	649	649	640	632	618	624	645	02	42	677	23	07	610	67
26	* ≠		648	673	691	700	683	667	662	664	656	640	638	617	621	639	646	646	639	642	637	636	630	635	618	618	648	03	49	712	11	44	582	130
27			647	664	682	693	697	695	691	540	632	638	559	620	632	611	622	627	649	647	618	626	632	628	625	629	638	07	04	741	07	35	429	312
28	* ≠		640	656	664	682	676	704	689	680	664	648	646	639	638	638	640	645	639	639	646	635	622	610	605	614	648	05	33	721	21	59	607	114
29			640	663	696	711	707	683	664	648	656	648	646	634	630	622	638	640	487	584	596	641	647	741	709	711	652	15	25	821	15	56	415	406
30	≠		684	654	595	582	599	766	610	660	680	648	640	637	634	636	628	620	627	645	635	626	629	635	595	613	637	05	12	856	04	05	508	348
31			632	647	659	670	658	694	690	698	645	648	602	605	638	645	637	640	650	650	641	656	656	629	638	622	648	11	15	805	10	44	459	346
Mean			642	659	674	685	689	686	676	676	646	641	632	631	635	634	640	645	647	652	644	647	650	646	640	636	652							
Mean *															Insufficient data																			
Mean /															"	"																		
Mean ≠															"	"																		

DESIGNATIONS

* Ten least disturbed days

/ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 20

HOURLY VALUES OF DECLINATION

SEPTEMBER 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h m		Minimum h m		Range
1	≠	691	648	672	664	682	719	613	784	782	712	729		632	713	707	585	618	631	614	602	636	628	584	596	663	12 29	1143	09 35	276	867
2		630	673	695	677																											
3		605	647	658	631	673	600	596	614	567	682	658	676	727	716	672	665	693	739	671	637	620	604	572	602	647					
4	⁎	655	667	669	691	693	688	677	666	596	551	534	636	682	631	724	700	681	656	648	658	640	621	620	646	651	13 58	826	09 07	442	384
5		656	668	674	684	681	693	684	634	650	664	648	649	549	502	558	575	486	606	604	644	618	599	605	611	623			13 12	600	
6		605	635	660	694	703	702	674	666	679	632	642	646	685	622	618	632	622	611	610	614	640	613	613	632	644	12 39	791	12 14	558	233
7		640	656	671	684	694	690	694	672	699	682	658	650	640	631	631	647	636	623	632	629	666	640	639	739	660	23 33	(831)	19 01	512	319
8	≠	702	623	604	685	584	669	624	594	673	648	713	743	874	782	703	711	821	780	648	631	632	642	630	575	679	11 56	1170	07 50	353	817
9	≠	557	601	570	647	620	677	627		613	700		705	649	747	620	628	699	680	629	637	652	638	588	549	637					
10		529	649	677	622	718	702	467	605	615	704	743	809	672	753	674	651	648	647	653	636	637	614	608	604	652	11 05	1203	08 09	184	1019
11		595	632	664	682	694	708	693	672	671	638	536	605	618	649	729	632	606	657	647	647	644	646	630	647	648	14 36	805	10 40	466	339
12		654	667	663	632	641	647	691	688	632	651	640	704	703	702	608	612	614	646	620	653	657	634	620	627	650	12 29	962	12 47	456	506
13	⁎ ≠	647	665	682	691	691	676	664	664	664	656	647	637	627	657	656	647	643	640	640	632	613	600	604	618	648	03 58	700	20 46	566	134
14		656	673	676	685	647	634	682	645	624	646	643	611	600	580	566	749	810	636	649	656	655	654	631	622	651	16 06	1109	14 37	412	697
15	⁎	632	643	663	676	682	666	658	656	618	541	621	638	640	635	657	735	695	677	662	700	673	640	628	614	652	15 28	764	09 40	455	309
16	⁎	629	652	664	693	704	685	674	658	659	595	557	640	662	648	656	645	649	654	653	648	628	648	674	674	652	03 50	713	09 54	503	210
17	⁎ ≠	663	673	700	702	700	696	685	664	663	631	595	586	602	631	667	665	664	672	664	640	623	604	602	620	651	02 52	711	10 50	415	296
18	⁎ ≠	664	684	700	706	708	700	648	664	657	648	648	630	638	656	656	658	657	656	656	655	629	605	592	603	655	04 10	714	22 04	571	143
19	⁎ ≠	638	664	690	701	700	684	672	658	657	656	653	649	648	639	643	673	640	645	654	648	633	612	614	611	653	15 38	707	23 10	589	118
20	⁎	648	685	712	721	718	703	693	680	672	656	647	646	647	648	650	656	646	656	648	639	595	549	559	560	651	03 24	727	23 04	470	257
21		577	651	685	763	764	738	708	680	667	622	632	631	640	639	653	657	657	656	649	656	638	596	611	634	659	03 38	780	01 98 / 01 32	556	224
22	⁎	658	682			698	688	674	693	709	631	629	637	640	651	657	640	619	616	605	610	620	655					10 16	826	09 31	591	235
23	⁎ ≠	673	687	697	708	716	711	694	674	672	636	635	641	632	630	631	666	649	644	643	637	622	609	610	632	656	03 48	720	09 39	564	156
24		664	684	707	717	727	728	699	685	658	657	581	595	628	632	640	673	620	638	587	607	611	619	635	648	651	15 25	739	10 44	479	260
25		680	709	716	713	698	684	675	665	666	664	645	631	640	643	644	644	634	634	662	664	638	580	584	551	653	01 56	721	23 34	504	217
26		533	537	549	626	729	753	770	753	656	655	667	650	636	626	655	649	646	647	643	638	618	613	621	638	646	05 12	876	00 21	492	384
27		658	682	695	692	673	622	710	746(834)		737	900	744	640	655	700	672	672	632	613	631	619	609	620	632	683	10 20	1082	09 09	391	691
28		648	685	699	736	712	728	694	667	664	685	707	613	610	591	610	640	552	498	502	631	544	615	602	600	635	08 26	1021	09 04	275	746
29	≠	567	596	675	755	770	703	696	698(834		798	083	789)			559	624	619	640	649	622	679	737	647	596	697					
30	≠	353	510	694	699	690	709	724	707	706	688	652	630	702	664	704	666	720	672	673	649	620	603	611	595	652	10 14	1103	00 09	174	929
Mean		622	649	671	689	690	690	671	672	670	658	643	635	629	633	627	656	653	649	637	641	631	620	613	617	653					
Mean ⁎ a		650	669	686	699	701	690	674	665	651	619	615	634	642	642	660	672	658	656	652	651	628	610	611	630	652					
Mean ≠		657	675	694	702	703	693	673	665	663	645	636	629	629	643	651	662	651	651	651	642	624	606	604	617	653					
Mean ≠		Insufficient data																													

a Means of 9 values

DESIGNATIONS

⁎ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

223

TABLE 21

HOURLY VALUES OF DECLINATION

OCTOBER 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1			625	632	666	696	642	686	685	629	664	671	645	625	638	656	647	684	680	665	648	658	631	610	599	596	649	09	46	876	09	09	486	390
2			623	654	697	721	729	697	716	691	681	621	643	619	638	606	611	638	646	608	601	611	639	627	605	614	647	04	31	737	13	53	451	286
3			630	659	708	730	699	711	693	684	674	666	664	646	626	525	621	736	377	517	650	648	583	646	663	667	643	15	03	937	16	29	111	826
4	≠		586	607	737	763	734	785	766	854	883	(845)	626	620	611	649	653	856	592	621	586	567	577	603	586	502	675	07	36		14	41	387	
5	≠		647	678	700	713	640	695	905	709	(607)	771	(820)	640	562	597	597	(645	559)	585	774	604	628	629	631	598	681							
6			586	638	587	603	711	656	643	659	746	668	635	658	748	648	734	579	693	661	655	653	628	607	602	614	651	09	11	1077	09	35	(462)	(615)
7			655	688	721	737	736	718	682	632	668	659	602	632	629	656	702	680	616	602	647	628	592	586	608	630	654	03 13	52 06	746	10	55	440	306
8																																		
9								(720)	689	675	673	667	676	698	658	624	665	637	645	652	650	636	640	632	675	656								
10			655	702	712	721	702	683	695	677	653	549	627	657	658	657	656	654	645	651	646	664	818	753	633	637	671	20	45	907	09	39	383	524
11			673	684	737	737	729	701	702	681	657	640	610	656	664	626	664	659	643	640	710	655	623	621	610	622	664	09	20	809	13	05	414	395
12			647	721	701	684	668	633	658	692	676	624	648	620	676	748	679	681	667	648	651	636	622	609	626	620	660	13	12	819	05	51	515	304
13	*		694	696	703	703	693	676	668	668	668	667	664	650	656	653	650	676	656	637	640	631	609	601	606	632	658	03	34	711	21	37	577	134
14	*		670	693	704	701	691	673	646	677	675	666	648	632	658	666	665	656	709	682	648	640	628	619	623	647	663	16	29	731	06	20	599	132
15	* ≠		683	701	705	698	692	682	668	662	657	657	656	657	657	661	664	663	665	645	640	654	623	611	621	638	661	02	04	717	21	58	604	113
16	*		666	700	717	726	729	713	702	684	675	667	659	642	619	632	648	656	657	653	640	624	612	604	612	669	663	03	50	743	22	28	586	157
17			674	695	731	753	749	737	700	693	684	667	682	666	680	673	659	651	640	676	598	575	577	608	648	667	670	10	30	835	19	26	535	300
18			695	723	737	744	738	744	725	695	673	685	643	656	652	682	652	656	621	619	608	608	610	583	611	629	666	13	21	769	21	09	566	203
19	*		673	700	729	737	728	714	691	649	668	540	620	628	611	602	647	665	647	643	636	620	605	596	605	641	650	08	58	956	09	19	449	507
20	* ≠		683	711	736	743	736	727	719	684	670	671	678	771	648	661	667	648	597	603	636	614	594	596	604	622	667	11	21	905	16	56	568	337
21			676	719	745	747	738	720	700	681	672	672	691	682	694	647	633	409	498	499	542	652	685	599	605	633	647	14	30	933	14	54	205	728
22	* ≠		677	723	729	726	710	703	691	676	673	667	663	658	636	645	655	648	651	649	639	618	593	581	593	615	659	02	59	740	21	20	569	171
23	* ≠		649	685	711	729	723	717	702	683	672	668	664	659	657	634	629	630	656	631	623	613	604	599	(601)		631	03	26	736	12	51	562	174
24	* ≠		640	668	705	718	729	720	710	693	680	672	656	655	655	656	649	648	643	640	638	622	605	598	605	629	660	04	46	738	21	31	593	145
25			664	693	719	728	737	731	718	703	697	690	692	643	592	638	623	605	585	587	634	637	584	602	615	647	657	11	05	920	11	11	436	484
26	≠		636	647	462	669	737	727	757	725	680	691	682	688	584	653			583	433	639	630	638	619	624	626								
27	*		636	664	706	720	753	738	719	713	674	701	683	666	647	656	664	662	656	647	647	637	611	599	595	614	667	09	40	519	22	44	275	244
28			645	656	692	726	727	721	719	704	688	656	631	611	638	638	638	640	663	636	634	630	624	618	620	660	659	03	04	752	10	05	542	210
29			685	694	708	721	708	689	683	676	664	624	631	636	630	591	673	493	529	595	548	559	589	567	600	627	630	14	36	810	15	50	346	464
30	≠		632	637	646	627	647	737	734	718	711	682	691	649	646	643	702	916		462	498	575	667	625	615	654								
31	≠		675	717	583	647	767	769	678	756	701	674	704	848	(602)	553	335	(584)	656	610	608	632	629	620	615	656	651	11	23	1393	14	39	-38	1431
Mean			654	682	694	713	715	710	706	691	696	667	661	658	642	640	643	654	623	612	630	624	622	612	613	629	658							
Mean * a			667	694	715	720	718	706	692	679	671	658	659	662	644	647	654	655	654	643	639	627	608	600	606	634	661							211
Mean ≠			666	698	717	723	718	710	698	680	670	667	663	680	651	651	653	647	642	634	635	624	604	597	605	626	661							
Mean ≠															Insufficient data																			

a Means of 9 values

DESIGNATIONS

* Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 22

HOURLY VALUES OF DECLINATION

NOVEMBER 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1	≠	562	614	687	732	751	734	704	676	668	659	614	562	610	568	857	749	563	629	643	651	579	562	578	589	648	14	46	1354	10	51	418	936
2		624	677	724	743	707	691	715	705	661	660	645	678	633	618	791	687	613	602	593	583	571	568	578	574	652	14	37	1036	21	10	546	490
3		610	663	691	717	734	728	683	684	691	649	661	618	607	592	622	637	619	617	619	611	593	594	598	634	645	11	06	762	09	50	481	281
4	⁎ ≠	651	686	731	747	734	732	710	679	672	666	660	652	651	643	652	650	646	643	632	616	598	600	612	630	662	03	01	760	20	28	580	180
5	⁎	666	707	741	759	754	732	708	687	677	638	602	644	651	662	680	649	643	626	606	573	556	547	557	590	652	03	19	767	21	20	538	229
6		640	704	734	717	795	772	759	685	688	664	607	634	(597)	622	591	625	616	619	634	610	580	545	544	582	649	12	13	869	12	20	334	535
7		613	664	716	723	723	704	676	673	660	646	635	564	598	618	638	671	681	655	699	763	690	646	641	634	664	19	42	806	11	20	509	297
8		655	704	734	734	708	688	691	670	663	618	594	603	637	663	682	671	650	654	611	627	619	636	608	609	655	02	42	758	22	14	509	249
9		664	691																														
10	⁎ ≠	654	681	706	713	704	701	684	669	663	661	659	651	652	645	645	646	643	654	619	589	574	578	598	618	650	03	00	717	21	02	552	165
11	⁎ ≠	643	682	704	717	713	697	688	669	660	663	660	655	652	651	651	658	652	607	581	589	591	587	620	654	652	03	19	726	18	54	560	166
12	⁎ ≠	679	725	741	743	732	700	681	670	672	667	664	659	651	637	644	644	644	635	617	609	607	609	606	634	661	04	02	752	20	27	596	156
13	⁎ ≠	660	702	733	728	715	696	683	670	665	663	660	642	632	651	652	643	639	629	608	580	564	562	574	605	648	02	45	746	21	48	546	200
14	⁎	655	690	740	750	753	743	723	707	679	687	637	644	638	642	638	634	627	611	591	571	557	530	581	587	651	03	24	764	21	16	513	251
15		635	676	719	741	735	705	684	680	646	645	643	627	624	627	639	653	659	643	596	593	594	564	572	599	646	09	26	944	22	08	553	391
16		651	707	751	762	761	724	688	687	689	652	659	652	427	614	580	683	619	619	593	582	585	599	605	631	647	14	57	951	12	41	152	799
17		696	717	756	762	760	731	707	671	742	709	627	583	616	641	653	618	626	614	602	664	670	578	637	637	667	09	01	1079	21	38	515	564
18	⁎	660	712	732	734	723	730	708	708	697	696	636	636	645	639	640	645	628	627	616	601	588	575	583	608	657	03	31	770	21	45	547	223
19	⁎	644	690	700	741	737	720	689	679	662	659	662	635	627	647	660	682	667	644	618	594	581	575	591	632	656	03	27	753	21	47	557	196
20	⁎	678	708	732	767	758	733	711	690	676	668	654	650	651	644	636	636	635	627	606	582	571	555	556	607	655	03	30	780	21	30	524	256
21	≠	635	697	733	836	840	785	753	761	798	732	725	643	569	607	626	627	635	667	651	624	600	570	583	(550)	677	07	45	1202	11	31	350	852
22		584	658	724	749	756	744	716	688	691	687	740	750	(950)	547	(643	619)	611	645	615	592	578	574	572	597	668	12	11	1448	15	59	346	1102
23		650	671	705	726	750	749	686	732	712	748	672	660	632	646	625	631	626	625	625	611	592	586	581	582	659	09	44	855	10	21	544	311
24		625	647	659	688	701	705	697	708	714	742	651	667	691	589	658	633	634	622	625	618	609	607	607	610	654	09	07	965	13	09	550	415
25		632	687	708	712	731	732	724	713	704	641	638	660	667	696	681	629	635	624	619	616	612	608	614	632	663	13	06	748	09	52	505	243
26	≠	659	687	702	708	715	725	714	696	724	(855)	667	675	680	547	597	592	560	576	583	625	751	705	618	683	669							
27	≠	694	720	747	739	712	780	822	855	812	847	749				(518)	578	634	609	593	595	589	623	561	576								
28	≠	570	633	652	623	724	722	715	646	679	685	741	686	635	759	606	632	624	661	573	635	624	626	608	611	653	13	07	1135	13	36	428	707
29		649	652	690	702	720	716	708	704	698	864	699	660	732	666	565	598	643	643	634	652	635	627	625	626	671	09	52	1161	13	06	435	726
30		634	656	692	725	735	732	721	661	691	678	674	677	623	613	624	654	678	654	632	610	598	594	596	602	656	11	41	752	23	28	584	168
Mean		640	682	716	732	738	724	705	688	687	686	657	645	642	632	649	646	633	631	616	612	601	590	594	612	657							411
Mean ⁎		659	698	726	740	732	718	698	683	672	667	649	647	645	646	650	649	642	630	609	590	579	572	588	616	654							202
Mean ≠		657	695	723	730	720	705	689	671	666	664	661	652	648	645	649	648	645	634	611	597	587	587	602	628	656							
Mean ≠		606	658	694	725	758	742	722	694	717	733	687	642	624	620	672	650	596	633	612	634	638	616	597	608	661							

DESIGNATIONS

⁎ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 23

HOURLY VALUES OF DECLINATION

DECEMBER 1952 — 23° East plus tabular quantities expressed in tenth of minutes of arc — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	Maximum m	Minimum h	Minimum m	Range
1		652	679	699	731	751	738	726	716	691	643	654	652	626	610	691	545	596	695	672	618	634	607	632	634	662	662	14	41	920	14	50	100	820
2	≠	609	688	715	698	749	724	719	691	680	635	661	607	634	716	972	562	578	615	589	627	635	619	639	591	665	665	14	32	1272	15	35	-98	1370
3		601	643	635	655	626	578	700	696	695	672	681	659	654	643	625	602	614	611	612	615	612	623	587	581	634	634	12	55	768	05	10	447	321
4	≠	508	353	602	726	757	751	796	735	662	708	699	803	770	700	705	698	652	653	707	718	733	667	580	543	676	676	11	29	1101	01	40	153	948
5		571	640	607	609	677	675	682	708	697	670	646	665	742	664	661	659	660	646	643	654	646	624	616	607	653	653	09	17	964	09	11	497	467
6	✻,	624	653	687	706	678	705	708	703	694	690	677	666	660	662	685	646	661	589	627	634	618	604	634	609	659	659	07	19	724	17	18	579	145
7	✻	619	708	732	739	758	752	730	705	687	671	661	660	651	652	658	653	651	643	643	627	634	619	599	607	668	668	04	37	778	00	28	580	198
8	✻	619	645	688	740	749	765	735	705	701	669	634	643	652	653	682	659	618	624	617	610	592	586	593	602	658	658	05	20	777	21	06	579	198
9	✻ ≠	625	656	699	709	724	724	712	699	687	682	677	669	658	659	653	644	645	642	627	610	610	589	575	592	657	657	04	59	732	22	59	572	160
10		649	695	712	732	760	749	724	705	693	692	685	648	628	601	619	641	660	568	583	565	565	571	613	636	654	654	04	06	769	17	36	515	254
11		672	711	725	743	748	703	668	698	712	707	738	687	705	607	599	624	614	600	585	607	593	583	598	613	660	660	10	48	830	18	13	557	273
12		641	670	696	716	740	733	739	708	716	714	708	672	678	618	546	538	604	627	616	616	606	588	606	605	654	654	12	34	869	14	56	403	466
13	≠	(587)	702	776	748	798	769	847	847	966	981	114	883	702	607	571	612	575	580	592	596	603	596	612	632	721	721	10	37	1424	13	08	436	988
14	✻	644	669	694	697	697	702	697	682	678	682	664	659	669	676	659	651	633	623	614	596	580	573	571	623	651	651	13	51	714	21	46	526	188
15		689	708	758	716	740	752	717	678	661	691	617	653	649	645	636	636	636	613	614	615	594	588	592	628	659	659	09	35	816	10	01	472	344
16		668	713	761	732	738	724	714	680	680	633	670	690	591	618	616	586	671	643	618	586	563	577	607	607	654	654	11	51	790	15	51	473	317
17		666	734	766	784	786	748	751	734	724	688	686	654	651	651	659	661	663	642	622	592	562	538	503	623	670	670	06	19	847	22	38	483	364
18		631	703	724	775	781	797	761	722	691	675	669	654	645	660	651	654	642	593	636	625	586	536	560	600	665	665	05	20	804	20	59	500	304
19	✻ ≠	651	696	740	758	752	732	707	684	668	667	653	651	669	669	666	659	645	639	625	609	578	570	579	607	661	661	03	08	769	20	55	544	225
20	✻ ≠	667	732	773	794	793	771	740	705	685	678	652	662	645	643	644	651	666	653	631	611	586	573	584	611	673	673	03	33	803	21	43	563	240
21	✻ ≠	641	700	749	787	783	761	732	708	696	696	679	667	654	651	662	661	645	627	606	587	579	579	579	(591)	668	668	03	45	795	23	13	570	225
22	✻	634	653	698	719	747	748	732	740	732	716	644	640	650	651	609	615	607	610	632	644	633	602	591	607	661	661	14	04	787	14	14	484	303
23	✻ ≠	619	655	678	696	707	707	708	707	696	585	662	627	634	650	643	634	634	625	616	610	604	580	579	575	647	647	04	00	715	23	07	546	169
24		608	658	669	709	711	730	740	740	742	711	769	748	651	651	614	474	605	607	606	598	693	639	581	592	660	660	13	15	(1018)	14	53	208	(810)
25		621	615	662	669	619	725	748	740	722	659	757	690	690	696	570	591	598	643	660	643	644	624	619	611	659	659	10	29	883	12	56	473	410
26		582	618	641	667	696	712	708	709	716	717	714	678	650	653	657	654	680	673	636	646	640	625	624	616	663	663	11	24	740	11	50	483	257
27		658	660	696	717	712	726	690	712	712	701	662	668	654	635	643	636	643	626	618	631	651	616	552	711	664	664	23	17	758	22	35	347	411
28		661	635	659	697	699	697	696	697	703	697	686	694	648	633	627	562	557	622	651	672	691	643	649	716	662	662	15	00	830	14	30	346	484
29	≠	678	730	680	660	739	743	736	714	703	715	675	716	650	647	644	739	999		(892)	698	652	623	632	604									
30	≠	660	684	703	660	634	664	627	690	680	614	732	741	761	765	740	689	677	571	624	623	615	615	634	617	668	668	16	18	1025	17	06	296	729
31		(629)	627	663	671	687	713	710	651	682	680	667	625	627	644	700	801	651	636	620	625	625	664	670	642	663	663	15	25	1032	11	28	491	541
Mean		632	665	700	715	727	726	723	710	705	692	693	678	663	653	655	633	645	625	633	623	618	601	600	614	662	662							430
Mean ✻		634	677	714	734	739	737	720	704	692	684	660	654	654	657	656	647	641	628	624	614	601	588	588	602	660	660							205
Mean ≠		641	688	728	749	752	739	720	701	686	682	665	655	652	654	654	650	647	637	621	605	591	578	579	595	661	661							
Mean ≠		608	631	695	698	735	730	745	735	738	731	776	750	703	687	726	660	696	673	681	652	648	624	619	597	689	689							

DESIGNATIONS

✻ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 24

APRIL 1952 — HOURLY VALUES OF HORIZONTAL INTENSITY — G.M.T. used

12500 plus tabular quantities expressed in gammas

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m	Minimum h	m	Range
1																																
2	≠																															
3	≠																															
4																																
5																																
6									Continuous recording started 7th April, 1952																							
7		840	885	911	914	898	970	959	907	892	862	627	399	706	761	646	827	844	646	747	859	863	855	866	862	814	06	58	1009	11	27	150	859
8		877	897	869	902	007	011	004	914	842	645	549	740	559	563	446	810	855	828	674	760	744	814	843	861	792	04	57	1208	10	12	21	1187
9		845	897	921	930	879	881	884	917	885	866	865	793	644	766	877	865	669	578	689	864	876	868	855	850	832	07	58	1040	16	57	284	756
10			952	013	987	092	081	053	952	880	825	720	473	625	654	818	855	873	879	877	867	868	852	843	845	864	05	22	1230	11	50	348	882
11	⁂	845	853	872	886	888	888	896	890	910	864	863	614	462	738	482	865	879	877	874	868	877	877	865	862	825	08	58	966	12	03	150	816
12	⁂ ✓	854	852	873	889	893	894	918	915	898	873	835	860	867	859	870	870	876	879	881	879	877	874	873	866	876	09	44	974	09	13	764	210
13		865	867	893	018	033	880	863	868	867	875	903	895	910	872	879	873	866	868	860	868	877	873	870	862	887	03	47	1136	05	45	850	286
14	⁂	861	862	866	874	880	884	890	886	892	919	953	911	867	865	844	794	737	847	881	892	882	875	870	865	871	10	29	1006	16	40	643	363
15		864	870	879	904	917	898	912	900	890	910	798	705	478	310	735	730	762	887	897	886	886	884	876	872	819	04	53	979	12	56	-179	1158
16		866	878	887	890	942	988	052	937	926	887	877	862	821	659	761	821	849	869	882	881	881	871	868	872	876	06	14	1301	14	04	553	748
17	⁂	870	875	892	951	071	038	912	881	897	820	873	900	893	875	872	869	872	876	876	877	878	878	870	869	895	04	52	1155	08	59	740	415
18		865	867	871	875	882	885	889	885	891	893	893	903	889	881	843	874	871	811	811	870	881	848	836	831	869	11	47	946	14	38	729	217
19		870	880	882	928	907	902	888	897	873	884	867	844	689	482	326	503	852	853	745	684	854	861	830	853	798	03	27	978	14	44	122	856
20	⁂ ✓	870	869	876	881	891	926	916	892	883	857	869	865	863	877	878	867	865	851	876	885	882	875	864	844	876	06	42	952	09	11	800	152
21	≠	857	861	868	890	917	976	961	928	910	901	899	884	672	479	469	777	523	604	630	732	645	756	818	859	784	06	16	1045	14	03	- 99	1144
22		868	885	914	978	097	072	085	907	979	864	745	772	872	868	867	866	865	868	871	876	875	869	863	863	900	06	05	1217	10	32	453	764
23	⁂	856	872	875	871	883	903	910	898	908	866	607	851	872	869	864	850	850	858	859	871	882	880	868	859	862	09	15	941	10	01	465	476
24	⁂	838	858	867	873	880	882	878	878	878	876	876	877	876	876	877	794	724	852	877	880	883	859	817	869	860	17	42	1698	16	02	897	801
25	⁂ ✓	869	864	865	879	884	885	885	882	882	881	878	854	814	863	868	871	863	876	880	883	882	882	872	866	872	19	47	888	12	17	738	150
26	⁂ ✓	858	854	864	864	877	887	887	887	890	896	897	884	859	882	884	884	881	870	856	859	892	888	879	870	877	10	30	920	19	01	824	96
27	⁂ ✓	861	858	860	869	885	882	889	891	890	891	891	890	891	889	887	882	888	887	891	893	894	894	890	875	884	12	20	913	01	48	846	87
28		872	867	898	974	103	114	079	026	966	901	856	591	510	377	365	388	431	499	663	847	900	891	871	910	787	05	09	1199	15	37	155	1044
29	≠	855	920	867	922	052	026	063	837	945	964	837	(402)	558	628	656	527	(79)	384	640	701	777	865	818	918	760	04	50	1192	16	28	-303	1495
30	≠	909	915	007	906	050	022	912	958	920	765	394	457	554	724	684	788	681	804	813	859	835	880	836	975	819	04	54	1214	10	44	- 23	1237
Mean		862	877	891	911	950	949	941	906	900	866	807	759	740	734	737	794	769	794	815	848	858	865	857	870	846							675
Mean ⁂		858	862	871	884	903	907	898	890	893	874	854	851	826	859	833	855	844	867	875	879	883	878	867	864	870							357
Mean ✓		862	859	868	876	886	895	899	893	889	880	874	871	859	874	877	875	875	873	877	880	885	883	876	864	876							
Mean ≠														Insufficient data																		

DESIGNATIONS

⁂ Ten least disturbed days

✓ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 25

HOURLY VALUES OF HORIZONTAL INTENSITY

MAY 1952 — 12500 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m	Minimum h	m	Range
1	≠		979	932	018	987	934	937	828	823	832	543	462	475	666	559	743	798	779	815	784	868	881	876	878	796	03	38	1157	11	54	008	1149
2	≠	943	958	056	058	922	944	893	910	844	(740	446)	634	288	484	525	564	762	833	794	799	856	843	854	938	787						
3	≠	922	958	990	950	022	966	879	972	922	778	650	760	823	775	694	452	585	656	689	675	660	692	841	927	802	04	56	1241	15	18	332	909
4		954	874	922	969	992	891	908	875	940	921	709	630	568	513	795	734	811	861	821	783	790	866	861	861	827	04	28	1228	11	48	221	1007
5		924	967	007	861	896	928	867	887	886	743	654	646	577	748	849	831	827	825	786	860	858	858	836	916	835	08	01	1025	12	46	449	576
6		881	850	843	884	934	944	934	757	900	879	822	721	652	720	782	762	745	854	869	869	862	859	841	829	833	07	03	1043	07	28	331	712
7	≠	832	871	888	903	961	046	971	851	914	364	739	637	627	320	164	-71	64	23	339	544	621	832	843	871	631	05	27	1079	15	13	-377	1456
8		866	900	983	893	878	894	907	825	723	828	839	709	686	751	756	661	777	846	861	867	867	872	863	851	829	02	40	1140	12	18	560	580
9	* ≠	842	845	855	862	864	871	864	866	870	867	864	861	862	870	868	867	869	871	871	874	874	873	859	848	864	21	08	875	00	58	832	43
10	* ≠	848	852	863	870	872	879	874	875	871	866	864	861	835	864	870	873	876	879	879	876	879	878	868	864	868	03	04	903	12	43	815	88
11		(859	859	863	871	871	877	878	879	884	886)																					
12	*	877	872	888	892	913	924	920	910	920	881	868	864	862	859	857	856	856	842	846	858	857	865	871	871	876	08	05	953	01	14	855	98
13	*	870	871	876	881	878	880	882	882	882	935	910	876	838	628	840	873	874	879	877	875	870	863	870	869	866	09	48	987	13	39	504	483
14	*	861	853	859	889	876	891	887	884	879	884	873	871	865	871	868	867	870	877	878	878	879	879	875	869	874	03	22	917	02	24	827	90
15	* ≠	867	864	864	877	881	882	885	878	877	880	879	878	861	847	832	829	856	851	870	878	879	873	872	872	868	11	51	886	15	08	797	89
16	* ≠	870	876	877	875	879	884	884	883	883	883	884	885	879	875	877	871	874	874	877	878	883	882	878	876	879	11	12	905	03	22	869	36
17	*	874	877	882	886	887	887	889	886	887	887	889	888	885	886	886	876	876	881	885	890	897	899	894	891	886	21	24	903	15	56	871	32
18		869	880	862	880	887	897	933	032	032	958	(837)	784	910	870	842	755	506	631	837	876	882	881	876	870	858	07	52	1082	16	37	324	758
19		860	879	884	901	012	894	888	945	970	717	935	941	898	867	824	746	692	793	869	875	869	868	865	863	869	04	31	1320	16	06	640	680
20		858	858	889	882	901	894	889	882	895	888	875	871	854	784	781	859	853	876	881	877	881	870	867	870	868	08	30	948	14	51	684	264
21		871	876	877	893	901	905	901	901	914	924	936	880	865	892	831	859	871	877	875	875	878	873	870	870	884	09	10	1036	13	01	802	234
22	* ≠	873	874	876	878	884	879	878	874	877	883	873	858	868	867	870	872	878	879	879	879	878	878	877	876	875	10	16	896	11	05	847	49
23	*	875	874	877	882	884	886	889	889	891	888	895	894	886	880	869	825	846	860	878	873	881	885	883	879	878	10	40	902	15	35	769	133
24		869	875	886	886	894	895	872	882	879	887	880	863	745	692	812	852	839	860	883	887	888	883	873	864	860	18	56	897	13	12	568	329
25		851	872	891	905	891	888	884	891	923	954	897	856	853	800	847	866	876	876	880	882	879	878	872	869	878	09	30	921	13	34	655	266
26		866	867	874	877	886	888	888	886	905	790	864	850	818	588	698	829	669	778	791	878	872	798	739	876	824	09	00	952	13	49	402	550
27	≠	(705	062	118	993	879	883	871	825	823	835	767	355	309	325	505	602	704	842	835	739	737	792	872	865)	777	(00	30)	1228	(12	20)	157	1071
28		868	901	895	882	871	879	883	889	915	883	765	713	319	727	665	338	705	911	825	834	872	870	862	866	793	09	16	990	15	28	-159	1149
29		925	888	913	940	885	925	901	899	905	813	901	751	506	672	777	765	698	707	836	849	833	841	856	878	828	00	05	1017	12	20	235	782
30		874	890	936	988	923	926	923	937	751	874	841	703	793	756	857	858	846	874	876	868	879	890	877	882	868	09	02	1040	08	47	185	855
31		892	893	932	896	961	(985)																									
Mean		886	892	909	909	908	906	896	886	886	844	817	776	731	738	766	745	769	803	831	841	849	859	862	874	841						517
Mean *		866	866	872	879	882	886	885	883	884	885	880	874	864	845	864	861	868	869	874	876	878	878	875	872	874						114
Mean ≠		860	862	867	872	876	879	877	875	876	876	873	869	861	865	863	862	871	871	875	877	879	877	871	867	871						
Mean ≠		950	966	997	984	954	955	910	877	865	710	629	570	504	514	489	458	583	627	694	708	748	808	857	896	761						

DESIGNATIONS

* Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 26

HOURLY VALUES OF HORIZONTAL INTENSITY

JUNE 1952 — 12400 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean	Maximum h m		Minimum h m		Range
1			975	966	959	974	989	985	981	982	981	001	975	956	953	945	956	957	960	969	971	973	974	966	968	966	970	05 06	1023	13 18	934	89
2	⁎		954	959	968	980	965	979	980	971	973	972	972	969	966	952	944	967	969	967	967	951	959	972	968	964	966	02 48	983	(14 10)	929	54
3			966	964	966	968	981	981	976	969	967	968	968	963	967	968	968	958	956	944	950	963	969	975	974	964	966	(05 40)	991	(18 00)	934	57
4	⁎		960	976	980	965	961	965	974	973	968	966	968	963	960	960	958	955	958	966	969	960	968	976	969	966	966	21 55	979	04 05	952	27
5			967	967	968	973	971	980	989	004	986	982	902	794	832	804	788	725	914	963	977	979	979	977	967	964	931	07 47	1043	11 25	630	413
6	⁎ ≠		969	975	974	975	977	983	981	984	999	990	973	969	970	970	970	970	972	974	976	978	978	978	975	978	977	08 58	1013	02 59 02 22	962	51
7	⁎ ≠		975	969	971	968	976	984	983	977	976	979	974	961	961	967	972	975	974	977	979	981	979	987	986	985	976	22 57	990	11 52	930	60
8			979	983	983	981	986	006	030	100	211	175	094	905	992	996	003	011	975	966	967	962	964	964	967	979	1007	08 55	1296	11 07	706	590
9	≠		978	978	988	994	014	045	025	994	018	006	002	849	800	675	413	890	953	961	972	966	980	974	975	975	934	05 50	1108	14 36	55	1053
10			967	969	981	981	989	992	978	974	989	000	994	985	979	944	763	888	957	975	976	974	962	945	952	962	962					
11			987	981	983	977	981	005	024	984	998	999	001	002	970	971	942	932	971	971	978	985	977	976	971	976	981	06 39	1078	14 55	887	191
12	⁎		968	968	974	975	985	988	990	994	989	986	988	996	009	955	966	973	972	976	981	982	983	982	985	982	981	12 35	1036	13 24	934	102
13	⁎ ≠		976	970	973	976	979	979	978	978	982	975	973	972	970	970	969	968	971	972	973	974	977	980	977	978	975	03 34	978	13 18	964	14
14	≠		979	972	973	973	980	979	991	046	156	275	160	978	769	940	021	028	843	797	738	886	976	971	937	974	973	09 09	1419	18 40	570	849
15			988	974	990	009	025	991	987	982	039	104	008	097	096	973	955	952	956	950	959	963	969	969	972	970	995	09 59	1355	10 24	766	589
16			968	968	980	987	998	086	016	992	049	059	947	885	918	010	890	826	876	945	976	980	983	981	982	982	970	05 51	1262	14 56	559	703
17			978	974	973	985	982	989	012	960	986	960	950	976	919	835	888	906	918	938	966	967	975	984	981	971	957	10 02	1137	13 07	750	387
18			962	947	969	016	001	976	975	974	974	981	982	007	008	898	920	924	966	961	971	972	976	979	969	969	970	12 03	1123	13 30	846	277
19	⁎		974	978	978	975	976	985	984	982	982	977	975	972	972	964	964	966	966	964	966	968	968	971	972	970	973	12 28	1000	12 57	930	70
20	⁎ ≠		968	968	968	972	975	977	979	976	975	974	972	971	970	958	968	966	966	968	968	970	970	972	979	972	971	12 27	994	13 05	942	52
21	⁎ ≠		965	956	961	974	968	979	985	984	989	990	986	979	980	967	968	968	970	979	980	984	983	985	981	980	977	21 53	985	01 05	948	37
22			982	973	972	973	977	981	984	999	019	997	983	975	916	830	814	833	733	815	881				(986)	984		08 20	(1042)	16 38	582	460
23	≠		964	968	993	016	002	989	004	084	082	985																				
24	≠		993	021	108	017	967	993	959	973	004	013	970	765	643	370	368	385	856	934	945	954	984	989	986	977	882	02 51	1202	14 22	114	1088
25			(974)	973	969	977	982	985	982	987	982	986	972	961	840	660	733	873	914	944	943	961	983	997	993	996	940	23 11	1042	13 40	465	577
26			980	984	986	987	988	991	987	003	007	934	778	759	937	796	750	866	971	981	989	986	986	983	981	974	941	07 53	1051	14 08	509	542
27			975	979	970	978	986	992	043	012	010	009	024	995	929	890	878	830	851	920	928	971	983	981	969	969	961	06 56	1140	15 46	773	367
28	⁎		969	976	968	974	975	978	981	979	974	976	974	964	953	992	981	970	962	971	976	976	976	975	975	977	974	11 14	1082	12 07	875	207
29			971	970	968	969	970	973	969	974	971	971	971	971	966	968	958	965	976	978	979	975	974	932	948	979	969	23 45	1008	21 30	901	107
30	≠		010	047	011	143	930	820	793	818	709	643	673	806	684	605	668	770	890	936	943	950	957	957	958	958	862	03 33	1231	(10 15)	285	946
Mean			974	975	980	987	981	984	983	983	994	995	969	942	925	889	876	906	942	955	959	968	975	974	972	973	961					356
Mean	⁎		968	970	972	973	974	980	982	980	981	978	976	972	971	966	966	968	968	971	974	972	974	978	977	975	974					67
Mean	≠		971	968	969	973	975	980	981	980	984	982	976	970	970	966	969	969	971	974	975	977	977	980	980	979	975					
Mean	≠ c		990	004	020	032	973	959	942	958	972	984	951	850	724	648	618	868	886	907	900	939	979	973	964	971	913					

c Means of 4 values

DESIGNATIONS

⁎ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 27

HOURLY VALUES OF HORIZONTAL INTENSITY

JULY 1952 — 12400 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1			948	946	944	944	947	955	957	955	961	960	957	955	954	958	956	955	957	962	963	967	968	972	950	964	956	20	34	1038	21	36	879	159
2	✱ ≠		972	967	963	967	973	976	978	988	005	054	997	968	966	968	961	963	966	971	972	975	974	976	972	968	977	09	25	1093	23	50	966	127
3			968	963	963	967	971	979	968	973	968	969	968	969	975	954	958	908	906	925	936	950	961	965	964	967	958	14	49	1004	16	59	859	145
4			968	967	969	973																				974							
5	≠		970	965	968	978	012	191	230	170	035	123	152	921	899	596	748	660	493	247	555	671	866	944	950	975	888	06	48	1285	(17	10)	-433	1718
6	≠		975	965	975	980	028	979	005	079	979	001	041	963	984	960	969	952	955	958	960	958	960	961	960	953	979	(07	40)	1204	11	45	709	495
7	✱		952	954	965	965	963	975	970	982	975	983	974	974	971	964	965	955	941	911	923	966	971	968	967	966	962	09	22	1011	(17	30)	858	153
8			961	960	961	963	959	969	961	976	979	981	012	998	973	928	902	876	966	987	977	976	975	973	973	969	965	13	35	1162	13	10	734	428
9	≠								094	103	079	993	088	074	059	058	896	829	861	976	979	976	966	965	971	971		10	55	1204	09	53	699	505
10			971	970	968	978	993	040	003	044	991	993	059	005	012	075	982	997	766	821	853	947	981	982	976	964	974	07	39	1270	16	19	623	647
11			956	982	987	993	112	002	999	988	983	994	994	980	968	954	961	957	960	965	968	974	974	976	977	978	983	04	32	1254	15	24	925	329
12	✱		969	959	948	966	969	984	985	986	986	990	022	982	965	970	968	965	970	971	974	973	974	979	981	982	976	10	22	1059	02	25	936	123
13			982	979	975	972	978	979	986	984	981	979	991	988	983	951	890	832	939	955	976	983	980	980	981	982	967	10	30	998	15	25	701	297
14			978	974	971	986	984	983	983	992	026	021	041	993	848	791	885	849	967	972	970	975	980	976	973	965	962	12	04	1138	13	19	680	458
15			963	969	979	982	987	999	005	003	055	106	090	983	969	957	942	972	966	969	973	971	972	973	967	955	988	09	56	1181	14	08	924	257
16	✱		967	971	967	970	978	987	984	011	992	977	955	985	004	982	935	954	966	965	962	958	970	973	973	973	973	12	58	1059	09	52	854	205
17	✱		970	969	966	977	980	978	995	988	992	004	989	974	969	968	945	951	956	944	954	977	980	979	982	985	974	09	54	1014	15	00	918	96
18	✱		978	974	974	978	976	981	980	981	012	989	956	901	925	926	915	934	968	977	978	977	975	976	970	969	965	09	12	1067	09	58	863	204
19	✱ ≠		965	962	962	965	969	975	978	978	978	978	979	978	976	976	968	972	970	968	969	973	978	978	971	970	972	12	30	994	13	59	953	41
20	≠		970	976	982	987	997	995	998	001	997	995	999	569	811	863	754	703	745	937	977	981	978	963	952	935	919	20	25	1032	11	25	249	783
21	≠		957	007	031	123	117	999	102	984	043	001	926	839	723	613	578	391	922	951	913	952	959	955	981	959	918	03	59	1354	15	06	-43	1397
22			929	959	977	995	988	990	004	999	004	000	839	918	965	955	964	950	965	967	976	967	968	967	963	957	965	10	10	1131	10	14	661	470
23			970	965	975	977	988	986	991	991	016	001	975	964	965	959	942	931	966	969	973	978	979	964	969	970	974	08	27	1076	15	31	889	187
24			959	981	987	992	990	983	984	978	976	976	972	962	917	921	958	962	951	863	968	986	984	976	972	976	966	(01	39)	(994)	17	20	734	260
25			975	975	972	978	977	988	988	985	981	985	970	961	899	880	931	950	938	911	954	975	965	989	974	974	961	10	14	1063	13	39	802	261
26			960	974	000	026	976	984	960	971	976	971	963	954	910	834	928	955	964	965	970	975	977	975	977	975	963	03	11	1105	13	20	650	455
27			966	959	963	971	972	975	980	981	976	974	973	973	951	951	963	964	966	965	976	979	983	976	960	969	969	20	47	991	13	04	931	60
28	✱ ≠		977	968	953	956	971	979	981	980	978	980	977	972	972	972	972	973	974	974	976	979	980	978	977	969	974	09	38	987	02	26	942	45
29	✱ ≠																																	
30	✱ ≠																																	
Mean			966	969	972	982	991	993	998	998	994	999	991	947	941	916	917	901	923	922	944	959	970	972	970	968	963							382
Mean ✱ b			969	966	962	968	972	979	981	987	990	994	981	967	968	966	954	958	964	960	964	972	975	976	974	973	972							124
Mean ≠															Insufficient data																			
Mean ≠ c			968	978	989	017	038	041	084	058	014	055	030	823	854	758	762	676	779	773	851	890	941	956	961	956	926							

b Means of 8 values c Means of 4 values

DESIGNATIONS

✱ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 28

HOURLY VALUES OF HORIZONTAL INTENSITY

AUGUST 1952 — 13000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h m		Minimum h m		Range
1			344	343	348	352	371	384	389	400	376	366	383	444	398	339	338	338	341	347	345	337	339	345	344	340	360	12 00	509	01 01	330	179
2									370	378	389	406	428	404	378	352	345	345	333	312	305	339	369	371	357	353						
3	≠		354	353	356	384	424	559	655	622	548	554	546	440	395	129	106	116	403	380	358	365	363	365	368	365	396	06 25	693	14 49	-61	754
4			350	358	364	380	369	387	393	431	405	404	415	379	355	349	343	303	351	355	340	332	351	358	359	360	366	10 40	481	15 25	248	233
5			337	345	366	381	390	389	379	393	406	442	365	318	368	370	369	350	253	264	339	377	383	381	371	365	363	09 44	501	16 35	189	312
6			370	361	361	440	521	470	407	498	503	543	415	377	303	278	251	262	341	350	349	357	362	363	357	349	383	04 48	617	13 55	151	466
7			353	349	365	399	387	395	387	426	426	402	422	412	353	371	340	334	355	356	357	362	385	384	373	365	377	08 13	561	12 36	225	336
8			368	372	358	375	401	400	392	387	423	417	393	349	212	250	364	376	376	378	378	377	368	377	376	373	368	09 09	454	12 18	88	366
9	✱		366	364	362	361	368	371	374	375	376	376	370	370	358	351	354	360	366	360	334	349	372	377	367	359	364	08 45	380	19 08	308	72
10			353	389	403	398	390	400	399	400	398	465	455	320	78	38	232	188	221	300	337	352	372	375	373	369	334	09 55	496	13 10	-108	604
11			374	379	381	398	401	387	390	379	390	428	493	451	396	378	373	380	379	375	383	387	389	395	385	372	393	10 45	606	13 30	359	247
12	≠		369	391	380	386	391	397	393	409	439	441	455	402	344	365	361	315	270	380	367	362	357	367	372	366	378	10 35	516	15 52	126	390
13	✱																															
14	✱ ≠																															
15																																
16	✱ ≠																															
17	≠																															
18	≠																															
19								366	367	368	383	359	352	363	359	342	346	232	242	315	372	374	372	371	366	355				15 50	129	
20			353	356	363	376	416	426	411	418	372	435	235	122	238	249	340	363	371	375	356	364	379	378	353	349	350	09 35	532	10 45	-67	599
21	✱		348	360	361	375	387	390	389	385	385	388	388	381	380	377	377	376	378	381	381	381	381	378	373	367	378	09 35	405	00 34	342	63
22	✱		360	364	369	373	373	377	386	385	381	383	370	368	364	369	376	377	380	379	379	379	386	386	371	368	375	06 57	406	12 25	360	46
23			363	364	374	373	371	380	387	390	382	383	377	374	373	373	373	374	375	375	383	382	384	379	369	365	376	02 23	428	01 50	334	94
24	✱		350	355	357	355	357	370	374	373	385	394	379	373	370	365	364	366	370	371	370	371	367	368	364	360	368	08 54	431	00 27	348	83
25	✱ ≠		355	355	359	358	365	372	372	372	373	375	375	366	361	368	369	370	372	374	376	378	380	377	376	374	370	06 05	376	12 41	349	27
26	✱ ≠		371	368	369	371	371	379	384	385	379	381	381	376	373	378	381	381	383	385	385	385	385	382	376	371	378	10 52	393	23 45	363	30
27			364	368	368	357	366	387	403	466	444	482	468	395	386	385	364	352	313	335	367	374	381	382	378	367	386	07 25	557	16 15	283	274
28	✱ ≠		370	363	368	379	378	392	390	374	374	375	368	367	364	365	365	366	366	368	370	374	375	374	371	363	372	05 56	403	23 55	358	45
29			355	355	353	359	362	367	377	378	379	377	375	374	374	367	286	177	247	317	333	355	349	307	306	325	340	20 00 29	384	15 50	15	369
30	≠		364	364	431	575	635	631	499	448	378	373	364	352	355	361	358	349	334	306	355	347	339	343	366	365	400	05 48	697	17 40	279	418
31			353	354	366	374	388	366	391	413	432	428	295	200	245	332	353	355	355	356	357	350	347	343	334	319	350	09 00	502	11 20	112	390
Mean			358	362	369	386	399	405	405	413	407	418	395	361	337	326	336	327	318	355	361	365	369	369	364	360	371					
Mean ✱															Insufficient data																	
Mean ≠															"	"																
Mean ≠															"	"																

DESIGNATIONS

✱ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 29

HOURLY VALUES OF HORIZONTAL INTENSITY

SEPTEMBER 1952 — 12700 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1	≠	646	683	723	779	858	792	909	705	730	604	689	296	490	312	303	534	581	633	667	657	618	644	629	596	628		06	52	1075	11	36	-176	1251
2		679	682	713	730																													
3		678	670	705	720	795	876	868	822	697	547	665	608	466	484	641	654	568	547	642	669	653	652	647	644	663		05	27	1030			402	628
4	⁎	631	650	671	658	669	682	683	682	673	687	646	477	540	470	484	635	648	674	668	664	673	672	668	662	636		10	13	712	14	19	368	344
5		668	676	677	675	676	699	705	699	701	701	704	549	172	228	376	314	103	383	555	657	669	646	645	652	564		10	20	740	16	57	-112	852
6		682	685	689	708	719	805	772	836	874	671	649	648	626	624	599	565	635	621	650	649	654	659	661	660	681		08	04	940	15	11	500	440
7		659	657	658	695	762	758	730	722	703	674	663	658	653	649	653	653	650	606	463	590	637	631	604	548	653		04	44	797	18	05	407	390
8	≠	673	718	734	702	875	841	834	640	596	546	681	471	146	310	400	009	233	438	583	630	629	652	661	647	569		04	29	1057	15	47	-220	1277
9	≠	740	720	798	873	832	900	817	617	678	683	79	524	583	486	532	340	497	658	664	658	637	645	659	643	636		05	40	1090	10	23	-431	1521
10		669	660	701	740	668	736	749	744	651	708	590	512	619	533	615	660	667	664	655	656	669	669	661	657	661		08	36	927	10	49	305	622
11		656	663	661	670	670	687	679	672	682	708	697	639	646	598	440	490	629	652	672	678	680	657	656	659	648		10	39	737	14	31	337	400
12		661	662	694	758	829	792	705	682	769	741	661	607	372	472	621	669	658	669	622	663	657	658	658	649	664		04	58	935	12	52	214	721
13	⁎ ✓	656	658	659	661	673	674	675	673	676	679	665	639	633	636	669	674	674	680	681	683	683	681	670	669	668		04	54	688	11	36	609	79
14		661	664	700	713	842	755	745	715	703	667	652	565	522	456	273	232	476	656	681	675	656	650	654	648	623		04	32	923	15	42	-90	1013
15	⁎	654	664	665	671	672	672	671	676	668	672	655	657	637	649	644	563	641	672	672	651	643	664	650	635	655		09	41	693	15	22	496	197
16	⁎	657	665	675	667	681	673	673	680	686	673	655	646	622	619	646	656	660	667	667	672	671	644	626	645	659		04	48	712	12	12	584	128
17	⁎ ✓	652	653	653	667	680	671	671	677	673	672	678	636	572	630	634	668	671	673	684	684	679	675	667	655	661		10	49	707	12	50	537	170
18	⁎ ✓	654	659	661	671	693	694	697	680	676	676	672	672	678	678	679	678	679	681	682	677	681	677	669	657	676		06	12	722	23	46	656	66
19	⁎ ✓	648	650	656	663	667	672	672	674	671	670	670	670	671	672	670	668	673	682	685	684	683	673	664	657	669		06	06	684	00	37	645	39
20	⁎	653	651	656	668	677	691	703	699	676	672	671	671	672	674	674	674	671	675	683	685	683	648	658	633	672		07	13	716	23	37	620	96
21		645	667	709	648	648	652	665	660	681	690	666	649	644	650	665	672	673	679	680	678	679	668	667	652	666		02	21	744	01	09	619	125
22	⁎	649	660					682	680	696	674	609	666	663	663	662	645	643	654	667	669	667	658	654	653			09	31	(723)	10	38	533	
23	⁎ ✓	652	656	662	675	697	688	691	689	689	691	687	675	673	671	671	661	677	684	684	681	677	673	671	664	677		04	26	700	15	48	651	49
24		667	677	679	687	700	729	746	704	682	678	677	685	675	666	642	511	537	663	672	673	676	666	653	635	666		06	13	765	16	29	448	317
25		654	662	669	675	676	676	675	675	676	677	672	666	673	671	668	668	674	669	667	658	666	669	649	612	667		05	55	688	23	56	592	96
26		591	744	875	927	957	895	766	666	680	648	575	599	577	617	624	642	648	662	663	662	663	657	651	640	693		04	25	1009	12	24	552	457
27		642	642	653	678	765	880	894	866	518	560	601	469	586	566	414	373	543	654	666	659	662	657	655	648	635		05	46	925	08	45	-06	931
28		648	661	690	691	810	837	864	863	757	404	666	648	596	536	540	670	617	502	361	380	515	577	645	667	631		06	59	949	09	29	-10	959
29	≠	746	721	703	655	663	816	826	794	758	443	495	273	108	-44	576	675	656	664	663	638	543	482	576	610	585		06	58	883	13	01	-765	1648
30	≠	884	796	678	739	724	670	670	761	707	630	294	581	517	500	566	486	459	613	636	652	653	653	650	642	632		00	48	993	10	23	-35	1028
Mean		669	676	691	705	735	747	740	713	690	644	621	585	549	536	568	560	589	633	642	652	653	650	651	642	648								565
Mean ⁎ a		651	657	662	667	679	680	682	681	676	677	666	638	632	632	641	653	666	676	678	676	675	667	660	653	664								121
Mean ✓		652	655	558	667	682	680	681	679	677	679	674	658	645	657	665	670	675	680	683	682	681	676	668	660	670								
Mean ≠		738	728	727	750	790	804	811	703	694	581	448	429	369	313	475	409	485	601	643	647	616	615	635	628	610								

a Means of 9 values

DESIGNATIONS

⁎ Ten least disturbed days

✓ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 30

HOURLY VALUES OF HORIZONTAL INTENSITY

OCTOBER 1952 — 12600 plus tabular quantities expressed in gammas — G.M.T. used

Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1		736	741	760	758	803	782	772	784	789	715	725	741	754	755	743	731	728	752	742	741	748	752	751	743	752	09	24	831	09	50	563	268
2		744	749	744	754	787	824	788	765	779	786	762	727	703	553	675	753	768	762	753	723	705	738	751	750	743	05	44	852	13	09	440	412
3		755	765	768	788	891	897	870	785	759	758	759	760	635	651	438	427	429	418	551	717	660	691	663	720	690	04	40	919	15	25	285	634
4	≠	778	838	755	795	943	969	917	915	813	608	862	786	768	676	363	224	588	712	697	651	736	748	695	751	733	07	08	1131	09	15	050	1081
5	≠	743	763	776	820	960	955	936	909	464	592	492	452	323	666	691	397	188	554	484	745	768	769	766	766	666	06	06	1153	16	06	-143	1296
6		786	787	845	884	836	980	927	901	784	667	740	735	526	473	557	445	696	736	769	788	777	771	770	763	748	05	31	1081	12	59	198	883
7		(764)	762	763	771	786	796	842	833	776	768	722	619	548	620	574	707	763	755	769	769	763	750	749	752	738	07	04	871	14	49	369	502
8																																	
9							(779)	781	776	778	781	705	603	539	590	743	764	774	774	777	774	769	752	763	751					12	55	339	
10		756	758	777	785	792	814	799	791	790	751	756	776	778	775	774	765	767	774	782	747	658	721	751	752	766	06	00	826	20	30	622	204
11		751	765	770	782	794	843	808	844	818	677	717	778	633	666	770	785	772	733	629	759	795	782	761	730	757	07	59	917	18	14	436	481
12		740	777	862	920	958	006	867	806	798	796	721	737	714	579	757	756	752	770	776	773	764	760	760	749	787	05	58	1084	13	11	416	668
13 ✻		739	760	774	783	783	784	782	781	776	771	769	763	762	759	757	728	743	767	765	769	765	755	751	(735)	763	04	07	799	00	09	719	080
14 ✻		747	751	767	767	796	839	831	765	757	756	757	758	762	763	760	760	719	745	769	770	768	763	756	745	765	05	38	878	17	03	704	174
15 ✻ ≠		744	755	766	772	773	774	769	771	772	770	768	766	768	769	769	769	762	761	743	758	770	762	754	751	757	05	45	784	18	31	723	061
16 ✻		753	764	775	798	788	778	784	784	781	781	779	766	726	755	767	767	773	771	771	769	759	745	730	737	767	04	05	813	12	41	674	139
17		740	758	770	807	846	828	834	799	811	802	787	714	659	767	773	761	730	604	663	728	753	758	751	748	758	04	30	869	17	25	475	394
18		748	763	793	838	853	818	833	852	713	776	814	765	722	670	743	676	678	720	762	760	757	759	753	745	762	08	02	925	13	19	588	337
19 ✻		744	752	766	774	785	786	793	811	818	640	697	761	727	747	745	723	759	770	768	766	762	754	745	743	756	08	58	894	09	12	571	323
20 ✻ ≠		742	757	773	789	807	794	796	786	798	806	782	636	699	713	620	665	717	768	780	776	768	757	748	735	750	09	52	833	14	51	569	264
21		731	740	750	760	777	778	777	772	778	779	769	590	628	630	436	479	665	709	661	737	714	756	762	758	706	10	47	796	14	43	299	497
22 ✻ ≠		758	765	780	779	778	791	783	780	775	771	768	765	714	765	768	769	772	774	778	776	771	765	758	755	769	05	16	846	12	14	632	214
23 ✻ ≠		755	760	761	765	783	785	788	789	793	788	784	777	674	725	770	759	765	776	777	780	777	775	(774	773)	769	08	28	797	12	28	540	257
24 ✻ ≠		770	(768)	766	765	773	779	781	786	784	784	777	775	774	770	771	775	778	778	779	781	775	774	773	770	775	07	18	790	02	04	756	034
25		768	765	774	784	795	802	810	816	818	824	835	748	782	708	723	775	763	640	670	760	760	761	735	748	765	10	22	849	17	36	556	293
26	≠	767	793	065	839	959	850	862	905	829	801	715	591	392	455	076	287	404	566	815	782	755	756	762	763	700	02	34	1217	14	44	-376	1593
27 ✻		785	802	781	829	780	777	782	807	871	810	796	724	760	756	762	763	759	758	757	749	753	753	751	743	775	08	28	919	11	20	636	283
28		748	791	790	777	799	828	817	789	800	779	754	691	680	712	742	773	759	759	774	770	764	765	759	759	766	05	32	848	11	40	643	205
29		757	765	768	761	767	785	781	792	794	781	742	744	702	715	535	315	437	575	693	697	681	718	738	747	700	12	45	808	15	27	230	578
30	≠	752	805	920	037	129	796	770	783	797	844	796	739	749	759	534	281	157	450	667	644	688	712	717	779	721	04	13	1215	16	15	-215	1430
31	≠	783	811	004	952	875	869	972	914	851	802	733	468	190	218	331	209	432	668	781	775	772	748	754	779	695	02	46	1215	13	36	-204	1419
Mean		755	770	799	808	834	831	823	814	782	758	754	712	664	675	646	622	656	701	728	750	748	752	748	751	745							517
Mean ✻		754	763	771	782	785	789	789	786	792	768	768	749	737	752	749	748	755	767	769	769	767	760	754	749	766							183
Mean ≠		754	761	769	774	783	785	783	782	784	784	776	744	726	748	740	747	759	771	771	774	772	767	761	757	766							
Mean ≠		765	802	904	899	973	888	891	885	751	729	720	607	484	555	399	280	354	590	689	719	744	747	739	768	703							

DESIGNATIONS

✻ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 31

HOURLY VALUES OF HORIZONTAL INTENSITY

NOVEMBER 1952 — 12500 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h m		Minimum h m		Range
1	≠	923	946	913	912	920	909	920	896	884	883	808	720	664	674	399	577	720	849	794	813	852	852	834	845	813	01 51	983	14 37	181	802
2		866	877	894	895	935	949	899	918	890	882	870	712	793	817	563	723	775	856	884	879	874	876	873	863	848	04 44	984	14 19	432	552
3		868	873	881	882	901	904	925	907	898	908	805	780	784	806	779	802	882	890	888	877	868	866	853	851	862	09 45	999	14 41	696	303
4	⁎ ≠	857	867	874	881	897	895	914	904	883	871	865	865	863	866	867	868	869	879	882	877	870	863	856	855	874	06 41	927	00 00	847	80
5	⁎	851	857	858	872	872	876	874	884	879	880	867	861	864	825	781	852	869	884	885	882	877	873	859	857	864	07 36	891	14 22	749	142
6		857	860	879	929	902	945	955	033	025	814	761	668	377	646	858	886	881	891	871	866	872	868	856	853	848	07 17	1073	12 53	231	842
7		855	852	865	893	904	906	928	906	897	896	884	810	836	854	863	806	842	852	802	744	815	839	824	862	856	06 32	945	19 07	699	246
8		879	875	879	895	927	981	948	926	904	876	805	833	863	826	802	846	868	858	859	845	844	859	864	850	871	05 51	1033	14 07	728	305
9		866	865																												
10	⁎ ≠	869	877	890	903	916	910	910	904	906	903	901	898	893	893	892	891	884	879	881	881	880	876	874	866	891	04 02	917	00 46	867	50
11	⁎ ≠	872	879	887	892	897	905	904	893	894	895	896	891	888	888	887	883	857	861	873	877	874	861	850	846	881	(06 02)	913	16 16	846	67
12	⁎ ≠	856	864	875	887	898	902	912	899	882	881	876	874	873	876	880	882	881	882	883	882	876	871	859	856	880	06 12	918	00 00 23 28	851	67
13	⁎ ≠	853	854	874	885	891	893	888	883	881	876	878	877	876	882	884	885	886	889	889	885	881	872	867	862	879	05 09	897	00 24	848	49
14	⁎	861	875	882	895	904	904	926	916	923	909	874	885	887	884	882	875	877	879	880	870	864	856	854	852	884	08 46	943	21 14	850	93
15		853	859	866	882	891	914	937	966	979	936	875	843	846	859	860	843	843	867	861	836	844	857	856	853	876	08 59	1042	15 53	818	224
16		859	865	873	885	896	945	975	985	940	899	888	834	457	567	373	729	896	900	885	878	863	855	844	837	830	07 30	1045	12 43	157	888
17		847	860	870	877	884	889	885	925	869	780	793	714	834	834	848	869	890	893	885	803	756	824	853	843	847	08 05	984	08 42	615	369
18	⁎	854	883	887	892	894	919	903	921	965	994	917	896	875	853	869	871	874	884	885	883	870	877	859	865	891	09 11	1016	00 14	830	186
19	⁎	848	857	866	873	882	891	892	881	880	873	857	844	856	858	864	859	863	878	880	878	865	854	848	846	866	05 51	903	11 11	815	88
20	⁎	849	857	881	897	905	915	912	902	893	893	883	884	886	885	882	881	884	889	887	884	874	861	855	858	883	05 19	917	22 34	849	68
21	≠	860	873	913	904	898	947	010	044	735	800	687	690	689	752	829	829	852	844	847	878	876	865	850	852	847	07 42	1175	08 21	510	665
22		860	866	879	899	885	895	913	922	888	858	730	567	532	495	512	574	708	805	834	879	869	860	853	852	789	07 19	929	12 01	245	684
23		858	875	887	894	911	955	994	957	936	966	901	871	786	781	852	864	857	867	872	869	869	869	864	865	884	06 08	1031	13 10	699	332
24		868	871	883	865	867	867	874	901	941	893	868	860	754	739	728	778	837	857	870	872	873	868	861	857	852	08 59	1037	12 47	602	435
25		858	854	871	876	877	875	877	883	900	919	858	864	850	756	730	788	839	867	868	870	863	859	862	862	855	09 41	942	14 18	701	241
26	≠	858	866	878	879	897	901	953	929	954	949	905	849	814	758	790	711	639	772	830	711	697	740	753	833	828	09 51	1136	19 52	542	594
27	≠	875	878	880	949	952	005	131	080	940	787	679	(543	414	47)	570	742	556	715	856	834	826	832	854	861	784	06 59	1215	13 33	-297	1512
28	≠	894	890	939	957	903	938	952	952	903	871	691	683	498	387	660	738	695	830	769	781	815	839	833	842	802	03 01	1037	12 58	163	874
29		844	856	863	873	877	887	880	895	930	(831)	861	730	665	529	732	807	871	862	815	850	874	867	862	863	830	09 26	1063	13 08	359	704
30		857	852	867	878	891	922	951	945	895	867	869	790	796	827	822	842	829	847	875	862	852	847	845	847	862	06 57	999	11 37	709	290
Mean		862	870	881	893	899	915	929	930	907	882	840	798	759	747	768	810	828	860	862	853	853	855	851	854	854					405
Mean	⁎	857	867	877	888	896	901	904	899	899	898	881	878	876	871	869	875	874	880	882	880	873	866	858	858	879					89
Mean	≠	861	868	880	890	900	901	906	897	889	885	883	881	879	881	882	882	875	878	882	880	876	869	861	857	881					
Mean	≠	882	891	905	920	914	940	993	980	883	858	754	697	616	524	650	719	692	802	819	803	813	826	825	847	815					

DESIGNATIONS

⁎ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 32

HOURLY VALUES OF HORIZONTAL INTENSITY

DECEMBER 1952 — 12600 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1		745	763	786	794	803	816	807	778	823	729	767	773	782	776	506	579	750	619	699	758	732	725	727	743	741	08	56	868	14	45	294	574
2	≠	727	765	782	823	806	832	818	813	804	814	699	693	624	243	254	94	538	746	779	733	749	760	707	757	682	03	33	848	15	32	-107	955
3		760	772	782	821	898	938	877	843	849	818	745	731	702	612	526	688	772	776	777	766	753	753	749	754	769	05	31	1043	14	48	426	617
4	≠	751	802	854	848	830	842	894	894	821	748	708	394	450	481	341	548	713	619	553	666	718	740	766	761	673	05	10	939	11	21	416	523
5		766	749	818	807	813	844	821	804	827	767	713	630	508	682	765	770	767	766	772	753	736	775	766	761	758	06	53	939	11	21	416	523
6	⁂	763	773	779	786	820	828	815	819	801	789	784	780	774	769	754	735	735	750	780	788	787	767	772	755	779	09	09	928	12	40	350	578
7	⁂	761	755	753	776	801	800	804	836	825	811	789	778	771	767	757	756	749	756	760	767	772	780	778	770	778	04	45	830	15	11	684	146
8	⁂	765	765	773	775	795	797	810	812	820	786	774	778	775	775	719	688	764	771	775	777	776	773	771	763	774	07	09	859	15	56	730	129
9	⁂ ≠	767	761	769	774	778	789	790	788	788	782	782	776	771	772	775	774	775	776	775	763	763	760	754	746	772	08	41	830	15	01	628	202
10		750	752	769	782	782	788	786	781	774	776	771	756	692	686	688	603	585	628	708	727	749	754	746	742	732	05	37	794	23	39	743	051
11		736	747	772	779	844	912	926	841	843	843	765	730	595	529	724	762	750	742	730	741	756	758	755	754	764	05	00	800	16	11	492	308
12		750	759	772	772	789	807	801	827	853	821	773	770	608	459	459	551	767	790	774	767	758	755	747	746	736	06	04	985	13	04	414	571
13	≠	747	743	760	842	919	062	048	013	892	769	582	623	595	693	770	802	775	759	759	756	756	755	754	750	788	09	04	880	14	56	346	534
14	⁂	756	757	769	774	782	794	784	781	770	770	763	759	764	718	672	748	760	769	773	768	764	763	754	754	761	05	21	1220	12	32	392	828
15		759	753	774	823	822	830	842	847	873	793	643	733	779	783	779	783	782	779	786	782	772	765	751	750	783	05	30	804	14	16	627	177
16		744	753	772	793	808	839	836	834	822	793	726	433	565	610	592	628	628	790	784	780	763	735	736	740	729	09	15	914	10	36	504	410
17		743	748	785	815	890	956	984	905	839	777	757	738	750	760	765	768	772	785	787	780	771	762	727	750	796	05	50	860	11	43	266	594
18		756	766	798	816	844	813	804	798	798	786	785	782	778	776	717	744	776	763	698	704	758	760	742	731	770	06	16	1095	22	53	706	389
19	⁂ ≠	744	759	777	796	812	804	795	790	781	780	782	777	778	774	775	775	777	776	774	774	767	759	751	746	776	04	20	855	18	39	660	195
20	⁂ ≠	745	747	757	772	788	707	794	787	790	784	771	761	739	724	757	758	764	766	771	771	767	761	750	742	765	24	00	820	00	01	731	89
21	⁂ ≠	744	751	761	766	780	791	800	805	804	798	788	774	764	753	724	749	764	767	767	763	764	765	764	754	769	05	47	803	13	16	704	99
22	⁂	756	755	756	764	772	786	795	786	794	789	719	748	755	698	540	431	488	653	731	769	766	764	755	759	722	07	05	803	14	17	708	95
23	⁂ ≠	762	767	770	777	782	786	782	778	780	793	796	763	775	776	774	770	770	771	771	772	776	780	775	770	776	09	30	831	14	10	324	407
24		767	768	788	817	800	810	810	812	802	826	638	610	660	252	363	498	682	743	778	713	737	740	726	749	704	10	18	810	11	30	752	58
25		757	777	809	882	896	804	778	787	817	767	580	692	522	499	618	707	742	761	756	740	753	763	765	773	739	09	40	870	13	37	545	225
26		775	774	775	778	762	804	827	815	777	771	773	787	713	733	749	728	708	743	758	768	764	760	759	755	765	04	01	976	13	01	147	829
27		755	767	768	778	802	800	830	817	792	784	782	707	708	757	772	771	773	770	765	733	737	737	670	723	762	11	52	920	16	03	676	244
28		779	778	773	777	787	790	786	782	789	789	783	754	733	744	542	580	669	619	683	740	745	736	709	694	732	06	29	850	22	35	568	282
29	≠	729	767	822	855	817	809	801	802	843	692	720	674	621	680	666	376	156	34	342	581	696	756	746	722	658	00	48	814	14	36	347	467
30	≠	745	783	803	854	890	982	917	869	833	729	570	510	478	431	311	380	135	616	761	765	764	746	750	753	682	02	38	907	17	19	-199	1106
31		760	787	818	810	825	809	891	895	821	799	720	639	700	753	610	347	703	760	744	740	729	734	736	731	744	05	39	1164	16	27	-185	1349
																											07	01	957	15	10	989	32
Mean		754	762	782	801	817	834	834	824	814	783	734	705	685	660	638	641	687	715	738	749	755	756	747	748	748							421
Mean ⁂		756	759	766	776	791	797	797	798	795	788	775	769	767	753	725	718	735	756	768	771	770	767	762	756	767							145
Mean ≠		752	757	767	777	788	793	792	790	789	787	784	770	765	760	761	765	770	771	772	769	767	765	759	752	772							
Mean ≠		740	772	804	844	852	905	896	878	839	750	656	579	554	506	468	440	463	555	639	700	737	751	745	749	701							

DESIGNATIONS

⁂ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 33

HOURLY VALUES OF VERTICAL INTENSITY

APRIL 1952 — 64000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m	Minimum h	m	Range
1																																
2	≠																															
3	≠																															
4									Continuous recording started on 7th April, 1952																							
5																																
6																																
7		(609)	619	623	615	597	635	581	531	555	556	408	345	543	556	532	594	559	432	490	543	542	551	571	573	548	05	17	677	11	06	162	515
8		612	(624)	596	597	648	620	596	501	492	448	448	469	458	536	438	530	534	515	448	511	471	520	554	570	531	04	50	736	10	08	124	612
9		609	635	621	613	586	588	582	601	550	581	574	478	296	465	561	555	426	435	498	555	562	559	563	581	545	00	49	681	12	21	203	478
10			650	643	638	667	638	609	608	584	547	448	312	451	438	556	575	584	578	574	569	570	570	571	571	563	05	21	724	11	46	350	374
11	*	574	581	596	600	596	585	584	592	598	547	575	477	438	478	543	565	577	573	567	556	562	567	565	571	561	08	59	627	12	49	303	324
12	* ≠	574	581	598	601	597	602	621	619	575	567	544	575	570	555	561	567	567	567	565	562	562	563	567	570	576	09	40	642	08	59	462	180
13		574	582	596	664	642	570	561	561	561	565	586	574	588	556	574	575	570	565	547	559	561	566	569	571	576	03	46	713	13	01	535	178
14	*	579	581	579	584	579	574	571	567	570	577	539	546	546	555	544	513	463	538	569	570	561	561	567	570	558	09	32	613	16	43	413	200
15		573	574	582	596	601	600	(597)	588	582	586	508	431	501	502	523	477	573	617	601	588	584	573	573	573	563	17	02	667	12	57	188	479
16		574	584	586	589	629	659	642	629	633	597	577	546	509	530	615	481	528	565	569	562	562	562	563	570	578	06	11	783	15	22	419	364
17	*	574	574	586	644	693	586	569	579	552	486	559	593	586	571	569	569	569	569	569	569	569	569	569	569	577	04	22	737	09	00	408	329
18		571	574	578	582	584	(584)	585	582	579	573	571	582	544	555	527	558	546	485	462	509	535	546	559	573	556	11	48	617	18	25	435	182
19		619	620	609	613	623	615	616	610	579	584	555	530	451	368	138	424	584	562	453	471	536	530	534	573	533	00	35	669	14	47	006	663
20	* ≠	582	578	582	586	609	633	613	578	582	542	554	547	547	559	561	555	542	527	548	556	554	552	551	551	566	05	07	659	09	10	474	185
21	≠	563	573	578	593	613	656	640	650	638	621	608	575	462	648	880	889	858	709	697	562	455	556	600	606	635	14	29	1074	20	28	363	714
22		597	600	610	627	644	589	423	316	450	422	343	532	592	596	584	577	571	570	570	573	575	573	571	573	545	04	16	746	10	45	516	230
23	*	570	574	573	584	588	597	601	600	602	555	417	542	566	570	561	539	543	544	555	561	570	577	574	575	564	07	15	640	10	04	277	363
24	*	575	577	575	573	574	571	569	570	570	570	573	577	573	571	569	482	389	497	554	559	570	556	547	578	555	23	47	597	15	57	327	270
25	* ≠	581	577	578	579	574	571	570	569	570	571	574	532	519	558	559	559	551	556	559	561	565	565	566	569	564	00	06	588	11	54	443	145
26	* ≠	569	570	573	571	569	566	561	559	562	574	577	558	521	556	556	558	556	546	528	505	520	525	530	540	552	10	25	601	19	36	490	111
27	* ≠	554	561	569	571	573	570	569	566	562	561	561	567	567	562	561	556	558	556	556	555	555	555	554	551	561	12	20	592	23	58	540	52
28		554	556	584	636	678	647	615	552	532	559	530	365	339	291	492	561	597	555	597	632	615	596	581	581	552	16	18	763	13	46	129	-634
29	≠	615	636	612	628	694	654	628	417	569	584	554	484	471	459	457	569	431	400	465	465	569	586	574	667	550	23	28	752	11	45	187	565
30	≠	654	639	671	596	678	636	596	532	450	397	405	570	758	728	624	589	594	608	570	586	578	613	593	660	597	12	43	905	10	46	247	658
Mean		585	592	596	580	618	606	588	562	562	549	524	513	516	532	545	559	553	544	546	552	554	562	565	602	563							294
Mean *		573	575	581	589	595	586	583	580	574	555	547	551	543	554	558	546	532	547	557	555	559	559	559	564	564							216
Mean ≠		572	573	580	582	584	588	587	578	570	563	562	556	545	558	560	559	555	550	551	548	551	552	554	556	564							
Mean ≠																	Insufficient data															

DESIGNATIONS

* Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 34

HOURLY VALUES OF VERTICAL INTENSITY

MAY 1952 — 64000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1	≠		633	631	663	642	611	582	438	422	492	542	578	582	575	638	597	521	574	596	555	592	605	602	623	578	03	38	760	07	42	149	611
2	≠	663	665	666	586	586	620	601	562	451	(408)		584	557	550	692	611)	613	584	551	559	573	581	586	638	586							
3	≠	640	660	666	624	646	552	582	594	585	525	423	492	557	561	519	345	327	342	392	486	493	511	624	671	534	02	50	752	17	18	166	586
4		666	613	635	642	627	600	625	581	624	596	665	606	409	463	532	465	582	601	559	559	557	592	609	624	585	11	58	800	12	33	315	485
5		651	669	593	596	615	642	605	600	542	453	432	547	570	604	581	548	543	557	547	594	579	581	578	629	577	01	05	739	10	15	318	- 421
6		611	605	601	616	663	662	594	467	534	504	528	574	590	528	540	528	552	611	611	600	586	586	578	582	577	04	41	731	07	27	134	597
7	≠	608	627	617	611	662	663	492	381	424	462	586	586	591	508	511	478	409	168	237	385	480	600	648	628	515	10	01	854	17	50	-185	1039
8		600	615	656	617	605	613	624	519	517	584	597	511	493	509	503	455	504	542	557	571	579	597	589	584	564	02	39	739	07	59	353	386
9	⁎ ✓	584	588	588	588	593	593	588	586	586	584	578	573	570	562	561	566	569	570	570	570	570	570	566	567	577	02	46	597	13	42	552	45
10	⁎ ✓	570	582	584	581	573	573	571	570	573	577	581	567	525	534	554	559	563	563	561	561	563	565	563	566	566	03	04	608	12	44	490	118
11		570	571	570	569	565	565	563	562	565	569																						
12	⁎	573	575	588	586	598	612	606	597	602	582	567	558	558	559	555	556	555	543	540	547	554	561	573	574	572	06	02	640	18	22	532	108
13	⁎	575	577	578	577	573	569	567	570	572	612	608	574	532	424	546	573	571	570	564	559	551	552	555	561	563	09	48	659	13	20	277	382
14	⁎	570	581	596	597	582	586	594	573	567	570	567	555	546	557	558	559	565	565	559	557	557	557	557	558	568	03	18	624	12	18	543	81
15	⁎ ✓	567	570	571	574	574	570	569	561	559	558	558	558	546	528	501	500	543	546	561	559	558	557	557	557	554	03	49	582	15	10	470	112
16	⁎ ✓	562	567	570	570	573	573	569	566	562	561	559	557	557	558	559	558	561	561	559	558	559	558	557	557	562	(04	50)	577	11	59	538	39
17	⁎	557	559	561	563	567	570	573	573	569	565	562	562	559	558	550	544	544	550	557	557	559	557	547	544	559	06	26	578	15 16	57 07	538	40
18		543	559	561	574	570	577	606	567	551	546	368	401	551	555	540	500	451	503	546	555	561	566	570	561	537	(06	50)	647	(10	50)	158	489
19		559	570	582	586	654	570	582	620	586	278	543	570	565	543	488	480	505	570	589	586	586	582	570	569	555	04	26	744	09	37	138	606
20		558	565	585	582	590	581	585	585	597	594	582	570	515	439	503	527	539	575	582	574	571	566	567	561	562	08	27	642	13	14	393	249
21		557	558	563	570	574	594	601	597	598	585	624	574	492	517	488	528	552	561	562	561	570	567	567	562	563	09 10	05 10	642	12	49	435	207
22	⁎ ✓	561	561	559	558	562	566	567	567	570	569	555	543	555	552	548	548	554	557	559	565	566	567	567	566	560	08	17	578	11	05	525	53
23	⁎	562	563	562	559	559	561	559	559	562	567	579	579	567	558	544	485	496	513	540	548	559	567	566	561	553	11	02	586	15	35	443	143
24		558	565	567	579	571	566	559	569	565	567	558	544	422	401	497	520	505	520	534	535	544	550	554	555	538	03	45	594	13	12	284	310
25		566	612	621	608	604	608	582	585	584	(594	570)	567	557	476	512	547	558	561	562	563	565	567	569	570	571	02	00	659	(13	44)	(435)	(224)
26		573	573	571	569	567	562	558	557	570	476	544	573	570	459	422	517	453	531	496	543	528	505	536	659	538	23	32	708	13	47	277	431
27	≠																																
28		597	612	606	594	579	578	588	594	598	530	420	473	461	573	435	419	546	516	509	532	578	571	581	611	546	01	51	674	15	34	197	477
29		671	635	624	638	612	623	605	589	527	408	557	461	405	485	492	492	474	534	577	562	544	546	550	578	550	00	06	786	12	17	216	570
30		586	616	638	651	613	616	612	615	463	511	516	527	586	519	584	571	557	578	574	561	570	581	574	604	576	09	02	747	08	31	235	512
31		(621)	627	643	606	663	(651)																										
Mean		588	596	598	595	598	593	584	562	552	531	547	549	535	523	534	521	525	534	541	552	559	567	574	586	560							345
Mean ⁎		568	572	576	575	575	577	576	572	572	574	571	563	552	539	548	545	552	554	557	558	560	561	561	561	563							112
Mean ✓		569	574	574	574	575	575	573	570	570	570	566	560	551	547	545	546	558	559	562	563	563	563	562	563	564							
Mean ≠ c		637	646	645	621	634	612	564	494	470	472	517	560	572	548	590	508	468	417	444	496	534	574	615	640	553							

c Means of 4 values

DESIGNATIONS

⁎ Ten least disturbed days

✓ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 35

HOURLY VALUES OF VERTICAL INTENSITY

JUNE 1952 — 64000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1		585	570	562	571	594	623	602	600	596	571	550	530	531	527	551	559	567	570	569	566	561	558	559	558	568	05	06	642	13	19	515	127
2	✻	558	565	582	594	598	608	592	594	588	584	581	574	563	531	519	548	561	566	559	543	546	558	556	558	568	(05	10)	613	(14	15)	504	109
3		570	570	579	588	609	602	596	588	585	578	570	567	565	563	558	547	538	531	516	538	552	559	559	558	566	(04	50)	616	(18	00)	502	114
4	✻	585	605	596	584	574	573	573	579	578	582	573	561	555	554	554	543	547	559	565	558	558	556	555	554	568	01	34	620	15	30	536	84
5		556	558	567	582	584	573	586	606	597	593	502	520	505	502	458	435	516	552	559	559	556	556	552	552	547	07	38	535	15	24	353	282
6	✻ ≠	556	567	567	566	567	569	575	588	605	601	582	567	561	558	555	555	556	559	559	561	562	563	559	558	567	08	58	623			554	69
7	✻ ≠	556	556	561	569	570	570	567	565	574	586	574	546	538	554	555	552	548	551	547	535	544	554	556	555	558	09	04	601	12	02	511	90
8		555	559	559	562	569	574	609	640	631	500	394	385	517	543	548	554	556	546	547	544	555	547	546	562	546	07	58	710	10	52	98	612
9	≠	561	561	570	574	588	624	589	570	594	588	559	516	515	534	547	575	570	561	559	555	556	561	566	570	565	14	29	751	14	36	214	537
10		570	581	584	582	586	571	569	569	588	602	584	570	581	530	390	453	519	547	556	555	546	535	554	561	554			629			276	353
11		586	578	584	579	586	588	612	586	594	588	586	601	571	565	528	488	535	543	554	556	555	554	555	566	568	06	29	654	14	53	448	206
12	✻	562	571	584	579	574	573	573	579	570	570	579	582	586	516	543	558	558	558	556	555	552	548	548	552	564	12	25	610	13	24	493	117
13	✻ ≠	556	559	567	567	569	567	569	570	561	559	559	558	556	546	547	551	555	556	556	552	554	554	547	546	558	07	31	574	13	19	535	39
14	≠	546	554	561	566	571	584	585	638	612	555	485	432	458	584	586	600	477	497	443	492	544	548	528	556	542	09	11	693	11	51	214	479
15		567	558	574	597	625	586	573	582	615	597	478	586	501	466	547	544	555	555	558	561	558	556	555	559	560	10	00	669	10	23	284	385
16		567	567	582	596	596	613	581	600	610	628	520	461	489	606	489	448	497	556	577	578	573	566	563	563	559	09	16	708	14	53	264	444
17		565	562	570	586	597	589	610	584	609	543	474	543	513	431	473	494	504	531	566	559	559	562	562	556	548	06	56	659	13	08	372	287
18		555	559	586	610	598	570	562	562	563	570	577	567	561	508	534	527	569	561	569	569	570	567	559	566	564	12	02	663	13	30	461	202
19	✻	569	567	565	559	559	562	565	567	570	567	561	559	552	546	542	547	554	556	561	561	565	566	567	565	560	12	24	571	12	57	515	56
20	✻ ≠	559	559	558	559	563	562	565	569	570	569	565	561	554	532	543	546	548	555	556	558	558	561	562	558	558	08	20	574	13	07	515	59
21	✻ ≠	552	552	556	558	556	555	555	555	556	558	562	558	559	546	540	542	542	547	552	555	555	559	556	558	554	12	02	586	14	40	532	54
22		559	555	555	555	555	559	561	588	615	589	577	561	504	434	447	478	408	473					(573)	573		08	16	633	16	38	251	382
23	≠	571	585	608	620	594	593	600	610																								
24	≠	616	644	656	579	574	602	581	588	570	556	575	446	458	454	498	584	589	555	520	543	570	575	579	579	562	15	28	750	15	00	249	501
25		588	584	581	581	573	575	566	571	559	559	558	555	440	488	540	579	567	554	552	546	562	573	559	567	557	14	08	638	12	37	284	354
26		562	586	612	624	600	585	584	596	581	516	471	467	540	502	473	567	582	570	570	566	561	561	562	562	558	03	46	635	11	46	335	300
27		569	573	570	586	609	608	642	615	621	623	624	600	523	450	480	465	466	527	552	546	544	550	558	573	561	06	57	693	13	59	381	312
28	✻	584	584	584	582	571	570	567	563	561	563	570	519	544	596	596	586	571	569	567	561	558	558	558	561	568	14	04	613	11	57	463	150
29		562	567	570	573	574	573	570	570	570	570	571	573	559	546	544	540	550	556	555	554	543	504	530	573	558	23	56	610	21	31	480	130
30	≠	648	627	612	600	206	255	330	355	426	555	543	617	627	638	547	559	554	555	556	570	581	578	570	570	528	(09	45)	739	(04	25)	116	623
Mean		570	573	578	580	569	572	573	577	580	572	547	540	536	530	528	537	545	552	552	553	557	557	556	561	558							257
Mean	✻	564	568	572	572	570	571	570	573	573	574	571	558	557	548	549	553	554	558	558	554	555	558	556	556	562							83
Mean	≠	556	559	562	564	565	565	566	569	573	575	568	558	554	547	548	549	550	554	554	552	555	558	560	555	559							
Mean	≠	593	596	600	580	484	516	521	538	550	564	540	503	514	552	544	580	542	542	520	540	563	566	561	569	596							

DESIGNATIONS

✻ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 36

HOURLY VALUES OF VERTICAL INTENSITY

JULY 1952 — 64000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Mean	Maximum			Minimum			Range
																											h	m		h	m		
1			571	571	573	574	581	581	574	571	571	570	569	567	569	569	570	570	571	573	573	571	570	561	555	561	570	20	34	612	21	36	500	112
2	⁎ ≠		559	559	559	566	570	570	570	574	598	615	584	570	565	565	563	567	570	571	571	571	571	569	561	559	571	09	16	654	08	30	544	110
3			561	565	566	566	570	571	573	573	570	570	571	573	579	563	546	489	535	558	548	565	571	571	561	561	562	14	04	597	15	47	462	135
4			567	567	562	567	574	597	593	574	592	616	640	586	575	562	543	539	547	558	567	566	559	559	563	561	572	(10	18)	651	(15	00)	489	162
5	≠		562	559	558	567	600	667	596	489	390	378	395	345	489	370	480	500	311	157	530	570	528	581	557	570	490	05	23	724	17	10	-356	1080
6	≠		578	569	574	585	621	586	588	557	536	600	558	530	569	574	592	569	567	565	565	565	566	563	563	559	571	(07	14)	666	(11	34)	353	313
7	⁎		561	563	570	567	569	573	569	585	581	570	578	573	570	558	551	544	530	507	504	543	557	559	561	561	558	08	17	621	(18 | 10)	470	151
8			561	561	559	559	559	562	566	581	584	586	613	609	584	512	431	408	497	557	557	550	555	558	561	558	551	13	30	696	15	00	289	407
9	≠							572	627	538	593	440	541	571	559	560	423	368	447	556	560	556	545	548	556	559		06	29	676	09	52	261	415
10			566	563	563	575	586	605	571	586	559	579	602	525	511	536	507	493	354	367	420	497	532	549	556	559	532	07	39	706	16	14	229	477
11			570	590	591	585	643	585	587	575	572	578	586	574	563	542	548	548	555	553	549	549	548	548	549	549	568	04	27	764	14	24	510	254
12	⁎		551	556	560	578	586	587	583	586	585	583	604	575	562	564	568	563	559	557	553	548	547	545	544	544	566	10	18	639	22	21	537	102
13			545	547	548	551	557	556	556	548	548	556	583	590	576	538	477	423	489	526	549	552	549	547	545	547	542	10	34	600	15	24	315	285
14			547	548	556	579	581	574	571	568	601	589	532	485	354	395	504	489	530	537	549	547	549	545	544	544	534	09	03	626	12	32	218	408
15			548	563	567	578	598	589	600	586	627	627	635	575	548	534	529	549	549	557	555	549	548	547	542	541	568	10	02	707	14	07	508	199
16	⁎		545	548	547	556	563	576	590	600	582	564	532	583	585	522	518	545	559	557	555	545	548	552	549	548	557	07	39	641	09	53	439	202
17	⁎		545	548	547	557	570	571	600	600	604	616	590	566	551	548	522	519	538	540	549	559	552	548	549	548	560	09	09	627	15	00	485	142
18	⁎		542	542	545	556	567	572	571	575	604	557	551	522	536	519	488	481	526	556	559	557	556	553	548	544	547	08	30	626	15	30	463	163
19	⁎ ≠		534	533	533	537	541	544	545	545	547	548	549	559	544	544	536	542	541	541	545	547	549	548	544	544	543	11	34	563	12	45	519	44
20	≠		544	548	557	557	563	564	557	549	547	548	548	368	496	560	537	503	439	510	529	521	530	530	541	560	529	13	36	612	11	14	161	451
21	≠		575	604	601	638	617	559	613	489	545	536	519	406	(492 | 316)	379	458	545	542	504	534	530	536	571	566	528	03	45	732	13	18	218	504
22			572	587	583	587	581	560	574	583	589	563	476	480	533	530	533	521	534	542	537	533	542	544	547	557	550	00	42	639	10	13	341	298
23			563	560	559	560	562	556	560	575	597	570	555	542	545	533	488	447	492	512	526	533	534	533	544	547	541	08	23	641	15	30	408	233
24			548	560	568	583	586	559	549	541	544	549	549	544	478	488	511	525	517	454	518	522	518	518	530	542	533	03	09	594	17	17	360	234
25			556	556	549	548	547	547	547	553	557	563	519	530	468	476	522	544	537	507	534	537	519	548	542	547	536	10	12	597	12	28	401	196
26			572	587	612	624	572	562	560	564	574	549	517	518	469	409	488	522	534	534	534	537	540	541	544	545	542	03	12	695	13	23	237	458
27			547	552	560	562	556	548	544	541	540	541	542	548	534	521	527	536	541	536	534	527	523	521	522	536	539	02	51	570	13	38	506	64
28	⁎ ≠		551	549	547	548	557	559	547	544	544	545	545	536	540	540	541	542	542	541	537	533	533	532	532	532	542	04	39	562	20	52	529	33
29	⁎ ≠				545	559	557	553	547	542	537	534	533	533	534	534	534	536	536	534	534	533	532	529	529	529	538			560			(529)	(31)
30	⁎ ≠		(529)	533	534	542	545	545	544	542	538	536	534	532	532	533	533	534	536	536	536	533	532	530	529	522		05	01	547	23	15	518	29
31			522	530	532	534	544	545	545	578	563	562	523	382	466	530	491	517	518	551	555	544	534	544	549	544	529	07	43	645	11	05	297	348
Mean			555	559	561	568	574	571	570	562	564	563	554	528	531	516	519	517	520	521	539	545	544	547	548	550	548							259
Mean	⁎ a		546	548	549	556	563	566	569	572	576	570	563	557	554	544	536	537	545	545	545	548	549	548	546	545	553							101
Mean	≠ c		543	544	543	548	553	554	552	551	557	561	553	549	545	546	543	546	547	547	547	546	546	545	542	539	548							
Mean	≠ c		565	570	572	587	600	594	588	521	504	516	505	412	512	455	497	508	466	444	532	548	538	552	558	564	529							

DESIGNATIONS

⁎ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 37

HOURLY VALUES OF VERTICAL INTENSITY

AUGUST 1952 - 64000 plus tabular quantities expressed in gammas G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1			536	540	548	560	576	572	585	606	589	589	597	613	578	547	536	534	544	542	537	534	530	532	529	522	557	07	16	639	23	52	521	118
2									(562)	570	601	605	602	582	574	549	536	540	523	507	480	514	541	542	534	537								
3	≠		532	533	534	545	583	651	589	464	345	440	512	506	463	493	477	504	604	597	557	560	551	549	549	542	528	05	59	672	08	43	235	437
4			536	540	544	544	536	547	583	620	605	600	597	553	544	541	534	476	495	518	519	519	536	521	529	530	544	10	36	658	15	26	447	211
5			541	548	549	556	568	557	549	571	568	536	440	431	529	536	530	504	450	454	495	532	547	548	548	547	526	07	53	615	11	06	356	259
6			549	557	574	608	611	563	549	570	556	585	540	536	481	503	474	459	508	529	529	534	545	548	548	547	542	03	58	654	10	45	386	268
7			548	570	574	578	556	551	547	576	525	563	589	586	493	529	519	508	525	529	529	530	545	545	541	541	546	07	46	626	12	34	379	247
8			556	568	548	548	560	582	583	556	585	597	582	536	462	451	534	545	545	541	533	529	529	532	532	533	544	(09	06)	619	(13	10)	379	240
9	⁎		541	542	544	542	545	544	541	538	537	537	537	540	519	508	521	530	533	530	503	512	519	517	515	517	530			548	18	51	483	65
10			525	574	600	589	585	601	597	597	583	598	570	481	439	549	556	504	463	510	548	552	548	545	540	540	550	13	34	616	12	24	229	387
11			541	551	559	572	570	553	549	544	545	575	572	557	556	555	548	549	547	544	545	542	536	534	530	532	550	10	41	604	10	57	502	102
12	≠		540	570	572	563	570	566	562	581	597	590	564	542	534	542	547	466	453	541	534	518	507	521	523	525	543	08	35	604	15	55	331	273
13	⁎																																	
14	⁎ ≠																																	
15																																		
16	⁎ ≠																																	
17	≠																																	
18	≠																																	
19								(577)	564	559	562	525	524	544	532	510	521	417	423	483	537	543	548	549	551	548					15	50	341	
20			551	556	571	583	598	622	613	603	536	593	509	449	495	518	534	544	545	543	529	519	532	536	537	552	549	09	29	662	11	34	315	347
21	⁎		559	560	563	575	573	571	560	553	556	556	551	553	552	549	548	544	544	543	543	544	544	545	548	548	553	03	32	581	21	39	536	45
22	⁎		548	552	555	551	553	551	551	548	549	555	556	555	540	536	541	547	545	544	544	544	545	545	544	544	548	06	58	562	12	24	532	30
23			544	558	589	577	560	558	549	549	549	559	559	558	548	548	547	545	543	536	534	537	543	544	544	545	551	02	23	627	18	21	525	102
24	⁎		549	555	556	552	548	549	548	548	560	579	571	563	551	548	544	544	543	537	536	534	533	536	539	541	548	08	54	612			532	80
25	⁎ ≠		544	548	551	551	555	551	548	547	547	547	549	543	533	537	539	536	537	534	533	532	533	533	536	537	542	03	57	558	12	41	509	49
26	⁎ ≠		545	549	551	558	559	559	551	547	547	549	552	534	548	548	548	547	545	544	537	534	533	530	525	528	544	03	51	563	22	24	521	42
27			532	536	549	556	564	571	574	590	571	575	579	534	560	560	548	545	506	509	524	534	543	547	545	544	550	07	09	671	17	04	474	197
28	⁎ ≠		545	548	559	563	571	575	583	574	563	559	549	545	545	547	547	547	547	544	540	543	544	543	539	536	552	06	33	592	23	05	534	58
29			536	545	551	556	559	560	560	553	548	547	549	549	547	545	466	366	397	477	485	494	503	496	519	536	518	03	44	563	15	50	237	326
30	≠		560	575	639	673	626	573	517	577	547	549	537	530	536	544	541	533	530	506	534	536	536	534	547	544	555	03	13	703	06	32	489	214
31			543	545	555	563	578	577	592	616	628	601	488	370	432	517	536	548	552	558	556	547	537	533	534	534	543	09	00	649	11	20	287	362
Mean			544	553	562	568	570	570	564	566	554	564	550	529	521	533	531	518	522	531	532	533	536	535	537	538	544							194
Mean ⁎														Insufficient data																				
Mean ≠														" "																				
Mean ≠														" "																				

DESIGNATIONS

⁎ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 38

HOURLY VALUES OF VERTICAL INTENSITY

SEPTEMBER 1952 — 64000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m		Minimum h	m		Range
1	≠	549	570	612	631	647	615		564	464	410	378	533	511	601	534	592	669	608	604	590	560	510	536	537	555	557	12	06	737	09	06	152	585
2		590	575	586	588																													
3		592	579	590	592	624	578		601	549	(541)		522	(534)			510	536	483	503	545	555	547	549	570	574		05	02	679				
4	⁎	564	577	578	566	563	562		559	564	577	575	519	455	503	421	438	563	539	545	540	545	551	558	558	558	541	11	58	642	14	15	330	312
5		562	562	562	560	555	563		577	592	588	589	585	562	510	571	601	627	519	424	383	488	530	533	545	562	548	15	47	724	17	41	278	446
6		577	564	574	588	597	632		609	649	611	551	551	552	504	511	496	498	541	522	536	533	536	547	560	562	558	07	52	694	12	39	438	256
7		562	560	562	577	627	623		607	593	588	574	559	549	549	547	547	533	524	488	379	464	491	500	517	537	544	04	42	665	18	42	341	324
8	≠	586	601	597	585	645	575		489	435	409	397	544	469	451	697	528	398	465	485	506	515	524	549	560	563	524	13	24	805	08	30	179	626
9	≠	642	628	654	656	537	586		489	317	446	537	232	470	574	574	464	424	524	586	562	544	534	547	574	579	528	03	35	713	10	10	-23	736
10		615	600	604	613	573	601		585	547	438	506	464	534	537	447	506	552	560	558	547	537	547	548	545	545	546	06	22	658	08	08	165	493
11		549	560	560	566	568	577		586	577	570	589	560	479	514	515	442	465	503	559	573	573	562	549	560	553	546	09	45	609	14	23	374	235
12		555	562	596	642	665	601		582	581	601	568	522	509	430	481	492	551	547	562	510	529	536	544	555	551	553	04	47	701	12	46	282	419
13	⁎ ≠	551	551	558	562	574	575		573	562	560	562	536	509	506	518	543	552	555	558	556	551	551	548	545	544	550	04	53	586	11	36	484	102
14		548	549	564	583	672	611		613	597	570	558	530	460	483	372	344	342	451	517	539	545	544	549	555	548	527	04	26	731	15	42	134	597
15	⁎	559	560	560	560	560	563		563	567	577	560	536	540	519	530	529	479	519	545	549	532	522	537	536	545	544	08	10	589	15	22	424	165
16		566	566	564	560	563	559		559	559	574	563	537	539	492	489	517	532	539	548	549	551	551	544	541	547	546	09	00	590	13	37	457	133
17	⁎ ≠	548	551	553	560	573	570		564	560	562	563	549	466	442	476	509	530	534	536	544	545	545	545	545	547	538	04	47	579	12	01	410	169
18	⁎ ≠	549	549	552	552	560	563		583	560	551	549	553	549	547	544	539	536	537	537	540	536	537	541	547	548	548	06	20	597	19	42	534	063
19	⁎ ≠	552	553	555	553	553	551		549	549	551	549	549	548	545	537	532	526	515	524	532	534	539	539	544	545	543	05	57	558	16	12	507	051
20	⁎	547	545	548	552	551	560		571	589	564	556	548	547	544	539	536	533	528	532	534	534	534	522	533	536	545	07	10	601	21	44	509	092
21		552	586	613	560	541	543		549	553	566	571	555	539	532	522	534	543	539	536	536	534	534	532	536	534	548	02	20	635	12	59	507	128
22	⁎	547	558						558	559	571	545	492	552	547	547	536	514	503	517	529	530	532	532	534	544		11	21	(581)	10	37	438	(143)
23	⁎ ≠	547	551	553	552	560	555		558	559	551	560	560	559	558	552	547	528	532	541	543	540	537	537	543	545	549	09	52	575	15	48	509	066
24		551	556	556	558	560	579		607	594	563	558	549	558	548	545	526	440	416	525	525	517	514	509	515	524	537	07	06	619	16	29	329	290
25		559	562	560	559	553	551		547	547	547	547	545	532	545	547	548	548	545	534	517	506	506	518	509	511	539	03	30	567	22	52	495	072
26		547	671	701	686	646	558		509	492	544	533	494	530	502	518	525	532	534	548	549	544	537	536	536	536	554	02	11	722	07	11	391	331
27		543	547	558	571	628	669		604	476	(356)	504	574	537	597	577	571	438	524	566	560	548	547	545	547	541	547	08	52	842	08	48	002	840
28		545	558	574	577	637	615		619	519	461	404	603	560	506	462	499	558	509	447	440	398	496	549	571	573	528	04	30	668	09	21	067	601
29	≠	616	588	598	562	571	628		588	485	519	492	558	642	724	792	795	658	601	590	575	556	504	509	558	593	596	13	50	932	12	31	-98	1030
30	≠	698	566	544	601	598	560		571	588	551	540	492	639	656	590	532	503	496	548	532	545	560	564	562	559	566	00	29	740	10	25	311	429
Mean		568	570	578	581	588	583		569	544	534	535	531	531	534	534	527	521	526	536	528	530	533	538	546	550	546							355
Mean ⁎ a		554	556	558	557	562	562		564	563	563	560	543	524	517	512	521	531	533	541	543	541	541	541	544	546	545							128
Mean ≠		549	551	554	556	564	563		565	558	555	557	549	526	520	525	534	534	535	539	543	541	542	542	545	546	546							
Mean ≠		618	591	601	607	600	593		540	458	467	469	472	566	601	637	582	530	539	563	553	544	526	541	558	570	554							

a Means of 9 values

DESIGNATIONS

⁎ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

( ) Approximate

TABLE 39

HOURLY VALUES OF VERTICAL INTENSITY

OCTOBER 1952 — 64000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h	m	Minimum h	m	Range
1			560	568	575	571	598	581	577	564	588	503	515	533	547	547	529	524	524	539	534	536	536	541	545	544	549	08	44	615	09	50	386	229
2			549	552	549	552	574	601	575	567	574	578	547	518	522	476	449	511	537	533	522	507	504	532	543	547	538	09	14	626	13	53	393	233
3			549	552	558	573	631	598	604	577	558	549	548	536	425	412	421	397	262	326	420	528	506	530	530	564	506	04	40	653	16	36	138	515
4	≠		605	616	577	577	639	484	383	381	424	574	593	541	545	544	479	442	470	498	479	481	549	563	539	608	525	09	52	737	06	06	188	549
5	≠		594	586	582	596	658	574	410	393	469	588	741	669	781	769	667	605	547	465	242	510	547	555	560	570	570	10	38	863	18	57	62	801
6			586	586	620	618	590	620	537	550	454	399	494	532	448	468	366	342	588	544	556	562	558	555	560	563	529	02	34	695	15	41	209	486
7			564	(562)	549	566	566	568	589	590	562	556	495	395	468	522	410	510	548	536	544	540	536	536	544	547	533			624	14	46	216	408
8																																		
9								562	568	559	553	551	469	395	379	454	548	548	553	551	549	545	536	536	537	534					10	56	255	
10			555	559	563	568	585	603	588	573	559	506	506	548	547	547	547	536	532	536	544	518	443	466	510	532	540	05	09	611	20	30	421	190
11			543	559	575	575	573	586	578	590	528	469	503	540	504	454	521	549	551	525	462	533	549	545	537	537	537	07	58	618	18	11	325	293
12			579	590	619	646	654	639	552	563	562	545	506	536	537	489	552	547	545	548	556	551	549	555	558	553	564	03	27	686	13	11	397	289
13	⁕		556	562	573	568	573	574	573	564	562	558	551	539	534	533	543	507	518	537	547	551	548	545	545	(543)	550	05	44	577	15	49	483	94
14	⁕		547	551	562	571	589	619	607	573	558	559	549	541	539	543	537	536	492	496	536	547	548	548	548	547	552	05	38	656	17	03	458	198
15	⁕ ≠		547	551	556	555	556	558	558	558	553	551	547	543	539	539	537	534	530	522	518	532	536	537	544	545	544	05	45	562	18	31	506	56
16	⁕		549	551	548	555	552	564	562	552	548	547	541	530	484	510	533	533	533	533	536	537	539	537	536	544	540	05	26	570	12	41	445	125
17			545	549	552	590	616	581	592	577	588	560	553	551	530	549	548	532	495	420	461	484	506	521	524	534	540	04	26	641	17	25	341	300
18			541	551	574	603	598	573	588	574	468	571	553	530	518	465	495	438	440	466	515	530	533	540	539	541	531	09	37	618	13	15	393	225
19	⁕		548	552	558	560	564	560	564	589	581	457	521	571	536	545	545	518	544	552	547	544	541	541	545	551	548	08 07	37 19	601	09	12	383	218
20	⁕ ≠		553	559	567	575	588	588	588	589	596	585	552	485	479	489	421	468	491	530	547	543	536	533	533	537	539	09	00	605	14	51	387	218
21			536	536	534	532	534	534	534	534	537	543	532	526	714	701	593	476	518	454	435	510	502	530	537	534	538	12	26	793	18	10	327	466
22	⁕ ≠		533	533	533	529	530	530	528	528	530	532	532	532	472	521	533	532	530	524	522	519	521	522	530	533	526	05	17	560	12	14	401	159
23	⁕ ≠		536	536	536	536	537	536	536	534	534	534	534	533	460	466	517	515	517	507	510	517	517	517	(521)		521	02	48	544	12	27	370	174
24	⁕ ≠		529	(530)	533	532	533	532	530	529	529	532	530	528	525	528	529	530	529	528	524	519	518	515	515	517	527	02	57	537	22	39	510	27
25			519	524	530	530	530	530	530	530	528	530	521	529	518	472	469	519	517	430	457	492	504	510	510	530	511	11	32	581	13	51	366	215
26	≠		555	575	697	528	613	573	560	560	529	517	484	513	476	630	440	611	653	589	639	577	551	551	549	562	564	02	17	795	14	41	50	745
27	⁕		581	581	566	578	560	553	552	564	578	532	522	559	537	529	533	537	537	537	537	536	536	536	534	533	548	11	43	628	11	08	466	162
28			534	559	574	573	563	574	566	560	562	544	506	439	435	465	495	533	530	522	534	534	533	533	532	532	531	03	31	588	12	31	397	191
29			529	533	540	547	560	566	549	547	553	530	481	504	466	457	428	340	460	489	465	462	474	507	534	539	503	05	14	573	15	29	251	322
30	≠		549	603	658	647	593	477	507	537	558	570	533	504	517	525	442	374	299	413	506	491	504	517	541	574	518	03	24	682	16	15	-99	781
31	≠		559	562	657	571	551	570	551	451	537	548	533	387	336	545	536	383	589	582	594	579	573	558	559	574	537	02	46	756	12	18	88	668
Mean			553	676	692	688	700	685	665	658	654	537	535	524	515	526	504	496	511	506	510	527	527	534	538	548	536							322
Mean ⁕			548	551	553	560	558	561	560	558	557	539	538	536	510	520	523	521	522	527	532	534	534	533	535	537	539							143
Mean ≠			540	542	545	545	549	549	548	548	548	547	539	524	495	509	507	516	519	522	524	526	526	525	529	531	531							
Mean ≠			572	588	634	584	611	536	482	464	503	559	577	523	531	603	513	484	512	509	492	528	545	549	550	578	543							

DESIGNATIONS

⁕ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 40

HOURLY VALUES OF VERTICAL INTENSITY

NOVEMBER 1952 — 64000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum h m		Minimum h m		Range
1	≠	608	604	577	575	574	574	573	560	559	549	466	423	421	424	498	269	476	558	506	524	547	548	547	560		530	01 00	631	12 11	206	425
2		586	578	575	563	589	575	558	560	543	562	548	405	477	483	370	387	41C	489	522	518	529	536	539	540		518	04 37	619	11 39	288	331
3		545	548	558	562	567	570	575	559	559	547	519	537	489	506	513	474	521	530	532	525	524	532	533	537		536	09 45	604	15 18	412	192
4	✱ ≠	547	555	552	552	556	544	556	570	551	539	536	533	532	532	532	529	524	524	522	521	522	524	532	534		538	07 36	588	20 27	518	070
5	✱	544	548	548	551	548	547	537	540	547	549	533	524	524	465	406	465	502	519	521	519	519	522	521	521		522	03 45	562	14 11	371	191
6		521	521	528	549	562	604	604	592	547	494	524	473	442	503	536	545	529	539	529	518	524	524	524	522		531	07 05	656	12 46	252	404
7		532	537	551	562	570	575	579	559	545	537	522	453	489	492	511	488	504	506	451	387	436	469	492	544		512	05 53 08 37	590	19 07	359	231
8		548	548	555	563	588	604	588	566	534	495	464	492	525	496	476	498	522	521	510	502	509	530	537	533		529	05 50	628	10 21 14 07	428	200
9		551	549																													
10	✱ ≠	534	539	545	543	545	544	544	543	539	536	533	532	532	532	532	533	532	529	526	530	530	530	532	530		535	04 02	549	21 01	519	030
11	✱ ≠	536	539	544	545	547	552	551	548	545	539	534	530	524	529	533	532	494	492	503	511	524	524	525	522		530	06 08	558	17 20	481	077
12	✱ ≠	530	534	547	549	551	549	556	560	555	547	533	524	522	521	529	530	528	529	532	532	530	526	525	529		536	07 23	563	13 03	519	044
13	✱ ≠	533	533	540	544	548	547	545	539	536	533	532	524	521	525	528	528	530	533	534	532	529	526	522	521		533	03 08	551	11 55	511	040
14	✱	521	521	524	533	547	559	574	577	578	558	511	536	533	524	521	519	518	522	522	521	522	521	521	519		533	08 36	593	10 33	489	104
15		519	521	524	525	533	559	592	592	558	532	518	530	514	521	521	496	483	509	510	504	506	524	524	521		526	06 57	607	15 52	465	142
16		521	521	521	525	530	559	596	588	563	563	556	522	318	604	588	566	544	559	547	534	532	532	533	534		540	14 56	766	12 39	115	651
17		543	547	548	547	545	547	548	568	526	504	484	434	495	477	470	479	503	509	506	457	424	487	530	534		509	07 57	588	20 06	346	242
18	✱	561	569	563	557	550	552	545	550	576	549	541	540	535	519	529	527	531	535	535	535	529	535	537	549		544	08 40	590	13 38	508	082
19	✱	546	550	553	557	557	553	553	552	552	550	533	529	523	519	534	518	519	525	529	530	527	530	534	538		538	04 05	569	10 30	481	088
20	✱	542	544	552	550	549	546	540	535	537	538	537	538	537	535	534	533	533	531	526	522	520	519	523	533		536	03 45 03 05	567	21 27	514	053
21	≠	535	541	553	546	538	578	612	516	414	516	663	710	689	644	576	541	542	530	526	542	540	537	535	549		561	11 22	806	08 13	209	597
22		563	590	594	572	556	559	561	549	540	527	477	315	403	335	599	557	534	560	537	545	545	538	540	549		527	14 54	704	12 00	165	539
23		552	560	567	572	579	593	591	564	574	563	522	533	530	512	531	546	545	549	548	540	540	538	542	545		552	06 04	644	13 09	467	177
24		549	549	559	549	550	552	552	563	576	508	535	529	470	480	466	485	531	548	550	548	545	540	537	537		534	08 55	604	12 42	375	229
25		545	549	563	572	565	553	545	540	552	569	520	527	508	410	417	429	492	526	537	538	537	537	537	538		525	09 26	594	13 40	387	207
26	≠	544	549	549	546	556	556	582	586	594	540	535	533	501	454	485	463	362	417	473	376	414	459	496	555		505	09 45	628	19 48	247	381
27	≠	579	561	555	594	604	625	561	511	535	550	493	563	413	437	693	689	549	546	549	535	559	559	564	576		558	13 51	851	12 01	(138)	(713)
28	≠	604	601	612	604	563	590	606	604	569	548	377	429	520	540	579	526	492	561	499	546	552	551	550	552		549	03 00	663	10 47	277	386
29		553	553	555	561	564	565	563	574	590	481	535	537	557	555	549	519	549	533	505	537	552	557	559	560		548	09 25	685	09 46	266	419
30		561	561	571	572	567	576	608	578	555	559	552	459	451	469	470	505	508	505	526	535	537	545	550	552		536	06 56	644	11 34	350	294
Mean		548	551	555	557	559	566	569	560	550	537	522	507	500	501	518	513	510	525	521	516	521	528	532	539		534					260
Mean	✱	539	543	547	548	550	549	550	551	552	544	532	531	528	520	518	521	521	524	525	525	525	526	527	530		534					78
Mean	≠	536	540	546	547	549	547	550	552	545	539	534	529	526	528	531	530	522	521	523	525	527	526	527	527		534					
Mean	≠	574	571	569	573	567	585	587	555	534	541	507	532	509	500	566	538	484	522	511	504	522	531	538	558		541					

DESIGNATIONS

✱ Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

TABLE 41

HOURLY VALUES OF VERTICAL INTENSITY

DECEMBER 1952 — 64000 plus tabular quantities expressed in gammas — G.M.T. used

Day		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Mean	Maximum			Minimum			Range
																												h	m		h	m		
1		552	556	563	563	564	575	579	560	580	469	537	549	552	544	455	439	499	407	461	497	499	519	538	546	525	08	29	606	17	43	358	248
2	≠	553	587	589	594	590	590	580	580	565	553	533	537	490	488	443	455	683	587	549	525	540	552	526	569	552	16	10	751	15	34	213	538
3		575	578	578	594	629	634	578	563	568	549	533	550	553	567	526	523	535	541	540	530	525	533	548	568	559	05	03	727	14	46	410	317
4	≠	568	650	685	632	590	606	616	555	520	527	550	437	471	546	492	458	504	428	372	454	481	507	549	565	532	02	03	734	11	21	279	455
5		593	586	619	601	605	616	602	572	567	480	477	493	526	552	565	560	548	538	540	525	512	534	537	535	553	03	50	658	10	16	421	237
6	*	542	552	557	560	582	589	568	567	552	548	546	541	541	537	515	490	495	497	535	545	545	538	535	535	542	04	44	604	15	10	451	153
7	*	541	546	548	553	563	561	559	575	579	565	550	546	538	537	525	525	519	518	522	526	527	535	535	534	543	08	50	601	17	06	511	90
8	*	535	541	552	550	561	563	563	568	575	560	549	549	546	541	486	437	508	535	540	546	545	544	542	545	541	07	56	587	14	59	394	193
9	* ≠	549	549	549	553	555	563	561	557	559	552	548	538	535	540	540	538	544	544	544	538	538	537	538	537	546	05	36	564	13 23	20 44	535	29
10		540	545	559	567	579	590	578	565	552	541	537	512	440	431	426	380	376	386	477	505	526	523	519	520	507	05	30	594	16	09	275	319
11		526	535	546	553	590	650	635	579	591	553	523	561	469	471	519	550	546	533	522	535	546	542	541	538	548	06	04	685	12	55	375	310
12		538	541	549	553	557	565	571	591	595	567	549	561	499	425	386	452	535	567	559	550	549	549	549	549	538	09	03	614	14	54	308	306
13	≠	548	563	565	599	650	587	590	525	439	440	522	688	704	687	580	589	574	561	552	550	553	557	552	549	572	12	54	772	09	49	354	418
14	*	549	550	559	565	574	579	569	563	561	561	538	538	537	481	454	518	530	546	552	549	548	540	538	542	543	05	29	590	14	11	410	180
15		549	548	553	582	604	613	604	604	604	561	486	568	549	548	546	548	542	540	546	545	540	541	541	540	558	05	14	621	10	33	425	196
16		537	548	553	560	572	593	594	599	602	574	540	480	514	465	403	433	463	540	556	556	548	535	538	546	535	08	38	614	15	02	361	253
17		552	555	576	589	658	676	614	545	579	563	560	540	550	549	538	537	534	541	546	541	541	540	535	557	563	05	32	696	07	47	505	191
18		565	565	576	589	629	590	561	550	553	550	555	549	546	548	505	512	523	511	474	481	516	526	522	527	543	04	24	642	18	35	447	195
19	* ≠	546	557	564	567	564	550	549	548	549	549	549	550	546	544	545	546	545	540	535	534	533	533	534	538	546	03	41	574	21	45	522	52
20	* ≠	549	552	560	565	567	564	553	545	545	546	548	531	484	451	492	508	522	525	533	534	533	531	533	534	534	03	40	572	13	17	424	148
21	* ≠	537	544	549	549	549	550	550	557	561	561	553	535	526	505	444	484	508	522	527	527	529	530	533	534	532	08	56	567	14	17	428	139
22	*	537	546	552	557	563	560	560	552	555	526	467	512	512	474	380	333	398	452	467	512	520	535	540	548	507	09	18	579	15	05	254	325
23	* ≠	552	560	557	553	556	553	550	546	545	553	561	527	531	535	540	540	540	537	534	533	533	530	525	522	543	10	11	575	22	57	516	59
24		523	529	544	564	565	564	549	546	549	544	410	495	544	467	614	526	548	535	557	519	511	519	535	552	534	14	25	726	10	18	304	422
25		559	590	617	636	610	549	541	545	568	465	484	518	407	390	401	470	508	535	537	533	537	538	542	545	526	04	01	715	12	59	225	490
26		546	540	537	546	542	572	590	576	552	544	544	544	471	519	535	522	500	535	540	546	546	546	540	535	540	11	49	608	12	04	428	180
27		531	533	535	542	561	565	583	561	548	548	541	426	450	503	535	537	537	534	529	508	505	493	485	541	526	06	28	604	11	36	375	229
28		540	538	535	544	557	549	546	546	546	546	541	538	535	522	495	424	443	413	467	503	495	505	520	533	516	14	24	565	17	16	318	249
29	≠	550	565	590	604	563	568	565	563	576	478	516	485	426	499	495	426	347	362	(304)	375	482	568	579	555	502	02	36	643	16	04	(154)	489
30	≠	579	606	590	605	610	613	586	571	540	469	446	597	565	589	447	587	484	561	553	535	538	546	550	564	555	05	39	692	16	29	290	402
31		(574)	582	593	568	565	561	606	578	549	550	484	387	376	467	441	481	473	492	495	518	523	525	531	538	519	07	01	654	11	29	266	388
Mean		550	559	568	573	581	583	576	563	559	535	525	528	514	514	493	494	510	511	515	674	528	534	536	543	538							265
Mean *		544	550	555	557	563	563	558	558	558	552	541	537	530	514	492	492	511	522	529	534	535	535	535	537	538							137
Mean ≠		547	552	556	557	558	556	553	551	552	552	552	536	524	515	512	523	532	534	535	533	533	532	533	533	540							
Mean ≠		560	594	604	607	601	593	587	559	528	493	513	549	531	562	491	503	518	500	466	488	519	546	551	560	543							

DESIGNATIONS

* Ten least disturbed days

≠ Five international quiet days

≠ Five international disturbed days

() Approximate

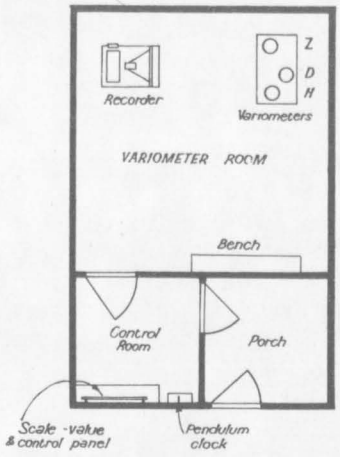
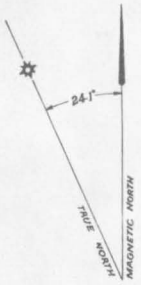


FIG. 1

VARIOMETER HUT



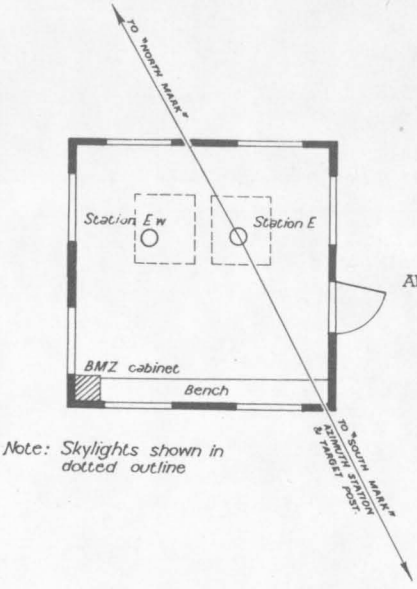


FIG. 2

ABSOLUTE HUT

Note: Skylights shown in dotted outline

Scale in feet

GEOPHYSICAL ACTIVITIES AT MACQUARIE ISLAND 1952 – 1953

MAGNETIC OBSERVATORY BUILDINGS FLOOR PLANS

GEOPHYSICIST

Geophysical Section, Bureau of Mineral Resources, Geology & Geophysics G54-22

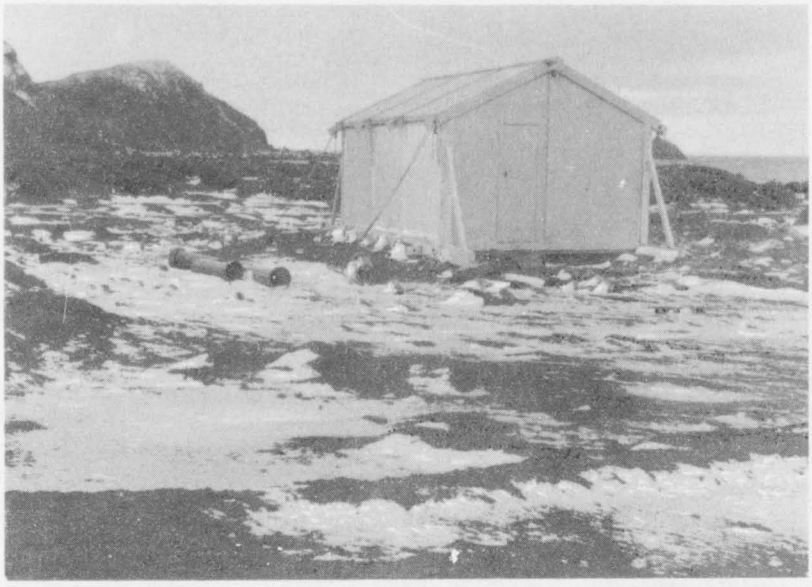


FIG. 1 VARIOMETER HUT

FIG. 2 ABSOLUTE HUT

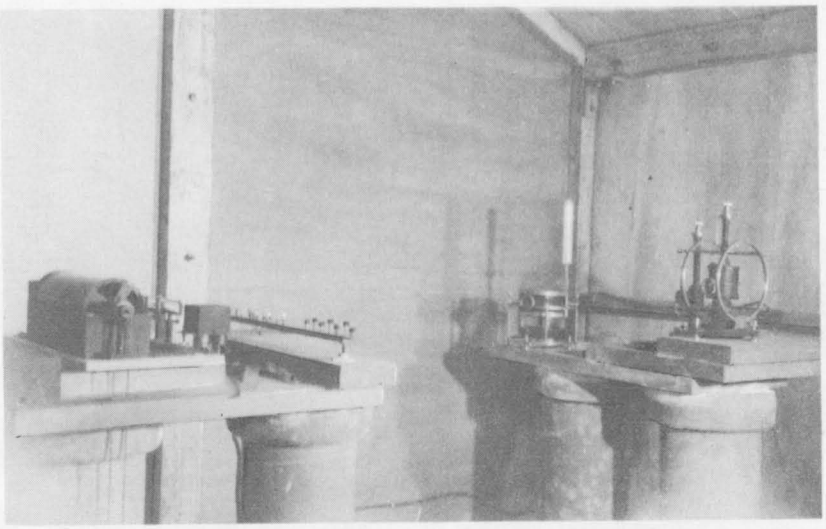


FIG. 1 La COUR MAGNETOGRAPH

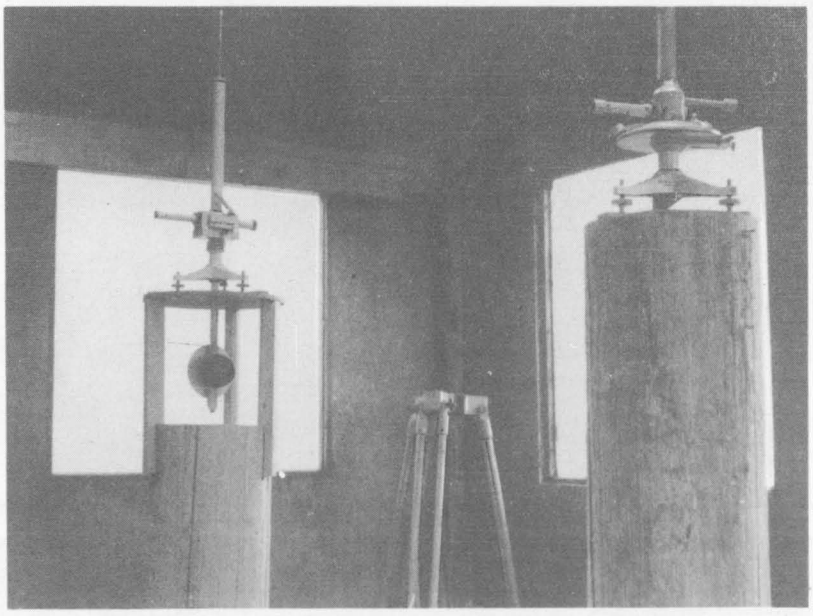


FIG. 2 B.M.Z. and Q.H.M. INSTRUMENTS