DEPARTMENT OF
MINERALS AND ENERGY

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record 1975/140

MAWSON GEOPHYSICAL OBSERVATORY
ANNUAL REPORT 1973

by

R. Almond

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SUMMARY

During 1973 two La Cour magnetographs (NORMAL and SENSITIVE) and a three-component Benioff seismograph were operated by the Bureau of Mineral Resources at Mawson as a continuation of the geophysical observatory program begun in 1955. In December 1973 the vertical-component seismometer was moved to a new underground vault 350 m south of the original seismograph building. Gravity and third-order magnetic observations were made at sites around Mawson and in the Prince Charles Mountains in January 1974.

1. INTRODUCTION

This Record describes the geophysical work carried out at and around Mawson from February 1973 until March 1974 by the Bureau of Mineral Resources, Geology and Geophysics. The work was part of the program of the Australian National Antarctic Research Expeditions, for which logistic support was provided by the Antarctic Division of the Department of Science.

The geophysical observatory at Mawson was opened in 1955 with the installation of a normal-run La Cour magnetograph (Oldham, 1957). Subsequently, enlargements and modifications were made, until by 1973 the observatory comprised two normal-run La Cour magnetographs and a three-component Benioff seismograph. In 1971 an underground vault was excavated on the site of a proposed new cosmic-ray laboratory and part of this was allocated for use as a seismometer vault.

During December 1973 the seismometer vault was put into use by the installation of the vertical-component seismometer which had previously been in the seismic building.

I arrived at Mawson on 19 February 1973 and took charge of the observatory from Jovan Silich on 24 February; I operated the observatory until January 1974, when Peter Cameron took charge. On 6 January I flew to Mount Cresswell base camp in the Southern Prince Charles Mountains to take part in the program of summer field activities. Gravity and third-order magnetic observations were made at several places until operations were curtailed by the loss of a helicopter in a crash landing.

During the return voyage to Australia in March 1974 I took a gravity reading at Davis Station.

2. POWER AND TIMING SUPPLIES

No major alterations were made to the seismic and magnetic power and timing control system apart from the replacement of the EMI clock by a new one in January 1974. The control equipment is fully described by Robertson (1972).

The power distribution wiring behind the power and timing panel PPT-1 was rewired using strip terminals to give several pairs of outputs at 240 V and 110 V. This avoided having several wires entering the same terminal. The new wiring is shown in Figure 1.

During the year, Pyrotenax power and timing cables to both the magnetic variometer building and seismic building were broken by vehicles deviating from the marked roadways.

The break in the magnetic power and timing cable occurred where it crossed the road to the kitchen. Before repair it was passed through two-inch steel piping which was placed across the roads to the kitchen and to the cosmic ray building. This piping was bolted to the rock and should prevent damage in the future. The cable was too short to enable the ends to be brought together for repair, and so a new length of cable had to be inserted; this entailed making two connections. Enough slack cable was left to enable any future repairs to be made with a single connector.

Faults with the seismic power and timing cable were identical with those described by Major (1971) and Silich (in prep.). Two cracks in the copper sheath were found 50 m from the seismic building. Water had entered the cable through these cracks and lowered the resistance between conductors to about 10 000 , low enough to cause the transistorized time-mark relay to stick in the ON position. Faults were found either side of a section of the cable which had been concreted into a crack in the rock where it crossed the roadway. A faulty connector was also found. The cable was eventually repaired by the insertion of three connectors and two new lengths of cable. Again an ample amount of slack cable was left to assist any future repairs.

3. SEISMOLOGICAL OBSERVATORY

Equipment

Recording was maintained throughout the year using a three-component short-period Benioff seismograph. On 15 December 1973 the vertical seismometer was moved to a vault 350 m south of the seismic building. Details are given below.

The calibrator motor constant, G, for each seismometer, and the frequency response of the vertical seismograph were determined. The results were the same as those obtained and reported by Major (1971).

In April 1973, Head Office requested that the seismograph polarities be checked and if necessary altered to conform with the convention that an upward trace deflection should represent upward, northerly, and easterly ground motions for the vertical, N-S, and E-W seismographs respectively. Weight-lift tests were undertaken on 14 April, and all seismograph polarities were found to be reversed with respect to the above convention. The output leads from each galvanometer control box were interchanged to correct the polarities and earlier seismograms were relabelled to show the ground motions that had been represented by the upward trace deflections.

Benioff recorder maintenance was carried out on 18 July. The adjusting grub screws on all three long mirror brackets were either missing or sheared. Difficulty had been encountered throughout the previous part of the year in maintaining the intensity of the N-S recording spot and this difficulty was now traced to maladjustment of the long mirror. The long mirror could not be adjusted in the conventional manner by moving the bracket because of the above faults with the adjusting screws. A rough correction was made by removing the long mirror from the bracket and replacing it at a slight angle. This brought the N-S recording spot intensity up to a reasonable level and no further problems were experienced with it. The other two long mirrors were in correct adjustment.

Data

Preliminary seismic data were telexed to Melbourne office four or five times per week. Final analysis was made in Canberra, and the data sent to the International Seismological Centre in Edinburgh. 703 events which occurred between 1 February 1973 and 31 January 1974 were scaled; 9 were attributable to nuclear explosions, and details relating to them are shown in Table 1. Causes of appreciable record losses are shown in Table 2.

Commissioning of the new vault

Description of vault. During 1971-1972 a new cosmic-ray laboratory was constructed at a site 100 m south of the main station. The building stands over an underground vault, which is divided into two rooms: the larger room houses cosmic-ray telescopes; the smaller one forms a seismometer vault. The vault is 15 m below ground; access is via a shaft 1.5 m in diameter, the top of which opens out at a trapdoor in the northwest corner of the laboratory. A block-and-tackle was fitted to the ceiling above the trapdoor to lower cumbersome articles down the shaft. The seismometer vault is 3.3 m long, 2.7 m wide, and 2.4 m high, with walls and ceiling of bare rock. A partition wall and door across the western end exclude draughts, and a level concrete slab at the eastern end forms a base for the seismometers.

Aims of modifications. The seismic system at Mawson comprised one vertical-component and two horizontal-component Benioff seismometers and a triple-drum photographic Benioff recorder situated in the seismic building. Power and timing were provided from the geophysics office via a four-core Pyrotenax cable (Fig. 2). The proposed modifications entailed moving the vertical seismometer to the vault and installing a visual Helicorder recorder in the office. Recording of the horizontal components was to be discontinued, but a photographic recorder was to be maintained in the seismic building as a standby. As the Helicorder was to be provided later, the program for 1973 was to move the vertical seismometer to the vault while maintaining recording with the photographic Benioff recorder in the seismic building. Recording of horizontal components was to be continued through 1973.

Preparations. (a) Work in the vault and the cosmic-ray laboratory:

No power had been installed in the seismometer vault and in May 1973 a temporary power supply was arranged via an extension lead from the cosmic ray telescope section of the vault. A light was placed on the partition wall above the door and a 2.4-kW fan heater was installed in order to melt thick frost which had formed on the walls and ceiling since the vault was excavated. When the vault had thoroughly dried out the fan heater was replaced by a thermostatically controlled 1-kW convector heater, which maintained a comfortable working temperature of about 12°C.

Two two-core shielded cables were laid up the shaft from the seismometer vault to a junction-box on the wall of the cosmic ray laboratory just above the trapdoor. One was for carrying the signal from the seismometer and the other was a spare. An unshielded cable pair was run from the seismometer vault to a calibrator unit fitted on the wall above the junction box. This unit was a simple resistive assembly which enabled calibration currents of various sizes to be delivered to the seismometer calibration coil.

(b) Cables between the cosmic ray laboratory and the seismic building:

In November and December 1973 a two-core Pyrotenax cable was laid between the cosmic ray laboratory and the geophysics office (Fig. 3). This cable entered the cosmic-ray laboratory at the junction-box mentioned above and was connected within this to one of the two-core shielded cables to the seismometer vault.

No more Pyrotenax or shielded cable was available on the station and a temporary arrangement had to be made to carry the seismometer signal between the geophysics office and the seismic building. This arrangement consisted of sending time closures down a temporary line between the two buildings, running the recorder off station power, and sending the seismometer signal down the four-core Pyrotenax cable which had originally been used for timing and power. This arrangement provided a continuous link between the seismometer vault and the seismic building.

Two-core shielded cable became available in December 1973, and this was laid between the office and the seismic building on 5 January 1974. The shielded cable was then used for carrying the seismometer signal and the Pyrotenax reverted to its original use as a power and timing line. The paths of all the cables except the temporary time-line are shown in Figure 2. The time-line followed a path almost identical with that of the two-core shielded cable.

Transfer of the vertical seismometer to the vault. The vertical seismometer was clamped (as detailed in the Manual) and transferred to the vault on 15 December 1973. To clamp the instrument the calibrator magnet and coil had to be removed. The seismometer was placed on the concrete slab at the eastern end of the vault, where it was found to be out of level. The levelling screws had seized and all attempts at levelling failed even after the application of penetrating oil over a period of several days. It was calculated that one of the three legs needed raising by 5.6 mm and another by 10.2 mm in order to bring the instrument back into level. Stainless steel discs 76 mm in diameter machined to these thicknesses were sent on the second ship in February and were inserted under the seismometer legs. They had the desired effect of levelling the seismometer.

When the seismometer was first installed in the vault the signal at the recorder in the seismic building was completely masked by 50 Hz noise. This was eliminated by adjusting the earthing and switching off the mains power to the seismometer room in the seismic building. Weight-lift tests indicated that the response of the seismometer had not altered appreciably despite the fact that at the time of the tests it was out of level. The seismometer free period was adjusted to bring it to 1.0 s.

The calibrator was refitted on 26 December 1973. Redeterminations of the calibrator motor constant and seismometer frequency response test were done during changeover in February. The results were left with the 1974 geophysicist and were not available at the time of writing.

4. MAGNETIC OBSERVATORY

Magnetographs

Continuous recording of D, H, and Z was carried out using two three-component normal-run La Cour magnetographs named NORMAL and SENSITIVE. Details of the variometers can be found in previous reports (Oldham 1957, Merrick 1961, Smith 1971, Robertson 1972).

Few recording problems were encountered and these could generally be corrected by making minor optical adjustments. Some prisms on the sensitive recorder were dislodged when the records were being changed by a stand-in observer. This caused the loss of the sensitive Z trace for one day. The dislodged prisms were replaced using Araldite.

The prism in the sensitive Z variometer was adjusted to move the Z trace down the paper away from the baseline. This caused a baseline jump of -386 nT for Z and about - 16°C for the thermograph trace.

Causes of appreciable record losses are shown in Table 3.

Total Intensity variograph

Continuous visual recording of the output of a proton precession magnetometer was begun in 1969 by Major (1971). The visual records enabled the geophysicist to select magnetically quiet periods for making absolute observations.

During 1971 the cable had broken close to where it entered the sensor and had been repaired (Petkovic 1973). Another sensor was taken to Mawson at the beginning of 1972 and was in use for both absolute observations and visual recording when the author took over the observatory. The visual recorder was in the ionospheric physics building and a wooden tripod for the sensor was situated 20 m away. Severe interference was being picked up from a new radio beacon nearby, so recording of F was discontinued until a better site could be found.

The sensor which had been repaired in 1971 was not working satisfactorily. A better repair was made by making a join between the two ends of the coaxial cable within a cavity which was drilled out of the sensor capsule. The cavity was then filled with Araldite, thus protecting the join from stresses resulting from movement of the cable. No further trouble was experienced with this sensor but it should not be relied on for making regular absolute observations.

Recording of F was recommenced in October with the visual recorder fitted inside the geophysics office and the repaired sensor mounted on a brass pole 2 m high and 20 m from the office. The resulting records gave an accurate picture of field variations despite obvious sources of magnetic contamination. They were given to the auroral physicist as an aid in assessing the effectiveness of the auroral radar which had been constructed earlier in the year.

Baseline value determinations

Variometer baseline control was maintained by absolute and scale value observations made on average seven times per month. Absolute instruments used were:

Declination (D): Askania declinometer 332

Horizontal intensity (H): QHM's 300, 301, 302
QHM 492 (field)

Vertical intensity (Z): BMZ 62
BMZ 121A (field)

Total intensity (F): Elsec PPM 340

Vertical intensity baseline values were usually computed from F and H (to yield derived values Zp), although Z was measured directly once a month to give the BMZ correction. Table 4 shows the annual mean differences between the sets of magnetometers.

Intercomparison instruments were sent on 'Nella Dan' in December 1973, after they had been standardized at Toolangi Observatory; they were QHM 172, HTM 704, Askania declinometer 320, and PPM 339. PPM 339 had to be returned on the voyage to Fremantle in early January, and the comparison observations with PPM 340 were done hurriedly on 1 January 1974. Subsequent analysis of the record showed that the results were inconclusive owing to slight magnetic activity at the time of the observations.

Comparisons between QHM 172, HTM 704, and QHM 300 and between declinometers 320 and 332 were carried out satisfactorily during February 1974.

On comparing 1971, 1972, and 1973 normal scale values after I returned to Canberra, doubt arose as to whether or not the scale value/orientation wiring was correct. The wiring of the coils when they were installed in 1970 was given by Robertson (1972). In particular, the normal scale-value coils were wired in series, enabling tests to be done simultaneously. It was decided that this practice should cease, and in June 1974 the geophysicist at Mawson was asked to rewire the coils so that tests could be done independently. It was also suspected that during 1971 and after the end of 1972 the normal D orientation and scale-value coils were in series; it was calculated on the basis of the normal D orientation tests that if this were so it would cause an error of roughly 1 percent in D scale values. After rewiring was completed several sets of scale values confirmed the predicted change in D scale value; there was negligible change in normal H and Z scale values. These scale values and those made at Mawson during 1973 are given in Table 5.

The final baseline values for Mawson from 1 March 1973 to 3 January 1974 were computed using the D scale value obtained in September 1974, and the H and Z scale values determined in the usual manner during 1973. The baseline values are given in Table 6.

Temperature control

Sticking of the mechanical relays of the temperature control in the variometer building has been a problem at Mawson since the introduction of room heating (Petkovic 1973), and sometimes caused the temperature in the variometer room to rise to around 30°C. Because of this, two temperature control units (PZC-1; Figs. 4 and 5) incorporating a thermistor sensor and electronic thyristor switching up to 20 A were manufactured in the BMR laboratories during 1972, and were taken to Mawson at the beginning of 1973. One unit (S/N 1) was installed in the variometer hut, and worked well except once when it failed to switch off the heaters. It was changed for the other unit (S/N 2) and no move problems were encountered. The original PZC-1 was installed in the absolute hut after being tested against a QHM and found to be effectively non-magnetic, and maintained the temperature at about 9°C. It was suspected that the fault with this unit was due to a bad contact within the 200-K ohms temperature adjustment trimpot, and it gave no more trouble after being moved to the absolute hut where this trimpot was set for a higher temperature.

Z thermograph scale values and baseline values were computed from daily readings of variometer temperatures; they are shown in Tables 5 and 6.

The normal H and Z variometer temperature coefficients (Q) were determined by regression analysis of the observed baseline values and corresponding temperatures; they were

$$qH = 0 \quad nT/^{\circ}C$$

$$qZ = +2.0 \ nT/^{\circ}C$$

Orientation tests

Orientation tests on normal and sensitive H and D variometers were performed on 26 December 1973. The scale value/orientation coils had been set up in 1970 (Robertson, 1972) and aligned in the true direction 64°W. The results of the orientation tests were computed on return to Canberra using this alignment for the coils, and were grossly different from what would have been expected from a consideration of annual secular variations, especially for the sensitive H and D variometers. Silich (pers. comm.) also reported discrepant results for orientation tests done in January/February 1973. In May 1974 the geophysicist at Mawson was requested to check the alignment of the coils. The results obtained are shown in Table 7. It was apparent that the coils had moved since their installation in 1970. The sensitive variometer pier had been subjected to particularly strong vibrations in high winds (Petkovic, 1973), and this could explain the large amount of movement undergone by the coils on the sensitive variometers. Because of this the results of orientation tests done on the sensitive variometers have been disregarded. However, the movement of the coils on the normal variometers was slight, and the results of the normal H and D variometer orientation tests performed in December 1973 were computed using the coil alignments measured in May 1974.

An orientation test on the normal Z variometer was done on 4 February 1974 using the bench described by Smith (1971) and the deflector magnet used by Major (1971). The result was not consistent with those of Major in 1969 and Silich in February 1973. However there were no obvious errors in the test, and the correctness or otherwise of the exorientation angle computed will have to be decided by future tests.

Results of orientation tests are shown in Table 8; they relate to the mean magnetic meridian and prime vertical.

5. REGIONAL MEASUREMENTS

During January 1974 I made gravity and third-order magnetic observations as part of the ANARE summer scientific program. Work was curtailed after 15 January owing to the loss of a helicopter in a crash landing.

Third-order magnetic observations

Third-order magnetic observations were made at seven sites in the Southern Prince Charles Mountains (Table 9). Instruments used were QHM 492, BMZ 121A, and a Wild compass theodolite. BMZ thermometers 1170 and 11126 were broken, and the concave half of the compound objective lens of the BMZ telescope was lost after the lens vibrated loose.

Gravity observations

Gravity readings were taken at Mawson, Fold Island, Moore Pyramid, Mount Cresswell Summit, and Mount Stinear. Readings were also made by the glaciologist at the glaciological stations, and I took base readings when necessary at Mount Cresswell camp.

6. BUILDINGS AND SERVICES

During March a thermostat was installed in the snow melter in the office cold porch. Later a tap was installed above the snow melter and connected to the station water system.

The Coleman oil heater in the office was not burning correctly and was taken apart and cleaned. It was found that the fuel inlet hole at the rear of the combustion dish was almost blocked by a hard deposit which had collected in the dish. This deposit was scraped off and the rest of the interior of the heater cleaned. Afterwards the heater worked well and continued to do so for the rest of the year.

A four-core PVC insulated cable was laid over the bridging and workshop roof between the office and the main powerhouse. One pair of conductors was used to carry 240 V 50 Hz power from the EMI clock in the office to drive a synchronous wall clock in the powerhouse. Comparison between this and a clock run off the station mains enabled the diesel mechanics to keep the generators regulated to an average of 50 Hz. The other pair of conductors in the cable was subsequently used as part of the temporary time line between the office and the seismic hut.

Accumulated chemical spillage had caused severe rotting of the darkroom floor and this was taken up and replaced with tongue-and-groove floor boards. Six millimetre plywood was nailed over the top of this and covered with vinyl tiles to provide a waterproof surface that could easily be cleaned of chemicals.

Much of the old shelving was taken down and new shelving erected to improve the appearance and storage capacity of the office. The interior of the office and darkroom was painted.

7. ACKNOWLEDGEMENTS

I thank all members of the 1973 Mawson party for their help and co-operation throughout the year; thanks are due in particular to:

Geoff Robinson (ionospheric physicist) for changing and scaling records while the I was on a field trip;

Dave Bennett (Cosmic ray physicist) for assistance in work on the seismometer vault; and

Geoff Kirby (Cook) for helping with seismograph tests.

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TABLE 1

NUCLEAR EXPLOSIONS RECORDED AT MAWSON, 1973

DATE	ORIGIN TIME UT			ARRIVAL TIME UT			PLACE
1973							
MAR 08	16	10	00.2	16	29	48.0	NEVADA TEST SITE
APR 26	17	15	00.2	17	34	50.8	"
MAY 17	16	00	00.0	16	19	54.4	"
JUN 05	17	00	00.0	17	19	50.9	"
JUN 06	13	00	00.1	13	19	46.2	"
SEP 12	06	59	54.3	07	19	18.9	NOVAYA ZEMLYA
SEP 27	06	59	58.0	07	19	14.0	"
OCT 12	17	00	00.8	17	19	50.0	NEVADA TEST SITE
OCT 27	06	59	57.4	07	19	13.6	NOVAYA ZEMLYA

TABLE 2

SEISMIC RECORD LOSSES

(1 March 1973 - 31 January 1974)

DATE	NO. OF HOURS LOST	COMPONENTS LOST	CAUSE
1973			
APR 10	1¼	Z, N, E	Systems tests
APR 14	1½	Z, N, E	Weight-lift tests. Z frequency response tests
APR 28	1	Z, N, E	Weight-lift tests
MAY 29	7	Z, N, E	Records not changes during blizzard
	11	Z	Misalignment of optics owing to wind vibration
JUN 25	1	Z, N, E	Adjustments to recorder optics
JUN 29	1	Z, N, E	Systems tests and Z frequency response test
JUL 11	2	Z, N, E	Tests connected with moving Z seismometer
JUL 18	2	Z, N, E	Benioff recorder maintenance
JUL 20	24	Z	Seismometer circuit shorted by wire strand
AUG 01	3	N	Blown globe
AUG 11	4	Z, N, E	½-hour caused by cessation of 50Hz power resulting from overload of EMI clock owing to break and shorting of magnetic variometer building power and timing cable. Rest of loss due to confused timing
SEP 06	7	N	Paper fell off drum after being loaded by stand-in
SEP 19	11	Z, N, E	Drive shaft of recording drums jammed by weight used for eliminating backlash
NOV 05	24	Z, N, E	No timing owing to cable (Pyrotenax) break
NOV 29	24 E	E	No time-marks owing to sticking time-mark assembly

TABLE 2. (contd.)

DATE	NO. OF HOURS LOST	COMPONENTS LOST	CAUSE
NOV 30	1	A, N, E	Work on time-mark assembly of E-W recorder
DEC 05	7	Z	Misalignment of optics
DEC 12	4	Z, N, E	Testing of cable to seismometer vault
DEC 15 DEC 16	24	Z	Moving Z seismometer to vault and subsequent 50Hz noise which masked signal
DEC 26	3	Z	Adjustment of free-period of Z seismometer. Re-installation of seismometer calibrator unit and subsequent recalibration
1974			
JAN 03 04	26½	Z, N, E	Confused timing after installation of new EMI clock

TABLE 3

MAGNETIC RECORD LOSSES (1 March 1973 - 31 January 1974)

DATE	No. of hours lost	Magnetograph	Cause
1973			
MAR 5	15	NORMAL	Recorder drum drive not engaged
MAR 5	21	SENSITIVE Z	Recorder main Z trace prism dislodged
MAR 6	16	NORMAL + SENSITIVE	Recorder drum drives not engaged
MAR 15	1	NORMAL	Optics adjustments
MAR 19	4	NORMAL + SENSITIVE	PMZ-1 rectifier failure
MAR 23	8	SENSITIVE Z	Partial fogging of record
MAR 24	24	SENSITIVE Z	Misalignment of optics
MAR 28	4	NORMAL + SENSITIVE	PMZ-1 rectifier failure
APR 18	1	NORMAL	Recorder adjustments
APR 25	7	SENSITIVE	Drum jammed by paper retaining clip
MAY 13	24	NORMAL + SENSITIVE	Unexplained total fogging of records
MAY 14	8	SENSITIVE	Drum jammed by paper retaining clip
JUN 27	1½	SENSITIVE	Adjustments to Z variometer
JUL 24	2	NORMAL + SENSITIVE	PMZ-1 rectifier failure
AUG 11	½	NORMAL + SENSITIVE	Cable break
SEP 7	24	NORMAL + SENSITIVE	Loss of time-marks owing to break of temporary repair to cable. Records alright for K-indices, but not for MHV's
OCT 15	5	NORMAL + SENSITIVE	Throwing of mains power circuit breaker and loss of standby power owing to unserviceable accumulator

TABLE 3. (contd.)

DATE	No. of hours lost	Magnetograph	Cause
DEC 24/12	1	SENSITIVE	Work on SV/orientation wiring
1974			
JAN 24	24	SENSITIVE	Recorder drum drive not engaged

TABLE 4

MAGNETOMETER DIFFERENCES 1973

Horizontal intensity (nT)		Vertical intensity (nT)	
QHM 300	- QHM 301 = -2	Zp	- BMZ 62 = -15
	- QHM 302 = -1		- BMZ 121A = -74
	- QHM 492 = 0		

Zp is given by F from PPM 340 (zero correction) and H from mean, observed QHM 300, 301, 302 measurements.

TABLE 5

SCALE VALUES 27 FEB 1973 - 3 JAN 1974

Magnetograph		Scale values determined in 1973	Scale values determined in September 1974
Normal			
D	min/mm	2.41	2.44
H	nT/mm	21.30	21.30
Z	nT/mm	22.85	22.70
T(Z)	^{o}C/mm	1.834	
Sensitive			
D	min/mm	0.87	
H	nT/mm	9.54	
Z	nT/mm	10.48	
T(Z)	^{o}C/mm	1.15	to 27 June 73
		1.24	from 27 June 73

TABLE 6

OBSERVED BASELINE VALUES (27 Feb 1973 - 31 Jan 1974)

Date	UT h m	Baseline value	Standard deviation
Declination		BD (W)	
1973		° '	'
Feb 27	00 00	60 33.2	
Mar 04	00 00	35.9	0.85
Mar 27	09 00	32.7	0.39
Apr 18	00 00	35.0	
Apr 25	00 00	35.7	0.46
May 05	00 00	36.4	0.49
Nov 18	00 00	37.9	0.47
Horizontal intensity		BHs	
1973		nT	nT
Feb 27	00 00	17 349	3.1
Jun 01	00 00	345	2.6
Nov 01	00 00	350	3.1
Vertical intensity		BZs	
1973		nT	nT
Feb 27	00 00	47 147	1.5
Apr 01	00 00	150	3.5
May 01	00 00	152	3.2
Jun 01	00 00	154	3.0
Aug 01	00 00	156	2.4
Temperature		Bt	
Normal (Z)		°C	
Feb 27	00 00	-104.0	
Jul 25	00 00	-103.6	
Nov 19	00 00	-103.3	

TABLE 6. (contd.)

Date	UT h m	Baseline value	Standard deviation
Sensitive (Z)			
Feb 27	00 00	50.69	
Jun 06	00 00	66.72	

TABLE 7

DIRECTIONS OF ORIENTATION COIL AXES (MAY 1974)

Normal		Sensitive	
D	H	D	H
63.55°W	63.8°W	62.5°W	60.9°W

TABLE 8

ORIENTATIONS OF NORMAL VARIOMETER MAGNETS

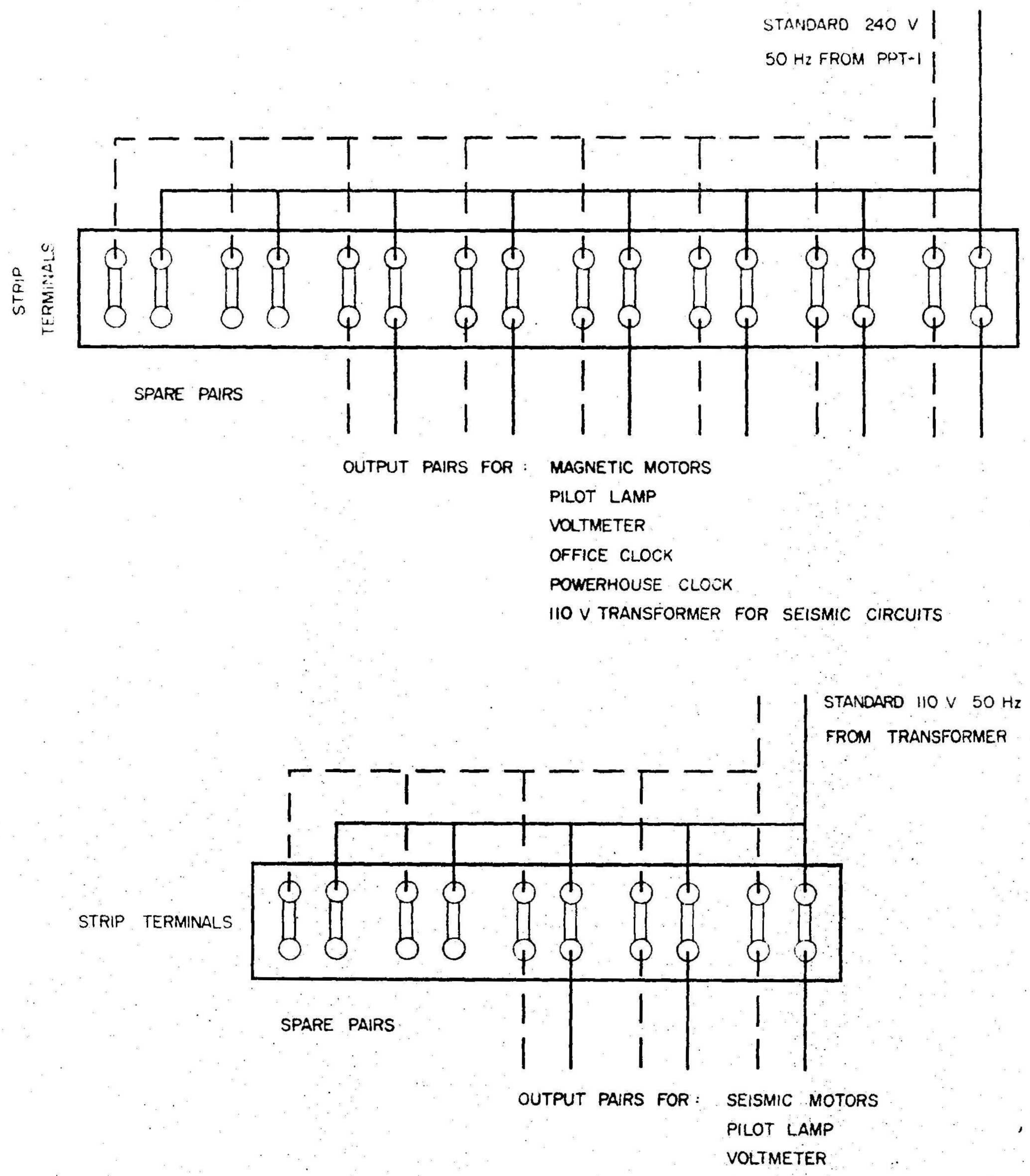
Component	Date	Magnet N pole
H	26/12/73	E 0.5°N
D	26/12/73	N 0.2°W
Z	4/2/74	N 1.4°D

TABLE 9

THIRD-ORDER MAGNETIC OBSERVATIONS IN THE SOUTHERN PRINCE CHARLES MOUNTAINS.

Date	Place	Survey Ref.	H	D(W)	Z
			nT	$^{\circ}$ '	nT
7/1/74	Mt Stinear	NM/S/128	17583	-	-50368
8/1/74	South Mawson Escarpment (Rooster Point)	NM/S/188	17382	72 03.5	-
9/1/74	Mt Menzies	NM/S/178	18382	66 13.8	-49681
10/1/74	Mt Johns	NM/S/180	17675	69 47.7	-50998
11/1/74	Mt Ruker	NM/S/181	17586	68 02.7	-50320
13/1/74	Mt Newton	NM/S/182	17525	71 08.6	-50721
13/1/74	Mt Borland (Lat. 74°24.6'S, Long. 67°48.8'E - subject to amendment on availability of more accurate map)	not surveyed	19451	71°34.4'W	-

FIG. 1



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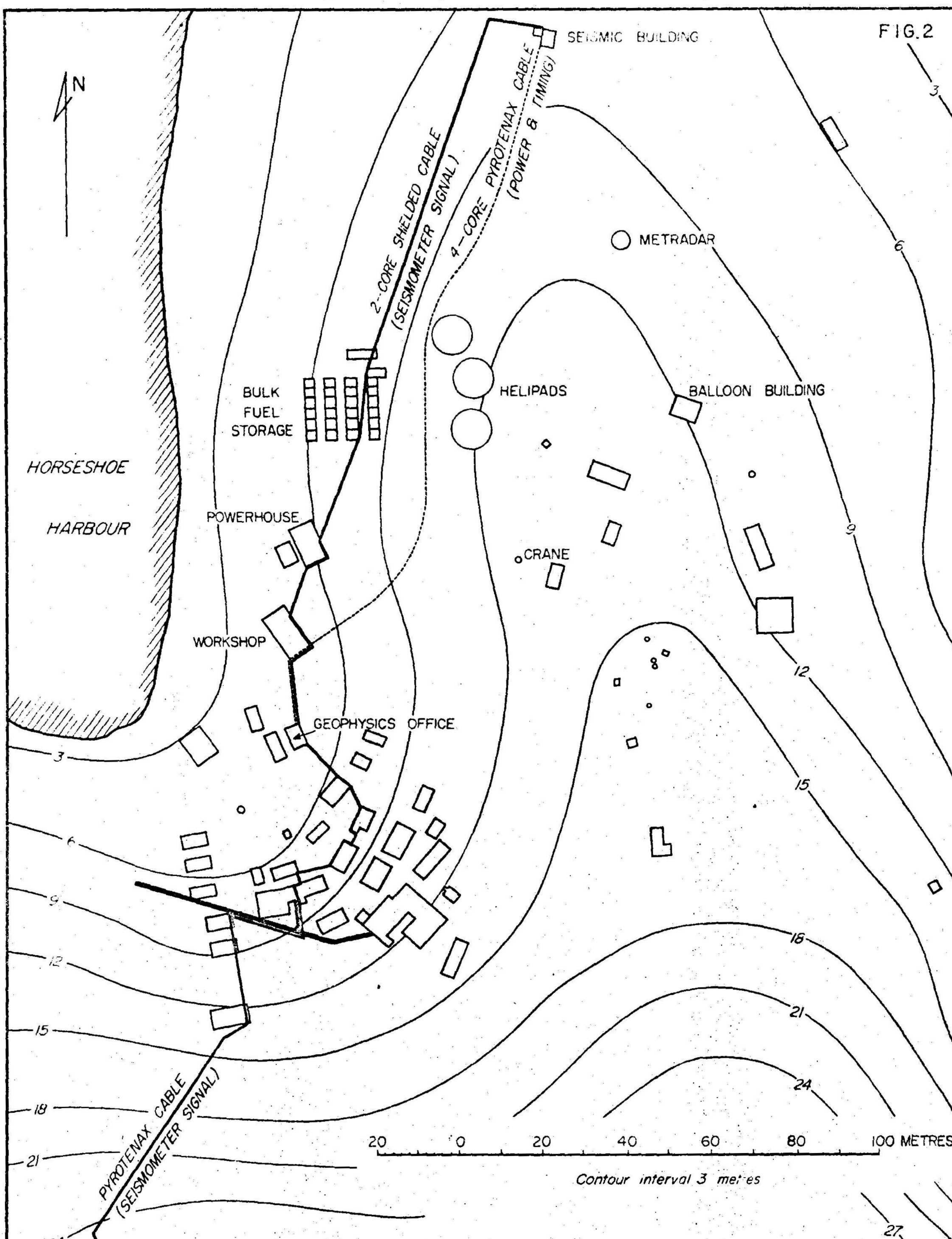
RECORD 1975/140

ANT/B9-51A

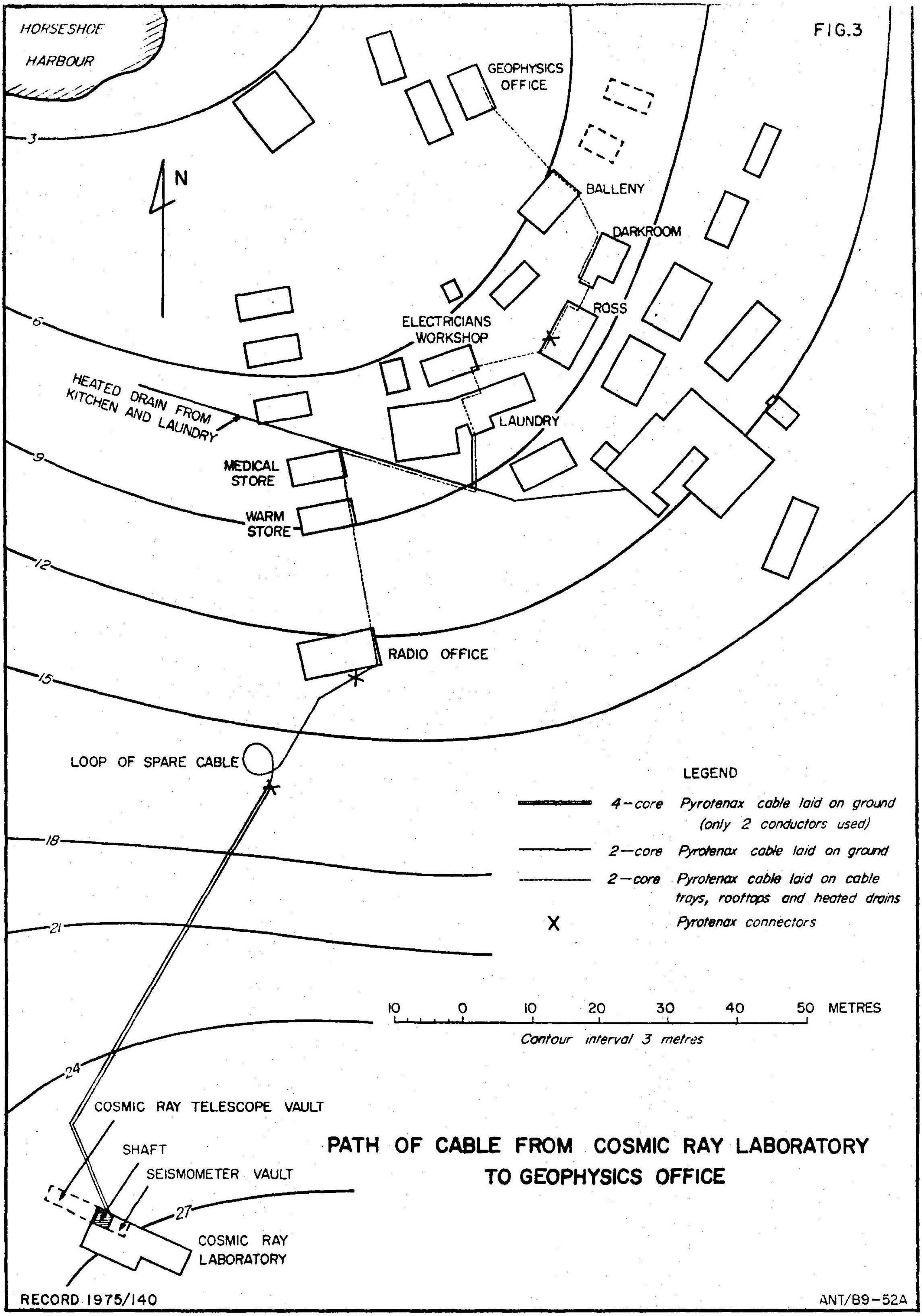


CABLES CONNECTED WITH SEISMOGRAPH SYSTEM

RECORD 1975/140

ANT/B9—53A

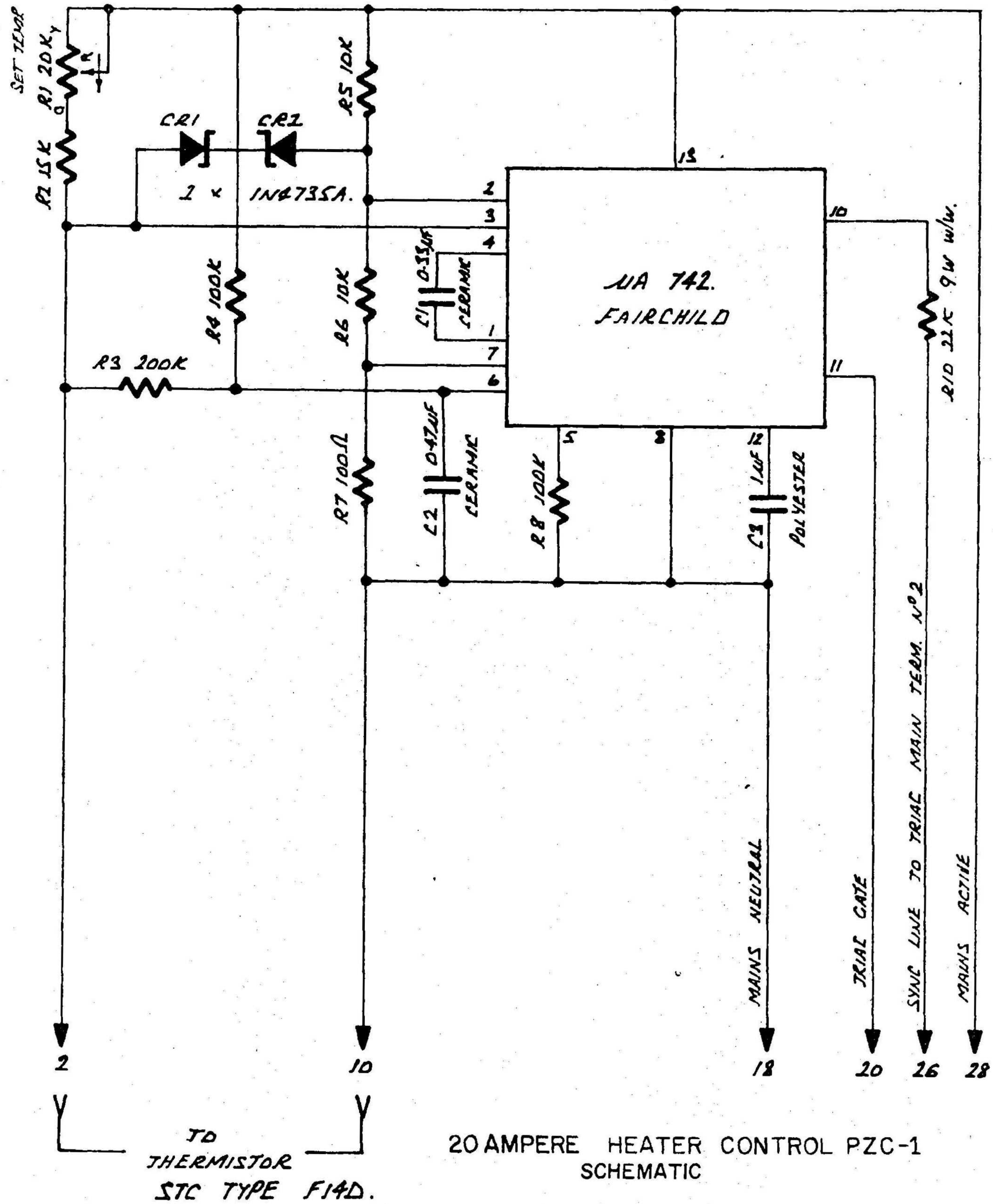
FIG.3



PATH OF CABLE FROM COSMIC RAY LABORATORY TO GEOPHYSICS OFFICE

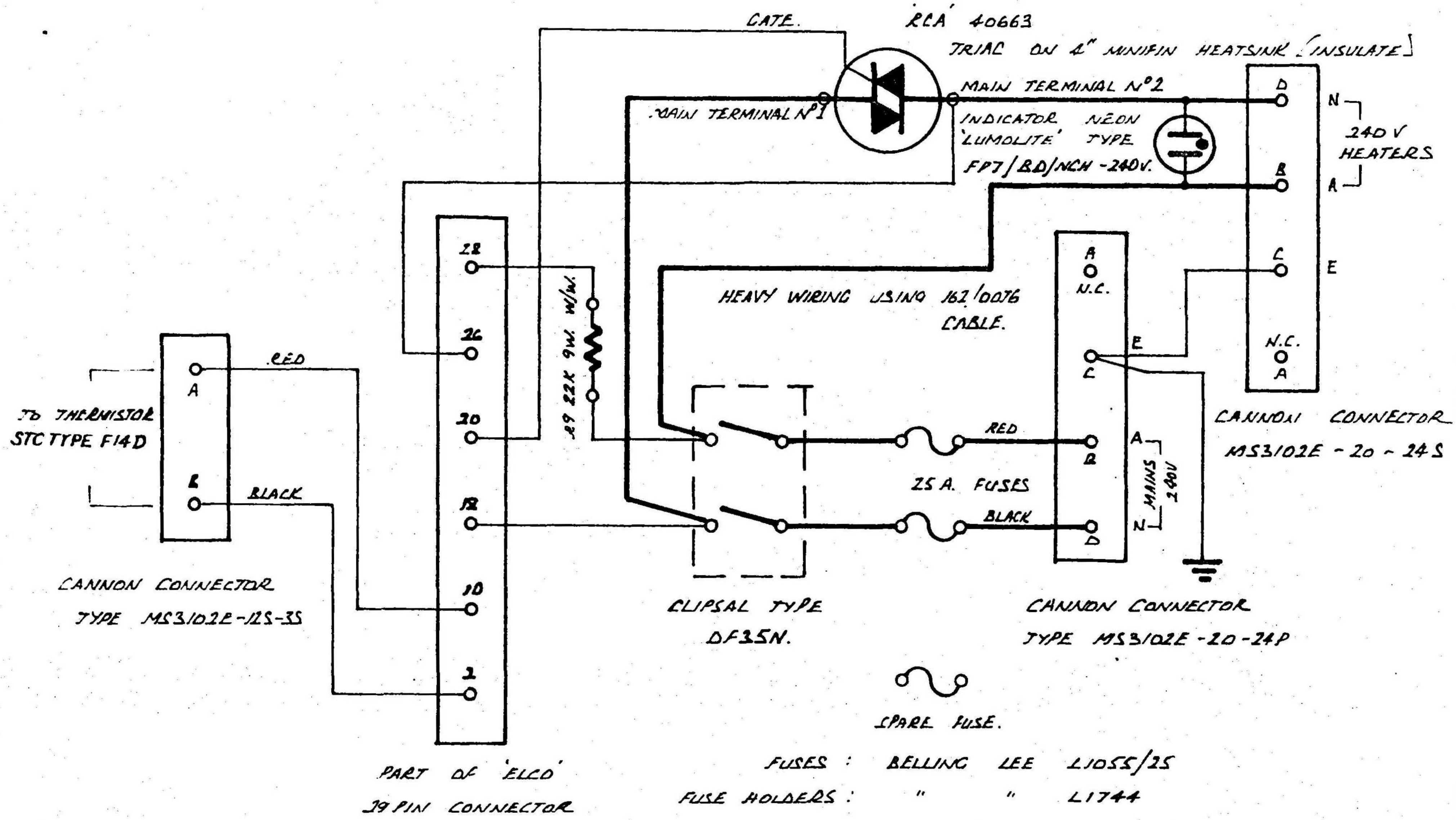
RECORD 1975/140

ANT/B9-52A



20 AMPERE HEATER CONTROL PZC-1
SCHEMATIC

(Based on Electronic Drawing Office No Z3 Sheet 60)



Record No 1975/140

20 AMPERE HEATER CONTROL PZC-1

CHASSIS WIRING

FIG.5

ANT/B9-57A