Energy, Mines and Resources Canada
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Earth Physics Branch
Direction de la physique du globe

Geomagnetic Service of Canada

ANNUAL REPORT FOR MAGNETIC OBSERVATORIES—1973

E.I. Loomer

Geomagnetic Series Number 9
Ottawa, Canada 1976

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K1A 0Y3

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FOREWORD

The annual report is in two sections. An introductory section gives coordinates of the observatories and a general description of the instrumentation and methods of data reduction and distribution applicable throughout the observatory network. This is followed by brief reports for each observatory containing details of instrument changes, baselines, scale values, corrections for temperature and parallax effects, and a summary of mean values of the magnetic field components.

Tables of mean hourly values and hourly ranges are not published. Microfilm copies of these tables and of the K-indices for Victoria, Meanook, Ottawa and St. John's are sent on a yearly basis to World Data Centre A. A magnetic tape containing the tabular data for several years is also deposited at World Data Centre A. Computer-output copies of mean hourly values and hourly ranges will be distributed on an exchange basis to foreign magnetic observatories.

The magnetic observatories in Canada are operated by:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines
and Resources
Ottawa, Canada
K1A 0Y3

AVANT-PROPOS

Cet annuaire est en deux parties. Dans la première, on retrouve les coordonnées des dix (10) observatoires, et un rapport général qui est applicable au réseau entier. Ce rapport contient une description des instruments, la méthode de réduction d'enregistrements au pilier de référence de chaque observatoire, et la diffusion des données. Dans la partie suivante, on rapporte pour chaque observatoire les remplacements d'instruments, la sensibilité et les valeurs de base des enregistrements, et les coefficients de température et de parallax, de plus les variations journalières de champ et les moyennes mensuelles pour l'été, l'hiver, les équinoxes et l'année sont données pour tous les jours de 1973. Les tableaux de valeurs annuelles de plusiers années sont aussi donnés.

Les tableaux de valeurs moyennes horaires et d'amplitudes horaires pour les composantes du champ (XYZ ou HDZ) ne sont pas publiés. Cependant, on a expédié des microfilms de tous les magnétogrammes, tableaux de valeurs horaires, et indice K (d'Ottawa, Victoria, Meanook, St. John's) au Centre Mondial de Données A. Les données de tableaux de plusieurs années sont aussi enregistrés sur bande magnétique qui est envoyée au Centre Mondial de Données A. Un échange de tableaux de valeurs moyennes horaires et d'amplitudes horaires peut être fait avec les observatoires étrangers.

Les observatoires magnétiques du Canada sont sous l'égide de la

Division du géomagnétisme
Direction de la Physique du globe
Energie, Mines et
Ressources Canada
Ottawa, Canada
K1A 0Y3

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ANNUAL REPORT FOR MAGNETIC OBSERVATORIES—1973

E.I. Loomer

INTRODUCTION

The only significant change in the Canadian magnetic observatory network in 1973 was the installation of a digitally recording magnetometer system (AMOS)[1] at Resolute Bay.

The location, method of recording, and date of commencement of the observatories are given in the following table.

OBSERVATORY INSTRUMENTATION

Primary Photographic Recorders

A set of three-component standard-run Ruska variometers recording the North(X) and East(Y) (or Horizontal intensity (H) and Declination (D)) and the Vertical (Z) components of the earth's magnetic field was the primary recorder at Resolute Bay, Mould Bay, Baker Lake and Victoria. (At all other observatories AMOS was the primary recorder in 1973.) The time scale of the Ruska magnetograms is 20 mm/hr. The hour marks at all observatories are initiated on the hour by a crystal-controlled clock and last for approximately 15 to 20 seconds.

Scale values were determined once or twice a month using the Helmholtz coils provided, and are listed with adopted baselines in the brief reports which follow for each observatory. Scale values are determined for four current settings: +10 mA, +5 mA, -5 mA and -10 mA. Measurements of the resulting magnetogram trace deflections are made to the undisturbed trace level (that is, with zero current in the coils).

OBSERVATORIES		GEOGRAPHIC				GEOMAGNETIC*		ELEVATION	ELEMENTS RECORDED	DATE OF COMMENCEMENT OF CONTINUOUS RECORDING IN THREE ELEMENTS	
Name	IAGA Code	Lat. N. °	'	Long. W. °	'	Lat. N. °	Long. E. °	m		Analogue	Digital
Northern											
Resolute Bay	RB	74	42	94	54	83.1	287.7	25	X Y Z	Nov 1953	Jul 1973
Mould Bay	MLB	76	12	119	24	79.1	255.4	40	X Y Z	July 1962	
Cambridge Bay	CB	69	06	105	00	76.7	294.0	17	H D Z		Apr 1972
Baker Lake	BL	64	20	96	02	73.9	314.8	30	H D Z	Mar 1951	
									X Y Z	July 1957	Nov 1971
Fort Churchill	CHR	58	48	94	06	68.8	322.5	15	X Y Z	July 1957	Sept 1971
Great Whale River	GW	55	18	77	45	66.8	347.2	25	H D Z	Jan 1965	Oct 1972
Southern											
Meanook	ME	54	37	113	20	61.8	301.0	700	H D Z	Sept 1931	Nov 1970
St. John's	JO	47	36	52	41	58.7	21.4	100	H D Z	Aug 1968	Dec 1969
Ottawa	OT	45	24	75	33	57.0	351.5	75	H D Z	July 1968	Sept 1970
Victoria	VI	48	31	123	25	54.3	292.7	185	H D Z	July 1975	Nov 1970

*Assuming geomagnetic pole 78.3°N, 291.0°E (Finch and Leaton, 1957).[2]

Assuming the Helmholtz coils are calibrated to an accuracy of 0.05% and that the coils are sufficiently well-aligned, uncertainties in scale value determinations will result from errors in setting and reading the current in the coils, and errors in measuring the trace deflections on the magnetogram. To minimize errors arising from uncertainty in current readings, the ammeters previously used were replaced in 1972 with digital ammeters capable of measuring current to 0.05%. A magnifying viewer with a scale in tenths of mm is used to measure deflections. Owing to the finite width of the traces and the problem in identifying upper and lower trace edges precisely, the uncertainty in measuring trace deflections is estimated to be 0.2 mm in most cases.

The resulting uncertainty in a single determination of Ruska scale values, using four current settings, should be about 0.5%. In practice, uncertainties are frequently as high as 1%. Scale values for the year are adopted from a least-squares fit to the series of observed values. The uncertainty in the adopted values should be less than 0.3%. For a typical magnetogram, this could introduce an error of about 1 nT in the absolute value of the baseline.

Thermostatically controlled electric heaters maintained the temperature in the variometer rooms constant to $\pm$ 1.5°C for periods of a few months, except at times of power failure or heater malfunction. The correction for seasonal temperature changes is included in the adopted baseline values. Mean hourly values have been corrected for significant temperature changes occurring over periods of a few hours to a few days.

Tests to determine the temperature and parallax corrections to be applied to the Ruska magnetograms are carried out at regular intervals and the corrections are listed for each observatory. To test for the effect of temperature changes on the elements recorded by the Ruska magnetograph, the heaters in the Ruska variometer room are disconnected for a period of about six hours when magnetic conditions are relatively quiet. Mean hourly values scaled from the Ruska magnetogram for this period are then compared with values from the stand-by fluxgate chart at stations where the stand-by instrument is located in a separate room, or with mean hourly values derived from the AMOS.

Assuming AMOS data is independent of changes in temperature[3], the most convenient way to determine Ruska magnetogram temperature coefficients is by comparison between Ruska and AMOS mean hourly values. The temperature coefficient is then given by $\frac{(R2 - R1) - (A2 - A1)}{T2 - T1}$ or $\frac{\Delta R - \Delta A}{\Delta T}$, where R1, R2; T1, T2, are the mean values for hours 1 and 2 of the Ruska (X,Y or Z) trace deflections and temperature trace deflections respectively, and A1, A2 are the corresponding values derived from edited AMOS data. Uncertainties in the temperature coefficient are approximated by the sum of the magnitudes of the partial differentials of $\frac{\Delta R - \Delta A}{\Delta T}$. Assuming uncertainties of 2 nT in ΔR and 0.2°C in ΔT (corresponding to 0.1 mm in R and T) and 1 nT in ΔA, then for typical values of $\Delta R - \Delta A = 15$ nT and $\Delta T = 6$°C, the uncertainty in the Ruska temperature coefficient derived in this way is 0.6 nT/°C. This method is preferable to comparisons with fluxgate chart values, in that it is difficult to make sufficiently precise measurements on the fluxgate chart, and to ensure that the temperature at the fluxgate sensor is constant during the temperature test.

Where a large temperature change persists over periods of several weeks, the temperature coefficient is established from the baseline values observed before and after the temperature shift.

Temperature corrections are to be used with the formula $A_o = A - \alpha (T - T_o)$, where

A_o is the component value at the normal variometer room temperature,
A is the uncorrected component value,
α is the temperature coefficient,
T is the instantaneous temperature in °C,
and T_o is the normal temperature in °C.

The sensitivity of the Ruska temperature trace is 1.3°C/mm.

Stand-by variometers and storm recorders

Continuous traces of X,Y (or H,D) and Z on a strip-chart recorder were provided by a three-component fluxgate magnetometer at all observatories. A new untuned solid-state version of the recording fluxgate magnetometer[4], with improved temperature stability, was in use in 1972. Full scale chart sensitivity is normally 1000 or 2000 nT, with automatic switching to half sensitivity at times of large magnetic disturbance.

The chart is operated at 20 mm/hr. Chart values are used to interpolate for missing intervals on the Ruska magnetograms. The chart also provides a visual indication of magnetic field conditions. An electronic integrator[5] is used in conjunction with the fluxgate magnetometer at Ottawa observatory.

Additional stand-by recorders in operation in 1973 were a standard LaCour and a low-sensitivity LaCour magnetograph at Meanook, and a second Ruska standard magnetograph at Ottawa.

Digital Magnetometer

A digitally recording magnetometer system (AMOS)[1] was installed in Resolute Bay in July, extending the AMOS network to nine observatories (see Table). The AMOS records values of D,H (or X,Y), Z and F once a minute on digital magnetic tape in a format which can be read directly by computer.

The orthogonal elements D,H (or X,Y) and Z are derived from three fluxgate sensors mounted inside a Helmholtz coil system. One pair of coils continuously nulls the principal horizontal component and the second pair, Z, so that the fluxgates operate in essentially zero field at D,H stations. At Fort Churchill, Baker Lake and Resolute Bay, where X,Y are measured, the average value of the minor horizontal component is less than 500 nT. A proton precession magnetometer measures F.

Voltages proportional to the values of the three orthogonal components D,H,Z or X,Y,Z are sampled in quick succession by a digital voltmeter each minute. Then follows a measurement of F by the proton magnetometer. The four readings are recorded on digital magnetic tape together with the date, time and station identification. The variations of the three orthogonal components are also recorded continuously by a strip-chart recorder.

Installation and maintenance of AMOS is carried out by electronic technologists located in Ottawa who travel as required to AMOS sites. In addition a telephone verification system (TVS)[6] has been developed whereby the operation of an AMOS at some distant point is monitored by the operations controller in Ottawa by means of connections to commercial telephone circuits. TVS had been installed at six sites in 1972: St. John's, Victoria, Cambridge Bay, Fort Churchill, Meanook and Ottawa. There were no additional TVS installations in 1973. Sites with TVS were interrogated from Ottawa for one or two minutes each day, to record data actually being produced together with signals indicating a malfunction of the distant equipment. Frequently an AMOS malfunction could be diagnosed immediately from the TVS check; replacement modules for the equipment were then shipped to the station, dispensing with the necessity of a costly service trip.

To reduce noise spikes in the F data, the proton precession magnetometer (PPM) sensors are operated inside a cube, 0.6 m to the side, constructed of 3 mm aluminum sheeting.

To minimize temperature variations at times of power failure or heater malfunction, the AMOS fluxgate sensor and associated Helmholtz coils are placed inside a styrofoam box.

Absolute instruments

The absolute instruments in use throughout the Canadian network are a proton precession magnetometer[1] for the measurement of total field intensity (F) and a portable electrical magnetometer of the saturable core type[7] used with the internally reading nonmagnetic Jena (020) theodolite for measurement of declination (D) and inclination (I). An exception is Victoria observatory, where a GSI precise (first order) magnetometer, manufactured by Sokkisha Limited, Japan, remained the D and I standard in 1973.

The Quartz Horizontal Intensity Magnetometer (QHM)[8] and a declinometer and inclinometer of classical design provided back-up instrumentation at Meanook and Ottawa observatories.

ABSOLUTE OBSERVATIONS AND BASELINE CALCULATIONS

In the Canadian observatory network, the minimum requirement for adequate absolute control of the standard-run Ruska magnetograph has been one set a week of declination (D), inclination(I) and total intensity (F) measurements made during magnetically quiet times in an environment carefully controlled to exclude spurious magnetic effects and large temperature fluctuations.

From earlier comparisons with the Agincourt observatory standards,[9] the probable error of a single observation using the portable electrical magnetometer and including the error in reading the magnetogram, was 0.3' in D and 0.2' in I, equivalent to 3 nT at Agincourt. Assuming the probable error remains at 3 nT in the horizontal components at any site in Canada, the probable error in D will be expected to range from 0.3' in southern Canada to 14' at Resolute Bay.

Calculations of Ruska baselines

Time marks were placed on the Ruska record at the times of the absolute observations. Baseline values were calculated from the measurement of the record ordinates at these points and the values of H (or X,Y) and Z obtained from the absolute observations. In general each baseline determination was based on the mean of six absolute measurements of D,I,F. The standard deviation from the mean of the six Ruska magnetogram baselines calculated from these measurements is an indication of the quality of the set of absolute observations. The final baseline values were adopted by fitting the best straight line to the observed values between known discontinuities. During intervals when the quality of the observed values is significantly non-uniform, the values are first weighted according to their standard deviation. Lists of adopted and observed baselines and scale values are included in the reports for individual observatories. All baseline drifts are assumed to be linear unless otherwise indicated.

The absolute values of Z and H are calculated from the relations Z = F sin I and H = F cos I, where Z,H and F are field values at the time of the I measurement.

In determining the absolute value of X and Y for observatories recording geographical components of the field, a correction must be calculated to reduce H to the time of the D observations, as X and Y are functions of both H and D. This correction is given by

$$\Delta H = (X_D - X_I) \cos D + (Y_D - Y_I) \sin D,$$

where X_D, X_I, Y_D, Y_I are the ordinates of the traces measured at the times of the absolute determinations.

At observatories recording X,Y and Z components of the field, the magnetogram baselines are calculated from the following formulae:

$$\text{X baseline} = (F_I \cos I + \Delta H) \cos D + \text{X var}_D \cdot e_X$$

$$\text{Y baseline} = (F_I \cos I + \Delta H) \sin D + \text{Y var}_D \cdot e_Y$$

$$\text{Z baseline} = F_I \sin I + \text{Z var}_I \cdot e_Z$$

where F_I is the value of F at the time of the I absolute measurement; X var_D and Y var_D are the deflections in mm of the X and Y traces from the baselines at the time of the D absolute measurement; and e_X, e_Y, e_Z are the scale values of the X,Y and Z Ruska traces respectively. Z var_I is the deflection in mm of the Z trace from the baseline at the time of the I absolute measurement.

Accuracy of Ruska data

Each baseline calculation includes uncertainties in the absolute observations, in the measurement of the deflection of the magnetogram trace from the baseline, and in the scale value adopted for the trace.

The uncertainties in the Ruska X and Y baselines are approximated by the sum of the magnitudes of the partial differentials of the X and Y baseline equations. Assuming uncertainties of 1 nT in F, 0.2' in I, the equivalent of 3 nT in D, 0.2 mm in scaling and 0.3% in scale values, the calculated uncertainty in the X and Y baselines, derived from the mean of 6 absolute measurements of D,I and F is 3 nT at all X,Y stations. Approximately half of this uncertainty is attributable to the uncertainty in scaling and in scale values. The corresponding uncertainty in determining the Z baseline from the mean of 6 absolute measurements is 1.5 nT.

In addition to a baseline uncertainty of 3 nT, the X or Y field value derived from a magnetogram will also include the uncertainty in measuring the trace deflection, which is at least ± 0.1 mm or typically 1 nT for a good quality record, assuming the necessary corrections have been made for effects of temperature and parallax. That is, values of X and Y derived from standard Canadian magnetograms may be expected to have an inherent uncertainty of ± 4 nT.

REDUCTION OF AMOS DATA TO OBSERVATORY STANDARDS

The automatic magnetic observatory system (AMOS), in operation at 9 observatories in Canada in 1973, is a quasi-absolute instrument recording three orthogonal field components and total field intensity once a minute on digital tape. These systems constitute a class of magnetic stations intermediate to magnetic observatories and variation stations. Until now, the AMOS has been regarded solely as a digital recorder, and edited AMOS values are corrected to the absolute reference pier of the observatory by comparison with the measurements of D,I,F carried out once or twice weekly at each observatory.

In the AMOS editing process,[3] each one-minute value derived from the fluxgate sensor is multiplied by the factor F/F* where F is the total force reading of the proton precession magnetometer for that minute and F* is calculated from the three orthogonal fluxgate values $[F^* = (X^2 + Y^2 + Z^2)^{\frac{1}{2}}]$. Effects of temperature variation on the fluxgate sensor and associated Helmholtz coils, and other effects which are proportional to the intensity of the field components measured by the sensor, are largely removed by multiplication with F/F*. Changes in level and azimuth of the fluxgate assembly, assumed to be gradual, are compensated by addition of a correction given by comparison between absolute field measurements and simultaneous AMOS values. The procedure is analogous to determining Ruska magnetogram baseline values. The scatter in determining corrections to reduce the AMOS values to the absolute reference (AMOS "baselines") should be significantly less than for a Ruska baseline determination, as the Ruska calculations include uncertainties in measuring trace deflections on the magnetogram, as well as parallax uncertainties. For example, the average standard deviations for 38 sets of D and H baselines at Great Whale River, 1973, were 1.8 nT (AMOS) and 3.0 nT (Ruska) for D; and 1.9 nT (AMOS) and 2.3 nT (Ruska) for H. However, the magnetogram resolution or scale value and the degree of misalignment between the AMOS and Ruska sensors are also factors affecting such a comparison, and the baseline scatter for the AMOS is not invariably less than for the Ruska, as may be seen in case (1) of the Table of Standard Deviations which follows.

At Canadian observatories, where the inclination is large ($\sim 70^\circ$), multiplication by F/F* provides a fully effective absolute control of the AMOS Z component (see Table of Standard Deviations).

Accuracy of AMOS data

Canadian observatories equipped with AMOS can be grouped into three classes according to type of observatory operation. Class I observatories are those operated by permanent staff with considerable experience: Meanook, Victoria, Ottawa and Baker Lake. Following installation of AMOS in July, 1973, Resolute Bay should also be included in this class, although the operator at Resolute generally leaves after a one or two-year term. Class I observatories are equipped with both photographic (Ruska) and digital (AMOS) recorders.

The Class II observatories, Fort Churchill and Great Whale River, are also equipped with both Ruska and AMOS, but are operated under contract. The operation is carried out on a rotating basis by two or more technicians. The technicians are trained at the station by an officer from the Division of Geomagnetism. Effective operational control at these observatories is complicated by the frequent change in technical personnel.

Cambridge Bay and St. John's are Class III observatories, equipped with AMOS only. The operation is by contract and the observatories are visited once (or twice) a week only, to check the AMOS and to make absolute D,I,F measurements.

To estimate the number of absolute observations required to reduce AMOS data to the acceptable observatory level of operation AMOS baselines for 1973 have been examined for the three classes of observatories. Three cases were considered. The results are summarized in the following Table of Standard Deviations.

Case (1) The mean X,Y (D,H) baseline values for each month for both AMOS and Ruska were determined. The standard deviation of the observed baselines from the values given by the graph joining the monthly means was calculated for each station for the year 1973. The line joining successive monthly means has been taken as the curve of best fit to the observed data, which are generally distributed fairly uniformly in time.
Case (2) The standard deviation of observed AMOS baseline values minus the mean baseline value for the year was calculated. This case corresponds to an initial calibration of the AMOS against absolute standards with no further absolute control during the year.
Case (3) Four baseline values were constructed to coincide as closely as possible with the mid-points of February, May, August and November, by meaning the baseline values observed a few days before and after these dates. These four points were joined, and the standard deviation was calculated between actually observed baseline values and the values which would have been adopted if 4 determinations only were available. This approach is suggested by the nature of the AMOS baseline plots, which show over several years with few exceptions an annual quasi-sinusoidal variation. At stations where some data were missing, an attempt was made to evenly distribute the constructed baselines throughout the interval used. For example, at Baker Lake, owing to changes in instrument standards in September, AMOS data were used for the period January to August

STANDARD DEVIATIONS (nT)

Type of operation	Observatory	No. of values	Case (1)		Case (2)	Case (3)
			Ruska	AMOS	AMOS	AMOS
Class I	Baker Lake	26	X 1.8	2.4	6.1	4.3
		26	Y 2.1	2.2	9.8	4.8
		26	Z 5.1	0.4	0.6	
Class I	Victoria	38	H 3.0	1.8	4.6	2.8
		39	D 2.2	3.0	4.6	4.6
		39	Z 2.0	1.5	1.7	
Class II	Churchill	33	X 3.1	3.4	8.9	5.3
		33	Y 4.8	3.2	17.8	4.0
		31	Z 5.8	0.6	1.1	
Class II	Great Whale	34	H 3.0	2.7	10.0	3.4
		29	D 3.8	2.9	14.0	4.0
		36	Z 4.5	0.9	1.8	
Class III	Cambridge Bay	43	H	2.2	6.2	4.0
		43	D	2.8	4.6	3.4
			Z		1.1	
Class III	St. John's	78*	H	2.5	3.0	2.9
		72*	D	2.6	3.4#	3.4#
			Z		1.2	

Note: Values for case (3) Z are not shown: they will be less than case (2) Z values which already meet observatory requirements.
*Consists of morning and afternoon sets of 4 readings each.
#Malfunctioning of the digital voltmeter affected the July and August D values; these months were accordingly omitted in forming Case (2) and (3) means.

only, and 3 baselines were constructed: February 12 (from the mean of values observed February 10 and February 13); April 30 (mean of April 25 and May 4); and July 19 (mean of July 16 and July 22).

The differences in method of operation are reflected in the table, in particular in the relatively high standard deviation for case (1) (Ruska) at Churchill and Great Whale River. At these observatories AMOS data for the year 1973 reduced to the absolute reference pier by 4 absolute sets only (case (3)) are almost as reliable as values corrected by 30 or more sets. At St. John's, omitting the D data for the two months when the digital voltmeter was not functioning properly, reasonably good control of the AMOS data is possible with one set of absolute observations during the year, owing to the relatively small seasonal variation and/or drift of AMOS baselines, as shown in case (2). Baseline drift is generally higher at the northern stations where the seasonal movement of instrument piers is more pronounced.

As noted previously, AMOS baseline curves vary gradually with time, and generally exhibit the familiar seasonal variation associated with pier tilting. These curves can often be closely approximated by straight-line segments joining four points centred quarterly. However, the character of the annual variation of AMOS baselines, which is expected to persist from year to year in its main outlines, should be carefully considered in choosing the times for absolute observations. For example, at Great Whale River, a lag of one month in the four evenly spaced absolute sets has little effect on the accuracy of determining H(AMOS), but increases the standard deviation in D from 4.0 nT to 4.8 nT. This increase is entirely due to the poorer fit at the time of the August-September maximum, and an additional observation in the period July to September is obviously desirable to more accurately approximate the observed baseline variation. At Victoria, a shift of 2 weeks in the times of the four sets of constructed baselines changed the standard deviations in H and D from 2.8 nT and 4.6 nT to 2.4 nT and 3.9 nT respectively.

A number of conclusions which may be drawn from this analysis are listed below.

1) It is evident from case (2) of the table of standard deviations that, as a result of the initial reduction of AMOS fluxgate values to the total force reference provided by the proton precession magnetometer, AMOS Z values satisfy the accuracy expected from a magnetic observatory with no additional absolute control.
2) Without question the accuracy of observatory data increases with the number of absolute observations. For this reason, at permanently staffed (class I) observatories high priority must continue to be given to increasing the number and quality of absolute field measurements. Although a significant portion of the time now required for the operation of contract observatories is spent on absolute measurements, the consistently high quality of operation possible at Class I observatories cannot reasonably be expected from contract stations.
3) The AMOS, with limited absolute control, is capable of producing data approaching observatory accuracy. This fact will greatly increase the usefulness of the equipment, and will allow a significant extension of the AMOS network with a minimum expenditure of money and manpower. Moreover, existing Class II and Class III stations can be allowed to run unattended for periods up to a few months if staff for holiday or emergency relief is not available.
4) It is probable that incorporation of a reliable self-levelling device in the AMOS sensor would considerably improve the reliability of the system.
5) It is concluded that absolute observations four times a year are sufficient to maintain AMOS data at an absolute accuracy of a few nT in any component.

DATA DISTRIBUTION

Microfilm copies of standard-run photographic magnetograms with provisional baselines and scale values are supplied to World Data Centre A, Boulder, Colorado, on a monthly basis. Copies of magnetograms may be obtained from the Division of Geomagnetism or from

World Data Centre A, Geomagnetism,
NOAA
Boulder, Colorado 80302
U.S.A.

Mean hourly values for Cambridge Bay, St. John's, Meanook, Great Whale River, and Fort Churchill were derived from the one-minute digital data. Mean hourly values have not been calculated for hours in which five or more consecutive minute values were missing. Interpolations for missing data were made from the Ruska magnetograms at Meanook, Great Whale River and Fort Churchill and from the stand-by fluxgate charts for Cambridge Bay and St. John's. Magnetograms were scaled at Victoria on a semi-automatic scaling machine.[10] At Ottawa, some mean hourly value data for January to May were derived from the output of the electronic integrator[5]; for the remainder of the year, all mean hourly values were derived from the minute data. The mean hourly values for Baker Lake, Resolute Bay and Mould Bay were scaled manually; values were punched on cards and the tables were calculated by computer. All values were rounded off to the nearest nT. Copies of mean hourly value and hourly range tables may be obtained from World Data Centre A or from the Division of Geomagnetism.

Tabular data on magnetic tape is in the IAGA format, with the addition of hourly range data. Ranges in X,Y and Z for each hour are automatically computed from the AMOS data if no minute values are missing in the hour. If one or more minute values are missing, hourly range information must be interpolated from a back-up analogue record. These interpolations have not been done for the vertical component ranges or for ranges in any component at Cambridge Bay.

On microfilm the tables for each observatory are arranged as follows:

Tables 1-36: Mean values of the three recorded elements for each hour of the day, and daily and monthly means for all days and for the international quiet and disturbed days;

Tables 37-45: Summary by month, season, and year of mean hourly values of the three elements for all days and for the international quiet and disturbed days;

Table 46: For the observatories reporting K-indices (Victoria, Meanook, Ottawa, St. John's), three-hour range indices and K-indices.

Tables 46-69: For the northern observatories, hourly ranges in 10-gamma units in the two horizontal components (R-Indices).

Beginning with 1973 the following tables are included, if available:

Tables 70-75: Summary by month, season, and year of mean hourly ranges of the horizontal components (X and Y) for all days and for the international quiet and disturbed days;

Tables 76-87: Hourly ranges in 10-gamma units in the vertical component (Z);

Tables 88-90: Summary by month, season and year of mean hourly ranges in the vertical component (Z) for all days and for the international quiet and disturbed days.

All times on the tables are universal time (UT).

K indices are sent twice a month from Meanook and Ottawa observatories to DeBilt, Netherlands, and Göttingen, Germany, for use in preparation of planetary K indices published by the International Association of Geomagnetism and Aeronomy (IAGA). K indices from Victoria and Ottawa contribute to the formulation of the index Kn.[11] In addition, K indices from St. John's observatory are forwarded on a regular basis to IAGA.

The lower limit, in nT, for K_9 is:

1500 for Meanook
500 for Victoria
750 for Ottawa
750 for St. John's

Magnetograms are read each month at these observatories for magnetic events and the results forwarded to the appropriate IAGA Commission.

Unedited AMOS data for Fort Churchill and Great Whale River were forwarded to W.D.C. A for use in formulating the AE[11] indices.

SUMMARY OF MEAN VALUES

The summary for 1973 of the mean hourly values of the three elements, and a list of annual mean values, are given in the reports for individual observatories. Mean hourly values have been derived from the AMOS data for at least a part of the year 1973 for all observatories except Mould Bay, Resolute Bay, Baker Lake and Victoria. All mean hourly values derived from AMOS data are given in the XYZ system.

RESOLUTE BAY

Officers-in-charge: D. Showalter 1972.5-1973.5
R. Green 1973.5-1974.5

A magnetic observatory was established at Resolute, Cornwallis Island, N.W.T. in 1948. However, photographic variometers capable of recording the geomagnetic field in three components were not in operation until November 1953.

The mailing address for Resolute Bay Observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines & Resources
Ottawa, Canada
K1A 0Y3

Observatory site

The area consists of Paleozoic limestone. Magnetic field intensity gradients are extremely small: a survey of the area has indicated a very low gradient in total field intensity with no natural anomaly greater than 50 nT within 1.5 km of the observatory.

Magnetic equipment

An AMOS was installed in Resolute Bay in July.

Ruska drive-clock problems led to the installation of a synchronous motor-drive for the Ruska recorder June 22. The sensor for the recording fluxgate magnetometer was realigned in January. A defect in the locking mechanism for the horizontal circle of the Jena theodolite introduced uncertainties in the D and I observations during the period January to May.

Cable ducting was laid between the IGY building and the absolute and recording buildings in July: 11 cables between the IGY and absolute buildings, and 9 between the absolute and variometer buildings. 20-ft lengths of rigid PCV 7.5 cm thin-walled ducting was used. Owing to the difficulty in trenching, the cable was covered with a wooden box.

An intercommunication system was installed in the three buildings (FANON model IN - 600, modified for reception of WWV radio signals). This supplements the intercommunication system connecting the IGY building and the seismic vault.

An EICO battery eliminator was installed, to provide 4 volts for Ruska lights, 12 volts for the Sprengnether crystal-controlled chronometer, and charging for a 12-volt lead-acid battery. In the event of a power failure, the 12-volt battery powers the chronometer, and provides the 4 volts required for the Ruska lights. A second 12-volt battery provides stand-by power for the AMOS clock and is charged through this clock.

Parameters for Ruska data reduction

Corrections for temperature and parallax

The Ruska temperature coefficients were determined Feb. 5 (00 - 03) and Feb. 5 (19) - Feb. 6 (03), 1974, by comparison between the mean hourly values of the Ruska and AMOS. For a temperature change of 5°C the coefficients determined differed slightly from those found in 1972 (+2.5, -1, -1 for X,Y,Z respectively) when the fluxgate chart was used as reference. The apparent change is to be attributed to the difficulty in making sufficiently precise measurements on the fluxgate chart and in holding the temperature at the fluxgate sensor constant, and not to any real change. Parallax tests were carried out July 25, Sept. 28 and Oct. 24.

The temperature coefficients and parallax corrections adopted for 1973 are listed below.

	Temperature Coefficients	Parallax corrections (to be added to times read on the magnetograms)		
	nT/°C	min		
		Jan-Jul	Jul-Sept	Sept-Dec
X	+ 2.0	1.0	0.8	0.3
Y	- 1.5	1.2	1.0	0.8
Z	- 3.0	0.8	0.4	0.0

Changes in parallax corrections followed time-light adjustments on Jul. 7, 1800 U.T., and Sept. 28, 2309 U.T.

Baselines and scale values

Owing to the problem with the theodolite of the D&I instrument, only one set of baselines was obtained in the period January to April.

The change in the Y baseline on Nov. 3 resulted from an accidental change in the magnet-mirror angle which occurred when making an adjustment to the Y trace mirror. The Y trace was repositioned by adjusting the torsion head of the variometer, causing a misalignment of about 10° in the Ruska Y. This was not detected until the alignment of the Ruska and AMOS sensors was checked against the absolute measurements of the field for the months April to July 1974.

The Y variometer was correctly realigned Aug. 2, 1974. No correction has been made to the Y mean hourly values and ranges for Nov. 3 to Dec. 31, 1973. Values for 1974 have been derived from the AMOS one-minute data.

Other baseline changes in 1973 resulted from trace adjustments. Times of change are given in Tables 1 to 3, which list the adopted and observed baselines and scale values for 1973.

Local quiet days

The five local quiet days for each month selected on the basis of the R indices are listed below. Local quiet days which do not appear also on the list of 10 international quiet days are underlined.

January	2	3	4	18	31
February	4	5	13	14	15
March	4	5	14	15	17
April	5	6	7	9	12
May	3	5	24	30	31
June	1	7	21	22	27
July	5	6	7	17	22
August	10	11	12	17	19
September	14	19	28	29	30
October	15	24	25	26	27
November	12	19	20	29	30
December	1	2	12	16	18

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 4-7.

RESOLUTE BAY 1973

X BASELINES nT TABLE 1 | SCALE VALUES nT/mm

X Baselines: Adopted		X Baselines: Observed		Scale Values: Adopted		Scale Values: Observed	
Jan	-123			Jan	12.30		
Feb	-123			Feb	12.30		
Mar	-123			Mar	12.30	Mar 27	12.39
Apr	-123			Apr	12.30	Apr 6	12.32
						11	12.27
						19	12.31
May 1-19(0200)	-123	May 19	-123	May 1-24	12.30	May 19	12.19
19(0200)-20(1135)	Missing			25-31	12.10	25	12.06
20(1135)-22(0300)	-123						
22(0300)-22(1710)	Missing						
22(1710)-23(1015)	-123						
23(1015)-25(0400)	Missing						
25(0400)-25(1800)	140	May 24	140				
25(1800)-26(1800)	Missing						
26(1800)-31	142 to 146						
Jun 1-10	147 to 156	Jun 1	145	Jun	12.10	Jun 1	12.16
11-30	156 to 163	8	155			8	12.11
		15	162			15	12.11
		22	159				
Jul 1-6(0220)	164	Jul 4	164	Jul	12.10	Jul 3	12.14
6(0220)-6(0440)	Missing	6	-8			6	12.09
6(0440)-31	-5 to +4	16	-2			24	12.14
		19	+2				
		25	+4				
Aug 1-29	4 to 12	Aug 1	3	Aug	12.10	Aug 3	12.08
30-31	11	6	6			11	12.12
		12	8			26	12.07
		17	15				
		29	11				
Sep	11 to 2	Sep 5	13	Sep	12.10	Sep 6	12.19
		12	18			14	12.00
		20	-7			22	12.18
		27	0				
Oct	2 to -7	Oct 4	-3	Oct 1-15	12.10	Oct 2	12.02
		13	1	16-31	12.05	9	12.13
		20	-1			22	12.10
		25	-5				
Nov 1-11	-8 to -2	Nov 1	-6	Nov 1-15	12.00	Nov 1	12.08
		3	-11	16-30	11.95	4	11.97
12-30	-2 to -1	12	-2			13	11.97
		19	-1			23	11.97
		27	-4			24	11.94
Dec	-1 to +1	Dec 4	-1	Dec	11.95	Dec 3	11.91
		10	1			14	11.93
		18	0			25	11.95
		24	-2				
		31	1				

RESOLUTE BAY 1973

Y BASELINES nT — TABLE 2 — SCALE VALUES nT/mm

Y Baselines nT: Adopted		Observed		Scale Values nT/mm: Adopted		Observed	
Jan	-716 to -717			Jan	11.40		
Feb	-717 to -719			Feb	11.40		
Mar	-719 to -720	Mar 28	-722	Mar	11.45	Mar 27	11.39
Apr	-721 to -722			Apr	11.45	Apr 6	11.30
						11	11.43
						19	11.57
May 1-19(0200)	-723	May 19	(-712)	May 1-24	11.50	May 20	11.52
19(0200)-20(1135)	Missing	25	-455	25-31	11.80	25	11.83
20(1135)-22(0300)	-723						
22(0300)-22(1710)	Missing						
22(1710)-23(1015)	-723						
23(1015)-25(0400)	Missing						
25(0400)-25(1800)	-456						
25(1800)-26(1800)	Missing						
26(1800)-31	-456 to -452						
Jun	-452 to -436	Jun 1	-456	Jun	11.80	Jun 1	11.80
		8	-442			8	11.75
		15	-446			15	11.70
		22	-439				
Jul 1-25	-436 to -432	Jul 3	-435	Jul	11.85	Jul 3	11.81
26-31	-432 to -438	6	-441			6	11.88
		16	-432			24	11.90
		19	(-449)				
		25	-432				
Aug 1-10	-440 to -455	Aug 5	-435	Aug	11.85	Aug 3	11.87
11-31	-455 to -447	7	-455			11	11.87
		12	-454			26	11.76
Sep	-448 to -458	Sep 5	-448	Sep	11.85	Sep 6	11.91
		12	-456			14	11.85
		20	-457			22	11.88
		27	-456				
Oct	-458 to -461	Oct 4	-462	Oct 1-15	11.90	Oct 1	11.99
		13	-455	16-31	11.95	2	11.86
		20	-455			22	11.89
		25	-464				
Nov 1-3(0700)	-462	Nov 1	-464	Nov	12.00	Nov 1	11.88
3(0700)-12	-481 to -490	3	-481			4	11.99
13-30	-490	12	-491			13	12.01
		19	-488			23	12.01
		27	-490				
Dec 1-4	-490	Dec 4	-489	Dec	11.95	Dec 4	12.01
5-25	-490 to -497	10	-492			14	11.95
26-31	-499 to -507	18	-495			25	11.90
		24	-496				
		31	-507				

RESOLUTE BAY 1973

Z BASELINES nT — TABLE 3 — SCALE VALUES nT/mm

Z Baselines Adopted		Z Baselines Observed		Scale Values Adopted		Scale Values Observed	
Jan 1-15	58145			Jan	11.15		
15(1215)-25(0700)	Missing						
25(0700)-31	58124						
Feb	58123			Feb	11.20		
Mar	58123	Mar 28	58123	Mar	11.25	Mar 27	11.33
Apr	58123			Apr 1- 8	11.25	Apr 6	11.31
				9-30	11.24 to 11.11	11	11.28
						19	11.07
May 1-19(0200)	58115	May 25	58383	May 1-23	11.10 to 10.97	May 20	10.98
19(0200)-20(1135)	Missing			24-31	9.87 to 9.92		
20(1135)-22(0300)	58115						
22(0300-1710)	Missing						
22(1700)-23(1015)	58115						
23(1015-2000)	Missing						
23(2000)-25(1800)	58383						
25(1800)-26(1800)	Missing						
26(1800)-31	58383						
Jun 1-3(0046)	58380	Jun 1	(58365)	Jun	9.94 to 11.13	Jun 1	9.94
3(0046)-8(0305)	58415 to	8	58411			8	10.08
	58425	15	58402			15	10.21
8(0305)-28(2100)	58390 to	22	58408				
	58415						
28(2100)-30(2400)	58493						
Jul 1- 5(1900)	58493	Jul 3	58493	Jul 1-20	11.12 to 10.85	July 3	11.08
5(1900)-6(0450)	58453	6	58304			24	10.80
6(0450)-8(2130)	58303 to	16	58290	21-31	10.85		
	58323	19	58335				
8(2130)-11(0055)	58278 to	25	58336				
	58308						
11(0055)-13(0200)	58320 to						
	58340						
13(0200)-19(2400)	58240 to						
	58330						
20(0000)-25(2400)	58330 to						
	58336						
26(0000)-31	58336 to 58355						
Aug 1- 7	58357 to	Aug 1	58360	Aug	10.85	Aug 3	10.88
	58378	7	58378			11	10.87
8-31	58377 to	12	58375			26	10.82
	58367	17	58364				
		29	58369				
Sep 1- 2(1800)	58366	Sep 5	58323	Sep 1- 2(1800)	10.85	Sep 6	10.01
2(1800)-17(1750)	58323 to	12	58322	2(1800)-30		14	10.03
	58320	20	58270		9.99 to 10.14	22	10.05
17(1750)-30	58275 to	27	58272				
	58272						
Oct	58271 to	Oct 4	58265	Oct 1-26	10.15 to 10.28	Oct 1	10.15
	58262	13	58270	27-31	10.25 to 10.00	9	10.13
		20	58263			22	10.27
		23	(58250)				

RESOLUTE BAY 1973

TABLE 3

Z BASELINES nT				SCALE VALUES nT/mm			
Adopted		Observed		Adopted		Observed	
Nov 1-3(0700)	58261	Nov 1	58263	Nov 1-3(0700)	9.98 to 9.90	Nov 1	9.92
3(0700)-12	58273 to 58276	3	58273	3(0700)-30	9.90	4	(9.79)
13-30	58275 to 58268	12	58277			13	9.97
		19	58271			23	9.88
		27	(58263)				
Dec 1-21(0445)	58268	Dec 4	58267	Dec	9.95	Dec 5	9.90
	to 58260	10	58262			14	9.96
21(0445)-28(1910)	58279	18	58261			25	9.91
	to 58267	24	58275				
28(1910)-31	58255	31	58256				

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 4 RESOLUTE BAY X = 0 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	210	209	207	219	205	218	214	236	237	234	246	242	223	218	224	227
1-2	203	217	231	237	235	229	234	252	249	245	254	249	236	238	241	231
2-3	216	226	242	265	251	252	254	269	261	258	258	258	251	257	257	240
3-4	233	237	256	289	268	280	277	285	272	268	264	264	266	278	271	250
4-5	244	246	261	303	289	294	292	295	279	280	268	272	277	293	281	258
5-6	249	260	272	331	308	306	303	307	288	294	272	276	289	306	296	264
6-7	252	272	294	333	325	313	318	315	297	308	282	282	299	318	308	272
7-8	259	277	296	337	333	336	328	328	307	307	294	285	307	331	312	279
8-9	261	276	292	341	333	360	329	325	310	299	295	290	309	337	311	281
9-10	263	275	292	338	334	353	337	317	313	297	287	287	308	335	310	278
10-11	266	267	285	327	331	349	341	314	309	284	281	283	303	334	301	274
11-12	260	262	284	324	322	346	338	317	300	274	272	274	298	331	296	267
12-13	247	247	281	304	309	335	323	303	293	263	264	263	286	318	285	255
13-14	237	236	262	294	299	315	305	309	276	247	251	253	274	307	270	244
14-15	224	226	241	259	273	289	283	279	257	241	235	246	254	281	258	233
15-16	207	212	226	232	242	279	269	255	242	223	223	242	238	261	231	221
16-17	194	200	209	219	223	230	238	224	222	203	211	223	216	229	213	207
17-18	188	181	184	181	197	206	215	217	211	193	209	210	199	209	192	197
18-19	172	167	166	169	185	178	186	201	197	185	198	208	184	188	179	186
19-20	177	156	163	163	181	181	154	194	189	191	195	218	180	178	177	187
20-21	188	147	160	180	174	196	170	213	204	198	206	218	188	188	186	190
21-22	183	167	175	187	194	194	176	223	209	207	222	226	197	197	195	200
22-23	196	183	177	188	192	175	200	228	206	220	234	229	202	199	198	211
23-24	202	195	191	211	184	187	208	232	222	226	241	237	211	203	213	219
MEANS	222	223	235	260	258	267	262	268	256	248	248	251	250	264	250	236

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 5 RESOLUTE BAY Y = -1080 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	275	274	254	231	233	247	261	276	281	263	291	294	265	254	257	284
1-2	266	267	255	208	212	243	252	262	274	264	293	294	258	242	250	280
2-3	271	265	256	204	220	225	249	254	278	262	289	298	256	237	250	281
3-4	269	274	252	212	228	211	245	260	272	266	294	299	257	236	251	284
4-5	263	267	253	228	235	231	252	263	277	276	297	292	261	245	259	280
5-6	275	266	267	241	247	251	264	272	287	283	303	299	271	259	270	286
6-7	283	277	280	262	258	272	276	290	296	290	305	301	283	274	282	292
7-8	297	293	290	286	269	282	287	300	305	307	311	301	294	285	297	301
8-9	311	310	312	315	290	301	304	318	318	322	320	314	311	303	317	314
9-10	330	321	328	331	308	316	328	336	339	340	327	329	328	322	335	327
10-11	338	333	343	345	327	339	352	345	352	355	338	335	342	341	349	336
11-12	349	343	358	359	346	363	368	372	373	366	347	341	357	362	364	345
12-13	356	354	373	379	360	394	381	384	389	372	357	350	371	380	378	354
13-14	359	357	386	404	376	417	392	392	386	374	366	356	380	394	388	360
14-15	363	362	389	418	390	422	404	401	390	382	373	354	387	404	395	363
15-16	364	374	395	408	389	439	415	410	389	381	374	358	391	413	393	368
16-17	361	369	394	406	387	430	416	400	387	363	362	354	386	408	388	362
17-18	351	360	377	378	379	425	406	389	369	350	352	350	374	400	369	353
18-19	336	352	347	343	353	429	387	373	349	338	340	341	357	386	344	342
19-20	322	336	336	325	321	366	346	333	333	321	328	326	333	342	329	328
20-21	304	313	303	298	311	336	321	304	312	305	314	318	311	318	303	312
21-22	296	300	286	267	296	301	305	302	308	292	303	310	297	301	288	302
22-23	291	283	274	255	269	278	288	295	289	282	300	305	284	283	275	295
23-24	285	273	262	244	243	253	274	289	287	274	297	300	273	265	267	289
MEANS	313	314	315	306	302	324	324	326	327	318	324	322	318	319	316	318

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 6 RESOLUTE BAY Z = 58000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	463	502	503	473	460	456	476	489	514	521	528	522	492	470	503	504
1-2	467	503	501	469	462	459	479	497	517	530	530	526	495	474	504	507
2-3	471	504	504	478	468	464	483	498	521	536	533	526	499	478	510	509
3-4	469	505	512	489	475	473	486	507	526	540	537	527	504	485	517	510
4-5	479	510	525	495	479	480	498	515	535	543	540	533	511	493	525	516
5-6	484	519	520	507	488	482	501	524	535	550	539	536	515	499	528	520
6-7	485	527	534	512	495	490	508	530	540	561	540	540	522	506	537	523
7-8	486	526	537	521	505	497	516	538	542	558	550	549	527	514	540	528
8-9	481	536	531	519	502	509	517	537	545	558	559	548	529	516	538	531
9-10	487	529	540	522	503	504	516	539	546	571	554	550	530	516	545	530
10-11	493	537	545	522	501	503	514	533	548	564	550	552	530	513	545	533
11-12	501	534	545	518	503	506	513	530	548	562	548	549	530	513	543	533
12-13	499	529	545	510	501	504	513	521	553	560	549	545	527	510	542	531
13-14	500	526	540	512	489	498	516	519	545	553	549	545	524	506	538	530
14-15	495	525	535	496	481	491	513	512	540	546	550	542	519	499	529	528
15-16	492	524	525	484	475	473	504	508	530	539	547	538	512	490	520	525
16-17	492	520	513	479	477	464	496	500	514	536	541	538	506	484	511	523
17-18	490	516	504	455	474	455	473	483	508	531	536	538	497	471	500	520
18-19	484	507	503	440	459	432	460	467	499	529	531	535	487	455	493	514
19-20	480	503	504	432	452	400	485	459	502	528	528	532	484	449	492	511
20-21	476	506	496	458	474	408	474	481	494	519	529	526	487	459	492	509
21-22	471	508	499	468	464	429	464	492	500	520	527	524	489	462	497	508
22-23	468	505	507	471	454	458	472	492	512	521	526	524	493	469	503	506
23-24	467	501	508	469	455	458	473	489	517	521	526	522	492	469	504	504
MEANS	482	517	520	487	479	470	494	507	526	541	539	536	508	487	519	519

TABLE 7

Annual Mean Values (Resolute Bay)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	'	°	'	nT	nT
1954.5	-96	-915	57971	264	01	89	05.4	920	57978
1955.5	-69	-906	57999	265	38	89	06.1	909	58006
1956.5	-41	-904	58020	267	24	89	06.4	905	58027
1957.5	-24	-903	58065	268	29	89	06.5	903	58072
1958.5	9	-884	58035	270	35	89	07.6	884	58042
1959.5	32	-861	58032	272	08	89	08.9	862	58038
1960.5	54	-850	58052	273	38	89	09.5	852	58058
1961.5	72	-844	58076	274	53	89	09.9	847	58082
1962.5	85	-827	58103	275	52	89	10.8	831	58109
1963.5	108	-815	58120	277	33	89	11.4	822	58126
1964.5	117	-800	58144	278	19	89	12.2	809	58150
1965.5	132	-791	58170	279	28	89	12.6	802	58175
1966.5	141	-780	58208	280	15	89	13.2	793	58213
1967.5	153	-766	58250	281	18	89	13.9	781	58255
1968.5	166	-751	58291	282	28	89	14.7	769	58296
1969.5	179	-732	58320	283	16	89	15.6	754	58325
1970.5	193	-715	58374	285	06	89	16.4	741	58379
1971.5	199	-697	58417	285	56	89	17.3	725	58421
1972.5	222	-686	58444	287	56	89	17.6	721	58448
1973.5	250	-682	58508	290	08	89	17.3	726	58512

*D,I,H,F are derived from the annual means of X, Y, Z.

MOULD BAY

Officers-in-charge: R. Green 1972.5-1973.5
D. Wright 1973.5-1974.5

A combined magnetic and seismic observatory was established at Mould Bay, Prince Patrick Island, N.W.T., in the summer of 1961.

The mailing address for Mould Bay observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines & Resources
Ottawa, Canada
K1A 0Y3

Observatory site

The station is in a permafrost area and is underlain by sandstones, siltstones and shales of the Devonian Melville Island formation. Using a Varian portable proton precession magnetometer, small magnetic field intensity gradients of the order of a few nanoteslas in 30 m were found to exist at the site. The magnetic-seismic observatory is north of the weather station and about 70 m from the nearest building.

Magnetic equipment

The new untuned version of the recording fluxgate magnetometer was found to interfere with the WWV radio time signal on 15 MHz. Reduction of the excitation current eliminated the interference.

An EICO battery eliminator was installed in October as the stand-by power system for the Ruska magnetograph and chronometer.

To provide adequate dynamic range the sensitivity of the recording fluxgate was converted to 200 nT/volt in December.

Parameters for Ruska data reduction

Corrections for temperature and parallax

Temperature coefficients for use with the Ruska magnetograms were checked January 23, and were unchanged from those reported for 1972.[12]

Parallax corrections were determined from tests on January 3, January 20, June 21, 1973, and January 18, 1974.

	Temperature Coefficients	Parallax corrections (to be added to times read on the magnetograms)	
	nT/°C	min	
		Jan 1-Jun 21	Jun 22-Dec 31
X	+0.5	-0.1	0.1
Y	-1.5	-0.1	0.2
Z	+3.0	-0.4	0.1

The change in parallax correction followed adjustment of traces June 21.

Baselines and scale values

Y and Z baseline changes January 19, June 21 and December 3 followed from adjustment of traces. On July 10 and September 27 the Y trace was accidentally moved when installing the Helmholtz coil prior to a Y scale-value calibration. Several abrupt changes occurred in the Z baseline in November and December, which are attributed to permafrost action.

Times of sudden baseline changes and associated changes in scale values are given in Tables 8 to 10, which list the adopted and observed baselines and scale values for 1973.

Local quiet days

The five local quiet days for each month, selected on the basis of the R indices are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	2	3	18	22	31
February	4	13	14	15	16
March	4	14	15	16	17
April	6	7	9	10	12
May	4	5	12	24	30
June	1	7	21	22	27
July	5	6	7	12	18
August	10	11	16	17	18
September	14	19	28	29	30
October	7	24	25	26	27
November	12	19	20	22	30
December	1	2	12	18	24

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 11-14.

MOULD BAY 1973

Table 8

X BASELINES nT — SCALE VALUES nT/mm

X Baselines Adopted			X Baselines Observed			Scale Values Adopted		Scale Values Observed		
Jan	1-20(0645)	858-854	Jan	3	858	Jan	12.50	Jan	3	12.48
	20(0645-1125)	missing		13	855				18	12.55
	20(1125)-31	854		18	854				22	12.42
				22	854					
				31	852					
Feb		854	Feb	6	852	Feb	12.45	Feb	6	12.46
				13	856				20	12.43
				20	854					
Mar	1-31	853	Mar	1	853	Mar	12.40	Mar	1	12.38
				5	855				13	12.42
				13	853					
				27	851					
Apr	1-17	853-852	Apr	4	853	Apr	12.40	Apr	6	12.46
	18-30	853-860		7	855				27	12.34
				(23	851)					
				27	854					
May	1-31	860-877	May	2	862	May	12.35	May	3	12.32
				5	864				5	12.40
				11	863				24	12.35
				23	868					
				24	873					
				30	880					
June	1-25	877-891	June	6	878	June	12.35	June	8	12.37
	26-30	891-889		9	885				9	12.42
				17	881				20	12.23
				22	893				22	12.34
July	1-31	889-874	July	3	887	July	12.35	July	10	12.34
				11	884				10	12.33
				17	884					
Aug	1-31	873-857	Aug	4	870	Aug	12.40	Aug	1	12.51
				15	863				21	12.33
				21	863				20	12.39
				(31	848)					
Sept	1-30	856-840	Sept	7	852	Sept	12.40	Sept	12	12.45
				12	852				27	12.38
				19	849					
				27	839					
Oct	1-15	839-830	Oct	8	825	Oct	12.35	Oct	15	12.31
	16-24	831-846		24	847				28	12.37
	25-31	849-877		25	846					
Nov	1-15	882-907	Nov	1	884	Nov	12.40	Nov	16	12.46
	16-30	906-886		11	903				27	12-40
				16	907					
				23	893					
				30	890					
Dec	1-10	885-871	Dec	11	876	Dec	12.40	Dec	16	12.35
	11-19	874-895		16	886				30	(12.60)
	20-31	893-881		19	897					
				30	881					

MOULD BAY 1973 Table 9

Y BASELINES nT | SCALE VALUES nT/mm

Adopted		Observed			Adopted		Observed		
Jan	1-20(0645)	Jan	3	2103	Jan	12.40	Jan	22	12.42
	2104-2110		13	2109				22	12.40
	20(0645-1125)		18	2107					
	missing		22	1982					
	20(1125)-31		31	1990					
	1986-1988								
Feb	1-15 1988-1990	Feb	6	1989	Feb	12.40			
	16-28 1990		13	1988					
			20	1992					
Mar	1-29 1990	Mar	1	1991	Mar	12.40			
	30 1991		5	1989					
	31 1992		13	1988					
			27	1991					
Apr	1993-2010	Apr	4	1993	Apr	12.40	Apr	6	12.50
			7	1994				6	12.42
			23	2006					
			27	2011					
May	1-11 2011-2017	May	2	2010	May	12.40	May	24	12.38
	12-31 2018-2047		5	2013				24	12.37
			11	2016					
			23	2036					
			24	2036					
			30	2045					
June	1-21(0515)	June	6	2056	June	12.40	June	20	12.28
	2048-2069		9	2059				22	12.48
	21(0515-0605)missing		17	2067					
	21(0605)-30		22	1873					
	1873-1878								
July	1-10(0845)	July	3	1881	July	12.40	July	10	12.52
	1879-1883		11	1567					
	10(0845)-18(0635)		17	1988					
	1568-1572								
	18(0635)-31								
	1988-1986								
Aug	1986-1982	Aug	4	1984	Aug	12.40	Aug	1	12.45
			15	1983				21	12.37
			21	1992				30	12.41
			(31	2001)					
Sept	1-10 1982-1980	Sept	7	1982	Sept	12.45	Sept	12	12.53
	11-27(0720)		12	1980				27	12.43
	1979-1965		19	1969					
	27(0720)-30 2042		27	2042					
Oct	2043-2050	(Oct	8	2030)	Oct	12.45	Oct	15	12.43
			24	2047				28	12.50
			25	2048					
Nov	1-9 2050-2052	Nov	1	2051	Nov	12.45	Nov	16	12.48
	10-30 2051-2017		11	2056				27	12.45
			16	2038					
			23	2026					
			30	2023					
Dec	1-3(1100)	Dec	11	2098	Dec	12.45	Dec	16	12.53
	2016-2012		16	2103				30	12.46
	3(1100)-16		19	2105					
	2092-2104		30	2104					
	17-31 2104								

MOULD BAY 1973 Table 10

Z BASELINES nT						SCALE VALUES nT/mm					
Adopted 57000 nT +			Observed 57000 nT +			Adopted			Observed		
Jan	1-20(0645)	998-996	Jan	3	997	Jan	1-20(1125)	11.72-11.79	Jan	3	11.73
	20(0645-1125) missing			13	996		20(1125)-31	11.60-11.65		18	11.79
	20(1125-31)	947		18	997					22	11.61
				22	949						
				31	946						
Feb		947	Feb	6	947	Feb		11.65	Feb	6	11.67
				13	949					20	11.67
				20	949						
Mar	1-12	947	Mar	1	947	Mar		11.70	Mar	1	11.68
	13-31	947-941		5	950					13	11.69
				13	946						
				27	940						
Apr		941-937	Apr	4	939	Apr		11.70	Apr	6	11.68
				7	941					27	11.74
				23	938						
				27	939						
May	1-5(0810)	936	May	2	935	May		11.70	May	3	11.68
	5(0810)-25	943-947		5	942					5	11.66
	25-31	947		11	942					24	11.68
				23	949						
				24	945						
				30	949						
June	1-21(0515)	947	June	6	946	June		11.70	June	8	11.76
	21(0515-0605)missing			9	947					22	11.62
	21(0606)-30	885-882		(17	837)						
				22	885						
July		882-873	July	3	880	July		11.70			
				11	880						
				17	876						
Aug	1-21(0700)	873-868	Aug	4	872	Aug		11.75	Aug	1	11.65
	21(0700)-31	854		15	869					30	11.76
				21	854						
				31	853						
Sept	1-12(0730)	856	Sept	7	856	Sept		11.80	Sept	27	11.84
	12(0730)-25	871-859		12	873						
	26-30	859		19	860						
				27	858						
Oct	1-16(0430)	859	Oct	(8	846)	Oct		11.80	Oct	15	11.76
	16(0430)-31	952		24	951					28	11.81
				25	952						
Nov	1(0000-1820)	952	Nov	1	953	Nov		11.85	Nov	27	11.79
	1(1820)-16(0510)	937-928		11	928					30	11.91
	16(0510-0535)	940		16	910						
	16(0535-1258)	910		23	926						
	16(1258-1315)	916		30	941						
	16(1315-1755)	956									
	16(1755)-19(0716)	943									
	19(0716)-20(2014)	955									
	20(2014)-22(1515)	943									
	22(1515)-27(0650)	928									
	27(0650)-30(2400)	941									

Table 10

Z BASELINES nT		SCALE VALUES nT/mm	
Adopted 57000 nT +	Observed 57000 nT +	Adopted	Observed
Dec 1(0000)-11(0855) 941-964	Dec 11 964	Dec 11.85	Dec 30 11.87
11(0855)-14(2100) 929-908	16 888		
14(2100)-15(1220) 933	19 964		
15(1220)-16(0511) 940	30 940		
16(0511)-18(1004) 888-904			
18(1004)-24(2400) 964-934			
25(0000)-28(1134) 934-956			
28(1134)-29(0036) 950			
29(0036-0742) 960			
29(0742)-30(0201) 928			
30(0201)-31(2400) 940			

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 11 MOULD BAY X = 500 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	624	620	610	597	604	641	623	642	639	641	655	646	629	628	622	636
1-2	620	623	627	601	617	624	630	648	649	649	662	653	634	630	632	640
2-3	629	633	636	628	625	632	642	658	662	658	663	660	644	639	646	646
3-4	642	644	647	651	648	656	658	672	671	666	668	666	657	659	659	655
4-5	647	652	653	661	672	666	675	681	676	677	670	668	667	674	667	659
5-6	652	657	669	694	694	689	691	695	689	690	674	671	680	692	686	664
6-7	657	669	683	708	716	703	711	709	697	700	683	678	693	710	697	672
7-8	664	677	693	712	728	734	724	723	710	710	691	671	703	727	706	676
8-9	672	680	701	737	734	757	728	727	717	708	699	690	713	737	716	685
9-10	679	688	698	737	734	756	743	727	730	696	700	696	715	740	715	691
10-11	688	684	702	725	736	755	755	725	729	701	697	690	716	743	714	690
11-12	682	684	696	725	729	759	750	728	721	691	686	684	711	742	708	684
12-13	665	670	698	709	725	752	737	720	713	685	680	674	702	734	701	672
13-14	657	659	683	699	713	739	723	727	701	674	669	665	692	726	689	663
14-15	649	652	667	681	701	720	704	704	689	666	654	658	679	707	676	653
15-16	634	643	663	663	678	703	697	688	678	657	650	657	668	692	665	646
16-17	623	634	650	658	661	672	666	653	661	638	636	638	649	663	652	633
17-18	617	611	626	623	642	656	655	649	647	624	630	625	634	651	630	621
18-19	599	600	602	604	616	622	633	644	628	613	618	619	617	629	612	609
19-20	599	584	594	584	598	615	590	625	612	612	609	624	604	607	601	604
20-21	602	570	583	589	590	621	590	633	622	616	614	624	605	609	603	603
21-22	599	579	584	591	612	619	594	636	630	622	633	633	611	615	607	611
22-23	610	595	579	584	607	593	609	651	623	628	642	633	613	615	604	620
23-24	616	611	594	612	593	597	620	644	636	634	650	643	621	614	619	630
MEANS	639	638	647	657	666	678	673	680	672	661	660	657	661	674	659	648

MEAN VALUES OF MAGNETIC ELEMENTS

EAST CCMPONENT OF HCRIZCNTAL INTENSITY-ALL DAYS

TABLE 12 MCULD BAY Y = 2000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINCX	WINTER
0-1	304	300	283	271	288	303	302	299	301	301	315	320	299	298	289	310
1-2	292	294	289	251	268	279	290	283	296	305	319	320	291	280	285	306
2-3	299	295	283	241	265	252	283	277	298	298	314	327	286	269	280	309
3-4	297	301	279	246	267	236	271	281	289	304	317	324	284	264	280	310
4-5	292	291	279	258	266	259	279	276	298	304	321	317	287	270	285	305
5-6	300	285	285	247	270	272	283	277	302	304	326	324	290	276	285	309
6-7	305	287	286	263	275	282	285	289	306	294	322	319	293	283	287	308
7-8	309	300	290	282	281	283	289	292	311	315	309	307	297	286	300	306
8-9	320	302	319	331	311	294	308	313	316	330	317	323	315	307	324	316
9-10	329	319	330	329	325	318	336	331	339	351	335	336	332	328	337	330
10-11	329	332	344	354	349	341	360	346	356	368	353	337	347	349	356	338
11-12	355	344	358	370	364	373	377	380	382	383	366	354	367	374	373	355
12-13	359	371	382	396	381	401	389	390	392	394	375	372	384	390	391	369
13-14	363	373	393	411	402	421	403	399	394	394	382	373	392	406	398	373
14-15	369	376	397	428	418	432	420	414	404	397	389	372	401	421	407	377
15-16	371	392	409	432	417	451	430	427	405	403	385	374	408	431	412	381
16-17	375	392	425	440	417	455	438	427	418	401	381	379	412	434	421	382
17-18	370	401	422	441	429	464	439	422	413	400	376	376	413	439	419	381
18-19	363	399	411	434	421	476	434	419	407	390	366	369	407	438	411	374
19-20	354	380	395	426	401	447	391	399	394	373	355	353	389	410	397	361
20-21	332	352	366	382	392	420	378	370	372	355	340	346	367	390	369	343
21-22	319	328	331	338	372	377	362	338	352	335	322	330	342	362	339	325
22-23	310	302	297	313	329	331	321	329	307	321	319	326	317	328	310	314
23-24	305	297	284	297	300	321	328	316	307	312	317	323	309	316	300	311
MEANS	330	334	339	341	342	354	350	346	348	347	343	342	343	348	344	337

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 13 MCULD BAY Z = 57500 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	678	687	692	683	662	619	633	639	688	688	704	695	672	638	688	691
1-2	675	687	688	677	661	642	638	643	685	698	705	695	675	646	687	691
2-3	678	685	686	673	660	632	645	642	685	703	705	698	674	645	687	692
3-4	676	686	689	680	660	626	639	652	685	708	706	695	675	644	691	691
4-5	679	684	696	690	662	638	649	661	694	711	711	697	681	653	698	693
5-6	689	691	698	704	675	649	655	676	698	720	714	703	689	664	705	699
6-7	691	702	719	717	689	667	666	693	705	738	717	711	701	679	720	705
7-8	699	712	727	734	705	680	688	712	713	742	737	723	714	696	729	718
8-9	699	725	726	753	716	705	695	719	722	749	749	723	723	709	738	724
9-10	718	733	753	760	719	708	703	728	730	764	746	741	734	715	752	735
10-11	740	749	762	765	728	709	712	722	736	771	745	748	741	718	759	746
11-12	751	749	773	760	732	718	721	730	743	772	746	742	745	725	762	747
12-13	746	743	769	757	729	729	721	726	759	774	752	743	746	726	765	746
13-14	744	738	771	767	730	729	719	722	752	770	756	744	745	725	765	746
14-15	739	737	769	768	737	725	721	723	747	768	761	739	745	727	763	744
15-16	734	744	765	766	735	731	723	730	745	760	760	736	744	730	759	744
16-17	738	747	771	770	732	729	729	735	742	751	755	738	745	731	759	745
17-18	737	744	776	761	738	727	725	725	735	749	750	741	742	729	755	743
18-19	729	742	755	735	732	737	715	713	728	742	741	739	734	724	740	738
19-20	716	728	736	716	726	697	707	693	713	735	732	727	719	706	725	726
20-21	704	715	706	678	702	668	681	660	688	710	726	718	696	678	696	716
21-22	692	704	682	647	676	638	660	643	671	693	709	704	677	654	673	702
22-23	685	692	689	651	663	640	645	643	668	690	702	701	672	648	675	695
23-24	681	690	700	661	654	634	637	644	686	694	701	698	673	642	685	693
MEANS	709	717	729	720	701	682	684	691	713	733	730	721	711	690	724	719

TABLE 14

Annual Mean Values (Mould Bay)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	'	°	'	nT	nT
1962.8	983	2205	57951	65	57	87	37.0	2412	58001
1963.5	1001	2208	57940	65	37	87	36.3	2424	57991
1964.5	1015	2212	57948	65	21	87	35.7	2434	57999
1965.5	1034	2220	57960	65	02	87	34.8	2449	58012
1966.5	1053	2233	57991	64	45	87	33.7	2469	58044
1967.5	1067	2247	58019	64	36	87	32.7	2487	58072
1968.5	1078	2258	58053	64	29	87	31.9	2502	58107
1969.5	1092	2276	58081	64	22	87	30.8	2524	58136
1970.5	1115	2306	58120	64	12	87	28.6	2561	58176
1971.5	1125	2322	58145	64	09	87	27.6	2580	58202
1972.5	1141	2333	58179	63	56	87	26.6	2597	58237
1973.5	1161	2343	58211	63	38	87	25.7	2615	58270

*D,I,H,F are derived from the annual means of X,Y,Z.

CAMBRIDGE BAY

Officer-in-charge: Operated under contract by Cambridge Bay Sports and Electric Co.

An automatic magnetic observatory system (AMOS) was installed in April 1972 at a site 1.5 km east of the Cambridge Bay settlement. The observatory is not permanently staffed; it is attended once or twice a week for absolute observations and routine instrument and building checks.

The mailing address of Cambridge Bay observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines & Resources
Ottawa, Canada
K1A OY3

Observatory site

The observatory is located on top of a 17 m hill at the centre of the site, of area 90,000 m^2, and is 180 m north of the coast. The area is one of metamorphosed sedimentary rocks of Ordovician and Silurian age. A total force survey of the immediate area in Sept. 1971 indicated no gradients greater than 3 nT in 10 m.

Reduction of data

Corrections to reduce the AMOS values to the absolute pier of the observatory are calculated from the absolute measurements of D and I and the simultaneous AMOS F values. The procedure for calculating these corrections is analogous to that used for determining Ruska baseline values.[3] A list of the corrections to be applied to the AMOS values is given in Tables 15-17.

Computer plots of the one-minute AMOS data are produced in the Ruska magnetogram format for distribution to World Data Centre A and for general research purposes. Mean hourly value tables were calculated by computer from the edited digital data and corrected to the absolute reference of the observatory.

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values is given in Tables 18 - 21.

CAMBRIDGE BAY
1973

TABLE 15

D BASELINES minutes

Adopted		Observed	° '
Jan 1 - 31	30°59 - 30°51	Jan 22	30°52
		28	30°51
Feb 1 - 28	30°49 - 30°45	Feb 8	30°52
		15	30°50'
		22	30°42'
Mar 1 - 31	30°43	Mar 1	30°42
		7	30°47
		14	30°44
		29	30°44
			30°42
Apr 1 - 30	30°43 to 30°44	Apr 5	30°39
		12	30°36
		18	30°37
May 1 - 27	30°45 - 30°49	May 3	30°50
		10	30°42
		24	30°51
		27	30°46
May 28	28°23	29	28°28
June 1 - 30	28°22 to 28°21	June 6	28°18
		15	28°13
		22	28°28
		28	28°25
July 1 - 31	28°19 to 28°20	July 5	28°22
		17	28°16
		26	28°24
Aug 1 - 31	28°20	Aug 3	28°17
		10	28°19
		17	28°19
		29	28°17
Sept 1 - 30	28°20 to 28°22	Sept 5	28°18
		12	28°23
		19	28°23
		27	28°24
Oct 1 - 31	28°24 to 28°32	Oct 3	28°25
		10	27
		18	29
		24	31
		31	33
Nov 1 - 30	28°32 to 28°26	Nov 10	28°28
		14	28°29
		21	28°32
		28	28°27
Dec 1 - 31	28°24 to 28°22	Dec 5	28°32
		16	28°19
		29	28°28

CAMBRIDGE BAY
1973

TABLE 16

H BASELINES nT

Adopted		Observed	
JAN 1-31	-47 to -41	JAN 22	-42
		28	-41
FEB 1-28	-41 to -42	FEB 8	-39
		15	-43
		22	-43
MAR 1-31	-43 to -42	MAR 1	-42
		7	-40
		14	-44
		29	-40
APR 1-30	-42 to -37	APR 5	-39
		12	-36
		18	-37
MAY 1-28	-36 to -26	MAY 3	-31
		10	-33
		24	-29
MAY 29-31	+85	27	-35
		29	+85
JUNE 1-30	+85 to +83	JUNE 6	+84
		15	+88
		22	+85
		28	+87
JULY 1-25	+81	JULY 5	+82
JULY 26 - 31	+49	17	+76
		26	+43
AUG 1-31	+50	AUG 3	+51
		10	+48
		17	+50
		29	+47
SEPT 1-30	+50	SEPT 5	+50
		12	+44
		19	+50
		27	+49
OCT 1-31	+51	OCT 3	+47
		10	+47
		18	+53
		24	+52
		31	+50
NOV 1-30	+52	NOV.10	+46
		14	+54
		21	+48
		28	+52
DEC 1-31	+53	DEC 5	+66
		16	+52
		29	+56

CAMBRIDGE BAY
1973

TABLE 17

Z BASELINES nT

Adopted		Observed	
Jan 1 - 31	+2	Jan 22	+2
		28	+2
Feb 1 - 28	+2	Feb 8	+2
		15	+2
		22	+3
Mar 1 - 31	+2	Mar 1	+2
		7	+2
		14	+2
		29	+2
April 1 - 30	+1	Apr 5	+1
		12	+2
		18	+2
May 1 - 28	+1	May 3	+1
		10	+1
		24	+1
		27	+2
May 29 - 31	-4	29	-4
June 1 - 30	-4	Jun 6	-4
		15	-4
		22	-4
		28	-4
July 1 - 31	-3	July 5	-4
		17	-2
		26	-2
Aug 1 - 31	-3	Aug 3	-2
		10	-3
		17	-2
		29	-2
Sept 1 - 30	-3	Sept 5	-3
		12	-2
		19	-2
		27	-2
Oct 1 - 31	-3	Oct 3	-2
		10	-3
		18	-3
		24	-3
		31	-2
Nov 1 - 30	-3	Nov 10	-2
		14	-3
		21	-2
		29	-3
Dec 1 - 31	-3	Dec 5	-3
		16	-3
		29	-2

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 18 CAMBRIDGE BAY X = 2000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	489	484	473	471	473	498	507	518	509	490	510	508	495	502	486	499
1-2	483	490	496	484	481	507	513	522	515	482	517	512	501	508	494	503
2-3	497	494	501	497	498	521	529	524	520	489	514	519	509	520	502	508
3-4	506	506	505	513	515	537	535	530	516	495	512	522	516	531	507	512
4-5	505	500	475	522	540	547	545	535	508	506	515	508	517	542	503	507
5-6	498	493	521	552	557	561	557	541	533	505	522	516	530	553	527	509
6-7	501	509	521	562	559	569	567	553	540	517	533	518	538	562	535	517
7-8	512	524	535	561	548	584	574	557	554	536	536	524	546	567	546	525
8-9	524	529	544	563	582	591	579	563	559	534	538	534	554	578	550	532
9-10	525	531	540	564	579	600	585	560	561	514	539	531	553	581	545	532
10-11	531	516	537	560	581	601	589	563	555	515	534	534	551	584	541	528
11-12	515	518	529	561	573	598	591	564	548	506	526	530	547	582	536	523
12-13	518	518	532	556	569	595	580	563	541	501	523	521	543	577	532	520
13-14	509	514	526	547	569	583	566	565	540	496	513	515	537	571	527	513
14-15	499	509	514	536	547	563	549	546	527	496	499	511	525	551	518	505
15-16	488	500	508	510	523	559	519	521	515	488	496	506	512	531	505	499
16-17	470	491	491	497	486	524	487	484	505	470	492	492	492	496	491	488
17-18	470	474	478	498	468	513	481	494	499	468	494	479	486	491	486	481
18-19	466	478	459	507	473	516	501	511	498	466	489	479	486	503	482	480
19-20	448	455	455	493	479	516	499	531	503	467	490	491	487	509	479	475
20-21	461	450	449	468	459	510	512	527	518	473	489	494	486	506	476	476
21-22	468	449	442	447	459	503	512	515	496	477	495	499	482	501	466	480
22-23	480	460	436	455	458	471	510	522	484	480	505	500	481	494	464	488
23-24	488	475	451	463	457	488	515	522	497	479	510	507	489	499	472	497
MEANS	494	494	497	516	518	544	538	535	523	494	512	510	515	535	507	504

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 19 CAMBRIDGE BAY Y = 1000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	528	516	499	486	490	502	510	519	515	510	527	527	511	507	503	524
1-2	519	508	499	459	455	487	496	502	506	507	530	528	500	488	493	522
2-3	527	506	495	445	460	463	486	484	504	498	522	530	493	474	486	521
3-4	527	517	489	445	455	444	466	483	496	498	520	528	488	463	482	523
4-5	519	503	483	458	462	452	470	478	498	500	523	516	488	466	485	515
5-6	513	492	497	466	467	469	475	477	499	495	526	515	491	472	490	511
6-7	515	489	483	481	474	488	483	497	501	484	522	510	494	487	487	509
7-8	517	501	501	504	504	501	491	504	510	518	517	503	506	500	508	509
8-9	536	523	530	536	515	503	511	522	525	538	531	529	525	513	532	529
9-10	548	533	541	546	526	526	533	543	548	545	549	542	540	533	545	543
10-11	553	539	555	558	543	544	554	551	560	564	559	549	553	548	559	550
11-12	554	553	563	567	555	569	560	573	574	570	568	556	564	565	569	558
12-13	560	573	576	588	577	591	573	583	578	582	570	565	577	581	581	568
13-14	569	573	584	598	586	610	588	590	588	585	578	571	586	594	589	573
14-15	575	578	596	620	602	617	595	604	598	585	582	568	594	605	600	576
15-16	578	587	611	629	613	625	601	611	598	595	587	576	601	612	608	582
16-17	568	592	617	630	609	628	595	597	598	591	583	572	599	607	609	580
17-18	571	588	613	633	602	624	591	585	592	589	577	568	595	600	607	576
18-19	572	591	598	621	587	638	583	588	582	580	572	562	590	600	595	574
19-20	562	578	593	608	588	612	574	584	578	565	559	549	580	590	586	562
20-21	545	563	570	573	585	592	569	565	564	553	545	547	565	577	565	551
21-22	540	542	540	547	569	574	571	557	555	545	537	537	551	567	546	539
22-23	536	527	518	532	528	543	543	553	531	527	532	534	534	543	527	532
23-24	532	518	504	504	522	522	535	536	522	515	523	532	522	529	511	526
MEANS	544	541	544	543	536	547	540	545	547	543	547	542	544	543	544	544

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY- ALL DAYS

TABLE 20 CAMBRIDGE BAY Z = 59000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	1012	999	1002	987	959	980	943	969	991	1015	1024	1024	993	963	999	1015
1-2	1015	1004	1005	995	982	963	952	981	1006	1026	1029	1029	999	969	1008	1020
2-3	1017	1011	1019	1023	991	977	966	1002	1022	1040	1040	1032	1012	984	1026	1025
3-4	1024	1014	1038	1045	1005	996	1002	1020	1046	1048	1053	1039	1029	1006	1045	1033
4-5	1035	1030	1058	1059	1029	1010	1017	1042	1051	1061	1057	1054	1043	1025	1057	1045
5-6	1055	1048	1049	1097	1061	1028	1026	1066	1051	1085	1057	1064	1058	1045	1071	1056
6-7	1062	1050	1095	1104	1076	1049	1049	1078	1069	1114	1070	1076	1075	1062	1096	1065
7-8	1062	1068	1098	1108	1094	1061	1074	1095	1079	1107	1111	1084	1087	1080	1098	1082
8-9	1063	1079	1087	1103	1094	1097	1067	1090	1082	1104	1120	1098	1091	1087	1094	1091
9-10	1079	1080	1106	1125	1094	1088	1069	1091	1089	1121	1097	1104	1096	1085	1110	1091
10-11	1092	1099	1106	1121	1089	1086	1081	1077	1095	1115	1085	1102	1096	1082	1109	1095
11-12	1160	1088	1114	1116	1097	1087	1089	1086	1098	1109	1084	1091	1101	1089	1109	1104
12-13	1094	1078	1126	1113	1097	1102	1102	1087	1122	1104	1095	1091	1101	1097	1116	1089
13-14	1102	1078	1135	1134	1105	1105	1096	1102	1122	1110	1101	1094	1107	1102	1125	1093
14-15	1102	1090	1143	1138	1109	1104	1098	1098	1118	1109	1115	1093	1110	1102	1127	1100
15-16	1099	1104	1137	1144	1129	1122	1109	1120	1110	1107	1112	1091	1115	1119	1125	1101
16-17	1098	1104	1141	1140	1125	1107	1102	1107	1097	1086	1099	1090	1108	1109	1116	1097
17-18	1096	1088	1125	1094	1091	1117	1090	1097	1079	1068	1067	1084	1093	1099	1092	1089
18-19	1056	1069	1092	1070	1046	1080	1059	1072	1049	1048	1067	1067	1065	1066	1065	1065
19-20	1043	1050	1054	1035	1029	1058	1019	1040	1030	1041	1043	1052	1042	1037	1040	1048
20-21	1030	1018	1024	1022	977	1014	992	1016	1016	1019	1030	1036	1017	1002	1020	1029
21-22	1018	1016	1011	999	978	977	946	988	1005	1005	1020	1030	1000	973	1005	1021
22-23	1008	992	1000	972	968	935	942	967	984	995	1016	1025	984	952	988	1011
23-24	1009	993	998	978	957	936	934	968	986	998	1021	1022	984	948	990	1012
MEANS	1060	1052	1073	1072	1049	1045	1034	1052	1058	1068	1068	1066	1059	1045	1068	1062

TABLE 21

Annual Mean Values (Cambridge Bay)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	'	°	'	nT	nT
1972.5	2502	1536	60025	31	33.0	87	12.0	2936	60097
1973.5	2515	1544	60059	31	32.8	87	11.2	2951	60131

*D,I,H,F are derived from the annual means of X,Y,Z.

BAKER LAKE

Officer-in-charge: O. Jensen

The Dominion Observatory (now Earth Physics Branch) began a program of magnetic field observations at Baker Lake, N.W.T., in 1947. Continuous photographic recording of the field using standard LaCour variometers began in January 1951.

The mailing address of Baker Lake observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada
K1A 0Y3

The area is one of granitic rocks of the Precambrian Shield.

Magnetic equipment

Aluminum floor rack panels and cable trays were installed in September. Ducting was laid between the seismic vault, absolute building and residence. This was covered with wood in areas where traffic was to be expected, and covered with a foot or more of gravel.

Comparisons between the AMOS and Ruska mean hourly values had shown a relative misalignment between the AMOS and Ruska X sensors of about 14°.[3]

A total intensity survey of the building in February revealed a large gradient between the absolute D&I pier and the location of the AMOS fluxgate sensor. No magnetic material could be found within the building which could produce such a large anomaly. In September, a survey was done around the outside of the building using a compass. This located a 3 m copper-coloured steel grounding rod opposite the D&I pier. On removing the rod, and replacing it with an aluminum rod, the anomaly disappeared. The fluxgate AMOS sensor was then realigned for X,Y,Z, using an azimuth line laid down with the theodolite.

Parameters for Ruska data reduction

Temperature and parallax corrections

Temperature coefficients were determined by comparison between the mean hourly values from the Ruska magnetograms and from the AMOS data February 11. A slightly smaller temperature coefficient for Z was indicated than that adopted for 1972 (+4 nT/°C). Parallax corrections, determined February 11, were unchanged from those adopted for 1972.

	Temperature Coefficients	Parallax corrections (to be subtracted to times read on the magnetograms)
	nT/°C	min.
X	-1.5	0.1
Y	0.0	0.2
Z	+3.0	0.3

Baselines and scale values

Removal of steel rod Sept. 12 (1630) introduced a large change in all baselines. The observed and adopted baselines given in Tables 22-24 have been corrected to the previous standard. Baseline changes in November and December resulted from trace adjustments.

Observed and adopted baselines and scale values for 1973 are given in Tables 22-24.

Local quiet days

The five local quiet days for each month, selected on the basis of the R index, are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	2	3	18	22	31
February	11	13	14	15	20
March	4	13	14	15	17
April	6	7	9	10	12
May	5	25	29	30	31
June	1	7	22	26	27
July	5	6	7	21	22
August	11	12	16	17	18
September	2	19	28	29	30
October	7	15	25	26	27
November	1	12	19	22	30
December	1	2	3	16	18

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 25-28.

BAKER LAKE 1973

X BASELINES nT TABLE 22 SCALE VALUES nT/mm

Adopted		Observed		Adopted		Observed	
January	3961	Jan 3	3960	January	12.95	Jan 31	12.87
		12	3962				
		17	3961				
		24	3960				
		31	3962				
February	3961	Feb 10	3962	February	12.90		
		14	3961				
		21	3961				
March	3961	Mar 6	(3954)	March	12.90	Mar 14	12.87
		14	3961				
		30	3962				
April 1-26	3961	Apr 6	3959	April	12.90	Apr 7	12.86
27-30	3960	13	3961				
		25	3961				
May 1-21	3959 to 3951	May 4	3958	May	12.90	May 4	12.99
22-31	3951 to 3958	11	3954			11	12.91
		26	3954				
June 1-29(0300)	3959 to 3956	June 1	3959	June	12.90	June 22	12.91
29(0300)-30(2400)	4204	14	3957				
		22	3957				
July 1-15(2030)	4204	July 16	3959	July	12.95	July 15	12.87
15(2030)-31(2400)	3960 to 3958	22	3962				
August	3958 to 3954	Aug 6	3957	August	13.00	Aug 16	13.01
		16	3956				
		28	3953				
September	3953 to 3947	Sept 4	3954	September	13.00	Sept 4	13.06
		28	3948			28	12.96
October 1-6	3947 to 3946	Oct 6	3946	October	13.00	Oct 23	13.01
7-31	3946 to 3924	16	3936				
		23	3932				
November 1-4(0400)	3923	Nov 1	3924	November	13.00	Nov 21	13.02
4(0400)-21	4085 to 4065	4	4085			30	12.98
22 - 30	4065 to 4063	14	4073				
		21	4065				
		30	4063				
December		Dec 8	4060	December	13.00	Dec 12	13.05
1-8(0345)	4063 to 4060	12	4307				
		20	4297				
8(0345-0420)	Instrument changes	25	4302				
8(0420-0530)	X trace invalid						
8(0530-2400)	4230 to 4280						
9	4280 to 4295						
10(0000)-11(2400)	4295 to 4305						
12-31	4305 to 4300						

BAKER LAKE 1973

Y BASELINES nT TABLE 23 | SCALE VALUES nT/mm

Adopted		Observed		Adopted		Observed	
January	-15 to -10	Jan 3	-15	January	13.45	Jan 31	13.47
		12	-15				
		17	-12				
		24	-12				
		31	-10				
February	-10 to -6	Feb 10	-8	February	13.45		
		14	-8				
		21	-6				
March	-6	Mar 6	-3	March	13.45	Mar 14	13.44
		14	-5				
		30	-5				
April 1-13	-6	Apr 6	-5	April	13.45	Apr 7	13.44
14-30	-6 to 0	13	-6				
		25	0				
May	0 to +11	May 4	-1	May	13.45	May 4	(13.60)
		11	4			11	(13.54)
		26	4				
June 1-14	11 to 15	June 1	16	June	13.45	Jun 22	13.44
15-30	15 to 8	14	15				
		22	12				
July 1-15(2030)	8 to 2	Jul 6	1	July	13.45	Jul 15	(12.98)
15(2030)-17(0210)	204	16	197				
17(0210)-30(2400)	2 to -2	22	-1				
August	-2 to -8	Aug 6	-2	August	13.45	Aug 16	13.50
		16	-6				
		28	-7				
September 1-12	-8 to -11	Sept 4	-10	September	13.50	Sep 4	13.47
13-30	-10 to -6	28	-7			28	13.49
October 1-6	-6	Oct 6	-5	October	13.55	Oct 23	13.60
7-31	-3 to 41	16	15				
		23	24				
November 1-4(0400)	43 to 51	Nov 1	44	November	13.55	Nov 21	13.46
4(0400)-14	-52 to -4	4	-52			30	13.55
15 - 30	-3 to 17	14	-4				
		21	7				
		30	17				
December 1-8(0345)	18	Dec 8	19	December 1-7	13.55	Dec 12	13.44
8(0345-0420)	Instrument changes			8-31	13.40		
8(0420)-11	-51 to -45	12	-44				
12 - 31	-45 to -39	20	-41				
		25	-41				

BAKER LAKE 1973

Z BASELINES nT TABLE 24 SCALE VALUES nT/mm

Adopted		Observed		Adopted		Observed	
January		Jan 3	60249	January	13.35	Jan 31	13.34
1-24	60249 to 60267	12	60264				
25-31	60267	17	60265				
		24	60267				
		31	60267				
February	60267 to 60270	Feb 10	60267	February 1-15	13.30		
		14	60268	16-28	13.25		
		21	60271				
March							
1-11	60270 to 60264	Mar 6	60263	March	13.20	Mar 14	13.17
12-31	60264	14	60265				
		30	60265				
April		Apr 6	60254	April	13.15	Apr 7	13.15
1-6	60263 to 60254	13	60279				
7-13	60257 to 60278	25	60278				
14-25	60278						
26-30	60276 to 60266						
May		May 4	60255	May	13.10	May 4	13.15
1-4	60265 to 60256	11	60258			11	13.09
5-31	60256	26	60255				
June		Jun 1	60256	June	13.05	Jun 22	13.06
1-14	60255	14	60256				
15-30	60253 to 60228	22	60241				
July		Jul 6	60224	July	13.10	Jul 15	(12.82)
1-3	60226 to 60223	16	60223				
4-31	60223 to 60219	22	60215				
August	60219 to 60214	Aug 6	60215	August 1-15	13.15	Aug 16	13.10
		16	60221	16-31	13.20		
		28	60218				
September		Sep 4	60209	September 1-15	13.25	Sep 4	13.23
1-12	60214 to 60212	28	60227	16-30	13.30	28	13.29
13-30	60213 to 60229						
October	60230 to 60257	Oct 6	60235	October 1-15	13.35	Oct 23	13.42
		16	60244	16-31	13.40		
		23	60245				
November		Nov 1	60261	November	13.45	Nov 21	(13.55)
1-4(0400)	60258 to 60261	4	60271			30	13.42
4(0400)-21	60271 to 60282	14	60281				
22 - 30	60285 to 60316	21	60282				
		30	60316				
December		Dec 8	60311	December 1-8(0345)	13.45	Dec 12	13.44
1-8(0345)	60315 to 60311	12	60275	8(0345)-31	13.40		
8(0345-0420)	Instrument changes	(20	60270)				
8(0420)-31(2400)		(25	60274)				
	60275 to 60299						

NOTE: P.P.M. values of F unreliable Dec 20 and 25.

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 25 BAKER LAKE X = 4000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	379	381	375	386	406	421	448	439	418	394	406	407	405	429	393	393
1-2	365	378	385	391	391	415	432	424	407	379	402	400	397	416	391	386
2-3	369	369	388	365	399	417	436	400	406	360	388	406	392	413	380	383
3-4	360	377	359	376	408	405	431	410	384	361	374	397	387	414	370	377
4-5	336	362	346	387	409	416	429	401	378	377	381	383	384	414	372	366
5-6	341	344	390	418	418	432	443	417	416	384	397	388	399	428	402	368
6-7	360	374	382	423	412	439	448	431	416	384	408	385	405	433	401	382
7-8	388	379	394	415	397	440	455	436	423	408	398	393	411	432	410	390
8-9	390	384	398	419	423	419	460	439	426	415	388	400	413	435	415	391
9-10	379	386	394	410	428	441	461	436	420	381	402	395	411	442	401	391
10-11	367	359	389	410	430	446	454	443	406	392	402	395	408	443	399	381
11-12	345	373	378	407	406	438	445	437	403	380	395	392	400	432	392	376
12-13	359	367	355	403	399	423	421	428	373	362	377	379	387	418	373	371
13-14	341	351	350	370	378	408	400	395	371	364	354	374	371	395	364	355
14-15	323	330	318	352	340	373	371	380	344	349	332	364	348	366	341	337
15-16	315	305	303	318	322	337	358	352	342	358	336	363	334	342	330	330
16-17	307	314	302	328	342	345	374	371	367	361	353	362	344	358	340	334
17-18	318	325	319	366	369	358	398	389	381	388	377	370	363	379	364	348
18-19	350	345	339	378	400	403	431	428	418	404	395	397	391	416	385	372
19-20	369	356	372	404	419	418	447	455	434	413	408	408	409	435	406	385
20-21	386	369	369	396	430	439	473	464	447	418	415	415	418	452	408	396
21-22	391	371	368	400	428	448	488	473	438	423	425	417	423	459	407	401
22-23	395	391	364	400	412	435	481	471	421	420	427	416	419	450	401	407
23-24	392	391	372	402	405	431	464	457	423	408	416	416	415	439	401	404
MEANS	359	362	363	389	399	414	435	424	403	387	390	393	393	418	385	376

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 26 BAKER LAKE Y = 0 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	221	213	193	176	187	197	218	218	212	209	224	222	208	205	198	220
1-2	215	204	193	143	152	181	197	196	203	204	225	224	195	182	186	217
2-3	214	199	190	137	152	149	185	173	200	197	216	224	186	165	181	213
3-4	209	207	179	140	163	124	164	162	184	184	207	217	178	153	172	210
4-5	191	197	173	150	164	140	168	164	177	191	210	195	177	159	173	198
5-6	192	170	190	152	172	162	177	174	193	180	212	202	181	171	179	194
6-7	198	182	177	188	188	188	196	192	203	183	214	197	192	191	188	198
7-8	219	202	202	206	208	200	204	206	218	222	215	202	209	205	212	210
8-9	227	226	227	233	223	213	221	224	234	241	235	223	227	220	234	228
9-10	244	237	242	245	231	229	235	239	251	242	245	237	240	234	245	241
10-11	249	239	252	251	237	248	252	242	259	259	246	244	248	245	255	245
11-12	254	254	255	259	253	269	265	259	265	264	251	247	258	262	261	252
12-13	259	261	268	274	272	288	277	273	275	272	257	253	269	278	272	258
13-14	260	263	277	291	278	301	293	284	288	273	262	259	277	289	282	261
14-15	269	271	286	304	293	304	300	285	294	274	263	256	283	296	290	265
15-16	265	274	291	301	289	305	290	283	276	277	262	255	281	292	286	264
16-17	253	269	282	284	272	289	267	257	257	264	248	251	266	271	272	255
17-18	254	262	274	290	262	290	267	245	245	259	241	243	261	266	267	250
18-19	252	270	270	284	256	289	260	249	252	257	244	239	260	264	266	251
19-20	244	265	276	283	264	278	262	247	263	255	242	234	259	263	269	246
20-21	234	258	255	265	273	268	268	242	262	249	236	235	254	263	258	241
21-22	227	235	230	242	254	250	263	244	253	238	232	231	242	253	241	231
22-23	226	226	207	211	225	227	247	241	231	225	231	230	227	235	219	228
23-24	225	217	199	195	203	211	234	229	225	216	226	227	217	219	209	224
MEANS	233	233	233	229	228	233	238	230	238	235	235	231	233	232	234	233

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 27 BAKER LAKE Z = 60500 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	126	124	134	136	84	62	70	96	120	134	124	142	113	78	131	129
1-2	138	138	152	161	129	87	85	116	141	157	136	149	132	104	153	140
2-3	142	154	165	200	158	124	115	147	159	159	149	158	153	136	171	151
3-4	155	162	202	236	177	165	157	179	173	186	164	168	177	170	199	162
4-5	172	180	190	243	207	179	185	205	179	208	168	181	191	194	205	175
5-6	190	204	207	290	246	202	210	221	197	229	173	198	214	220	231	191
6-7	173	215	267	305	247	217	234	242	222	266	190	214	233	235	265	198
7-8	194	226	266	289	264	233	245	249	235	255	237	226	243	248	261	221
8-9	204	235	257	272	252	272	234	256	229	253	245	236	245	254	253	230
9-10	226	240	272	298	260	261	233	242	239	271	221	240	250	249	270	232
10-11	250	260	272	307	270	260	249	225	251	264	211	243	255	251	274	241
11-12	270	252	285	310	279	265	262	239	263	255	212	239	261	261	278	243
12-13	243	250	318	298	277	280	273	249	307	270	229	243	270	270	298	241
13-14	245	253	324	333	290	272	259	278	302	252	228	233	272	275	303	240
14-15	234	263	313	317	273	265	243	249	268	241	216	215	258	258	285	232
15-16	216	246	275	282	234	239	221	234	235	224	200	203	234	232	254	216
16-17	195	222	247	242	183	204	186	183	207	189	181	186	202	189	221	196
17-18	186	189	232	210	181	177	170	178	188	176	170	167	185	177	202	178
18-19	163	172	184	182	162	159	184	177	160	162	154	160	168	171	172	162
19-20	133	132	132	146	131	124	143	163	145	142	139	155	140	140	141	140
20-21	120	113	115	124	99	96	106	142	123	123	122	137	118	111	121	123
21-22	110	110	104	83	79	79	86	116	109	126	119	137	105	90	106	119
22-23	109	96	113	95	79	40	78	102	108	122	116	130	99	75	110	113
23-24	112	109	121	118	76	54	75	96	107	121	116	133	103	75	117	118
MEANS	179	189	214	228	193	180	179	191	195	199	176	187	193	186	209	183

TABLE 28

Annual Mean Values (Baker Lake)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	'	°	'	nT	nT
1951.6	3730	74	60229	1	8	86	27.3	3731	60344
1952.5	3744	79	60216	1	13	86	26.5	3745	60332
1953.5	3767	87	60224	1	19	86	25.2	3768	60342
1954.5	3799	80	60230	1	12	86	23.4	3800	60350
1955.5	3834	80	60291	1	12	86	21.6	3835	60413
1956.5	3896	76	60314	1	7	86	18.2	3897	60440
1957.5	3933	84	60333	1	13	86	16.2	3934	60461
1958.5	3968	91	60338	1	19	86	14.2	3969	60468
1959.5	4009	109	60371	1	33	86	12.0	4010	60504
1960.5	4030	120	60394	1	42	86	10.8	4032	60528
1961.5	4056	125	60407	1	46	86	9.4	4058	60543
1962.5	4089	134	60412	1	53	86	7.5	4091	60550
1963.5	4115	145	60400	2	1	86	6.0	4118	60540
1964.5	4138	151	60390	2	5	86	4.7	4141	60532
1965.5	4174	144	60386	1	59	86	2.6	4176	60530
1966.5	4199	158	60396	2	9	86	1.2	4202	60542
1967.5	4223	178	60433	2	25	86	0.0	4227	60581
1968.5	4252	191	60492	2	34	85	58.5	4256	60642
1969.5	4277	201	60532	2	41	85	57.2	4282	60683
1970.5	4302	214	60587	2	51	85	55.9	4307	60740
1971.5	4329	224	60622	2	58	85	54.6	4335	60777
1972.5	4368	237	60655	3	06	85	52.5	4374	60813
1973.5	4393	233	60693	3	02	85	51.3	4399	60852

*D,I,H,F are derived from the annual means of X,Y,Z. All values corrected to the pier in the new magnetic observatory building.

FORT CHURCHILL

Officer-in-charge: Operated by National Research Council under Contract.

Photographic recording of magnetic field variations was begun at Fort Churchill in 1957 by the Defence Research Northern Laboratory (DRNL) of the Defence Research Board, primarily to provide information for the Fort Churchill Rocket Program. In July 1965 the operation of the Churchill Research Range, including the magnetic observatory, was taken over by the National Research Council of Canada, with funds for the magnetic observatory provided by the Earth Physics Branch, Department of Energy, Mines and Resources.

Until 1965 there were no facilities for regular absolute observations; baselines and scale values of the magnetograms were determined by personnel of the Division of Geomagnetism on an average of once or twice a year. Owing to inadequate absolute control, no data were published for the years 1957 to 1963.

The mailing address for Fort Churchill observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Ontario
K1A 0Y3

Observatory site

The observatory is in a region characterized by sedimentary and volcanic rocks of Precambrian age.

A total force survey carried out in 1963 had shown that the area was reasonably flat magnetically with no total force anomalies greater than 30 nT within 45 m of the proposed site of the building for absolute observations, which was constructed in November 1964 42 m west of the original variometer building.

Magnetic equipment

Ruska sensors were realigned and the sensitivities of the Ruska variometers were decreased by about 40% on May 15. Although additional control magnets were required, the decrease in sensitivity assists greatly in the interpretation of the magnetograms during disturbed periods.

On May 17 the AMOS fluxgate sensors were realigned relative to a true North-South line laid down in the absolute room with a theodolite. The initial alignment had used the strike of the building.

Operators for the Fort Churchill and Great Whale River observatories were trained in operational procedures at the Fort Churchill observatory in May.

Aluminum floor rack panels and cable trays were installed in September. At this time a new proton precession magnetometer with twin-bottle sensor was also installed.

Parameters for Ruska data reduction

Temperature and parallax corrections

Temperature coefficients were determined from comparison with AMOS mean hourly values in X,Y on Feb. 16, 1973 and in X,Y,Z on Jan. 18, 1974. Parallax corrections were determined Feb. 5, 1973 and Jan. 17 and 18, 1974. The changes in parallax corrections followed realignment of the Ruska variometers on May 15, 2000 U.T.

	Temperature Coefficients	Parallax Corrections (to be added to times read on the magnetograms)	
	nT/^{o}C	min	
		Jan 1-May 15	May 15-Dec 31
X	-2	0.6	0.3
Y	0	0.0	-0.3
Z	+3	-0.3	-0.4

Baselines and scale values

Repositioning of the Z system in February caused a significant change in the Z baseline.

Changes in baselines and scale values in all elements followed realignment of the Ruska variometers May 15, 2000 U.T.

There was some difficulty in establishing baselines in January and February, especially in Z, owing to poor observing procedures. AMOS values have been used to confirm the adopted Ruska baselines for these months.

Adopted and observed baselines and scale values for 1973 are given in Tables 29-31.

Local quiet days

The five local quiet days for each month, selected on the basis of the R index, are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	2	3	18	19	31
February	4	13	14	16	20
March	4	5	14	15	17
April	6	7	8	10	12
May	5	25	29	30	31
June	1	7	22	23	27
July	4	5	6	7	22
August	4	11	12	16	18
September	2	3	28	29	30
October	7	9	25	26	27
November	1	12	19	29	30
December	2	12	16	18	25

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 32-35.

FORT CHURCHILL 1973

X BASELINES nT — TABLE 29 — SCALE VALUES nT/mm

X Baselines nT Adopted		X Baselines nT Observed		Scale Values nT/mm Adopted		Scale Values nT/mm Observed	
Jan	7118 to 7115	Jan 3	7123	Jan	7.80	Jan 2	7.76
		17	(7133)				
		22	7117				
		23	7117				
Feb 1-9	7114 to 7113	Feb 13	7097	Feb	7.85	Feb 6	7.87
10-24	7112 to 7096	19	7085				
25-28	7097 to 7098	23	7095				
Mar	7099 to 7110	Mar 7	7101	Mar	7.85	Mar 14	7.85
						29	7.83
Apr	7110 to 7121	Apr 24	7119	Apr	7.85	Apr 9	7.91
May 1-15(2000)	7122	May 3	7123	May 1-15(2000)	7.85	May 3	7.80
15(2000)-31	7172 to 7175	11	7122	15(2000)-31	11.55	21	11.53
		24	7170			24	11.53
		30	7180				
Jun	7175 to 7182	Jun 7	7175	Jun 1-15	11.60	Jun 7	(11.70)
		22	7183	16-30	11.65	22	11.65
		26	7178				
Jul	7182 to 7190	Jul 4	7183	Jul	11.65	Jul 6	11.52
		6	7181				
		10	7183				
		17	7182				
		20	7189				
Aug 1-10	7190 to 7192	Aug 2	7192	Aug	11.65	Aug 3	11.77
11-31	7192 to 7191	8	7195			10	11.67
		10	7190				
Sep	7191	Sep 14	7192	Sep	11.65	Sep 15	11.64
		17	7188				
Oct 1-25	7191	Oct 15	7192	Oct	11.70		
26-31	7190 to 7188	26	7191				
Nov	7188 to 7174	Nov 12	7180	Nov	11.75	Nov 12	11.75
		28	(7185)				
		30	7174				
Dec	7174	Dec 7	7177	Dec	11.70	Dec 10	11.75
		17	7172				
		27	7174				

FORT CHURCHILL 1973

Y BASELINES nT TABLE 30 SCALE VALUES nT/mm

Adopted		Observed		Adopted		Observed	
Jan	350 to 360	Jan 3	347	Jan	7.85	Jan 2	7.84
		17	(333)			17	7.81
		22	349				
Feb 1-20	360 to 365	Feb 13	369	Feb	7.85	Feb 6	7.83
21-28	365	19	375				
		23	363				
Mar	365 to 360	Mar 7	363	Mar	7.85	Mar 14	7.85
						29	7.86
Apr	360	Apr 24	356	Apr	7.90	Apr 9	7.94
May 1-15(2000)	360 to 350	May 3	367	May 1-15(2000)	7.90	May 3	7.95
15(2000)-31	412 to 416	11	352	15(2000)-31	10.10	21	10.05
		24	414			24	10.09
		30	415				
Jun	416 to 421	Jun 7	417	Jun	10.10	Jun 7	10.17
		22	421			22	10.05
		26	421				
Jul 1-15	421	Jul 4	419	Jul	10.15	Jul 6	10.18
16-31	421 to 419	6	421				
		10	422				
		17	421				
		20	420				
Aug	418	Aug 3	416	Aug	10.20	Aug 3	10.22
		8	419			10	10.18
		10	417				
Sep	419	Sep 14	(411)	Sep	10.20	Sep 14	10.25
		17	420				
Oct 1-16	419	Oct 15	421	Oct	10.20		
17-31	419 to 423	26	418				
Nov 1-20	423 to 428	Nov 12	431	Nov	10.20	Nov 12	10.18
21-30	428	28	428				
		30	428				
Dec	428 to 435	Dec 7	426	Dec	10.20	Dec 10	10.14
		17	428				
		27	442				

FORT CHURCHILL 1973

Z BASELINES nT TABLE 31 SCALE VALUES nT/mm

Z Baselines nT: Adopted		Z Baselines nT: Observed		Scale Values nT/mm: Adopted		Scale Values nT/mm: Observed	
Jan 1- 2(2100)	60612	Jan 3	60607	Jan 1-15	8.30	Jan 2	8.34
2(2100)-4(0630)	60853	17	60615	16-31	8.30 to 8.15	17	8.29
4(0630)-31	60612	22	60618				
		22	60616				
Feb 1-13(1300)	60612	Feb 23	60745	Feb 1-17(0900)	8.10	Feb 6	8.07
13(1300)-17(0900)	60750			18-28	8.85		
17(0900)-28	60746						
Mar 1- 7	60746 to 60749	Mar 7	60749	Mar	8.85	Mar 14	8.90
8-31	60748 to 60743					29	8.79
Apr	60743 to 60737	Apr 24	60738	Apr	8.85	Apr 9	8.84
May 1-15(2000)	60737	May 3	60742	May 1-15(2000)	8.85	May 3	8.75
	to 60804	11	60789	15(2000)-31	11.22	21	11.25
15(2000)-31	60775	24	60769		to 11.34	24	11.30
	to 60761	30	60761				
Jun 1-24	60760 to 60740	Jun 7	60751	Jun 1-15	11.35 to 11.45	Jun 7	11.47
25-30	60740 to 60745	22	60743	16-30	11.45	22	11.46
		27	60752				
Jul 1-29	60746 to 60775	Jul 4	60736	Jul	11.45	Jul 6	11.37
30-31	60774	6	60754				
		10	60754				
		17	60763				
		20	60765				
Aug	60774 to 60757	Aug 3	60780	Aug	11.50	Aug 3	(11.66)
		8	60766			10	11.41
		10	60764				
Sep	60756 to 60738	Sep 14	60751	Sep	11.55	Sep 14	11.59
		16	60747				
Oct 1-15	60737 to 60727	Oct 15	60728	Oct	11.60		
16-31	60725 to 60705	26	60710				
Nov	60705 to 60682	Nov 12	60689	Nov	11.65	Nov 11	11.73
		28	60688				
		30	60690				
Dec	60682 to 60655	Dec 7	60677	Dec	11.65	Dec 10	11.63
		17	60668				
		27	60659				

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 32 CHURCHILL X = 7000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	205	207	198	203	258	269	281	259	249	224	236	259	237	266	218	227
1-2	186	196	177	179	202	244	259	232	219	197	225	252	214	234	193	215
2-3	189	168	168	131	179	195	227	204	204	191	214	238	193	201	174	203
3-4	175	167	120	124	173	155	183	166	182	165	198	226	170	169	148	192
4-5	142	142	131	116	127	157	155	153	173	163	197	195	154	148	146	169
5-6	146	121	127	93	112	142	143	135	173	132	194	190	142	133	131	163
6-7	155	130	85	103	121	144	127	136	148	125	173	178	135	132	115	159
7-8	150	143	110	127	88	132	110	122	156	142	126	169	131	113	133	147
8-9	141	107	111	141	136	91	138	120	157	136	117	152	129	122	136	130
9-10	95	106	85	105	127	106	150	134	125	82	152	146	118	130	99	125
10-11	52	69	81	83	105	104	130	155	104	97	153	135	106	124	91	103
11-12	42	80	60	76	84	99	110	134	81	105	150	144	97	107	80	104
12-13	80	74	14	77	93	87	97	123	40	92	136	141	88	100	56	108
13-14	99	92	24	40	83	81	116	115	67	129	155	161	97	99	65	127
14-15	128	100	56	54	126	103	135	142	117	148	163	198	123	127	94	148
15-16	145	125	100	114	159	151	156	138	155	155	179	202	149	151	131	164
16-17	154	124	117	152	179	168	172	168	179	184	189	205	166	172	158	169
17-18	154	159	136	176	183	185	186	189	192	199	194	217	181	186	176	182
18-19	173	177	172	208	203	216	203	203	210	211	204	225	200	206	200	195
19-20	189	195	215	227	226	245	231	221	235	228	213	235	222	231	226	208
20-21	199	202	220	236	247	252	247	235	248	241	232	246	234	245	236	220
21-22	216	214	227	252	265	263	262	248	260	242	232	247	244	259	245	227
22-23	220	227	215	236	279	297	265	259	261	244	242	252	250	274	239	235
23-24	214	212	200	221	262	277	276	264	263	241	245	262	245	269	231	234
MEANS	152	147	131	145	167	173	182	177	175	170	188	203	168	175	155	173

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 33 CHURCHILL Y = -0 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	508	507	500	482	476	478	496	503	488	497	495	499	494	489	492	502
1-2	513	501	491	427	454	468	488	487	481	488	495	503	483	474	472	503
2-3	514	491	488	430	453	437	474	467	476	481	490	493	474	458	469	497
3-4	500	501	487	424	449	422	445	460	460	469	477	484	465	444	461	491
4-5	484	483	467	410	435	430	445	446	458	457	471	456	454	439	448	473
5-6	485	471	470	406	436	443	445	442	455	426	466	451	449	442	439	468
6-7	486	465	447	432	464	450	451	453	463	424	457	450	454	455	442	465
7-8	492	481	480	458	478	466	463	473	474	464	448	452	469	470	469	468
8-9	496	506	501	489	489	474	488	490	490	473	459	462	485	485	488	481
9-10	512	514	511	491	499	491	495	504	508	478	481	473	496	497	497	495
10-11	521	520	526	503	518	513	513	511	525	497	492	482	510	514	512	504
11-12	528	535	537	522	540	535	534	528	539	504	496	490	524	534	525	512
12-13	529	550	547	536	551	564	552	548	550	500	500	490	534	554	533	515
13-14	529	539	553	542	557	563	559	553	541	497	493	488	535	558	533	512
14-15	528	534	553	536	546	547	548	539	530	497	487	487	527	545	529	508
15-16	519	519	543	521	523	526	528	519	505	494	487	486	514	524	516	502
16-17	506	510	523	512	511	512	506	496	486	485	477	478	500	506	501	493
17-18	502	506	512	516	499	506	494	485	477	481	468	474	493	496	497	487
18-19	499	512	512	527	489	505	482	477	476	479	472	474	492	488	498	489
19-20	494	516	521	527	495	504	483	474	483	487	473	471	494	489	505	488
20-21	492	517	525	525	502	498	481	477	489	492	479	479	496	489	508	491
21-22	498	508	511	520	498	490	486	482	489	491	483	482	495	489	503	493
22-23	502	509	500	499	499	494	489	494	492	494	489	489	496	494	496	497
23-24	502	506	493	489	490	485	493	500	490	497	491	493	494	492	493	498
MEANS	506	508	508	489	494	492	493	492	493	481	480	479	493	493	493	493

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY- ALL DAYS

TABLE 34 CHURCHILL Z = 60000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	819	838	801	821	803	800	847	839	837	848	861	852	830	819	827	842
1-2	811	827	821	831	801	808	828	825	836	839	861	846	828	814	832	836
2-3	812	818	838	847	804	822	828	812	842	834	849	846	829	815	840	831
3-4	816	834	850	860	830	840	849	816	849	833	834	841	837	832	848	831
4-5	801	817	846	887	869	870	885	858	842	851	839	847	850	869	856	825
5-6	820	832	875	992	925	912	918	897	866	880	852	856	884	912	903	839
6-7	836	871	939	1000	939	947	945	946	899	939	908	870	919	944	944	871
7-8	879	903	942	997	978	977	951	972	930	960	947	902	945	972	957	907
8-9	900	925	957	995	965	967	965	971	954	974	938	924	952	967	970	921
9-10	930	928	982	1018	971	1000	959	961	958	982	920	928	962	974	985	927
10-11	952	950	988	1006	981	985	943	938	958	966	903	921	958	964	979	931
11-12	923	932	982	1006	946	977	924	943	961	937	883	897	943	950	971	908
12-13	893	903	960	997	920	943	898	908	938	908	862	884	919	919	951	885
13-14	853	878	939	957	885	904	868	865	898	887	846	862	888	882	920	860
14-15	830	838	891	912	861	870	843	850	872	875	855	859	864	857	888	846
15-16	819	833	858	888	844	849	837	841	865	871	861	855	852	843	871	842
16-17	829	851	859	881	851	859	858	848	864	876	862	856	858	853	870	849
17-18	844	853	864	888	862	872	868	857	878	890	873	866	868	864	880	859
18-19	852	859	865	880	867	882	877	870	890	890	883	872	874	874	881	865
19-20	853	863	865	876	868	875	870	880	889	884	882	880	874	873	878	869
20-21	863	847	832	850	853	864	878	877	883	876	873	879	864	867	860	866
21-22	849	838	818	845	842	856	877	874	877	863	870	873	856	860	850	858
22-23	841	846	802	830	812	826	880	865	849	856	871	872	844	842	834	858
23-24	838	843	814	824	790	807	866	856	845	854	869	862	838	826	834	853
MEANS	853	864	883	912	878	888	886	882	887	891	875	873	881	883	893	866

TABLE 35

Annual Mean Values (Fort Churchill)

Year	X	Y	Z	D East*		I North*		H*	F*
	nT	nT	nT	°	'	°	'	nT	nT
1957.7	6648	320	60649	2	45	83	44.2	6656	61013
1958.5	6650	329	60641	2	50	83	44.1	6658	61006
1964.5	6826	459	60646	3	51	83	33.1	6841	61031
1965.5	6866	437	60683	3	39	83	41.1	6880	61072
1966.5	6881	452	60701	3	46	83	31.1	6896	61092
1967.5	6917	462	60736	3	49	83	29.3	6932	61130
1968.5	6941	469	60756	3	52	83	28.1	6957	61153
1969.5	6982	479	60781	3	55	83	25.9	6998	61182
1970.5	7030	497	60816	4	03	83	23.4	7048	61223
1971.5	7075	510	60847	4	07	83	21.1	7093	61259
1972.5	7130	509	60869	4	05	83	18.1	7148	61287
1973.5	7168	493	60881	3	56.1	83	16.2	7185	61304

*D,I,H,F are derived from annual means of X,Y,Z.

GREAT WHALE RIVER

Officer-in-charge: Operated by National Research Council under contract.

The Division of Geomagnetism of the Earth Physics Branch established the Great Whale River magnetic observatory in January 1965 at Poste-de-la-Baleine, Quebec. The observatory was designed to assist in conjugate point studies: its location is geomagnetically conjugate to the observatory operated by the United States, from August 1957 to October 1971 at Byrd in Antarctica, and its instrumentation was similar, including both standard and rapid-run photographic variometers. The rapid-run Ruska magnetograph was discontinued at Great Whale River on June 10, 1972. For two years prior to the installation of photographic recorders a three-component electrical recording magnetometer had been in operation in Great Whale River.

From September 1965, when a seismic observatory was established, until September 1972, a combined magnetic-seismic observatory was operated jointly by the Divisions of Seismology and Geomagnetism. Following September 1972 the magnetic operation has been carried out by contract with the National Research Council.

The mailing address for the observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada
K1A 0Y3

Observatory site

Poste-de-la-Baleine is located on a broad sandy spit at the mouth of Great Whale River on the east shore of Hudson Bay. The area consists of Archean granites largely overlain with a thick layer of sand. The sand was tested for magnetic properties and found to contain significant quantities of magnetite.

The observatory was built on a rock ridge 25 m above sea level about 2 km north of the east-west runway. Because of its magnetic properties, the local sand was not used in the construction.

Magnetic equipment

Aluminum floor rack panels and cable trays were installed in October, and ducting with new cables was laid between the absolute, seismic and variometer buildings.

Parameters for Ruska data reduction

Temperature and parallax corrections

Ruska temperature coefficients were determined Jan. 17 and 19, 1974, by comparison with AMOS mean hourly values. Tests for parallax corrections were carried out August 30, 31, 1973 and Jan. 17, 18; Feb. 6, 1974. Temperature coefficients determined March 1972 (0 in D and H, and -4 in Z) differ in D and Z from the values listed below by more than can be attributed to the uncertainty inherent in the method (see discussion in Part I under Primary Photographic Recorders). The reason for this discrepancy is not known.

	Temperature Coefficients	Parallax Corrections (to be subtracted from times read on the magnetograms)
	nT/°C	min
D	-2	1.0
H	0	1.0
Z	-3	0.9

Baselines and scale values

Variometer adjustments caused abrupt changes in the D baseline in January, February and August, and in the Z baseline in February and December. Times of baseline changes are given in the list of observed and adopted baselines and scale values in Tables 36-38.

Local quiet days

The five local quiet days for each month, selected on the basis of the R index, are listed below. Local quiet days which do not appear also in the list of 10 international quiet days are underlined.

January	2	3	4	18	31
February	4	13	14	16	20
March	4	5	14	15	17
April	6	7	8	10	12
May	12	25	29	30	31
June	1	7	22	23	27
July	4	5	6	7	22
August	11	12	16	17	18
September	2	19	28	29	30
October	7	9	25	26	27
November	1	12	19	28	30
December	2	3	12	18	25

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 39-42.

GREAT WHALE RIVER 1973

D BASELINES TABLE 36 SCALE VALUES '/mm

D Adopted ° '		D Observed ° '		Scale Adopted		Scale Observed	
Jan 1-12(1500)	339 15.5	Jan 1	339 15.5	Jan	4.65	Jan 2	4.64
	to 339°17.5	9	339 16.6			17	4.62
12(1500)-31(2340)		16	339 36.0			30	4.61
	339 36.5	30	339 43.5				
	to 339 43.5						
31(2340-2400)	338 59.0						
Feb 1(0000-2130)	338 59.0	Feb 7	338 06.0	Feb	4.57	Feb 6	4.46
1(2130)-6(1500)		12	338 06.7			19	4.68
	339 02.5	19	338 08.8				
	to 339 12.5						
6(1500)-28	338 06.0						
	to 338 09.5						
Mar 1-10	338 09.5	Mar 4	(338 03.8)	Mar	4.57	Mar 7	4.54
	to 338 11.0	11	338 11.2			18	4.57
11-31	338 11.0	18	338 09.1			29	4.54
	to 338 08.5	29	338 09.0				
Apr 1-6	338 08.0	Apr 5	338 07.9	Apr	4.57 to 4.54	Apr 5	4.57
7-30	338 08.0	12	338 09.7				
	to 338 13.5	24	338 15.4				
May	338 13.0	May 3	338 11.8	May	4.54	May 11	4.51
	to 338 09.0	10	338 11.3			26	4.59
		20	338 09.1				
		26	338 08.5				
Jun	338 09.0	Jun 6	338 11.7	Jun	4.54 to 4.58	Jun 14	4.53
	to 338 10.0	14	(337 54.8)			21	4.52
		21	338 08.1				
		28	338 09.0				
Jul	338 10	Jul 5	338 08.5	Jul	4.58 to 4.62	Jul 5	4.57
	to 338 08.5	12	338 09.0			17	4.57
		18	338 07.4				
Aug 1-9(1600)	338 08.5	Aug 3	338 09.1	Aug	4.63 to 4.70	Aug 3	4.59
9(1600)-31	338 30.5	12	338 30.1			21	4.69
	to 338 28.0	21	338 30.1				
Sep	338 28.0	Sep 7	338 28.8	Sep	4.70	Sep 7	4.67
	to 338 25.0	14	338 23.9			28	4.71
		28	338 25.3				
Oct	338 25.0	Oct 8	338 26.5	Oct	4.70	Oct 8	4.69
		23	338 25.9			23	4.68
		31	338 23.8				
Nov	338 23.5	Nov 12	338 27.6	Nov	4.65	Nov 12	4.64
	to 338 28.0	28	338 28.7			28	4.66
Dec	338 29.0	Dec 2	338 29.2	Dec	4.65	Dec 2	4.66
	to 338 38.5	13	338 37.3			26	4.67
		26	(338 46.0)				

GREAT WHALE RIVER 1973

H BASELINES nT TABLE 37 SCALE VALUES nT/mm

H Baselines Adopted		H Baselines Observed		Scale Values Adopted		Scale Values Observed	
Jan	9903 to 9900	Jan 2	9905	Jan	13.65	Jan 2	13.62
		9	9898			16	13.64
		16	9899			30	13.64
		30	9902				
Feb	9900 to 9897	Feb 6	(9915)	Feb	13.65	Feb 6	13.58
		12	(9916)			19	13.65
		19	(9922)				
Mar	9897 to 9905	Mar 4	9896	Mar	13.65	Mar 7	13.64
		11	9898			18	13.69
		18	9900			29	13.54
		29	9903				
Apr 1-19	9905 to 9911	Apr 5	(9898)	Apr	13.65	Apr 5	13.70
20-30	9911 to 9905	12	9910				
		24	9912				
May	9904 to 9889	May 3	9903	May	13.65	May 11	13.58
		10	9899			26	13.68
		20	(9899)				
		26	9890				
Jun	9888 to 9884	Jun 6	9890	Jun	13.70	Jun 15	13.76
		14	(9880)			22	13.70
		21	9889				
		28	9884				
Jul	9884 to 9887	Jul 5	9880	Jul	13.75	Jul 5	13.79
		12	9886				
		18	9886				
Aug	9888 to 9889	Aug 3	9894	Aug	13.80	Aug 3	13.77
		12	9890			21	13.73
		21	9889				
Sep	9889	Sep 7	(9883)	Sep	13.85	Sep 7	13.90
		14	9886				
		28	9887				
Oct	9889 to 9888	Oct 8	9888	Oct	13.90	Oct 8	13.94
		23	9892			24	13.97
		31	9890				
Nov 1-18	9889 to 9900	Nov 12	9898	Nov	13.85	Nov 12	13.79
19-30	9900	28	9903			28	13.81
Dec	9900	Dec 2	9898	Dec	13.85	Dec 2	13.79
		13	9900			26	13.87
		26	(9893)				

GREAT WHALE RIVER 1973

Z BASELINES nT — TABLE 38 — SCALE VALUES nT/mm

Z Baselines Adopted		Observed		Scale Values Adopted		Observed	
Jan	59267 to 59255	Jan 1	59271	Jan 1-15	14.50	Jan 2	14.58
		9	(59277)	16-31	14.55	17	14.42
		16	59260				
		30	59256				
Feb 1- 6(1500)	59255 to 59252	Feb 7	59283	Feb 1-15	14.60	Feb 6	14.64
6(1500)-10(1500)	59295	12	59343	16-23(0300)	14.65	11	14.68
10(1500)-28	59345	19	59345	23(0300)-28	15.35	19	14.68
Mar 1-17	59344 to 59342	Mar 4	(59336)	Mar 1-15	15.35	Mar 7	15.37
18-31	59342 to 59337	11	59343	16-31	15.40	11	15.34
		18	59342			18	15.41
		29	59339			29	15.42
Apr 1-11	59337 to 59332	Apr 5	59333	Apr	15.40	Apr 5	15.39
12-30	59332 to 59338	12	59332			12	(15.52)
		24	59334			24	15.39
May	59339 to 59364	May 3	59343	May	15.35	May 3	15.34
		10	59342			11	15.29
		20	59365			22	15.39
		26	59361			26	(15.20)
Jun	59365 to 59367	Jun 6	59368	Jun	15.40	Jun 6	15.37
		14	(59337)			14	15.48
		21	(59339)			21	(15.64)
		28	59366			27	(15.27)
Jul	59368 to 59383	Jul 5	59362	Jul	15.45	Jul 5	15.49
		12	59376			12	15.59
		18	59372			17	15.38
Aug 1-10	59383 to 59388	Aug 3	59382	Aug 1-22	15.45 to 15.69	Aug 3	15.34
11-31	59387 to 59371	12	59391	23-31	15.70	12	15.54
		21	59380			21	15.69
Sep	59370 to 59350	Sep 7	(59356)	Sep 1-15	15.70	Sep 7	15.66
		14	59358	16-30	15.72 to 15.86	14	15.69
		28	59352			28	15.75
Oct	59349 to 59339	Oct 8	59344	Oct 1-27	15.87 to 16.26	Oct 8	16.08
		23	59344	28-31	16.27	23	16.26
		31	59338				
Nov	59338 to 59329	Nov 12	59334	Nov	16.27 to 16.33	Nov 1	16.26
		28	59331			12	16.25
						28	16.36
Dec 1-11(1500)	59329	Dec 2	59329	Dec	16.33	Dec 2	16.30
11(1500)-11(2100)	59330 to 59360	13	59360			26	16.33
11(2100)-31	59360 to 59340	26	59347				

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 39 GREATWHALE RIVER X = 9000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	589	571	590	578	628	633	659	648	640	628	658	678	626	642	609	625
1-2	579	563	553	548	550	610	628	614	610	612	643	668	599	603	581	614
2-3	583	532	530	475	539	550	591	574	590	592	621	654	570	564	548	599
3-4	548	527	479	492	530	483	535	532	563	577	604	631	542	520	528	579
4-5	495	509	477	480	493	501	494	508	552	568	602	582	522	499	519	548
5-6	495	459	472	418	458	490	494	498	559	517	584	579	502	485	492	531
6-7	502	450	446	443	469	492	475	470	534	487	561	576	492	477	478	524
7-8	504	468	440	448	440	476	460	475	530	509	526	561	487	463	482	516
8-9	497	461	458	477	473	450	487	490	530	515	530	560	494	475	495	513
9-10	460	454	446	435	481	463	510	527	513	496	580	573	495	496	473	518
10-11	459	433	442	447	490	497	524	562	519	533	606	582	509	518	485	522
11-12	480	483	479	469	526	527	539	569	524	564	618	610	533	540	510	549
12-13	528	513	476	499	553	560	559	588	536	580	618	616	553	565	523	570
13-14	546	529	504	508	559	569	581	583	555	594	616	626	565	573	541	580
14-15	543	528	532	533	570	569	584	580	570	594	604	630	570	576	557	577
15-16	544	531	551	542	576	583	585	581	583	594	602	625	575	581	568	577
16-17	542	529	551	564	585	594	586	591	591	600	605	620	580	589	576	575
17-18	542	547	570	591	532	615	601	606	601	609	606	627	593	603	593	581
18-19	559	565	602	620	607	648	616	622	625	627	626	639	613	623	619	598
19-20	572	577	629	640	632	675	646	638	657	645	635	642	633	647	643	607
20-21	577	585	634	636	655	665	651	643	659	659	650	653	639	653	647	617
21-22	597	588	631	639	665	666	663	647	664	655	646	655	643	660	647	622
22-23	603	587	627	618	671	693	659	651	668	654	652	660	646	668	642	626
23-24	590	566	589	602	642	669	662	656	659	647	655	668	634	657	624	621
MEANS	539	523	530	529	558	570	575	577	585	586	610	621	567	570	558	575

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 40 GREATWHALE RIVER Y = -4000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	593	591	568	566	563	571	571	576	566	569	571	583	574	570	567	585
1-2	589	578	563	554	545	570	565	567	563	567	573	588	569	562	562	582
2-3	587	589	571	557	543	553	555	556	562	557	571	578	565	552	562	581
3-4	584	597	556	553	558	555	556	557	553	542	553	575	561	557	551	577
4-5	575	574	554	568	565	572	568	558	555	551	560	572	564	566	557	570
5-6	563	564	575	585	580	584	574	572	579	558	565	572	573	578	574	566
6-7	582	586	583	600	595	606	588	586	587	579	572	575	586	594	587	579
7-8	597	606	604	620	609	618	599	602	603	600	574	587	602	607	607	591
8-9	606	611	612	638	624	623	616	599	616	601	582	592	610	616	616	598
9-10	621	621	625	650	635	642	627	614	631	606	586	596	621	630	628	606
10-11	608	631	633	661	641	656	636	620	625	605	584	594	624	638	631	604
11-12	605	620	618	661	638	664	642	626	622	592	580	586	621	643	622	597
12-13	605	609	618	647	629	654	634	622	611	579	575	578	613	634	613	592
13-14	605	598	610	627	616	635	618	608	597	578	571	578	603	619	603	588
14-15	595	590	596	603	596	616	603	594	583	576	569	579	592	602	589	583
15-16	587	582	587	593	581	603	586	575	565	569	563	574	580	586	578	576
16-17	581	581	580	587	573	590	569	557	552	557	553	568	571	572	569	571
17-18	576	577	573	583	566	588	563	549	544	551	550	563	565	566	563	566
18-19	571	578	573	585	560	587	555	549	547	548	551	562	564	562	563	565
19-20	569	580	572	580	563	585	557	551	554	549	552	561	564	564	563	565
20-21	570	583	566	574	566	581	559	557	560	553	554	566	566	566	563	568
21-22	574	578	569	574	569	578	564	565	565	556	559	568	568	568	566	570
22-23	577	583	565	564	568	579	570	573	567	562	564	573	570	572	565	574
23-24	581	577	566	562	558	574	570	572	568	570	566	576	570	569	567	575
MEANS	588	591	585	595	585	599	585	579	578	570	567	577	583	587	582	580

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY- ALL DAYS

TABLE 41 GREATWHALE RIVER Z = 59000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	447	453	440	444	453	459	465	463	465	450	479	474	458	460	450	463
1-2	433	459	452	483	461	467	457	461	455	439	469	464	458	461	457	456
2-3	431	457	466	492	481	512	471	478	469	452	466	460	470	485	469	454
3-4	443	461	480	525	496	545	517	490	488	456	473	472	487	512	487	462
4-5	458	474	507	568	550	549	523	531	489	502	481	471	509	538	516	471
5-6	471	489	530	613	560	567	548	553	502	529	485	469	526	557	543	478
6-7	473	521	571	610	548	580	559	559	514	552	502	479	539	561	561	493
7-8	484	530	550	602	544	601	558	562	507	526	506	486	538	566	546	501
8-9	484	510	537	596	554	572	541	524	509	528	488	479	527	548	542	490
9-10	462	492	532	575	531	562	523	515	493	491	474	468	510	533	522	474
10-11	450	470	513	514	501	515	503	499	468	470	467	459	486	504	491	461
11-12	430	455	457	480	463	494	479	487	454	454	468	451	464	481	461	451
12-13	451	454	450	466	466	481	470	485	465	459	468	455	464	475	460	457
13-14	455	464	458	471	468	484	474	479	476	474	474	466	470	476	470	465
14-15	457	471	467	477	476	486	479	481	475	481	478	473	475	481	475	470
15-16	468	478	481	488	484	497	485	485	483	489	483	476	483	488	485	476
16-17	473	487	488	496	489	505	488	491	490	494	489	479	489	493	492	482
17-18	478	493	493	491	492	511	496	498	499	501	493	486	494	499	496	487
18-19	481	489	484	478	496	510	502	499	506	500	493	486	494	502	492	487
19-20	481	476	481	473	496	498	498	501	500	493	487	488	490	498	487	483
20-21	488	459	446	467	490	492	498	497	493	492	483	490	483	494	475	481
21-22	473	462	444	459	486	487	498	494	489	481	474	488	478	491	468	475
22-23	473	471	431	451	460	479	496	486	466	466	486	484	471	480	453	479
23-24	449	468	440	447	447	463	479	479	466	463	485	482	464	467	454	471
MEANS	462	477	483	507	495	513	500	500	484	485	481	474	489	502	490	474

TABLE 42

Annual Mean Values (Great Whale River)

Year	X*	Y*	Z	D East		I North*		H	F*
	nT	nT	nT	°	'	°	'	nT	nT
1967.5	9201	-3401	59302	339	42.8	80	36.4	9809	60108
1968.5	9246	-3399	59333	339	48.9	80	34.4	9850	60145
1969.5	9319	-3405	59379	339	55.6	80	30.8	9922	60202
1970.5	9357	-3407	59430	339	59.6	80	29.3	9958	60259
1971.5	9430	-3409	59468	340	07.6	80	25.8	10027	60307
1972.5	9505	-3408	59486	340	16.4	80	21.9	10098	60337
1973.5	9567	-3417	59489	340	20.7	80	18.5	10159	60350

*Values for X,Y,I and F derived from monthly means of D,H,Z.

MEANOOK

Officer-in-charge: A.B. Cook

Meanook magnetic observatory was established in July 1916, 136 km north of the city of Edmonton, Alberta, and 18 km south of the town of Athabasca.

The mailing address of Meanook observatory is:

Meanook Magnetic Observatory
Box 89
Athabasca, Alberta
TOG OBO

Observatory site

The observatory is located on the top of the plain to the west of the Tawatinaw valley. The site is underlain by Upper Cretaceous sedimentary deposits to a depth of 2 km.

Magnetic equipment

Earth-current recordings were made at Meanook throughout 1973 for Dr. R.R. Heacock, of the University of Alaska.

A digitally recording magnetometer was in operation at the observatory in 1973 for Dr. G. Rostoker of the University of Alberta.

Three sets of photographic variometers were in continuous operation at Meanook: standard-sensitivity Ruska variometers, and standard-sensitivity LaCour and low-sensitivity LaCour variometers. The paper speed is 20 mm/hr for the Ruska and 15 mm/hr for the LaCour.

The scale values per mm adopted for the LaCour variometers were constant throughout the year, and are as follows:

LaCour Standard	H	7.18 nT
	D	0.93'
	Z	10.36 nT
LaCour Low-sensitivity	H	21.67 nT
	D	2.35'
	Z	37.47 nT

Absolute instruments

As of January 1, 1973, the absolute instruments in use at Meanook are the portable fluxgate magnetometer for declination (D) and inclination (I) and the AMOS proton precession magnetometer for total intensity (F).

Relocation of the F sensor in August 1972[12] and adoption of the portable fluxgate magnetometer as the absolute standard for D and I in January 1973, have resulted in pier differences. To reduce data to the 1972 standard, corrections for these pier differences have been applied to the absolute measurements used in calculating the Ruska and AMOS baselines. These corrections are:

D +1.4'

H +8 nT

Z +20 nT

Parameters for Ruska data reduction

Temperature corrections

The Ruska temperature coefficients were determined from the baseline changes which followed the increase in ambient temperature March 1972 as +4 nT/^{o}C in H, and negligible in D and Z.

Ruska magnetogram baselines and scale values

Abrupt changes were observed in the Z baseline in March, April and August. Times of changes are given in the list of adopted baselines and scale values in Tables 43-45.

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 46-49.

MEANOOK 1973

D BASELINES TABLE 43 SCALE VALUES '/mm

	Adopted ° '	Observed ° '	Adopted ° '	Observed ° '
Jan 1	23° 00.0		1.61	
2 - 3	22° 59.9			
4 - 5	59.8			
6 - 8	59.7			
9 - 11	59.6			
12 - 14	59.5			
15 - 19	59.4			
20 - 28	59.5			
29 - 31	59.6			
Feb 1 - 3	59.6		1.61	
4 - 10	59.7			
11 - 17	59.8			
18 - 22	59.7			
23 - 28	59.6			
Mar 1 - 7	59.5		1.61	
8 - 12	59.4			
13 - 17	59.3			
18 - 24	59.2			
25 - 30	59.1			
31	59.0			
Apr 1 - 6	59.0		1.61	
7 - 10	58.9			
11 - 18	58.8			
19 - 21	58.9			
22 - 24	59.0			
25 - 28	59.1			
29 - 30	59.2			
May 1 - 2	59.2		1.61	
3 - 6	59.3			
7 - 9	59.4			
10 - 13	59.5			
14 - 16	59.6			
17 - 20	59.7			
21 - 24	59.8			
25 - 29	59.9			
30 - 31	23° 00.0			
Jun 1	00.0		1.61	
2 - 5	00.1			
6 - 8	00.2			
9 - 13	00.3			
14	00.4			
15 - 16	00.5			
17 - 19	00.6			
20 - 22	00.7			
23 - 24	00.8			
25 - 28	00.9			
29 - 30	01.0			

MEANOOK 1973

D BASELINES | TABLE 43 | SCALE VALUES '/mm

	Adopted ° '	Observed ° '	Adopted ° '	Observed ° '
Jul 1 - 3	23° 01.1		1.61	
4 - 5	01.2			
6 - 7	01.3			
8 - 10	01.4			
11 - 13	01.5			
14 - 31	01.6			
Aug 1 - 31	01.6		1.61	
Sep 1 - 30	01.5		1.61	
Oct 1 - 18	01.5		1.61	
19 - 24	01.4			
25 - 30	01.3			
31	01.2			
Nov 1 - 4	01.2		1.61	
5 - 10	01.1			
11 - 30	01.0			
Dec 1 - 20	01.0		1.61	
21 - 25	00.9			
26 - 31	00.8			

MEANOOK 1973

H BASELINES nT TABLE 44 | SCALE VALUES nT/mm

Adopted		Observed	Adopted		Observed
Jan 1 - 19	13053		Jan	10.29	
20 - 28	13052				
29 - 31	13051				
Feb 1 - 9	13051		Feb	10.29	
10 - 28	13050				
Mar 1 - 22	13050		Mar	10.29	
23 - 31	13051				
Apr 1 - 3	13051		Apr	10.29	
4 - 14	13052				
14 - 27	13053				
28 - 30	13054				
May 1 - 10	13054		May	10.29	
11 - 31	13055				
Jun 1 - 10	13055		Jun	10.29	
11 - 25	13054				
26 - 30	13053				
Jul 1 - 9	13053		Jul	10.29	
10 - 31	13052				

MEANOOK

H BASELINES nT TABLE 44 | SCALE VALUES nT/mm

Adopted		Observed	Adopted		Observed
Aug 1 - 10	13052		Aug	10.29	
11 - 25	13053				
26 - 31	13052				
Sep 1 - 27	13052		Sep	10.29	
28 - 30	13051				
Oct 1 - 26	13051		Oct	10.29	
27 - 31	13050				
Nov 1 - 6	13050 to 13045		Nov	10.29	
7 - 14	13045				
15 - 30	13044				
Dec 1 - 31	13044		Dec	10.29	

MEANOOK 1973

Z BASELINES nT — TABLE 45 — SCALE VALUES nT/mm

Adopted		Observed	Adopted		Observed
Jan 1 -	58424		Jan	9.42	
2 - 31	58423				
Feb 1 - 17	58422		Feb	9.42	
18 - 25	58423				
26 - 27	58424				
28	58425				
Mar 1 - 3	58425		Mar	9.42	
4 - 7	58426				
8 - 12	58427				
13 - 28(1800)	58428				
28(1800) - 31	58474				
Apr 1 -	58473		Apr	9.42	
2 - 5(2110)	58472				
5(2110-2206)	Missing				
5(2206) - 17	58431				
18 - 22	58432				
23 - 26	58433				
27 - 30	58434				
May 1 - 5	58435		May	9.42	
6 - 8	58436				
9 - 12	58437				
13 - 26	58438				
27 - 31	58437				
Jun 1 - 16	58437		Jun	9.42	
17 - 30	58436				
Jul 1 - 4	58436		Jul	9.42	
5 - 31	58435				

MEANOOK 1973

Z BASELINES nT TABLE 45

SCALE VALUES nT/mm

Adopted		Observed	Adopted		Observed
Aug 1 - 3(1500)	58435		Aug	9.42	
3(1500)-18	58463				
19 - 23	58464				
24 - 29	58465				
30 - 31	58466				
Sep 1 - 2	58466		Sep	9.42	
3 - 7	58467				
8 - 17	58468				
18 - 19	58469				
20 - 30	58468				
Oct 1 - 7	58467		Oct	9.42	
8 - 26	58466				
27 - 31	58465				
Nov 1 - 30	58465		Nov	9.42	
Dec 1 - 31	58465		Dec	9.42	

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 46 MEANOOK X = 12000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	264	264	275	303	314	310	295	290	288	291	295	296	290	302	289	280
1-2	270	267	271	315	324	314	295	296	288	292	289	296	293	307	291	281
2-3	271	269	272	302	309	319	289	296	289	293	289	293	291	303	289	281
3-4	275	264	270	299	290	304	290	290	277	299	283	291	286	293	286	278
4-5	265	265	265	290	285	289	278	287	290	287	280	289	281	285	283	275
5-6	260	263	257	243	259	276	276	277	285	265	279	287	269	272	262	273
6-7	249	250	225	184	233	253	256	262	275	263	272	283	250	251	237	264
7-8	239	227	231	184	195	208	230	230	266	240	258	279	233	216	231	251
8-9	236	202	192	107	188	184	226	222	255	219	247	270	212	205	194	239
9-10	210	210	142	122	198	192	226	223	239	204	261	263	207	210	177	236
10-11	195	192	138	144	198	206	205	233	204	212	263	262	204	211	174	229
11-12	190	191	166	146	222	204	217	230	181	211	268	265	208	218	176	229
12-13	216	195	145	148	239	221	235	248	194	235	268	266	218	236	181	237
13-14	232	210	178	156	239	229	249	258	215	254	272	271	230	244	201	247
14-15	243	226	202	186	243	230	257	261	242	250	269	281	241	248	220	255
15-16	244	226	215	204	252	248	259	256	256	261	270	285	248	254	234	257
16-17	242	220	219	213	250	245	255	254	255	262	269	282	247	251	237	254
17-18	238	230	214	222	247	241	249	249	252	257	265	279	245	246	236	253
18-19	235	228	221	231	254	245	250	249	252	256	259	278	247	250	240	250
19-20	237	231	232	249	261	253	259	259	259	263	261	282	254	258	250	253
20-21	240	244	244	264	274	264	267	271	271	270	271	284	264	269	262	260
21-22	247	242	259	278	282	286	272	280	286	278	279	285	273	280	275	264
22-23	254	251	271	287	293	299	276	287	299	286	281	289	281	289	286	269
23-24	259	249	279	300	313	307	290	292	293	285	284	294	287	300	289	272
MEANS	242	234	224	224	257	255	258	263	259	260	272	281	252	258	242	258

MEAN VALUES OF MAGNETIC ELEMENTS

FAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 47 MEANOOK Y = 5000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	308	308	306	314	312	307	303	304	298	297	299	297	305	307	304	303
1-2	318	309	307	320	315	309	307	312	303	306	301	303	309	311	309	308
2-3	319	316	312	331	318	321	310	317	306	309	306	302	314	316	314	311
3-4	328	319	324	336	313	321	314	317	307	314	308	304	317	316	320	315
4-5	328	323	323	327	323	312	313	318	312	307	304	308	316	316	317	316
5-6	323	321	317	298	304	308	311	308	305	292	302	307	308	308	303	313
6-7	314	309	286	276	292	297	300	296	305	289	294	301	296	296	289	304
7-8	307	296	299	276	278	272	284	284	293	284	284	296	288	280	288	296
8-9	305	282	283	236	273	268	281	284	290	277	287	291	280	277	272	291
9-10	293	291	259	257	284	276	286	274	293	276	290	282	280	280	271	289
10-11	291	285	266	282	288	281	274	294	293	281	290	291	285	284	280	289
11-12	299	294	275	284	304	281	287	279	293	283	294	295	289	288	284	295
12-13	295	303	286	285	315	305	308	306	299	288	297	297	299	308	290	298
13-14	303	302	288	292	324	319	326	324	315	295	297	296	307	323	298	299
14-15	311	309	295	305	329	326	334	332	325	294	294	298	313	331	305	303
15-16	319	310	308	309	333	333	338	330	324	298	298	299	317	333	310	306
16-17	317	303	309	317	331	326	330	322	313	297	296	298	313	327	309	304
17-18	311	300	298	316	321	315	317	309	302	290	292	294	305	316	301	299
18-19	303	291	295	306	308	305	301	293	291	283	283	285	295	302	293	291
19-20	299	291	295	303	300	290	289	278	283	278	276	283	289	289	290	287
20-21	294	291	297	304	300	285	283	277	283	279	278	284	288	286	291	287
21-22	294	291	299	310	298	292	282	282	291	284	284	287	291	288	296	289
22-23	299	297	301	311	301	298	284	290	301	289	287	289	295	293	300	293
23-24	303	302	305	315	314	302	295	299	299	292	290	293	301	302	303	297
MEANS	308	302	297	300	307	302	302	301	301	291	293	295	300	303	297	299

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY- ALL DAYS

TABLE 48 MEANOOK   Z = 58000 PLUS TABULAR VALUES IN GAMMAS   1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	688	678	696	705	693	702	687	687	683	692	681	678	689	692	694	681
1-2	689	687	695	699	681	699	695	690	688	692	682	676	689	691	694	683
2-3	693	694	693	691	685	691	691	691	681	690	683	675	688	689	689	686
3-4	690	685	685	686	680	689	685	688	676	686	679	675	684	685	683	682
4-5	691	682	682	668	672	679	675	670	671	669	674	676	676	674	673	681
5-6	678	676	670	624	638	669	666	650	669	663	673	670	662	655	657	674
6-7	670	658	634	618	635	644	628	627	652	640	657	661	644	633	636	662
7-8	658	655	637	616	591	603	618	609	640	634	632	650	629	605	632	649
8-9	647	641	619	644	641	591	613	608	634	620	619	638	626	613	629	636
9-10	620	622	615	632	629	594	611	616	621	602	635	628	619	613	617	627
10-11	601	620	611	641	630	603	604	636	620	613	645	625	621	618	621	623
11-12	604	625	603	626	642	616	621	618	629	620	649	636	624	625	619	628
12-13	623	639	595	639	648	633	637	643	618	623	644	632	631	640	619	634
13-14	640	643	608	642	646	637	645	648	620	634	645	637	637	644	626	641
14-15	650	641	625	643	656	640	649	651	638	646	642	645	644	649	638	645
15-16	659	650	649	660	661	653	654	652	648	652	650	650	653	655	653	652
16-17	662	645	658	680	666	657	655	657	660	661	656	651	659	658	665	654
17-18	660	660	661	687	665	659	656	660	662	664	658	653	662	660	668	657
18-19	666	667	673	689	666	663	656	662	665	667	660	655	666	662	674	662
19-20	670	671	683	694	668	668	659	665	670	671	668	659	670	665	679	667
20-21	671	678	693	699	677	674	665	670	674	674	677	664	676	672	685	672
21-22	677	679	699	701	682	684	669	673	680	679	680	667	681	677	690	676
22-23	682	682	697	702	691	690	672	679	681	684	677	671	684	683	691	678
23-24	682	680	699	704	703	698	682	684	682	685	677	674	688	691	693	678
MEANS	661	661	658	666	660	656	654	656	657	657	660	656	658	656	659	660

TABLE 49

Mean Annual Values (Meanook)

Year	D(East)		H	Z	X*	Y*(E)	I*(N)		F*
	°	'	nT	nT	nT	nT	°	'	nT
1957.5	24	23.1	12921	58801	11768	5335	77	36.4	60204
1958.5		15.0	12943	58819	11801	5316		35.4	60226
1959.5		13.0	12960	58787	11819	5316		34.1	60198
1960.5		09.7	12985	58774	11848	5316		32.5	60192
1961.5		06.1	13022	58748	11887	5318		30.1	60175
1962.5		02.7	13054	58723	11921	5318		28.1	60156
1963.5	23	58.7	13076	58711	11949	5314		26.5	60150
1964.5		54.9	13103	58694	11978	5312		24.9	60139
1965.5		51.7	13130	58672	12008	5312		23.1	60123
1966.5		49.6	13150	58663	12029	5312		21.9	60119
1967.5		47.2	13170	58663	12051	5312		20.8	60123
1968.5		45.0	13197	58659	12079	5315		19.4	60125
1969.5		42.1	13234	58662	12118	5320		17.2	60136
1970.5		39.8	13265	58672	12150	5324		15.6	60153
1971.5		36.2	13303	58669	12190	5327		13.5	60158
1972.5		30.8	13333	58668	12226	5319		11.8	60164
1973.5	23	23.5	13349	58658	12252	5300	77	10.8	60158

*X,Y,I,F are derived from annual means, D,H,Z to 1972.5. Thereafter D,H,I,F are derived from X,Y,Z.

OTTAWA

Officer-in-charge: W.R. Darker
Assistant: R. Groulx

Ottawa magnetic observatory was established in 1968 as part of the new complex of magnetic laboratories in the Department of Energy, Mines and Resources, located immediately east of the city of Ottawa, near the village of Blackburn. The new observatory was fully operational on July 1, 1968, and is the replacement for Agincourt observatory which had to be closed March 31, 1969, owing to industrial development and highway construction in the vicinity of the observatory. Agincourt observatory had been in continuous operation since 1898, and was itself a replacement for the Toronto observatory, established in 1843, which had to be relocated following electrification of the Toronto tramway system.

The mailing address for the Ottawa observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada
K1A 0Y3

Observatory site

The observatory is located on the east-west ridge of land known as Dolman Ridge, bounded on the north by the swamps and marshes of Mer Bleue, and on the south by the Borthwick Creek swampland. Dolman Ridge is a feature of the Recent geological period, and was at one time an island in the Champlain Sea.

Parameters for Ruska data reduction

Baselines and scale values

The adopted baselines and scale values for 1973 are given in Tables 50 to 52.

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 53-56.

Ottawa 1973 D BASELINES minutes TABLE 50 SCALE VALUES min/mm

Adopted	Observed		
Jan 1-31 346° 31.0'	Jan 3 346° 30.5' 9 346° 31.3' 17 346° 31.0' 25 346° 31.3'	Jan 1-31	1.07'
Feb 1-28 346° 31.0' to 30.5'	Feb 5 346° 30.7' 16 346° 31.1' 28 346° 29.9'	Feb 1-28	1.06'
Mar 1-31 346° 31.0' to 31.5'	Mar 2 346° 30.9' 9 346° 30.9' 23 346° 31.3'	Mar 1-31	1.06'
Apr 1-27 (23.59) 346°31.5' to 32.0' 28-30 346°32.0' to 31.5'	Apr 3 346° 31.5' 18 346°32.4' 24 346°32.0'	Apr 1-30	1.08'
May 1-31 346°31.5' to 31.0'	May 1 346°31.8' 7 346°31.4' 24 346°31.2'	May 1-31	1.07'
Jun 1-30 346°31.0' to 30.0'		Jun 1-30	1.07'
Jul 1-31 346°30.0' to 31.0'	Jul 6 346°30.4' 12 346°30.5' 16 346°30.9'	Jul 1-31	1.07'
Aug 1-31 346°31.0'	Aug 9 346°30.5 16 346°31.0' 28 346°30.2'	Aug 1-31	1.05'
Sep 1-14 (23.59) 346°31.0' to 30.0' 15-30 346°30.0' to 31.0'	Sep 13 346°31.0' 19 346°30.7' 25 346°31.0'	Sep 1-30	1.08'
Oct 1-21 (23.59) 346°31.0' to 31.5' 22-31 346°31.5' to 31.0'	Oct 1 346°30.7' 12 346°30.5' 18 346°31.1' 25 346°31.0'	Oct 1-31	1.08'
Nov 1-18 (23.59) 346°31.0' to 31.5' 19-28 (23.59) 346°31.5' to 30.0' 29-30 34.6°30.0' to 30.5'	Nov 2 346°30.6' 16 346°31.8' 20 346°30.6' 23 346°29.8' 26 346°30.4' 29 346°30.5'	Nov 1-30	1.07'
Dec 1-6 (17.00) 346°30.5' 6-31 346°38.5' - 39.0'	Dec 10 346°38.2 14 346°39.0 19 346°38.2 31 346°39.4	Dec 1-31	1.07'

Ottawa
1973

H BASELINES nT TABLE 51 | SCALE VALUES nT/mm

Adopted		Observed			
Jan 1-31	15854	Jan 3	15851	Jan 1-31	6.21
		9	15854		
		17	15854		
		25	15856		
Feb 1-28	15854 to 15858	Feb 5	15853	Feb 1-28	6.18
		16	15854		
		23	15858		
Mar 1-13 (19.30)	15858 to 15862	Mar 5	15859	Mar 1-13 (19.30)	6.29
13-31	15898 to 15886	6	15863	14-31	6.00
		8	15862		
		14	15899		
		23	15894		
Apr 1-12 (23.59)	15886 to 15882	Apr 8	15889	Apr 1-30	6.07
13-30	15882 to 15890	18	15886		
		24	15887		
May 1-24 (23.59)	15890 to 15894	May 1	15891	May 1-31	5.93
25-31	15894 to 15892	10	15893		
		16	15892		
		21	15894		
		31	15893		
Jun 1-30	15892 to 15890			Jun 1-30	6.00
Jul 1-31	15890	Jul 6	15887	Jul 1-31	6.06
		12	15891		
		20	15890		
Aug 1-31	15890	Aug 8	15894	Aug 1-31	6.07
		16	15889		
		22	15891		
		28	15887		
Sep 1-30	15890 to 15889	Sep 5	15893	Sep 1-30	5.98
		19	15892		
		25	15890		
Oct 1-31	15889 to 15887	Oct 1	15886	Oct 1-31	5.99
		12	15889		
		18	15890		
		22	15886		
Nov 1-30	15887 to 15886	Nov 2	15888	Nov 1-30	6.06
		9	15887		
		16	15886		
		20	15886		
		29	15885		
Dec 1-6 (17.00)	15886	Dec 10	16008	Dec 1-31	6.04
6-14 (23.59)	16008 to 16006	14	16004		
15-31	16006 to 16010	19	16007		
		31	16011		

Ottawa 1973

Z BASELINES nT TABLE 52 SCALE VALUES nT/mm

Adopted	Observed		
Jan 1-31 56253 to 56241	Jan 3 56252 9 56251 17 56240 25 56245	Jan 1-31	6.51
Feb 1-16 (23.59) 56241 to 56235 17-28 56236 to 56240	Feb 5 56239 16 56234 23 56238 28 56239	Feb 1-28	6.83
Mar 1-31 56242 to 56245	Mar 5 56247 7 56246 8 56246 23 56247	Mar 1-31	6.36
Apr 1-30 56245 to 56234	Apr 8 56240 18 56233 24 56235	Apr 1-30	6.59
May 1-31 56234 to 56228	May 1 56234 10 56230 16 56229 21 56228 31 56228	May 1-31	6.56
Jun 1-30 56228 to 56214		Jun 1-30	6.48
Jul 1-31 56212 to 56198	Jul 6 56209 12 56190	Jul 1-31	6.7
Aug 1-18 (23.59) 56198 to 56192 19-31 56194 to 56196	Aug 8 56198 9 56194 16 56191 22 56198 28 56193	Aug 1-31	7.14
Sep 1-30 56196 to 56210	Sep 5 56198 19 56205 22 56207 25 56206	Sep 1-30	7.25
Oct 1-31 56210 to 56218	Oct 1 56214 12 56217 18 56216 22 56218 25 56220	Oct 1-31	7.16
Nov 1-30 56218 to 56230	Nov 2 56218 9 56218 16 56223 20 56225 23 56232 29 56231	Nov 1-30	7.58
Dec 1-6 (17.00) 56232 6-14 (14.55) 56245 14-19 (14.45) 56250 19-24 (14.45) 56255 24-26 (14.55) 56260 26-31 56270	Dec 10 56236 14 56235 31 56275	Dec 1-31	7.13

MEAN VALUES OF MAGNETIC ELEMENTS

NORTH COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 53 OTTAWA X = 15000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	650	663	677	686	702	708	724	717	716	717	727	733	702	713	699	694
1-2	650	664	676	676	687	702	722	717	717	718	725	733	699	707	697	693
2-3	647	662	676	672	683	697	720	716	715	716	724	731	697	704	695	692
3-4	649	663	674	657	681	695	716	716	715	714	724	730	695	702	690	692
4-5	650	661	671	661	683	694	718	712	714	706	725	730	694	701	688	692
5-6	649	657	666	644	683	693	716	710	713	699	725	731	691	700	681	691
6-7	649	655	650	633	670	690	711	711	712	703	723	731	687	695	674	690
7-8	649	654	667	641	665	680	710	709	713	710	720	731	688	691	683	689
8-9	649	654	666	632	664	684	713	709	714	708	725	732	688	692	680	691
9-10	649	659	654	652	671	689	716	708	715	715	730	735	691	696	684	694
10-11	649	660	661	663	678	695	713	714	712	720	733	738	695	700	689	696
11-12	652	662	667	668	686	691	714	709	708	718	733	740	696	700	690	697
12-13	650	662	660	661	684	687	711	704	696	713	730	738	691	696	683	695
13-14	650	656	656	649	675	680	702	694	689	705	722	734	684	688	675	691
14-15	643	649	643	642	668	672	692	684	685	693	710	730	676	679	666	684
15-16	633	642	635	639	668	671	689	680	680	686	705	723	671	677	660	676
16-17	628	637	631	645	674	675	692	686	683	688	704	717	672	682	662	672
17-18	627	642	633	658	681	688	702	698	693	692	707	715	678	692	669	673
18-19	632	650	649	678	691	703	713	709	705	702	712	719	689	704	684	679
19-20	641	657	669	695	699	711	724	717	718	711	717	727	699	713	698	686
20-21	647	671	684	701	709	716	731	724	725	716	722	733	707	720	706	693
21-22	650	670	683	701	708	724	733	728	733	718	728	735	709	723	709	696
22-23	650	669	680	700	707	723	730	726	728	718	727	738	708	721	707	696
23-24	649	667	679	697	708	719	730	721	718	718	726	734	706	719	703	695
MEANS	646	658	663	665	684	695	714	709	709	709	722	731	692	701	686	689

MEAN VALUES OF MAGNETIC ELEMENTS

EAST COMPONENT OF HORIZONTAL INTENSITY-ALL DAYS

TABLE 54 OTTAWA   Y = -4000 PLUS TABULAR VALUES IN GAMMAS   1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	197	187	183	190	188	171	182	189	173	188	174	163	182	183	184	180
1-2	202	188	183	189	188	174	187	190	176	190	175	167	184	185	185	183
2-3	199	192	186	193	186	174	184	190	174	187	177	164	184	183	185	183
3-4	198	192	182	187	187	176	183	191	171	187	171	163	182	184	182	181
4-5	195	186	178	187	184	175	183	189	171	186	169	161	180	183	180	178
5-6	186	184	182	179	180	171	181	183	175	179	167	157	177	179	179	173
6-7	188	185	169	183	182	167	174	183	176	180	164	155	175	176	177	173
7-8	187	187	178	186	181	164	172	182	182	183	159	156	176	175	182	172
8-9	189	186	180	190	188	168	182	185	184	180	163	156	179	181	184	173
9-10	185	186	177	188	194	178	186	191	186	178	169	155	181	187	182	174
10-11	180	186	176	198	203	192	193	201	185	179	171	155	185	197	184	173
11-12	182	187	176	199	207	201	201	209	188	179	171	155	188	205	186	173
12-13	191	189	180	198	208	204	205	215	187	181	173	155	191	208	187	177
13-14	199	188	184	190	202	195	203	211	184	187	175	158	190	203	186	180
14-15	199	184	182	178	188	178	192	198	176	186	173	160	183	189	181	179
15-16	191	178	172	171	177	165	176	180	165	180	167	159	174	175	172	174
16-17	180	170	159	162	164	150	159	163	151	168	156	151	161	159	160	164
17-18	173	165	146	156	156	142	149	155	142	160	150	143	153	151	151	157
18-19	168	164	143	155	155	139	144	153	141	156	147	138	150	148	149	154
19-20	169	166	150	160	158	142	148	158	146	159	148	140	154	152	154	155
20-21	171	170	153	161	166	150	155	167	156	164	154	145	159	160	159	160
21-22	178	172	161	167	170	159	163	176	164	169	159	149	166	167	165	164
22-23	183	178	168	179	177	165	170	185	172	176	162	154	172	174	174	169
23-24	187	183	178	187	184	170	177	187	171	181	166	160	178	179	179	174
MEANS	187	181	172	181	182	170	177	185	171	178	165	155	175	178	175	172

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY- ALL DAYS

TABLE 55 OTTAWA Z = 56000 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	370	365	363	361	353	344	328	321	321	314	307	296	337	337	339	334
1-2	368	364	357	346	335	339	323	316	315	307	306	295	331	328	331	333
2-3	366	361	349	328	331	320	316	307	310	303	302	294	324	319	322	330
3-4	360	355	337	319	334	306	304	303	303	299	298	292	317	312	314	326
4-5	352	351	334	312	317	305	298	293	304	290	297	287	311	303	310	321
5-6	349	343	331	299	312	304	297	290	307	286	296	286	308	301	305	318
6-7	353	340	317	294	303	302	292	290	303	279	293	284	304	297	298	317
7-8	353	338	323	302	309	294	288	287	301	285	287	282	304	295	303	315
8-9	351	339	326	311	308	299	299	292	301	284	287	282	306	299	306	315
9-10	348	340	323	317	313	306	307	298	296	282	292	282	309	306	304	315
10-11	346	337	327	325	325	316	309	307	294	288	294	281	312	314	308	314
11-12	348	341	335	330	327	319	309	307	295	293	296	283	315	316	313	317
12-13	354	344	337	334	330	322	308	308	294	297	296	284	317	317	315	319
13-14	354	346	338	336	332	322	310	307	297	300	296	285	318	318	317	320
14-15	352	345	340	340	333	322	310	308	301	301	294	284	319	318	320	318
15-16	354	347	346	349	336	322	310	310	305	301	293	283	321	320	325	319
16-17	357	347	350	354	338	325	309	313	309	303	294	285	323	321	329	320
17-18	358	352	356	362	340	329	312	317	312	307	298	289	327	324	334	323
18-19	361	357	366	368	343	334	317	323	317	312	302	293	332	329	340	328
19-20	364	367	370	373	349	341	324	327	323	316	308	295	338	335	345	333
20-21	364	378	380	373	355	346	328	327	326	316	312	296	341	339	349	337
21-22	365	375	378	371	356	349	329	325	330	318	314	297	342	340	349	337
22-23	366	372	379	371	360	347	328	324	325	317	309	300	341	340	348	336
23-24	369	368	375	368	363	350	330	322	321	315	309	296	340	341	345	335
MEANS	358	353	347	339	333	323	312	309	309	301	299	289	322	320	324	324

TABLE 56

Annual Mean Values (Ottawa)

Year	D(East)		H	Z	X*	Y*	I(N)*		F*
	°	'	nT	nT	nT	nT	°	'	nT
1968.5	346	18.4	15684	56478	15238	-3713	74	28.8	58615
1969.5	346	18.9	15760	56467	15313	-3729	74	24.3	58625
1970.5	346	17.6	15858	56455	15406	-3758	74	18.6	58640
1971.5	346	18.8	15960	56429	15507	-3776	74	12.4	58643
1972.5	346	18.4	16051	56386	15595	-3800	74	06.6	58626
1973.5	346	18.1	16151	56322	15692	-3825	73	59.9	58592

*Values of X,Y,I and F are derived from means of D,H,Z, 1968.5 to 1972.5. Thereafter D,H,I and F are derived from X,Y,Z.

ST. JOHN'S

Officer-in-charge: Operated by Memorial University of Newfoundland under contract.

The magnetic observatory at St. John's, Newfoundland, began operation on August 1, 1968. A location in southeastern Newfoundland was chosen to reduce one of the largest gaps in the geographical distribution of the magnetic observatories of the northern hemisphere. In addition to contributing data for studies of world-wide geomagnetic variations and secular change, the St. John's observatory provides control for the many marine and airborne magnetic surveys conducted over the broad continental shelf east of Canada.

The mailing address of St. John's observatory is:

Division of Geomagnetism
Earth Physics Branch
Department of Energy, Mines and Resources
Ottawa, Canada
K1A 0Y3

Observatory site

The original land allotment for St. John's observatory of 135,000 m^2 was increased to 589,500 m^2 in February, 1972.

The observatory is 3 km northeast of the centre of the city and 1.5 km from the sea. The area is magnetically flat, and the total intensity varies less than 15 nT within the site. A preliminary survey of geomagnetic time variations throughout Newfoundland revealed no gross anomalies of electromagnetic induction in the St. John's region, but some coastal induction effects must be expected and have in fact been found.

Magnetic equipment

AMOS is the primary recorder at St. John's observatory. An independent 3-component fluxgate magnetometer recording on paper chart at 20 mm/hr provides a standby analogue recording system. The observatory is operated under local contract. Absolute field measurements in D and I and routine checks on the instruments and buildings are carried out twice a week.

Reduction of data

Tables 57-59 list the corrections for reducing AMOS values to the absolute reference of the observatory.

Computer plots of the one-minute AMOS data in the Ruska magnetogram format are produced for distribution to World Data Centre A and for general research purposes. Mean hourly value tables were calculated by computer from the edited digital data and corrected to the absolute reference of the observatory.

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 60 to 63.

ST. JOHN'S
1973

TABLE 57

D BASELINES ' EAST

Adopted		Observed	° '
Jan 1 - 3	333°36.8	Jan 7	333°36.9
4 - 6	333°36.7	7	333°36.8
7 - 14	333°36.6	13	333°35.7
15 - 17	333°36.5	13	333°39.2
18 - 25	333°36.4	19	333°36.4
26 - 31	333°36.3	19	333°37.0
		27	333°36.3
		27	333°36.4
Feb 1 - 7	333°36.2	Feb 2	333°35.4
7 - 10	333°36.1	3	333°36.9
11 - 28	333°36.0	11	333°35.3
		11	333°36.0
		17	333°36.1
		18	333°35.8
		25	333°36.1
		25	333°35.4
Mar 1 - 10	333°36.1	Mar 5	333°36.6
11 - 31	333°36.2	5	333°36.4
		10	333°35.7
		10	333°35.9
		28	333°35.0
		28	333°35.4
Apr 1 - 15	333°36.2	Apr 1	333°36.2
16 - 30	333°36.3	1	333°36.7
		8	333°37.3
		8	333°37.1
May 1 - 31	333°36.4	May 5	333°37.4
		5	333°37.4
		12	333°36.8
		12	333°36.7
		19	333°36.1
		20	333°35.8
		26	333°33.2
		26	333°33.2
Jun 1 - 18	333°36.4	Jun 8	333°36.4
19	333°36.5	8	333°36.4
20	333°36.6	16	333°36.1
21	333°36.7	16	333°36.0
22	333°36.8	23	333°36.8
23	333°37.0	23	333°36.7
24	333°37.1	30	333°37.6
25	333°37.2		
26	333°37.4		
27	333°37.6		
28 - 29	333°37.8		
30	333°37.9		
Jul 1	333°38.0	Jul 1	333°37.6
2	333°38.1	7	333°38.7
3	333°38.2	7	333°39.3
4	333°38.4	11	333°39.6
5	333°38.5	14	333°38.8
6	333°38.6	14	333°39.0
7	333°38.8	22	333°38.9
8	333°39.0	22	333°38.4
9 - 11	333°39.1		
12 - 14	333°39.0		
15	333°38.9		
16 - 18	333°38.8		
19 - 20	333°38.7		
21 - 23	333°38.6		
24 - 25	333°38.5		
26 - 28	333°38.4		
29 - 31	333°38.3		

D BASELINES ' EAST

Adopted		Observed	° '
Aug 1-2	333°38.2	Aug 5	333°38.3
2-4	333°38.1	5	333°17.5
5-7	333°38.0	25	333°16.9
8-9	333°37.9	25	333°17.5
10-12	333°37.8		
13-14	333°37.7		
15-17	333°37.6		
18-19	333°37.5		
20-21	333°37.4		
22-23	333°37-3		
24-26	333°37-2		
27-28	333°37-1		
29-31	333°37.0		
Sep 1-2	333°36.9	Sep 4	333°36.0
2-4	333°36.8	5	333°34.4
5-6	333°36.7	11	333°36.7
7-9	333°36.6	12	333°36.2
10-11	333°36.5	18	333°36.8
12-13	333°36.4	19	333°35.8
14-15	333°36.3	27	333°36.0
16-18	333°36.2	28	333°35.4
19-20	333°36.1	28	333°35.3
21-23	333°36.0		
24-25	333°35.9		
26-28	333°35.8		
29-30	333°35.7		
Oct 1-31	333°35.6	Oct 2	333°35.3
		3	333°35.6
		10	333°35.4
		14	333°35.4
		18	333°36.3
		19	333°35.9
		25	333°35.4
			333°34.3
Nov 1-20	333°35.6	Nov 6	333°36.3
21-30	333°35.7	6	333°36.9
		25	333°35.2
		25	333°35.1
Dec 1-5	333°35.7	Dec 10	333°36.0
6-14	333°35.8	11	333°35.9
15-17	333°27.0		
18-20	333°27.1		
21-23	333°27.2		
24-26	333°27.3		
27-31	333°27.4		

ST. JOHN'S
1973

H BASELINES nT TABLE 58

Adopted		Observed	
Jan 1 - 13	+9	Jan 7	+6
14 - 31	+10	7	+8
		13	+13
		13	+10
		19	+13
		19	+13
		20	+9
		27	+11
		27	+7
Feb 1 - 28	+10	Feb 2	+13
		3	+13
		11	+10
		11	+10
		17	+10
		18	+7
		25	+7
		25	+11
Mar 1 - 31	+9	Mar 5	+13
		5	+13
		10	+8
		10	+8
		28	+7
		28	+7
Apr 1 - 30	+8	Apr 1	+10
		1	+8
		8	+8
		8	+8
May 1 - 24	+8	May 5	+8
25 - 31	+7	5	+6
		12	+10
		12	+10
		19	+9
		20	+8
		26	+5
		26	+6
Jun 1 - 2	+7	Jun 8	+6
3 - 10	+6	8	+6
11 - 16	+5	16	+6
17 - 18	+6	16	+3
19 - 21	+7	23	+8
22 - 24	+8	23	+8
25 - 27	+9	30	+14
28 - 30	+10		
Jul 1 - 31	+10	Jul 1	+9
		7	+13
		7	+16
		11	+6
		14	+9
		14	+7
		22	+9
		22	+8
Aug 1 - 31	+10	Aug 5	+13
		5	+15
		25	+4
		25	+4

H BASELINE nT/mm

Adopted		Observed	
Sep 1 - 15	+12	Sep 4	+10
16 - 30	+13	5	+13
		11	+14
		12	+12
		18	+11
		19	+13
		27	+12
		28	+13
		28	+6
Oct 1 - 16	+14	Oct 2	+11
17 - 26	+13	3	+12
27 - 31	+12	10	+13
		11	+15
		18	+16
		19	+15
		25	+15
Nov 1 - 3	+12	Nov 6	+13
4 - 11	+11	6	+11
12 - 25	+10	25	+8
26 - 30	+9	25	+9
Dec 1 - 6	+9	Dec 10	+10
7 - 14	+8	11	+11
15 - 18	+39		
19 - 27	+40		
28 - 31	+41		

ST. JOHN'S
1973

Z BASELINES nT TABLE 59 | Z BASELINES nT/mm

Adopted		Observed		Adopted		Observed	
Jan 1 - 19	-3	Jan 7	-2	Aug 1 - 31	-4	Aug 5	-5
20 - 31	-4	7	-3			5	-6
		13	-4			25	-1
		13	-4			25	-1
		19	-5				
		19	-3				
		20	-4	Sep 1 - 30	-5	Sep 4	-4
		27	-3			5	-5
		27	-5			11	-5
						12	-5
						18	-4
Feb 1 - 28	-4	Feb 2	-5			19	-5
		3	-4			27	-5
		11	-4			28	-5
		11	-3			28	-5
		17	-4				
		18	-3				
		25	-3	Oct 1 - 31	-5	Oct 2	-4
		25	-3			3	-4
						10	-5
						11	-6
Mar 1 - 31	-4	Mar 5	-5			18	-6
		5	-5			19	-6
		10	-3			25	-6
		10	-3				
		28	-2				
		28	-2	Nov 1 - 30	-4	Nov 6	-5
						6	-4
Apr 1 - 30	-4	Apr 1	-4			25	-3
		1	-3			25	-3
		8	-3				
		8	-3				
				Dec 1 - 14	-4	Dec 10	-4
				15 - 31	-14	11	-4
May 1 - 20	-4	May 5	-3				
20 - 31	-3	5	-3				
		12	-4				
		12	-5				
		19	-4				
		20	-3				
		26	-2				
		26	-2				
Jun 1 - 7	-3	Jun 8	-2				
8 - 25	-2	8	-2				
26 - 30	-3	16	-1				
		16	-3				
		23	-3				
		23	-5				
		30	-3				
Jul 1 - 26	-3	Jul 1	-3				
26 - 31	-4	7	-4				
		7	-5				
		11	-2				
		14	-3				
		14	-2				
		22	-3				
		22	-3				

MEAN VALUES OF MAGNETIC ELEMENTS

HORIZONTAL INTENSITY-ALL DAYS

TABLE 60 ST JOHN S — H = 17000 PLUS TABULAR VALUES IN GAMMAS — 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	833	836	845	850	871	882	894	908	894	893	901	909	876	889	871	870
1-2	829	835	844	837	857	877	892	905	894	892	901	910	873	883	867	869
2-3	825	834	843	835	856	869	889	902	892	891	900	909	870	879	865	867
3-4	826	835	838	833	856	869	885	904	889	888	901	909	869	878	862	868
4-5	827	832	838	833	856	869	887	899	889	888	903	909	869	878	862	868
5-6	827	829	837	832	857	868	884	899	890	883	904	911	868	877	860	868
6-7	831	832	831	828	850	866	879	899	889	886	904	910	867	874	859	869
7-8	834	834	837	835	846	860	877	897	890	895	904	911	868	870	864	871
8-9	838	836	841	830	846	860	878	896	889	897	909	913	869	870	864	874
9-10	837	840	837	832	845	861	875	890	887	900	911	914	869	868	864	875
10-11	835	838	835	837	846	857	867	884	877	897	910	915	867	864	862	875
11-12	831	835	829	833	844	849	861	873	866	888	905	915	861	857	854	871
12-13	824	829	818	825	841	846	856	867	856	877	897	912	854	852	844	866
13-14	819	827	813	819	840	845	855	867	856	868	890	911	851	852	839	862
14-15	817	825	813	821	845	851	858	872	862	865	885	910	852	857	840	859
15-16	817	827	820	831	857	863	868	881	870	872	889	911	859	867	848	861
16-17	825	832	830	842	870	876	879	895	882	884	897	911	868	880	859	866
17-18	831	839	840	859	882	889	893	908	894	892	904	910	878	893	871	871
18-19	833	844	853	884	887	901	901	918	904	900	906	911	887	902	885	873
19-20	837	850	862	882	893	904	908	918	908	901	907	910	890	906	888	876
20-21	836	849	862	878	895	902	909	919	907	900	904	911	889	906	887	875
21-22	834	841	852	867	889	900	907	917	905	898	905	909	886	904	881	872
22-23	833	843	845	855	884	896	901	915	899	898	904	911	882	899	874	873
23-24	830	837	845	851	874	892	898	911	897	897	901	908	878	894	873	869
MEANS	830	836	838	843	862	873	883	898	887	890	902	911	871	879	864	869

MEAN VALUES OF MAGNETIC ELEMENTS

DECLINATION-ALL DAYS

TABLE 61 ST JOHN S D = 333.0 DEGREES PLUS TABULAR VALUES IN MINUTES 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	46.6	46.1	47.7	47.8	49.7	50.4	51.3	51.2	52.4	54.9	54.5	54.5	50.6	50.6	50.7	50.4
1-2	46.6	46.2	47.1	48.8	48.0	50.8	51.6	50.7	52.4	54.4	54.9	53.9	50.5	50.3	50.7	50.4
2-3	45.9	46.9	47.3	48.9	49.2	49.9	51.4	50.5	52.2	53.8	54.5	54.2	50.4	50.3	50.5	50.4
3-4	45.3	46.0	46.0	48.3	49.8	49.5	50.7	50.4	52.0	54.2	53.4	53.7	50.0	50.1	50.1	49.6
4-5	44.1	46.1	46.4	48.6	48.8	50.1	50.6	50.1	52.9	53.9	52.9	53.6	49.8	49.9	50.5	49.2
5-6	43.8	46.0	47.3	48.4	48.7	50.0	50.8	49.9	53.9	53.5	52.7	53.8	49.9	49.8	50.8	49.1
6-7	44.8	46.7	46.6	49.3	48.6	50.1	50.8	49.7	54.1	53.6	52.8	53.8	50.1	49.8	50.9	49.5
7-8	45.0	47.2	47.3	49.2	49.0	50.3	51.3	50.2	55.3	54.3	52.5	53.7	50.4	50.2	51.5	49.6
8-9	44.7	46.9	48.1	49.5	51.0	52.0	53.9	51.7	55.6	53.6	52.8	53.6	51.1	52.1	51.7	49.5
9-10	43.8	46.6	47.2	48.4	52.8	53.5	55.6	53.5	55.6	52.3	53.8	53.5	51.4	53.8	50.9	49.4
10-11	43.7	45.4	46.9	49.4	53.3	54.6	55.8	54.8	55.2	52.8	54.3	53.5	51.7	54.6	51.1	49.2
11-12	44.2	45.8	47.4	50.1	52.7	54.8	55.3	53.5	54.5	53.2	54.5	53.3	51.6	54.1	51.3	49.5
12-13	45.0	45.4	47.1	48.7	51.6	53.1	53.5	52.3	52.1	53.0	54.1	53.1	50.8	52.6	50.2	49.4
13-14	43.4	43.9	44.9	45.7	49.2	50.3	51.2	49.3	49.4	52.1	52.7	52.7	48.7	50.0	48.0	48.2
14-15	41.5	42.4	42.2	44.0	46.2	47.3	48.5	46.4	47.2	49.8	50.1	52.5	46.5	47.1	45.8	46.6
15-16	40.4	41.0	40.6	42.6	44.2	45.3	45.9	43.8	45.4	47.7	48.2	52.0	44.8	44.8	44.1	45.4
16-17	39.0	40.3	39.4	42.1	43.3	43.8	44.0	42.4	44.6	46.6	47.4	51.5	43.7	43.4	43.1	44.6
17-18	38.8	40.2	39.0	42.1	43.7	43.9	43.8	43.2	45.4	47.0	47.7	51.5	43.8	43.6	43.4	44.5
18-19	39.8	41.0	40.5	44.4	44.7	44.5	44.7	44.8	47.2	47.9	48.5	51.4	44.9	44.7	45.0	45.2
19-20	41.4	43.0	42.4	44.9	46.0	46.2	46.4	46.7	49.7	50.0	49.7	52.2	46.6	46.3	46.8	46.6
20-21	42.3	44.0	44.8	45.3	47.7	47.8	48.1	48.5	51.5	51.7	51.4	52.5	48.0	48.0	48.3	47.5
21-22	43.8	44.6	46.7	46.4	48.1	49.1	49.3	49.6	52.2	52.8	52.4	52.7	49.0	49.0	49.5	48.4
22-23	44.6	44.8	48.2	46.9	48.8	49.7	49.8	50.4	53.0	53.7	52.7	53.3	49.6	49.7	50.4	48.8
23-24	46.1	45.8	48.2	47.8	49.7	49.9	50.9	50.6	52.5	54.4	53.9	53.3	50.2	50.2	50.7	49.8
MEANS	43.5	44.7	45.4	47.0	48.5	49.4	50.2	49.3	51.5	52.1	52.2	53.1	48.9	49.4	49.0	48.4

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY-ALL DAYS

TABLE 62 ST JOHN S Z = 50500 PLUS TABULAR VALUES IN GAMMAS 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0-1	224	217	212	209	202	202	194	187	191	182	184	179	199	196	199	201
1-2	216	218	208	193	185	195	185	180	185	176	184	178	192	186	190	199
2-3	218	211	205	185	186	179	183	171	183	175	180	179	188	180	187	197
3-4	214	214	197	186	186	171	175	170	177	170	179	180	185	175	183	197
4-5	211	211	195	186	188	176	175	165	181	168	184	177	185	176	182	196
5-6	214	204	195	186	190	182	178	171	184	167	186	176	186	180	183	195
6-7	217	206	194	196	185	190	180	175	182	169	184	175	188	182	185	196
7-8	219	207	202	213	186	187	180	175	180	178	182	174	190	182	193	196
8-9	219	210	205	211	186	188	185	178	184	180	181	175	192	184	195	196
9-10	219	214	202	210	194	189	188	178	183	183	182	175	193	187	194	197
10-11	218	211	206	211	199	191	187	178	177	183	182	175	193	189	194	196
11-12	215	210	207	214	202	190	187	176	176	182	181	176	193	189	195	196
12-13	211	208	203	215	205	198	190	181	181	182	178	174	194	193	195	193
13-14	211	210	207	216	211	200	193	187	188	182	178	175	197	198	198	194
14-15	216	212	214	223	220	207	202	193	196	186	181	176	202	205	205	196
15-16	222	219	224	222	225	212	209	201	201	193	187	177	208	212	210	201
16-17	228	223	231	230	230	219	214	207	209	201	192	179	213	217	217	205
17-18	231	229	239	233	231	224	216	210	211	204	196	180	217	220	222	209
18-19	233	233	245	231	230	225	216	210	213	209	199	183	219	220	225	212
19-20	233	238	247	231	229	225	217	206	213	206	202	182	219	219	224	214
20-21	229	237	248	226	228	223	213	202	208	204	199	182	216	217	221	212
21-22	227	233	234	226	227	216	210	196	203	201	197	182	213	212	216	210
22-23	227	231	227	219	225	213	205	193	193	194	195	184	209	209	208	209
23-24	225	222	220	216	212	210	199	191	195	189	190	180	204	203	205	204
MEANS	221	218	215	212	207	200	195	187	191	186	187	178	200	197	201	201

TABLE 63

Annual Mean Values (St. John's)

Year	D		H	Z	X*	Y*	I(N)*		F*
	o	'	nT	nT	nT	nT	o	'	nT
1968.8	333	02.2	17436	50769	15541	-7906	71	02.7	53680
1969.5	333	09.9	17503	50777	15619	-7901	70	58.8	53709
1970.5	333	16.7	17598	50788	15719	-7913	70	53.3	53750
1971.5	333	28.5	17687	50761	15825	-7899	70	47.4	53754
1972.5	333	37.9	17779	50734	15929	-7896	70	41.3	53759
1973.5	333	48.9	17871	50700	16037	-7886	70	35.0	53757

*X,Y,I and F are derived from annual means of D,H,Z to 1972.5. Thereafter D,H,I, and F are derived from X,Y,Z.

VICTORIA

Officer-in-charge: D.R. Auld

The Victoria Magnetic Observatory was established in 1957 on the grounds of the Dominion Astrophysical Observatory (now National Research Council) on Little Saanich Mountain about 16 km north of Victoria, British Columbia. The observatory is situated, some 185 m above mean sea level, in a wooded area about 120 m northeast of the Dominion Astrophysical Observatory office building. The site was chosen in 1956 for convenience to observatory facilities and power, whilst maintaining adequate separation from buildings and pipelines.

The mailing address of Victoria magnetic observatory is:

Victoria Magnetic Observatory
R.R. #7,
5071 West Saanich Road
Victoria, British Columbia
V8X 3X3

Observatory site

The area is underlain by acid intrusive rocks of Mesozoic age. A survey was made in 1956, using a 7.5 m grid separation of stations, to determine the vertical magnetic field intensity gradients. This revealed an average station difference, independent of sign, of 25 nT ± 20 nT standard deviation in any one difference. No large anomalies exceeding 25 nT were found within 30 m of the building site and the distribution of small anomalies was apparently random. Beyond this distance to the southeast a decrease of 50 nT was noted. The building site was therefore chosen for its flatness and convenience. To the east the ground falls rather steeply.

Magnetic reductions

As of 1962 data has been processed on the semi-automatic magnetogram reader[10], with output directly to computer cards. Direct photo-offset reproduction of the computer output sheets was used for the observatory year-books. The data is available on tab cards, and duplicate decks can be supplied to interested agencies.

Parameters for Ruska data reduction

Temperature corrections

H: Jan 1 to Jul 30
+ 9 nT per mm change of temperature trace relative to the adopted reference level, when temperature is greater than reference level;

- 7 nT per mm change of temperature trace when temperature is less than the reference level.

Jul 31 to Dec 31
- 2 nT per mm change of temperature trace.

Z: Jan 1 to Jul 31
- 2 nT/mm change of temperature trace;

Jul 31 to Dec 31
+ 2 nT/mm change of temperature trace.

The temperature reference levels, expressed in terms of the deflection of the temperature trace relative to the Z baseline, are listed below.

Jan 1 (0000) - May 18 (1658)	:	4.4 mm
May 18 (1658) - Oct 30 (1652)	:	9.4 mm
Oct 30 (1652) - Dec 31 (2400)	:	4.4 mm

Baselines and scale values

The observed and adopted baselines and scale values for 1973 are listed in Tables 64-66.

Summary of mean values

A summary by month, season and year of the mean hourly values for all days in 1973, and a list of the annual mean values, are given in Tables 67-70.

D Baselines °'				D Scale Values '/mm		
Adopted		Observed		Adopted		Observed
Jan. 1-31	22° 10.3	Jan. 12	22° 9.9	Jan.	0.94	0.95
		18	22° 9.8			
		26	22° 10.1			
		29	22° 9.5			
Feb. 1-28	22° 10.3	Feb. 9	22° 9.6	Feb.	0.94	0.94
		25	22° 9.6			
		28	22° 10.2			
Mar. 1-31	22° 10.3	Mar. 13	22° 10.6	Mar.	0.94	0.94
		28	22° 10.2			
		30	22° 10.4			
Apr. 1-30	22° 10.3	Apr. 9	22° 10.0	Apr.	0.94	0.94
		25	22° 9.5			
		27	22° 9.8			
		30	22° 10.3			
May 1-31	22° 10.3	May 10	22° 10.3	May	0.94	0.94
		18	22° 9.8			
		23	22° 10.1			
		31	22° 10.4			
June 1-30	22° 10.3	June 8	22° 10.8	June	0.94	0.95
		21	22° 10.5			
		26	22° 10.4			
July 1 (0000) - July 15 (2400)	22° 10.3	July 13	22° 10.7	July 1-15	0.94	0.94
July 16 (0000) - July 30 (2400)	Indeterminate	16	22° 10.5	July 16-30	Indeterminate	
July 31 (0000) - July 31 (2400)	22° 12.1	31	22° 12.2	July 31 (0000)	0.95	0.95

D Baselines °'				D Scale Value '/mm		
Adopted		Observed			Adopted	Observed
Aug. 1-31	22° 10.3	Aug. 8	22° 12.3	Aug.	0.95	0.94
		17	22° 12.3			
		27	22° 11.9			
Sept. 1-30	22° 12.1	Sept. 11	22° 11.5	Sept.	0.95	0.95
		19	22° 11.8			
		25	22° 11.5			
		27	22° 11.8			
Oct. 1-31	22° 12.1	Oct. 9	22° 11.8	Oct.	0.95	0.95
		23	22° 12.3			
		26	22° 12.0			
Nov. 1 (0000) - Nov. 30 (2400)	22° 12.1	Nov. 19	22° 12.6	Nov.	0.95	0.95
		27	22° 12.3			
		30	22° 12.1			
Dec. 1 (0000) - Dec. 31 (2400)	22° 12.6	Dec. 10	22° 13.1	Dec.	0.95	0.95
		18	22° 12.6			
		27	22° 12.5			

H Baselines nT				H Scale Values nT/mm		
Adopted		Observed		Adopted		Observed
Jan. 1-31	18963	Jan. 12	18965	Jan.	2.28	2.26
		18	18963			
		26	18963			
		29	18962			
Feb. 1-28	18963	Feb. 9	18963	Feb.	2.28	2.28
		25	18965			
		28	18965			
Mar. 1-31	18963	Mar. 13	18964	Mar.	2.28	2.31
		28	18959			
		30	18961			
Apr. 1-30	18963	Apr. 9	18962	Apr.	2.28	2.30
		25	18958			
		27	18956			
		30	18958			
May 1 (0000) - May 18 (1658)	18963	May 10	18961	May 1 (0000) - May 18 (1658)	2.28	2.30
18 (1658) - May 31 (2400)	19008	18	18961	May 18 (1658) - May 31 (2400)	2.20	2.18
		23	19007			
		31	19009			
June 1-30	19008	June 8	19008	June	2.20	2.22
		21	19013			
		26	19014			
July 1 (0000) - July 15 (2400)	19008	July 13	19007	July 1 (0000) - July 15 (2400)	2.20	2.21
July 16 (0000) - July 30 (2400)	Indeterminate	16	19009	July 16 (0000) - July 30 (2400)	Indeterminate	
July 31 (0000) - July 31 (2400)	19006	31	19003	July 31 (0000) - July 31 (2400)	4.25	4.25

H Baselines nT				H Scale Values nT/mm		
Adopted		Observed		Adopted		Observed
Aug. 1-31	19006	Aug. 8	18999	Aug.	4.25	4.22
		17	19003			
		27	19003			
Sept. 1-30	19006	Sept. 11	19003	Sept.	4.25	4.26
		19	19008			
		25	19000			
		27	19003			
Oct. 1 (0000) - Oct. 30 (1652)	19006	Oct. 9	19007	Oct. 1 (0000) - Oct. 31 (2300)	4.25	4.24
Oct. 30 (1652) - Oct. 31 (2300)	19012	23	19009	Oct. 31 (2300) - Oct. 31 (2400)	4.32	
Oct. 31 (2300) - Oct. 31 (2400)	18936	26	19009			
		31	19011			
Nov. 1-30	18936	Nov. 19	18934	Nov.	4.32	4.31
		27	18930			
		30	18934			
Dec. 1-31	18936	Dec. 10	18937	Dec.	4.32	4.32
		18	18935			
		27	18935			

VICTORIA TABLE 66 1973

Z Baselines nT

Adopted		Observed		
Jan. 1-31	53049	Jan.	12	53051
			18	53050
			26	53049
			29	53049
Feb. 1-28	53049	Feb.	9	53048
			25	53046
			28	53046
Mar. 1-31	53049	Mar.	13	53047
			28	53051
			30	53048
Apr. 1-30	53049	Apr.	9	53047
			25	53050
			27	53050
			30	53047
May 1 (0000) - May 18 (1658)	53049	May	10	53050
May 18 (1658) - May 31 (0000)	53042		18	53047
			23	53044
			31	53044
June 1-30	53042	June	8	53043
			21	53043
			26	53042
July 1 (0000) - July 15 (2400)	53042	July	13	53044
July 16(0000) - July 30 (2400)	Indeterminate		16	53046
July 31(0000) - July 31 (2400)	53051		31	53054

Z Scale Values nT/mm

	Adopted	Observed
Jan.	4.20	4.22
Feb.	4.20	4.17
Mar.	4.20	4.21
Apr.	4.20	4.16
May 1 (0000) - May 18 (1658)	4.20	4.23
May 18 (1658) - May 31 (2400)	4.06	4.06
June	4.06	4.08
July 1 (0000) - July 15 (2400)	4.06	4.05
July 16 (0000) - July 30 (2400)	Intermediate	
July 31 (0000) - July 31 (2400)	4.25	

Z Baselines nT				Z Scale Values nT/mm		
Adopted		Observed			Adopted	Observed
Aug. 1-31	53051	Aug. 8	53048	Aug.	4.25	4.21
		17	53053			
		27	53053			
Sept. 1-30	53051	Sept. 11	53049	Sept.	4.25	4.27
		19	53053			
		25	53054			
		27	53054			
Oct. 1 (0000) - Oct. 30 (1652)	53051	Oct. 9	53052	Oct. 1 (0000) - Oct. 31 (2300)	4.25	4.23
Oct. 30 (1652) - Oct. 31 (2300)	53055	23	53052	Oct. 31 (2300) - Oct. 31 (2400)	4.32	
Oct. 31 (2300) - Oct. 31 (2400)	53011	26	53052			
		31	53057			
Nov. 1 (0000) - Nov. 2 (2400)	53011	Nov. 19	52982	Nov.	4.32	4.32
Nov. 3 (0000) - Nov. 10 (2400) linear decrease	52995 to 52981	27	52982			
		30	52981			
Nov. 11 (0000) - Nov. 30 (2400)	52981					
Dec. 1-31	52981	Dec. 10	52980	Dec.	4.32	4.35
		18	52979			
		27	52980			

MEAN VALUES OF MAGNETIC ELEMENTS

HORIZONTAL INTENSITY (GAMMAS) (ALL DAYS)

TABLE 67 VICTORIA — H = 18,500 GAMMA + — 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0- 1	493	490	489	493	505	505	511	512	507	498	507	512	502	508	497	501
1- 2	490	490	491	496	508	508	512	515	505	500	506	511	503	511	498	499
2- 3	491	489	492	491	503	506	512	514	505	503	506	513	502	509	498	500
3- 4	490	491	491	486	500	504	514	513	506	501	506	510	501	508	496	499
4- 5	488	492	493	487	498	500	512	515	505	501	507	509	501	506	497	499
5- 6	490	491	490	491	501	501	513	517	506	504	505	508	501	508	498	499
6- 7	491	491	497	490	501	505	515	518	508	505	507	509	503	510	500	500
7- 8	491	489	494	490	504	509	515	517	508	503	507	507	503	511	499	499
8- 9	492	490	496	483	497	509	517	518	510	505	507	510	503	510	499	500
9-10	492	493	493	493	503	509	519	519	510	506	507	510	504	513	501	501
10-11	494	492	492	489	509	511	520	523	508	507	510	512	506	516	499	502
11-12	493	495	499	494	507	511	518	524	507	507	511	512	506	515	502	503
12-13	495	494	495	490	509	513	520	524	510	513	514	513	507	517	502	504
13-14	497	498	496	487	508	516	523	526	513	513	514	515	509	518	502	506
14-15	500	499	495	490	508	514	522	524	513	509	514	518	509	517	502	508
15-16	497	497	492	487	506	512	521	518	505	505	511	518	506	514	497	506
16-17	499	491	487	475	499	505	515	509	494	499	509	517	500	507	489	504
17-18	492	483	475	466	492	494	504	496	486	492	502	513	491	497	480	498
18-19	481	476	464	463	491	488	498	489	479	485	492	508	484	492	473	489
19-20	477	469	460	465	490	486	497	490	479	484	485	505	482	491	472	484
20-21	477	467	458	472	491	489	497	496	485	487	486	503	484	493	476	483
21-22	479	475	465	478	493	494	499	503	495	493	492	502	489	497	483	487
22-23	484	483	474	483	497	500	503	509	502	498	500	507	495	502	489	494
23-24	490	488	482	487	500	506	509	514	507	499	504	511	500	507	494	498
MEAN	490	488	486	484	501	504	512	513	502	501	505	511	500	508	493	499

MEAN VALUES OF MAGNETIC ELEMENTS

DECLINATION (MINUTES) (ALL DAYS)

TABLE 68 VICTORIA D = 22 DEG 00.0 MIN EAST + 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0- 1	16.1	16.2	14.7	13.3	11.8	11.2	11.3	12.9	12.8	12.5	12.3	12.7	13.2	11.8	13.3	14.3
1- 2	16.7	15.9	15.4	13.8	13.5	12.0	12.5	14.2	13.6	13.8	13.2	13.7	14.0	13.0	14.2	14.9
2- 3	17.4	17.0	16.3	16.8	14.5	14.0	13.8	15.3	13.9	14.5	14.1	14.0	15.1	14.4	15.4	15.6
3- 4	18.3	17.8	18.1	18.0	15.4	15.6	15.0	15.4	14.7	14.8	14.9	14.5	16.0	15.3	16.4	16.4
4- 5	19.7	18.4	18.4	18.2	16.7	15.4	15.5	16.1	14.9	15.0	14.6	15.4	16.5	15.9	16.6	17.0
5- 6	19.4	18.7	18.3	18.5	16.5	15.3	15.3	15.7	14.4	15.2	14.4	15.2	16.4	15.7	16.6	16.9
6- 7	18.9	18.6	17.7	18.7	16.4	15.3	15.6	15.3	14.8	15.2	14.2	14.8	16.3	15.7	16.6	16.6
7- 8	18.2	17.6	18.2	17.9	16.4	15.1	15.1	15.2	14.1	15.1	13.9	14.4	15.9	15.4	16.3	16.0
8- 9	18.1	16.8	17.7	15.6	15.4	15.2	15.1	15.2	14.4	15.5	14.0	14.2	15.6	15.2	15.8	15.8
9-10	17.5	17.4	16.9	17.5	16.6	15.4	14.8	13.7	15.8	15.0	13.3	13.4	15.6	15.1	16.3	15.4
10-11	18.1	17.6	17.0	17.8	15.9	15.1	14.2	14.7	16.8	15.0	13.0	13.9	15.7	15.0	16.7	15.6
11-12	18.2	17.7	16.7	18.2	16.2	14.5	14.9	13.8	17.1	14.1	13.1	13.9	15.7	14.9	16.5	15.7
12-13	16.6	17.8	17.7	17.2	17.1	16.5	16.6	15.5	17.3	14.2	13.5	13.6	16.1	16.4	16.6	15.4
13-14	16.7	17.7	16.9	18.0	18.1	18.0	18.3	17.1	18.1	14.2	13.4	13.5	16.7	17.9	16.8	15.3
14-15	17.4	18.2	17.3	19.1	19.3	19.5	19.6	18.7	19.0	14.5	13.2	13.4	17.4	19.3	17.5	15.5
15-16	18.0	18.3	18.4	19.7	20.7	20.9	21.0	20.0	19.4	15.3	14.0	13.5	18.3	20.7	18.2	15.9
16-17	19.0	18.5	19.7	21.2	21.1	21.0	21.4	20.6	19.2	15.7	14.4	13.8	18.8	21.1	19.0	16.4
17-18	19.8	17.9	19.6	20.4	19.6	19.6	20.0	19.4	17.7	15.6	14.7	13.9	18.2	19.7	18.3	16.6
18-19	19.1	17.3	18.9	17.7	17.0	17.4	16.8	16.0	15.7	14.4	13.7	13.1	16.4	16.8	16.7	15.8
19-20	18.0	16.1	17.3	15.2	14.5	14.1	13.3	12.3	13.3	12.6	11.8	12.5	14.2	13.6	14.6	14.6
20-21	16.7	14.7	15.7	14.1	12.9	11.8	11.0	10.5	11.6	11.6	11.0	12.1	12.8	11.6	13.3	13.6
21-22	15.2	14.3	14.2	13.6	11.6	10.7	10.0	10.0	10.7	11.3	10.9	11.9	12.0	10.6	12.4	13.1
22-23	15.0	14.8	13.4	13.1	10.8	10.1	9.6	10.4	11.0	11.5	11.1	11.7	11.9	10.2	12.2	13.2
23-24	15.1	15.3	13.6	12.6	11.2	10.0	10.3	11.6	12.0	12.1	11.5	11.9	12.3	10.8	12.6	13.4
MEAN	17.6	17.1	17.0	16.9	15.8	15.2	15.0	15.0	15.1	14.1	13.3	13.5	15.5	15.2	15.8	15.4

MEAN VALUES OF MAGNETIC ELEMENTS

VERTICAL INTENSITY (GAMMAS) (ALL DAYS)

TABLE 69 VICTORIA Z = 52,500 GAMMA + 1973

U.T.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	SUMMER	EQUINOX	WINTER
0- 1	574	576	580	589	585	576	566	566	567	562	562	557	572	573	575	567
1- 2	576	576	581	594	596	580	571	568	567	565	562	557	574	579	577	568
2- 3	578	578	582	598	594	585	572	570	567	566	564	558	576	580	578	570
3- 4	579	579	582	596	592	583	570	568	567	567	563	557	575	578	578	570
4- 5	581	579	580	594	584	579	567	566	567	567	562	558	574	574	577	570
5- 6	579	578	579	584	578	574	564	562	566	562	560	556	570	570	573	568
6- 7	578	577	575	574	572	570	561	558	565	559	560	556	567	565	568	568
7- 8	573	572	571	568	564	563	555	554	561	556	554	553	562	559	564	563
8- 9	570	567	568	548	556	554	553	550	560	553	551	553	557	553	557	560
9-10	566	565	554	551	558	553	551	546	557	547	550	548	554	552	552	557
10-11	560	561	547	549	556	554	546	549	550	543	552	547	551	551	547	555
11-12	556	558	548	552	559	553	545	545	543	540	551	546	550	551	546	553
12-13	555	556	540	548	564	555	548	546	540	539	551	546	549	553	542	552
13-14	557	558	541	543	564	557	554	551	543	542	550	544	550	557	542	552
14-15	562	560	546	549	564	556	556	554	549	541	549	546	553	558	546	554
15-16	565	561	553	554	564	557	556	553	553	548	550	547	555	558	552	556
16-17	568	559	558	557	563	555	553	551	553	551	553	548	556	556	555	557
17-18	566	560	556	558	559	551	548	545	551	551	551	546	553	551	554	556
18-19	565	559	557	560	556	546	542	540	550	548	549	546	551	546	554	555
19-20	567	561	560	565	556	545	540	539	551	547	547	545	552	545	556	555
20-21	566	564	564	570	559	548	543	543	553	548	551	548	555	548	559	557
21-22	565	570	569	575	562	554	546	548	558	552	555	549	559	553	564	560
22-23	569	573	573	580	568	563	550	554	564	557	559	552	564	559	569	563
23-24	571	574	576	584	576	569	558	561	567	559	560	553	567	566	572	565
MEAN	569	567	564	568	569	562	555	554	557	553	555	551	560	560	561	561

TABLE 70

Summary of Annual Mean Values (Victoria)

Year	D East		H	Z	X*	Y*	I*		F*
	°	'	nT	nT	nT	nT	°	'	nT
1956.6	23	00.2	18689	53427	17203	7303	70	43.2	56601
1957.75	22	57.1	18705	53408	17224	7294	70	41.9	56589
1958.5	22	55.2	18713	53396	17236	7288	70	41.2	56580
1959.5	22	52.8	18736	53377	17262	7284	70	39.5	56570
1960.5	22	50.3	18748	53362	17278	7277	70	38.5	56560
1961.5	22	47.8	18787	53322	17319	7279	70	35.5	56535
1962.5	22	44.4	18804	53288	17342	7268	70	33.8	56508
1963.5	22	41.4	18814	53264	17358	7257	70	32.7	56489
1964.5	22	38.6	18837	53239	17385	7252	70	30.9	56473
1965.5	22	36.0	18860	53205	17412	7248	70	28.9	56449
1966.5	22	34.2	18873	53179	17428	7244	70	27.6	56429
1967.5	22	31.7	18888	53157	17447	7237	70	26.3	56413
1968.5	22	29.4	18902	53138	17464	7230	70	25.1	56400
1969.5	22	27.4	18923	53127	17488	7228	70	23.7	56396
1970.5	22	24.8	18946	53117	17515	7224	70	22.2	56395
1971.5	22	21.8	18971	53099	17544	7218	70	20.4	56386
1972.5	22	19.0	18986	53085	17564	7209	70	19.2	56378
1973.5	22	15.5	19000	53060	17584	7197	70	17.9	56359

*X,Y,I,F are derived from annual means of D,H,Z.

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