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Strangways Range Geophysical Survey, Northern Territory, 1967

by

J. E. Haigh

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ILLUSTRATIONS

SUMMARY

A detailed geophysical survey using induced polarization (IP), electromagnetic (Turam), self-potential (S-P) and magnetic methods, was conducted over portions of the Strangways Range Area 4.

Several weak IP anomalies were located and most are thought to be due to basic igneous rocks. In two areas there was good agreement between IP, Turam, and S-P results. One, the Johnnies Reward Prospect, has already been tested by drilling; the other, to the north of this Prospect, is considered to be too small to warrant further investigation. In general the magnetic results were too erratic to be of any value.

Tests of the Turam method using rectangular loops and grounded cables are discussed, and results of some IP tests using the gradient array technique are presented.

1. INTRODUCTION

The area known as Strangways Range Area 4 is one of several areas (Plate 1) covered by a detailed aeromagnetic survey conducted by the Bureau of Mineral Resources Geology & Geophysics (BMR) in 1965.

The first recorded geological work within the area was an investigation of the Pinnacles Copper Mine (Bell, 1953). The area in general was covered during routine regional mapping by the Resident Geological Section, Alice Springs, but the work has not been recorded (I. Faulks, pers. comm.).

In 1965, BMR flew a detailed aeromagnetic survey over Area 4 and other selected areas near the Strangways Range and the results are reported by Tipper (1969). In the same year, a ground geophysical survey was carried out by Geopeko Ltd over the Johnnies Reward prospect, using magnetic and self-potential (S-P) methods. A diamond-drill hole at 1250N/635E (depression 60°W, total length 463 feet) encountered only sparse mineralization between 146 feet and 261 feet.

The Resident Geological Section, Alice Springs proposed a detailed geophysical survey by BMR within Area 4. The purpose of the survey was two-fold: (1) To investigate the aeromagnetic anomalies to the north of the known mineralization at the Johnnies Reward Prospect; (2) To determine whether any large-scale mineralization was located beneath the broad alluvial flats near the existing mines within the area.

The geophysical party consisted of two Geophysicists (J.E. Haigh, D. Quick), one Geophysical Assistant, two Field Hands, one Cook and one Mechanic. A Surveyor and two Chainmen were supplied under a Department of the Interior contract by Kent & Curdie of Pitt Street, Sydney. The party operated from May to August 1967, from a camp at Southern Cross Bore, which has a good supply of slightly saline but potable water.

Methods used were induced polarization (IP), electromagnetic (Turam), magnetic, and self-potential (S-P).

Much of the geophysical grid was over areas of high relief, and this considerably slowed both the topographic and geophysical survey.

In the latter part of 1967, Magellan Petroleum carried out geological and geophysical investigations within the area, over some of the leases held by J. Vitosky, and four drill-holes were sited, apparently on geological grounds. The positions of these drill-holes shown in Plate 1 are approximate only, being transposed from an aerial photograph overlay. Only two of the drill-holes are of interest in terms of the geophysical results. DDH3 was drilled to investigate the Johnnies Reward Prospect, and DDH4 to investigate Ciccones Shafts. Shaw (pers. comm.) reports that none of the drill-holes encountered significant mineralization.

2. GEOLOGY

The geology of the area covered by the survey has been described in detail by Shaw (in prep.). The area forms part of the Precambrian Arunta Complex, and contains predominantly calcareous rocks which have been metamorphosed to the almandine amphibolite facies. Quartz, pegmatite, and granite dykes and sills have been intruded along shear zones which are generally parallel to the foliation of the metamorphic rocks. Mineralization of the quartz dykes occurs in widely scattered areas, but is rarely economic.

The main mines in the area are Centralian No. 2, Johannsen's shaft, and Ciccones shaft, although none have produced large tonnages of ore. All fall within a zone, about 1½ kilometres long and 150 metres wide, of scattered mineralization. Individual veins are usually less than one metre wide and rarely persist in depth. The predominant minerals are chalcocite and malachite with minor bornite. The association of copper minerals with magnetite, is found only at the Johnnies Reward Prospect.

3. GEOPHYSICAL METHODS

The theory and general field practice of the methods used in the survey (IP, S-P, Turam, and magnetic) have been sufficiently well described in the literature to require no further discussion here.

For the IP measurements, Geoscience variable -frequency equipment was used with the dipole-dipole geometry, at frequencies of 3 and 0.3 Hz. Dipole lengths of 200 feet were used, within 100 feet dipole lengths used to obtain detail in anomalous areas. Apparent resistivity, frequency effect (FE) and metal factor (MF), were computed and plotted in the standard manner. Some difficulty was encountered in the field in obtaining sufficiently low contact resistances to allow a satisfactory transmitter current. The method found to be most reliable was to prepare electrodes of 1-metre steel spikes driven into the ground and wetted with saturated salt water. A small amount of detergent added to the water allowed more rapid penetration. The electrode improved over a period of 24 hours as the water soaked down and was best used 1-2 days after preparation, although it usually remained usable for periods up to a week. In particularly bad areas (usually areas of bare rock outcrop), multiple electrodes were constructed by placing further spikes to the side of the traverse 3-6 metres from the central electrode.

Appendix 1 described some tests carried out on some traverses in the area using the gradient array geometry for IP frequency domain work.

Turam work using the ABEM Turam 2S equipment at frequencies of 220 and 660 Hz was initially carried out using a grounded cable as the source of the primary electromagnetic field. The ends of the cable were grounded with 1-metre steel spikes at least 300 metres from the traverse being surveyed.

A vertical electromagnetic field may also be produced by a large horizontal loop, and in the New Folly area results obtained using this system and the grounded cable were compared. The results are shown for Traverse 1800N in Plate 13. There are noticeable differences between the two sets of results, although in general form they are quite similar. The most striking difference is the enhancement of the ratio anomalies in the profile from the grounded cable. Admittedly this may in fact be desirable, particularly for locating conductors such as that at about 2530E, which is much more clearly apparent in the curves obtained with a grounded cable than with a loop. However for routine interpretations, particularly with respect to depth and conductivity, the grounded cable results are not satisfactory, because an unknown amount of the anomaly is produced by earth return currents.

All Turam work was repeated using a horizontal loop 4000 by 2000 feet. A coil spacing of 50 feet was used initially, but the anomalies detected were all of small amplitude, so a coil spacing of 100 feet was used thereafter.

A Sharpe VP6 voltmeter was used to obtain S-P readings. Some difficulty was experienced in obtaining suitable ground contacts, but multiple watering of the ground (Haigh, 1968) appeared to give satisfactory results. In some cases, especially in claypans, the water soaks in very slowly, particularly on the second and third watering; it is important to avoid having free water around the porous pot, as this produces spurious readings due to electro-filtration potentials.

Magnetic readings were taken using a Sharpe vertical fluxgate magnetometer. Instrument drifts, although initially high (200 gammas/hour) were acceptable after a warm-up period of half an hour (20-30 gammas/hour).

4. DISCUSSION OF RESULTS

The results may be separated into four groups for discussion purposes: The Johnnies Reward, Pinnacles, and New Folly grids, and traverses outside these areas.

The Johnnies Reward grid

The Johnnies Reward Prospect is an outcropping lens of quartz-magnetite rock containing copper mineralization, but no significant ore has been extracted. The existing grid 800N-1600N, 0-1000E, laid down by Geopeko Ltd, was extended northward to 6400N (Plate 1). IP measurements were taken with 200-foot dipole lengths over the whole grid, and 100-foot dipole measurements over anomalous areas. Turam readings were taken on Traverses 800N to 1600N from 0 to 800E, and on Traverses 4400N, 4600N, and 4800N from 400W to 800E. S-P and magnetic readings were taken over the whole grid.

In general the area is magnetically disturbed, and apart from the actual Johnnies Reward Prospect (Plate 3), the profiles were too irregular to give any useful information. This is not unexpected, because the area has extensive outcrops of basic igneous rocks which have a significant magnetite content.

The S-P results also tend to be very irregular, and only in two areas are the results consistent enough to be contoured. One such area is the Johnnies Reward Prospect itself (Plate 4), and the other is at about 150W from 4700N to 4900N (Plate 10). In both areas the anomalies are relatively small (100-150 mV).

Several areas within the grid show weak IP anomalies, but nowhere do the results suggest economic grades of mineralization.

Over the Johnnies Reward Prospect the IP anomaly, centred on 450E, extends from 900N to 1500N and is strongest between 1100N and 1300N. The results from Traverse 1300N are quite typical and are shown in Plate 5. The magnetic anomaly is very strong (12,000 gammas) and extends from 900N to about 1600N (Plate 3). The irregularity of the profiles, which is due to the surface outcrop, precludes quantitative interpretation, but this irregularity and the large amplitude are features that might be expected

from the known outcropping magnetite body. The limits of the major anomaly suggest that the length of the body is about 500 feet (150 metres); the limits of the S-P anomaly (Plate 4) suggest a similar length. The S-P anomaly is of the kind that would be expected to arise from a small, disseminated sulphide body. The Turam profiles over the body (Plate 6) are difficult to interpret quantitatively. The ratio anomaly bears a close relation to the theoretical profile over a purely magnetic body (Bosschart, 1964, pp. 37-44) and is consistent with a body centred at about 450-500E. No estimate of the conductivity is possible from these results, but the IP results show a weak resistivity anomaly. The Turam profiles show a very weak phase anomaly at 600E which indicates a slight decrease in resistivity at that point. The lack of a distinct ratio anomaly indicates that the resistivity contrast is quite small. This anomaly persists from 800N to 1500N and possibly represents a shear zone on the eastern side of the body.

A consideration of all the above results indicates that the main portion of the causative body is shallow and of small depth extent (probably less than 60 metres). If this interpretation is correct then the drill-holes of both Geopeko and Magellan have passed under the body. The obvious method of testing the above interpretation is a vertical drill-hole at 450E on 1300N, with a total depth of 75 metres. However, the known low grades of copper in the orebody where it crops out make it doubtful whether this relatively small body is worth further investigation.

At about 150W on Traverses 4800N and 4850N, a relatively weak IP anomaly (Plates 7 and 8) is associated with a weak Turam anomaly (Plate 9) and a small S-P anomaly (Plate 10). The ground magnetic profile is very disturbed and shows no obvious correlation, although the area corresponds to a small aeromagnetic anomaly. Shaw (pers. comm.) has found many basic igneous rocks and amphibolites in the area; many of these contain abundant magnetite, and they presumably account for the aeromagnetic anomaly. A small granitic or pegmatitic boss crops out at 120W on Traverse 4800N (Shaw, in prep.), and it seems likely that the geophysical anomalies are associated with this body. From an examination of the surface outcrop, Shaw has suggested that the body may be pyritic, and he has found some evidence of a weak boxwork, although no actual sulphide minerals were detected.

The Turam anomaly indicates a near-vertical body with the top at a depth of about 18 metres. This is consistent with the IP anomaly, which suggests a shallow, thin, near-vertical dyke. The asymmetry of the S-P countours (Plate 10) together with the other results and the known geological outcrop, suggests a pencil-shaped body plunging fairly steeply to the south-west. The body could be investigated by a vertical drill-hole at 4800N/120W. The target depth is 30-60 metres, so that a total depth of 90 metres would suffice.

At about 800E on Traverses 4600N, 4800N, and 5000N there is a large Turam anomaly. The profile of Traverse 4800N is shown in Plate 9. The anomaly is not associated with an S-P or magnetic anomaly, and the IP method shows a resistivity low at 600E but no FE anomaly. The extent of the resistivity low was not defined, but a narrow alluvial plain between relatively rugged rocky outcrops at 600-800E, is consistent with the idea that there may be a shear zone at this point.

Of the other IP anomalies shown in Plate 2, none are associated with S-P anomalies and all occur in areas of outcrop of basic igneous rocks and amphibolites. It is considered that the presence of these rocks is sufficient to explain the IP anomalies, and no further investigations are proposed.

The Pinnacles grid

The Pinnacles grid covers the area of calcareous outcrop which contains the main zones of known mineralization, and a large alluvial plain to the west of this area. The purpose of the survey of this grid was to test the possibility of large mineralized zones beneath the alluvial plain. A large traverse spacing was used (1000-1200 feet) and each traverse was surveyed using S-P and magnetic methods and IP using 200-foot dipole-dipole spreads. No major anomalous zones were located even over the areas of known mineralization (this was expected, because the known mineralization is almost entirely secondary carbonates and usually occurs near the surface and above the water-table). No S-P or magnetic anomalies were located. There is a broad, weak IP anomaly on Traverse 00 between 400E and 2400E (Plate 11). A similar anomaly is found on Traverse 1200N between 1200E and 2400E, and on 2400N from 1800E to 2400E, although these latter results are not shown.

The origin of the anomaly is doubtful. The possibility of a broad zone of weak mineralization should not be ruled out, but the most likely source would appear to be magnetite contained in the basic igneous rocks and amphibolites known to exist in the area. This is supported by the slightly irregular pattern which develops in the magnetic profiles in the area of the IP anomalies.

Traverse 5250N was surveyed to test an outcrop originally mapped as ironstone (Tipper, 1969), but mapped by Shaw (in prep.) as laterite. No S-P or magnetic anomalies were located but a resistivity anomaly with no corresponding FE anomaly was obtained, and there is no reason to suppose that the outcrop is other than as claimed by Shaw.

Traverse 1200N was extended to 12000E to investigate a large aeromagnetic anomaly using the IP method. As was expected a very broad, weak anomaly was detected and can be adequately explained by the large basic body interpreted from the aeromagnetic anomaly.

It was not possible, within the time allowed for the survey, to cover the area at a closer traverse spacing. However, it is reasonable to claim that no major mineralized zone remains undetected.

The New Folly grid

This grid covers an area 1100 feet x 1200 feet around the existing New Folly Mine (also known as the Polly Boy Mine). The mine produced some 22 tons of ore containing 17% copper (Shaw, in prep.). Shaw has described it as a mineralized quartz vein dipping 65°-80°E, intruding gneisses parallel to the northerly strike in a zone of suspected faulting. The floor of the mine, at a depth of 12 metres, is below the zone of secondary enrichment and contains sparse bornite and chalcopyrite.

Turam work was carried out using both a grounded cable and a horizontal loop. The 4000 x 2000 feet loop was placed to the west of the area with the front edge of the loop at 1500E and with the ends equidistant from the area. The grounded cable was also laid along 1500E, the grounding points each being approx. 300 metres from the nearest traverses. The Turam anomaly (Plate 12) shows good correlation with the mine and quartz veins which crop out along strike from the mine. The mine is located at 2000E on Traverse 2000N. The Turam anomaly occurs at 2040E, which is consistent with the known easterly dip of the orebody. The anomaly extends from 1400N to 2600N and the weak anomaly at the edges of the grid suggest that the zone does not extend much beyond the boundaries.

A parallel anomaly occurs at 2190E on Traverse 2000E. An outcropping quartz vein at about 2150E on Traverse 2000E almost certainly represents the surface expression of the zone that causes the anomaly. There are minor traces of mineralization in the outcrop, but exploratory pits and trenches have failed to find any extensions of the mineralization. The anomaly extends from 1800N and is still strong at 2600N suggesting that the anomaly extends to the north of the grid. The relatively strong phase difference in both anomalies suggests a moderate to high resistivity for the zones.

No S-P anomalies were detected in the area.

IP readings were taken on Traverses 1800N and 2000N using 100-foot dipole lengths and, in the area over the Turam anomaly on traverse 2000N, using 25-foot dipole lengths.

No anomaly was recorded with the 100-foot dipole lengths, but using 25-foot dipole lengths a weak anomaly extending in a broad zone from 1925E to 2200E was recorded. It is probable that the Turam anomaly is associated with the shear zones which have controlled the emplacement of the quartz veins, and that the weak mineralization observed at shallow depth does not persist in depth.

It seems reasonable to assume that the mineralization seen in the floor of the existing New Folly Mine is representative of the mineralization at that depth, and is probably sufficient to produce the observed IP anomaly. Under these conditions no further investigations in the area seem warranted.

Areas outside the main grids

Traverse H (Plate 1) was read with IP, S-P, and magnetic methods to investigate a small, closed aeromagnetic anomaly centred on the alluvial flat of Gillen Creek. No anomalies were recorded and further investigation revealed that the aeromagnetic anomaly is almost certainly associated with an outcrop of basic metamorphic rocks some 150 metres south-east of the origin of the traverse. No further tests were carried out.

Traverse G (Plate 1) crosses an outcrop of basic metamorphic rocks which contain magnetite visible in the hand specimen. S-P readings were taken on the traverse to investigate the theory that no anomaly would be obtained in this environment from magnetite in the absence of sulphide mineralization. No anomaly was detected and no further tests were carried out.

Shaw (pers. comm.) postulated that within the area of the survey the mineralization is fault-controlled and that the most likely location of any further mineralization would be along the shear zones. Traverses B, C, D, and E were placed to enable rapid investigation of some of the more clearly defined shear zones. Traverse E was centred on Ciccones Shaft, where the mine dump showed traces of sulphide mineralization. IP readings using 100-foot dipole lengths showed a weak MF anomaly associated with a very weak FE anomaly. The anomaly was not considered to be significant.

Traverse D was along a parallel fault zone (possibly an offset continuation) and no IP anomaly was located.

Traverses B and C were along fault zones at the sides of a wide alluvial flat. S-P readings were taken along both traverses, but no significant anomalies were detected.

5. CONCLUSIONS

Ground geophysical surveys in portions of the Strangways Range Area 4 located only two anomalies worth further investigation. These were both within the Johnnies Reward Grid. The Johnnies Reward Prospect has already been investigated by two diamond-drill holes, and only minor mineralization has been located. It is postulated that only shallow, low-grade mineralization occurs in this zone.

The anomaly on Traverse 4800N is also postulated to be due to low-grade shallow mineralization.

Two drill-holes to check the interpretation of these two anomalies have been specified, but in view of the small sizes and probable low grades of the causative bodies, further drilling investigation is not recommended.

6. REFERENCES

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SMITH, R.J., 1968 - Visit to U.S.A. and Canada, 1966. Ibid 1968/54 (unpubl.).

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APPENDIX 1

DISCUSSION OF THE GRADIENT ARRAY TECHNIQUE AS APPLIED TO THE FREQUENCY DOMAIN IP METHOD

For IP measurements in the time domain, the configuration known as the gradient array (Fig. 1) has been used extensively in the U.S.A. (Smith, 1968). This configuration has the advantage of a large reading area from a single transmitter setup. Preparation of the two electrodes for any given setup will normally be simple, because the large distance between the electrodes will allow choice of suitable sites with no contact difficulties. The use of multiple electrodes in areas of high contact resistance will normally allow a reasonable transmitter current to be achieved.

Theoretically, use of the gradient array with frequency domain IP equipment will be precluded by the high electromagnetic coupling of the system. However, the coupling depends on the distance between the transmitting and receiving cables, and if this can be kept large, then the coupling will remain within acceptable limits. As a test of this hypothesis several gradient arrays were used in the manner shown in Figure 1. The transmitting cable was laid out in a large half rectangle such that the cable was never nearer than 300 metres from the traverse to be measured.

The electrodes were placed at least 300 metres outside the area of measurement. A consistently good electrode system was found to be four electrodes at 50-foot intervals in a line perpendicular to the traverse direction. With this system there was no difficulty in obtaining a current of 1.5-2.0 amp, which is the maximum available from the equipment.

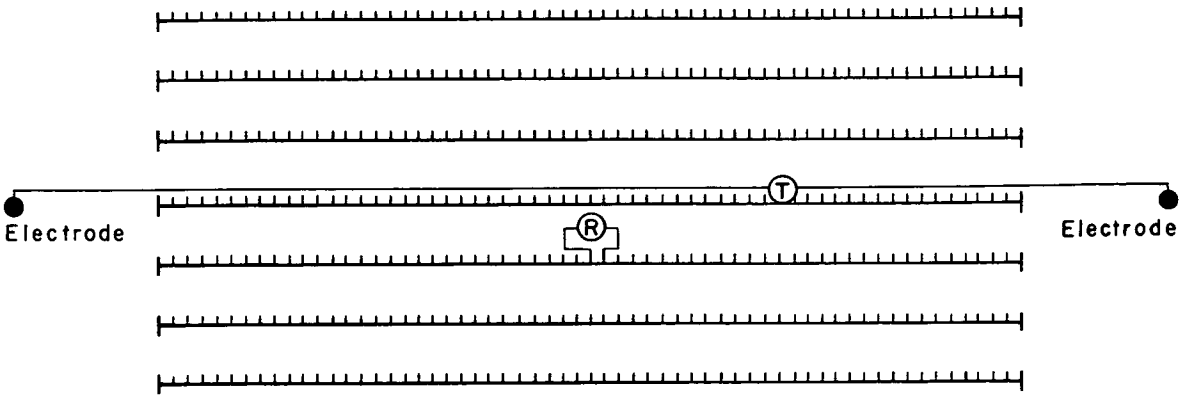
In all, four gradient arrays were used during the survey. The distance between the electrodes was 8000 feet giving a survey area 6000 feet long. No tests were carried out to determine the limits of the width of the area which could be surveyed, but on the Pinnacles grid an area 2400 feet wide was read without difficulty.

The electrode spacing of 8000 feet appears to be near the usable limit for the Geoscience equipment. With resistivities varying from 10-2000 ohm-metre, and using a receiver electrode spacing of 100 feet, the voltage ranged from 0.1 to 100 mV, except for a few stations where no readings could be obtained.

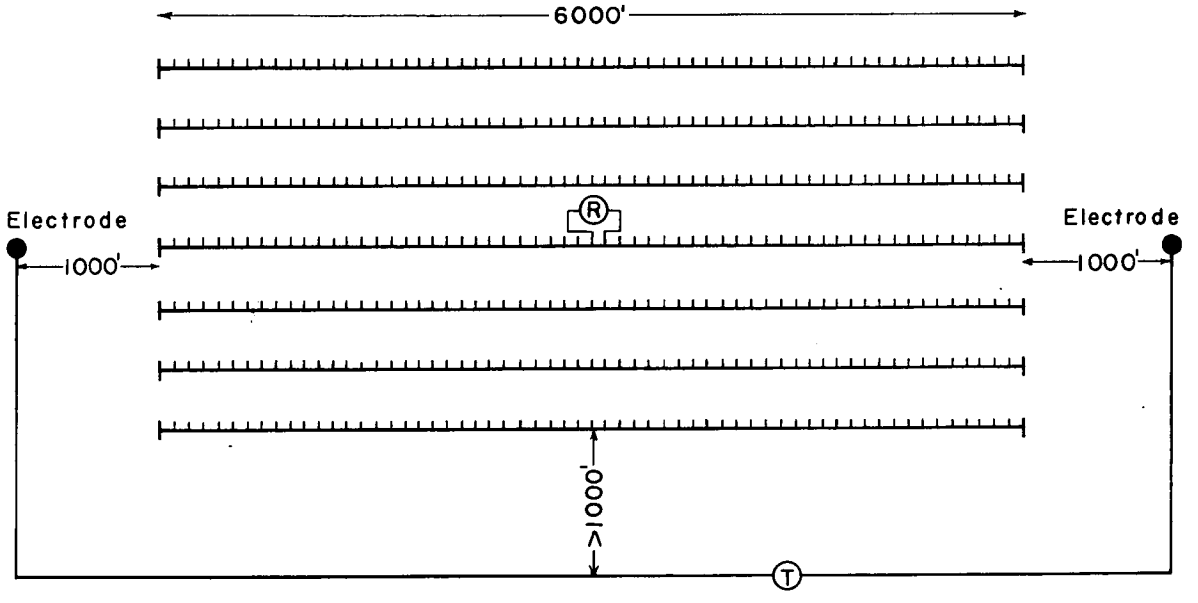
Some of the results from the gradient array in the Pinnacles grid are shown in Plate 14. The transmitting electrodes were at 1000W and 7000E on Traverse 1200N. Because no significant anomalies were located on these traverses using either configuration, the comparison of results is of no real value.

Of more interest are the results from the Johnnies Reward grid. Two arrays were used, one parallel and one perpendicular to the strike. The results from the array parallel to the strike are shown in Plate 15. Although the other results are not shown, they are consistent with both the profiles parallel to the strike, and the dipole-dipole results. The peak of the FE anomaly on the profiles parallel to the strike was larger than the peak on any of the perpendicular profiles. This was to be expected, as the current path in the orebody is much longer along strike than perpendicular to it.

Readings were also taken with a gradient array along traverses B and C. Several small anomalies (i.e. about 2-3% FE) were located but were not considered worth further investigation.

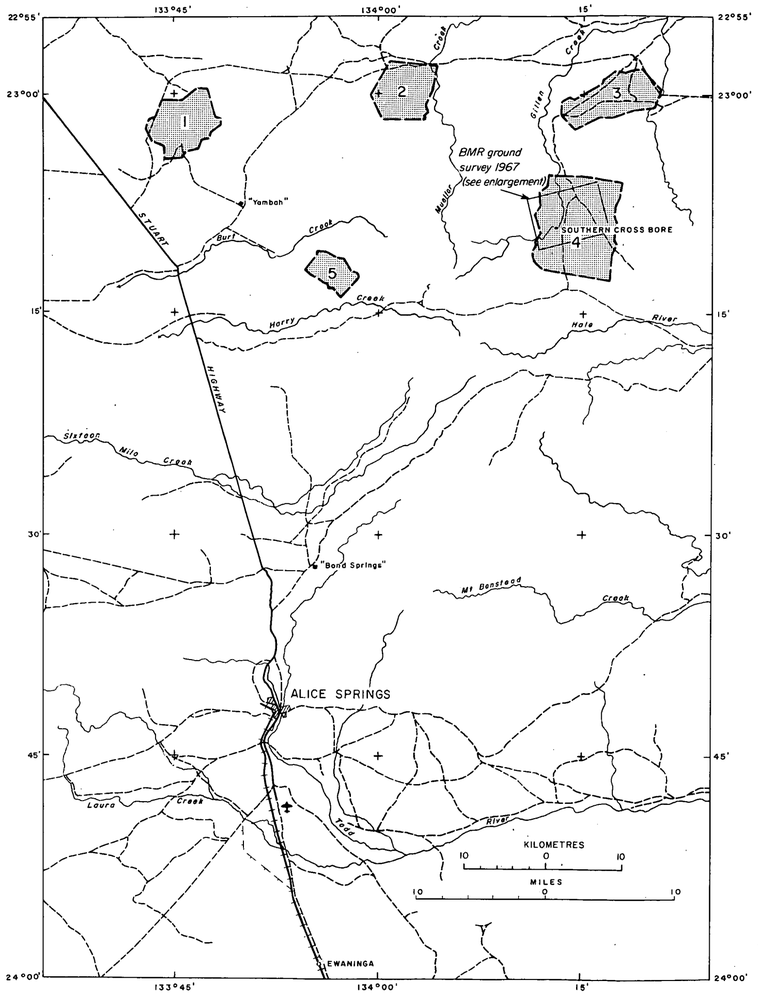


NORMAL "GRADIENT ARRAY"



"GRADIENT ARRAY" MODIFIED FOR FREQUENCY DOMAIN SURVEYING

FIG. 1



LEGEND

Areas covered by BMR aeromagnetic survey in 1965 and photo centres

LEGEND

- Geological boundary
- Fault, position approximate
- Fault, possible
- QUATERNARY: alluvium, gravel, scree
- pCc — PRECAMBRIAN: calc-silicate rocks, includes calcareous quartzite, amphibolitic granofels and gneiss, marble, quartz-diopside-calcite-plagioclase rock, epidote-amphibole-quartz-plagioclase-rock, biotite gneiss, schist
- Calcareous quartzite
- Marble
- Quartzite, gneiss, schist
- Biotite-muscovite-quartz and biotite muscovite-feldspar-quartz gneiss and schist
- Biotite-quartz-alkali feldspar gneiss
- Photo-interpreted rock unit
- Basic intrusive rock

Geological contacts approximate
(After Shaw, in prep.)

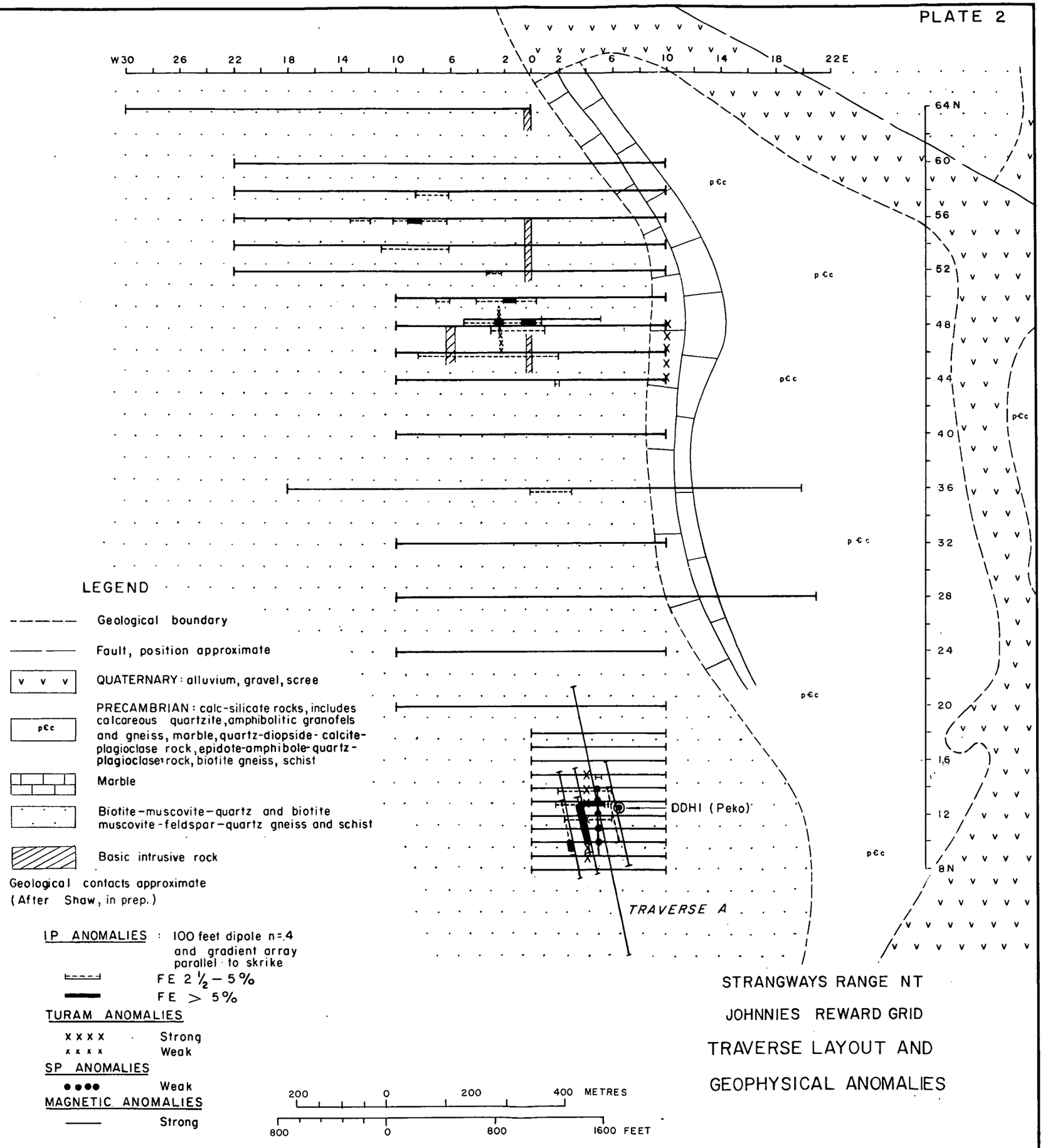
STRANGWAYS RANGE NT 1967 AREA 4

LOCALITY MAP AND TRAVERSE LAYOUT

TO ACCOMPANY RECORD No. 1971/18

F53/B7-17

PLATE 2



STRANGWAYS RANGE NT

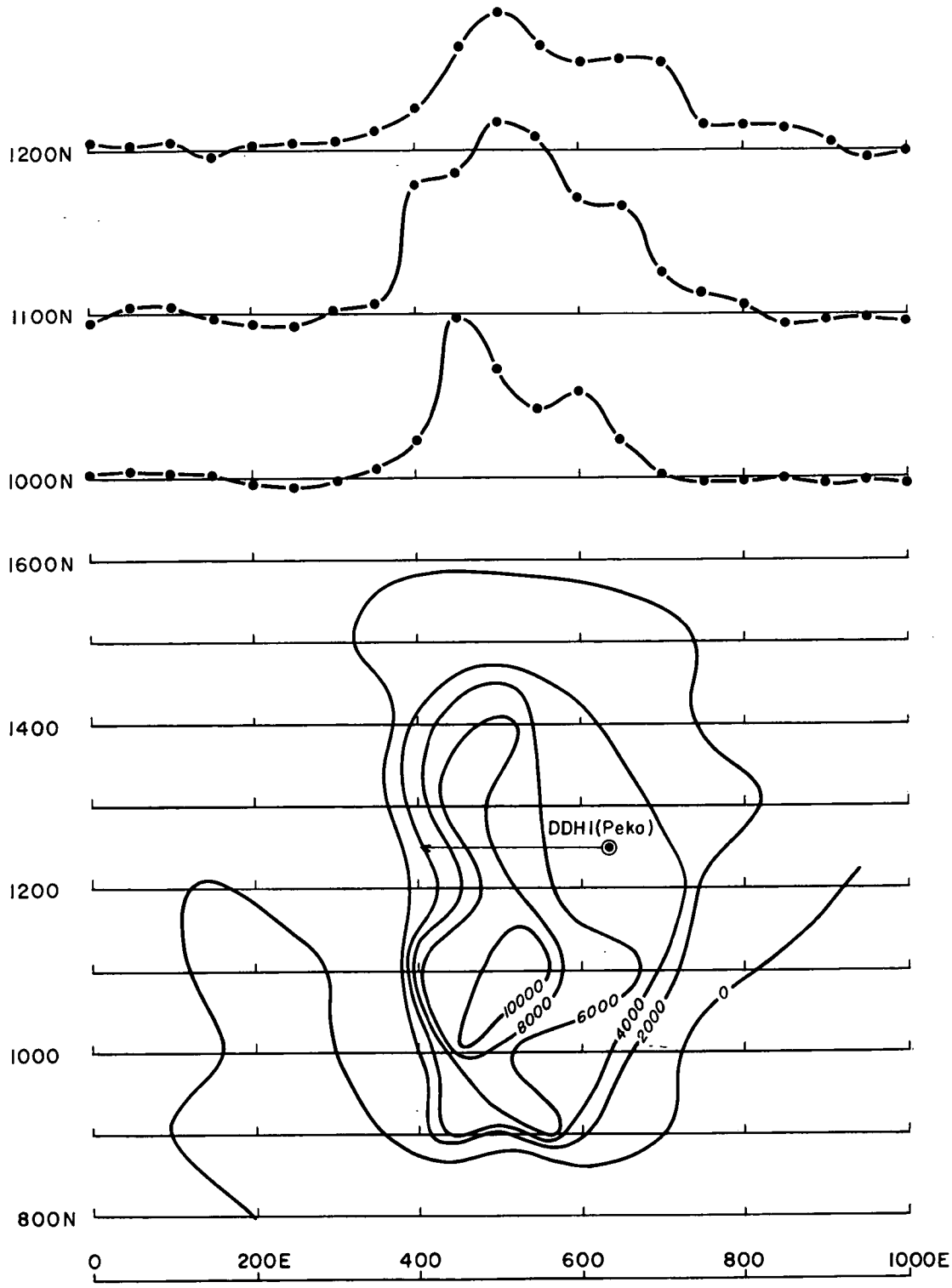
JOHNNIES REWARD GRID

TRAVERSE LAYOUT AND GEOPHYSICAL ANOMALIES

TO ACCOMPANY RECORD No. 1971/18

F53/B7-21

PLATE 3



STRANGWAYS RANGE NT

JOHNNIES REWARD GRID

AREA AROUND TRAVERSE 1200N

MAGNETIC VERTICAL INTENSITY CONTOURS AND SELECTED PROFILES

40 0 40 80 120 160 METRES

HORIZONTAL 200 100 0 200 400 600 FEET

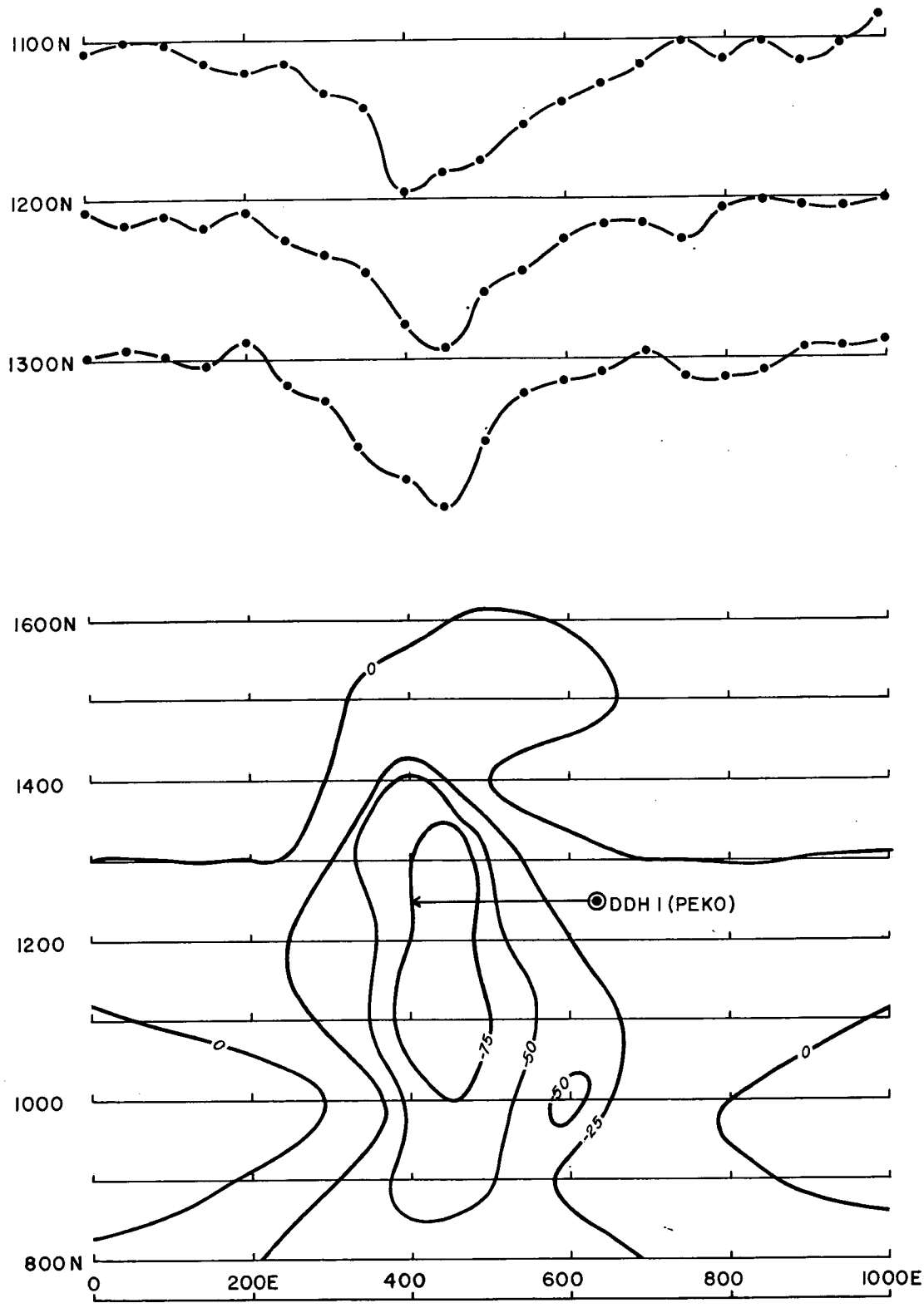
VERTICAL 10,000 0 20,000 30,000 40,000 GAMMAS

CONTOUR INTERVAL 2000 GAMMAS

F53/B7-24A

TO ACCOMPANY RECORD No. 1971/18

PLATE 4



STRANGWAYS RANGE NT

JOHNNIES REWARD GRID

AREA AROUND TRAVERSE 1200N

SELF-POTENTIAL CONTOURS AND SELECTED PROFILES

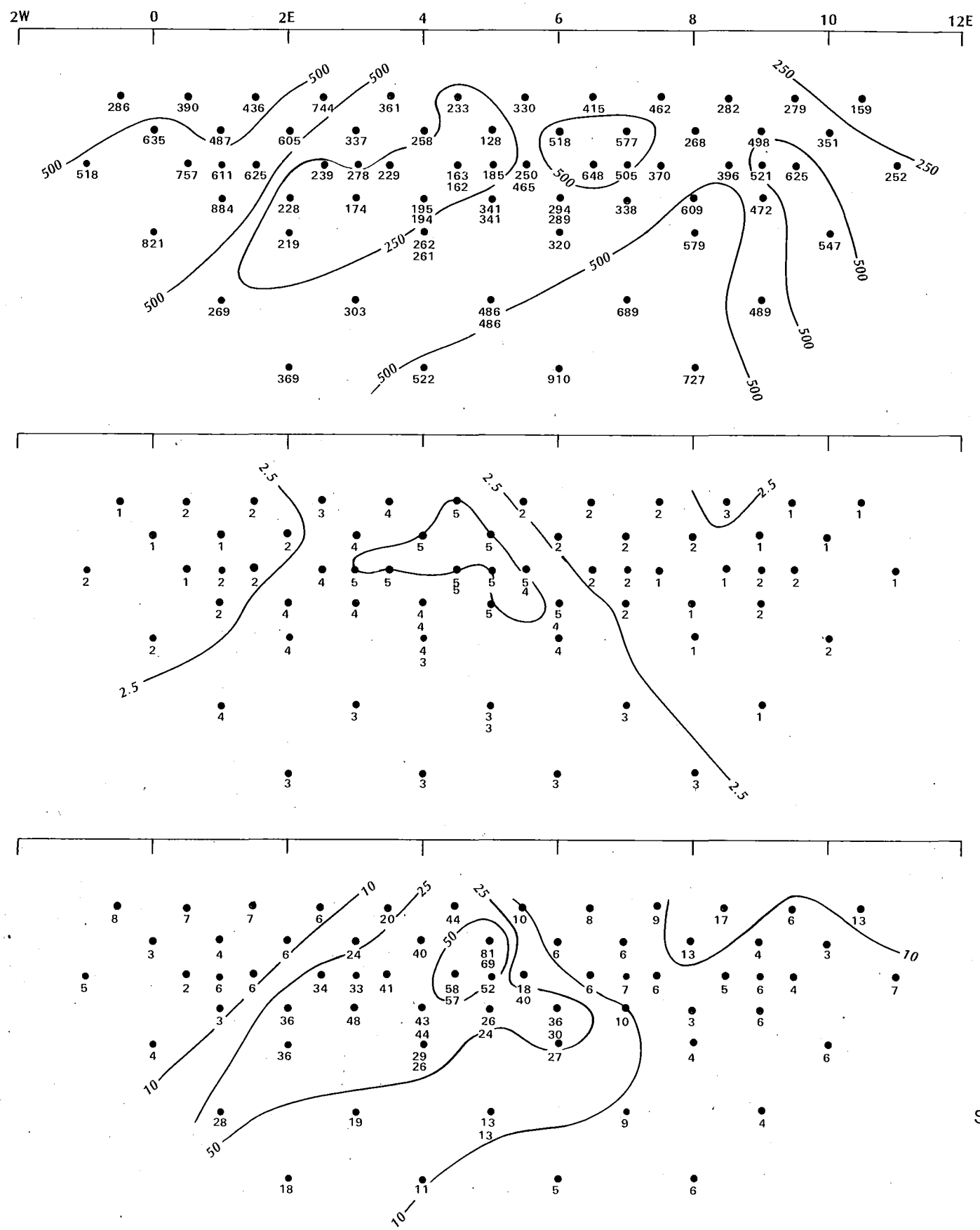
40 0 40 80 120 160 METRES

HORIZONTAL 200 100 0 200 400 600 FEET

VERTICAL 100 50 0 100 200 300 mV

TO ACCOMPANY RECORD No. 1971/18

F53/B7-23A



APPARENT RESISTIVITY
(Ohm–metres)

Dipole length - 100 & 200 feet
Frequency - 3.00/0.30 Hz

FREQUENCY EFFECT
(Percentage)

METAL FACTOR

STRANGWAYS RANGE NT

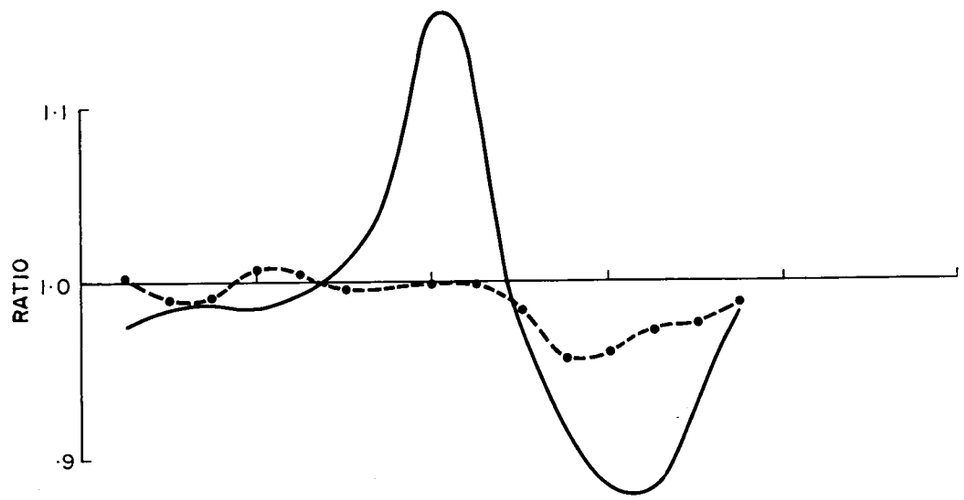
JOHNNIES REWARD GRID

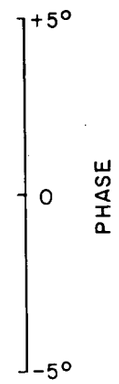
TRAVERSE 1300N

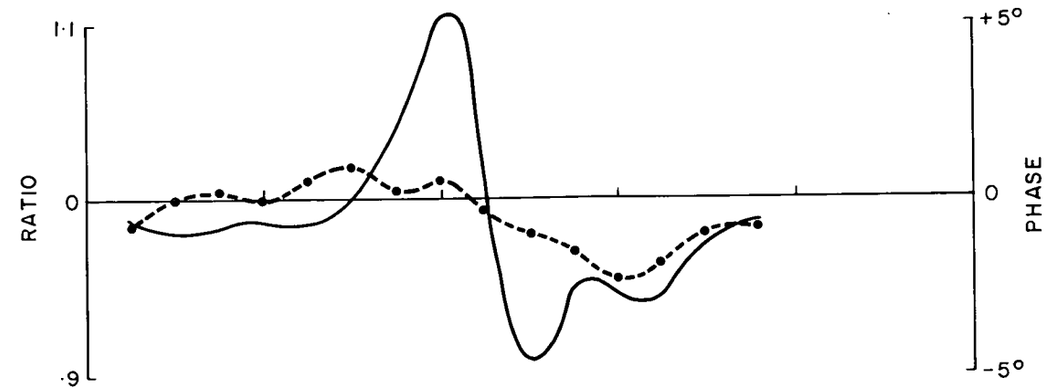
INDUCED POLARISATION RESULTS

TO ACCOMPANY RECORD No. 1971/18

F53/B7–19



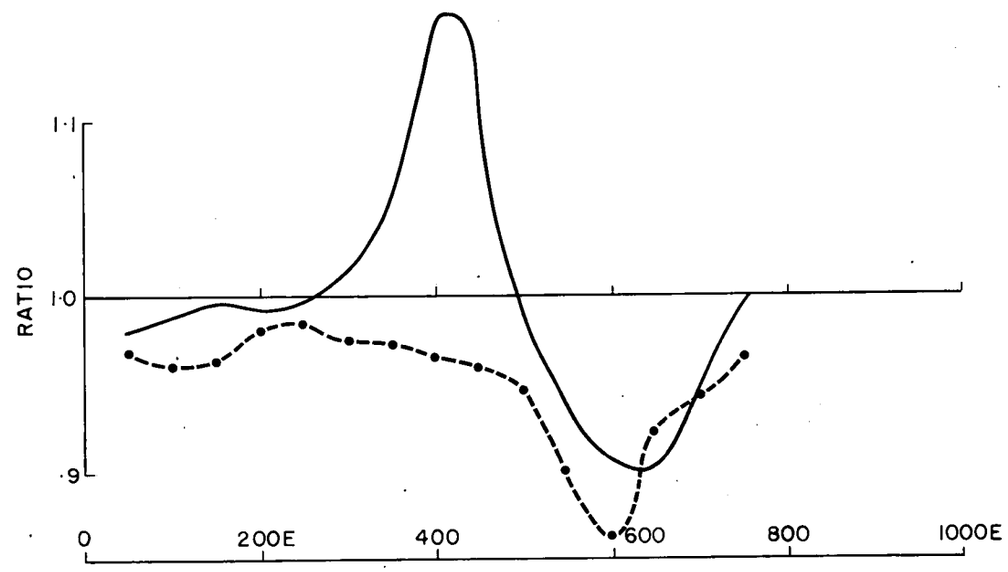


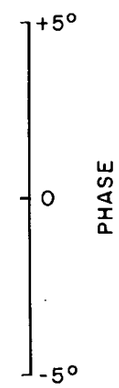


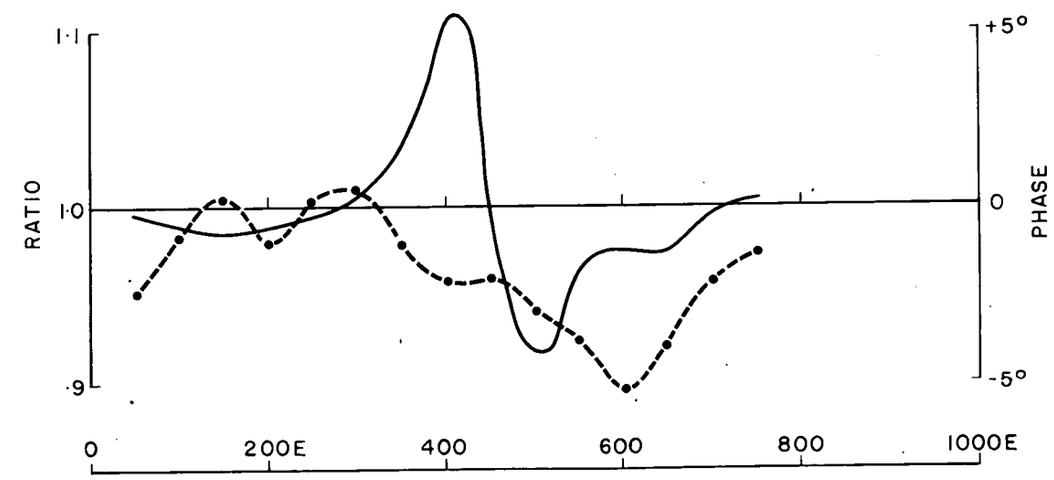
Frequency 220 Hz

TRAVERSE 1000 N

TRAVERSE 1300 N







Frequency 660 Hz

STRANGWAYS RANGE NT

JOHNNIES REWARD GRID

TRAVERSES 1000N AND 1300N

TURAM PROFILES

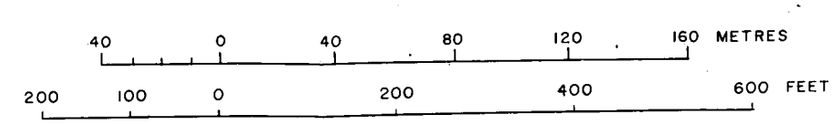
LEGEND

Ratio ———

Phase - - -•- - -

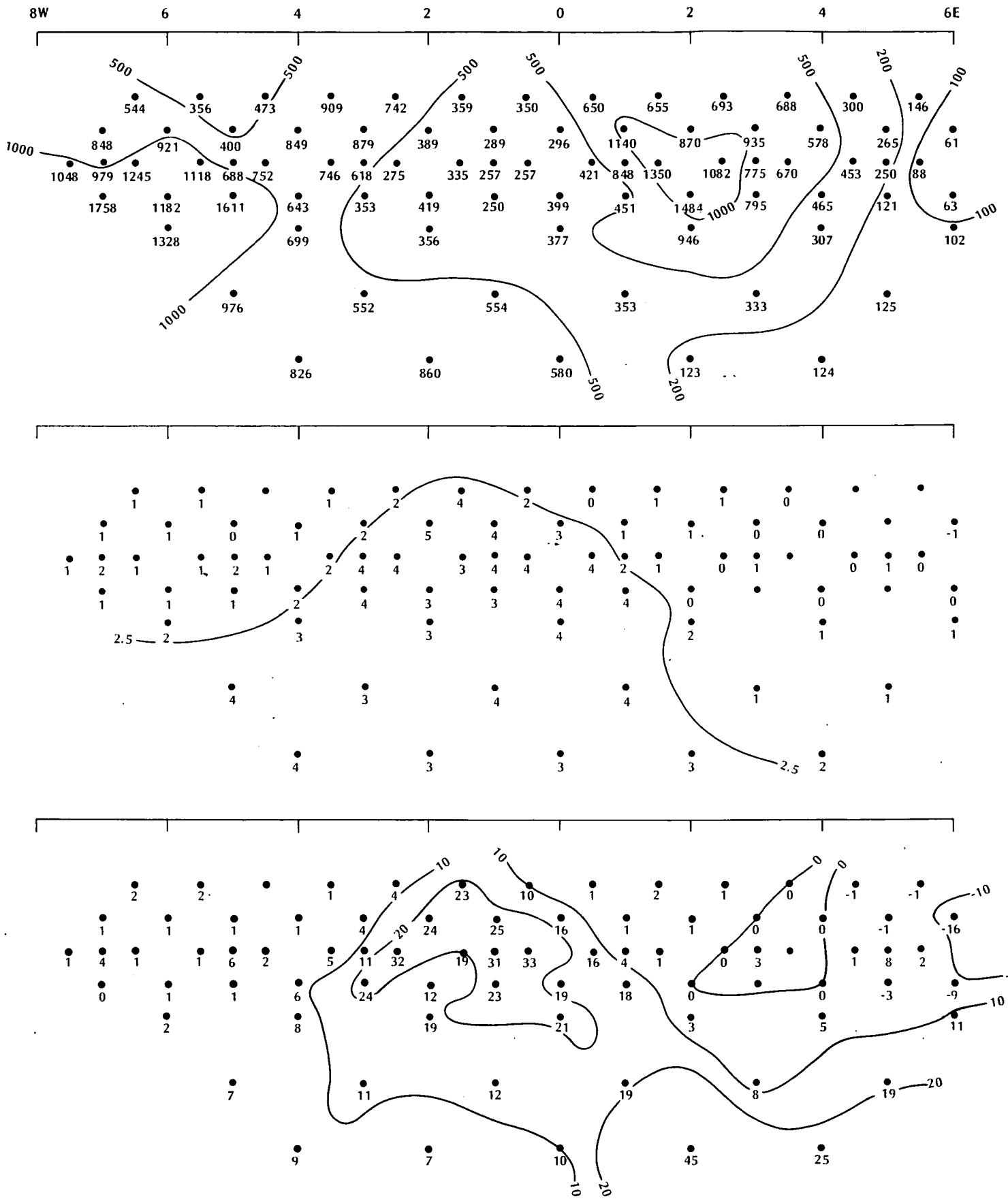
Loop 4000 feet by 2000 feet

near side at 1000 E



TO ACCOMPANY RECORD No. 1971/18

F53/B7-25



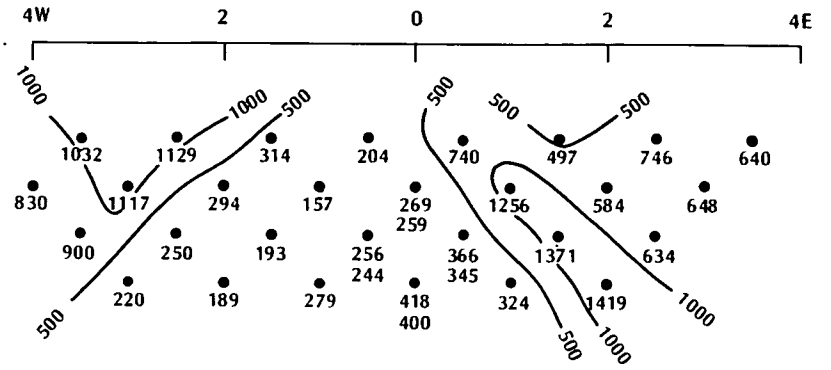
STRANGWAYS RANGE N T

JOHNNIES REWARD GRID

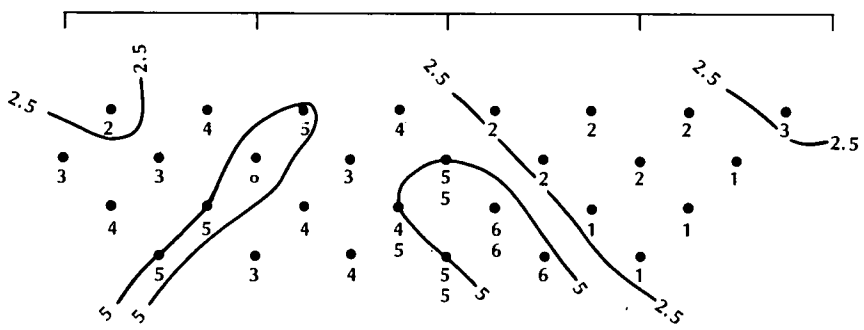
TRAVERSE 4800N

IP RESULTS

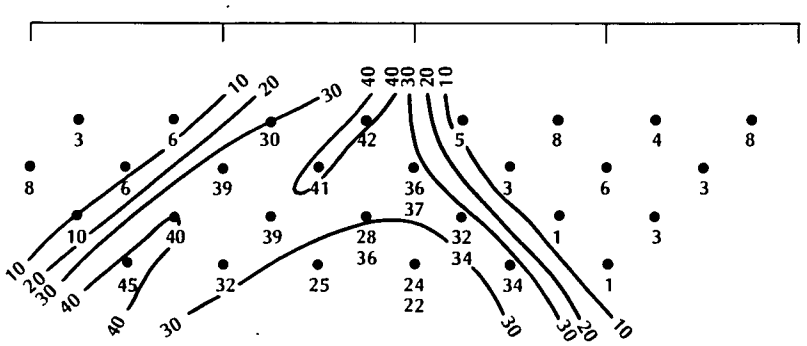
Frequencies: 3.00/0.30 Hz *Dipole Lengths: 100 and 200 feet*



APPARENT RESISTIVITY
(Ohm–metres)



FREQUENCY EFFECT
(Percentage)



METAL FACTOR

Frequencies: 3.00/0.30 Hz *Dipole Length: 100 feet*

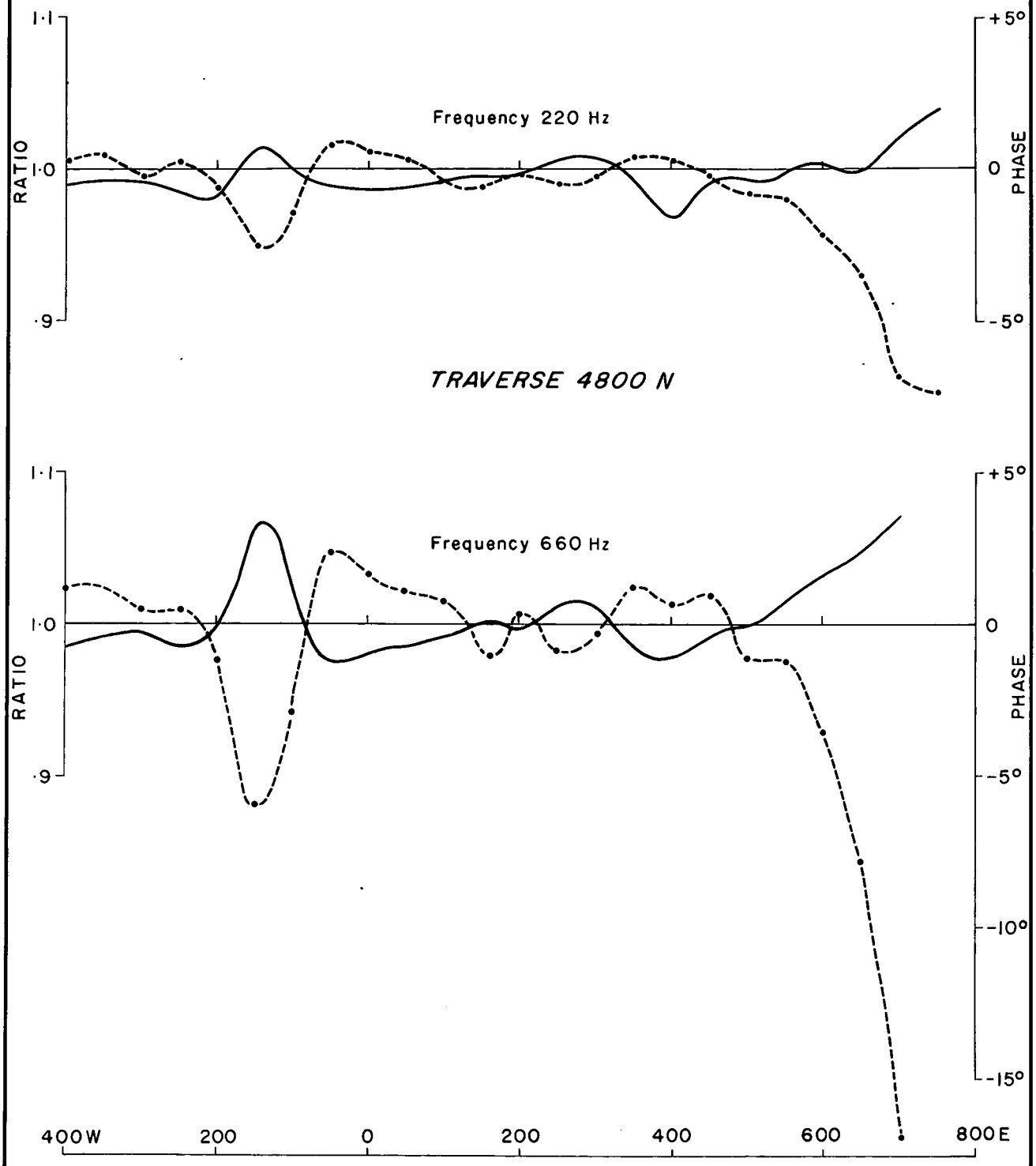
STRANGWAYS RANGE NT

JOHNNIES REWARD GRID

TRAVERSE 4850N

I.P. RESULTS

PLATE 9



STRANGWAYS RANGE NT

JOHNNIES REWARD GRID

TRAVERSE 4800N

TURAM PROFILES

LEGEND

Ratio

Phase

Loop 4000feet by 2000 feet
near side at 1500 E

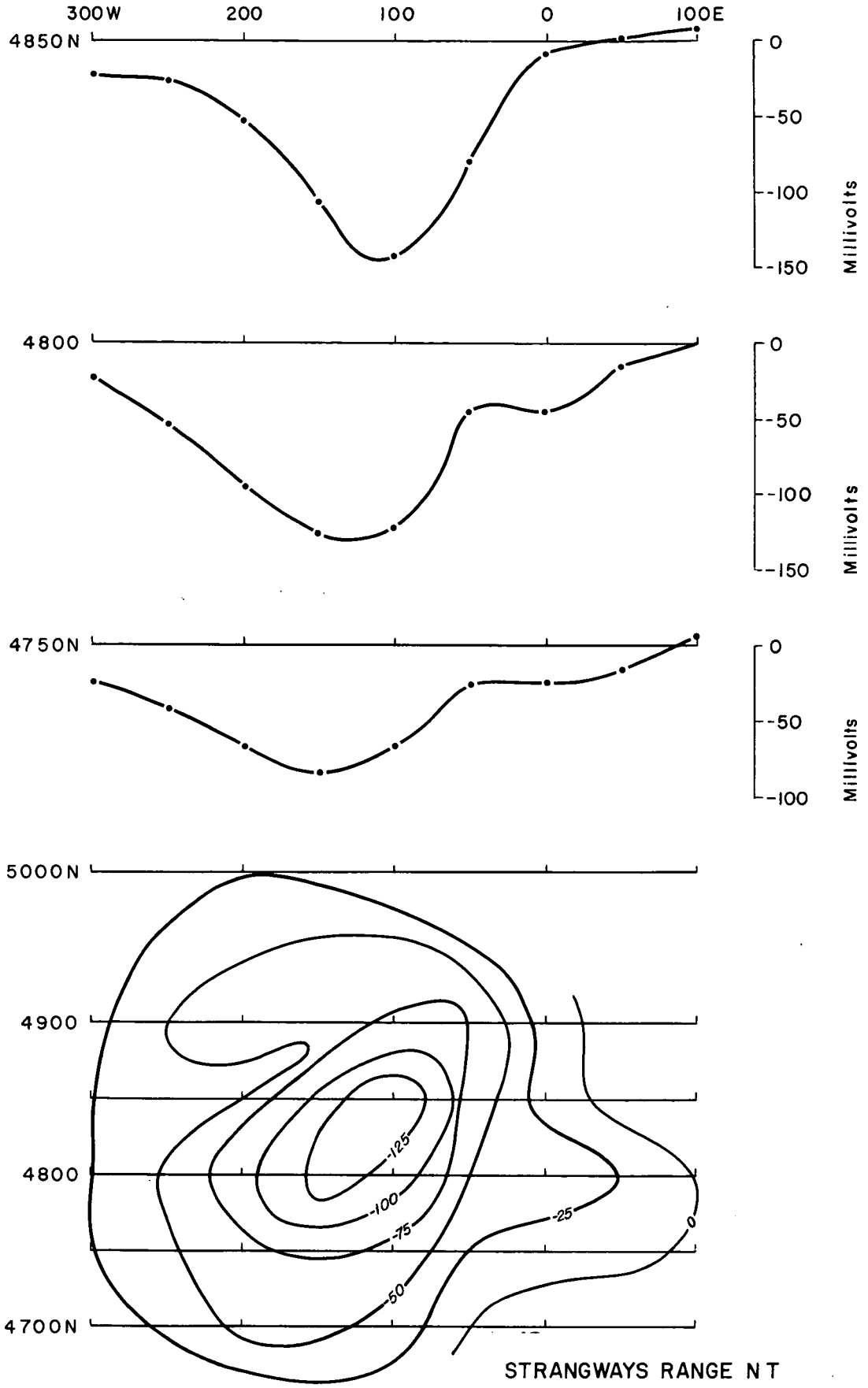
40 0 40 80 120 METRES

200 100 0 200 400 FEET

TO ACCOMPANY RECORD No. 1971/18

F53/B7-26A

PLATE 10



STRANGWAYS RANGE N T

JOHNNIES REWARD GRID

AREA AROUND TRAVERSE 4800N

SELF-POTENTIAL CONTOURS

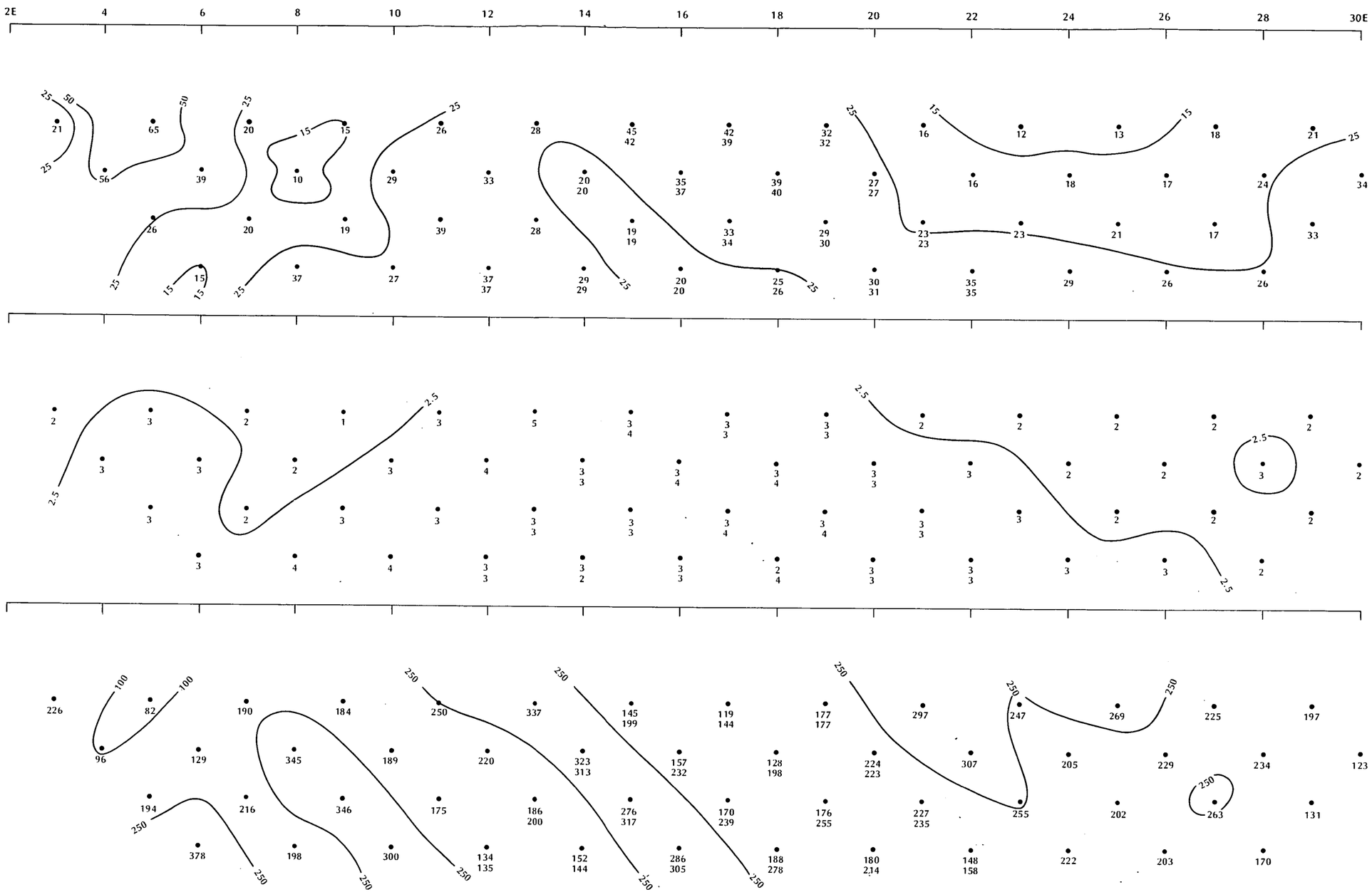
AND SELECTED PROFILES

30 0 20 40 60 METRES

100 0 100 200 FEET

TO ACCOMPANY RECORD No.1971/18 CONTOUR INTERVAL 25 mV

F53/B7-27A



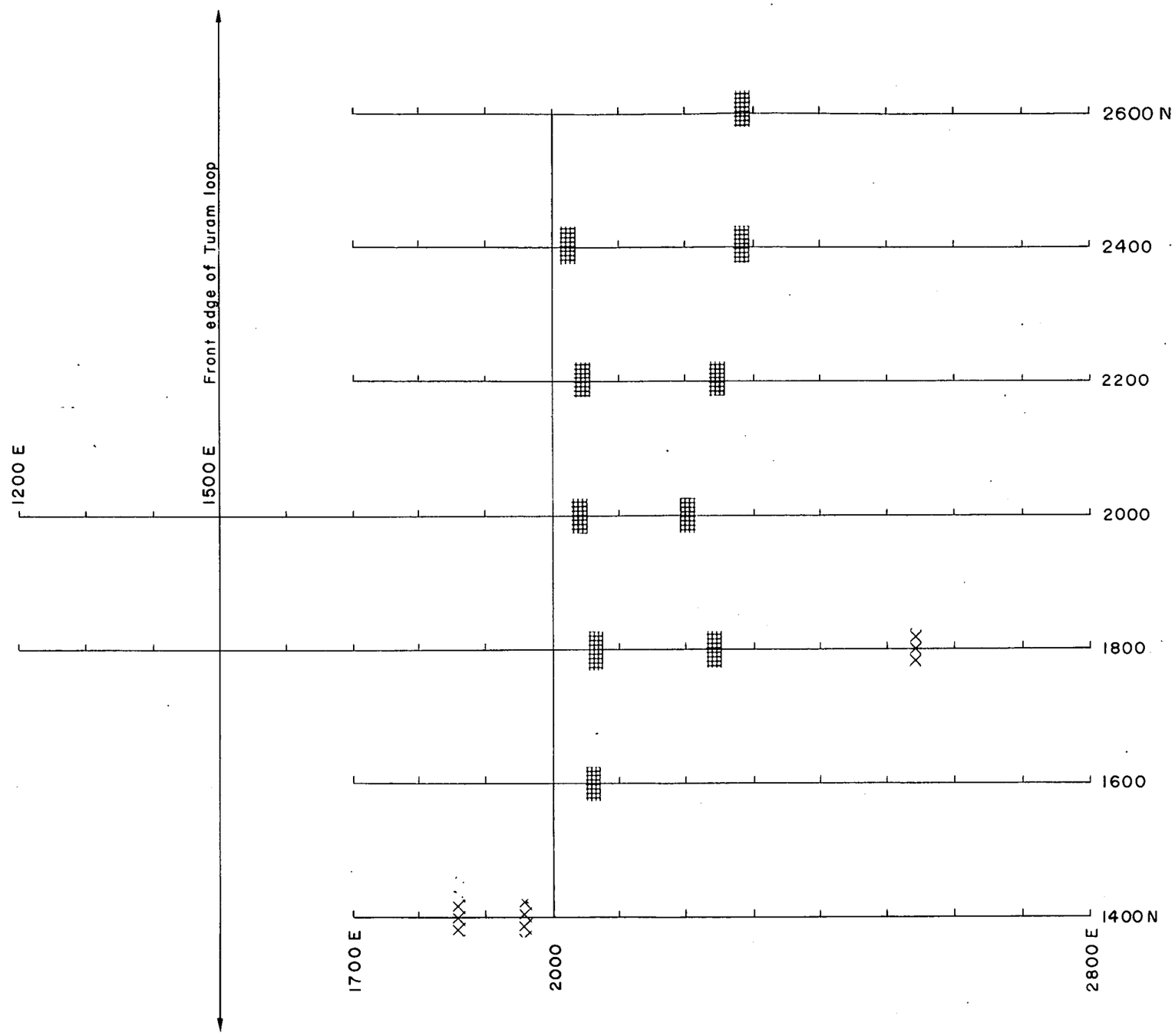
Dipole Length: 200 feet

Frequencies: 3.00/0.30 cps

STRANGWAYS RANGE NT

PINNACLES TRAVERSE OO

IP RESULTS



STRANGWAYS RANGE, NT

TRAVERSE PLAN OF NEW FOLLY AREA

SHOWING AXIAL TRENDS OF TURAM ANOMALIES

TURAM ANOMALIES

STRONG

WEAK

40 0 40 80 120 160 METRES

200 100 0 200 400 600 FEET

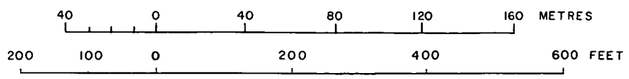
TO ACCOMPANY RECORD No. 1971/18

F53/B7-30

STRANGWAYS RANGE N T

NEW FOLLY TRAVERSE 1800N

COMPARISON OF TURAM RESULTS USING A HORIZONTAL LOOP AND A GROUNDED CABLE



LEGEND

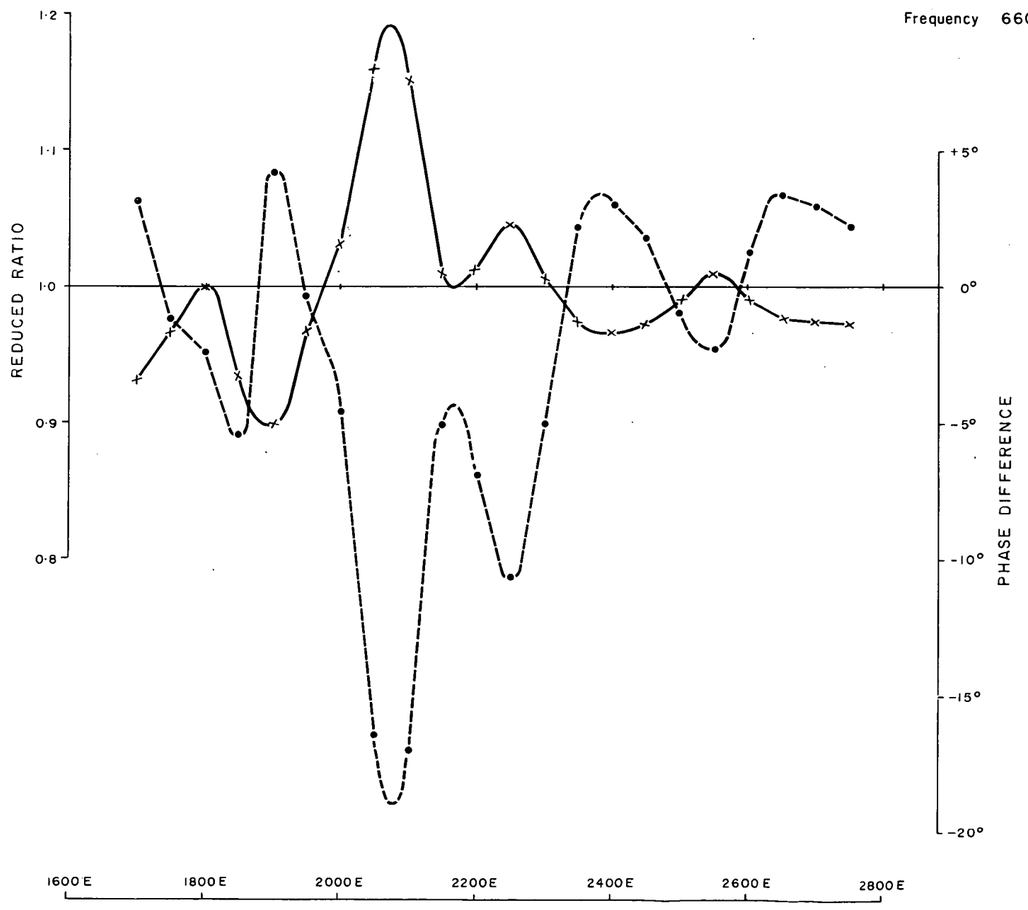
——— Reduced Ratio

– – – – Phase Difference

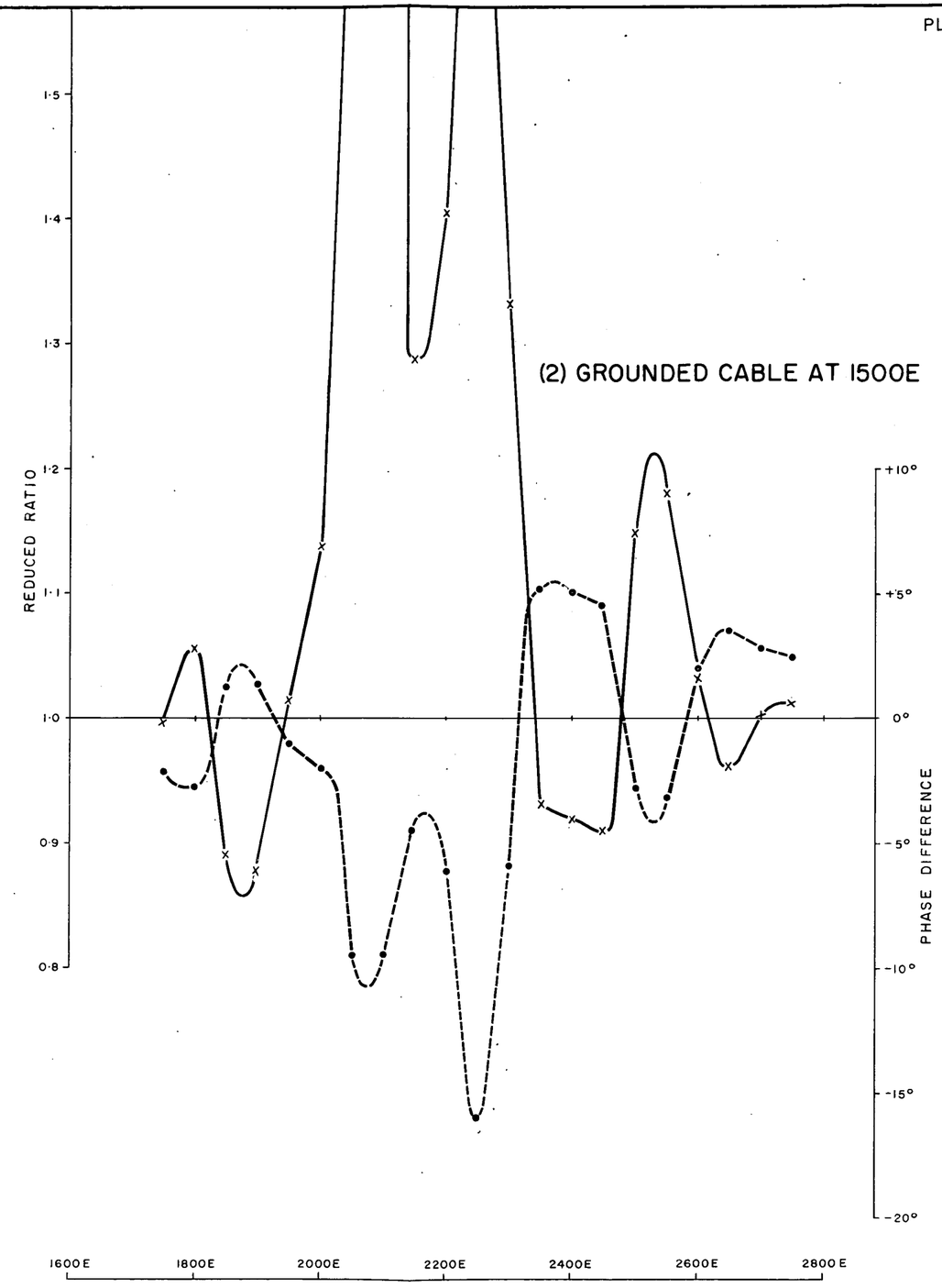
Coil Spacing 100 feet

Frequency 660 Hz

(1) LOOP, 4000 feet by 2000 feet, near side at 1500E

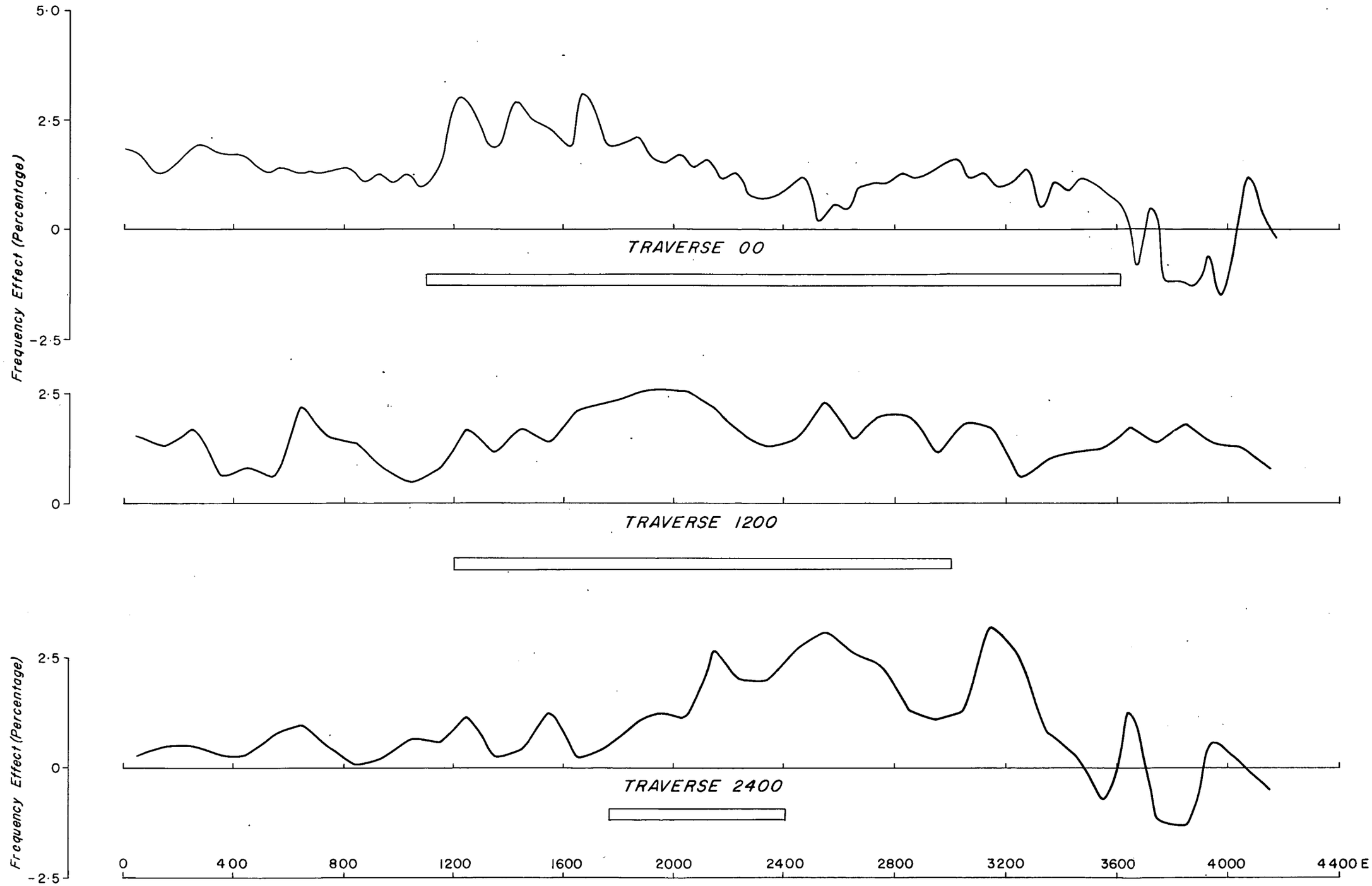


(2) GROUNDED CABLE AT 1500E



TO ACCOMPANY RECORD No. 1971/18

F53/B7-18



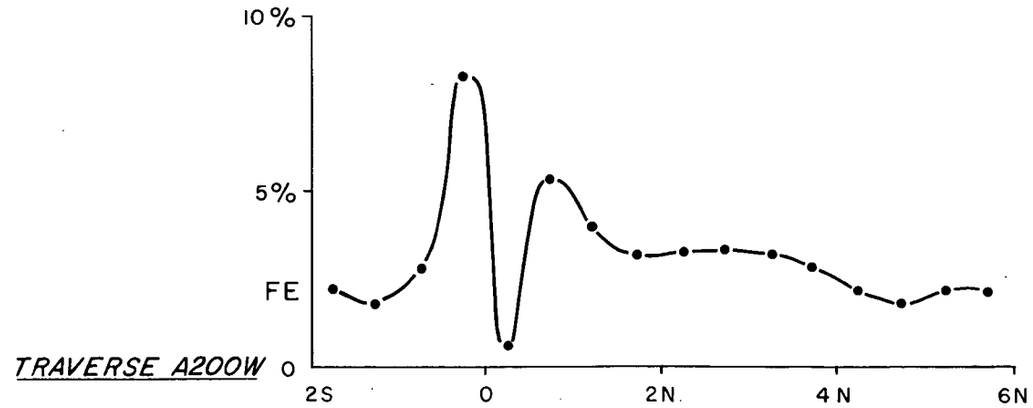
IP RESPONSE USING A GRADIENT ARRAY PERPENDICULAR TO THE STRIKE

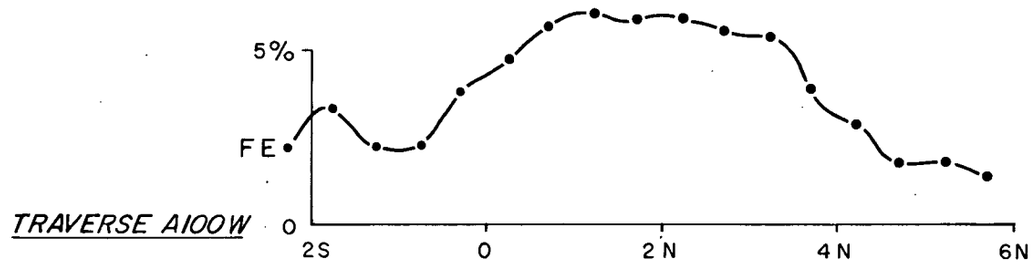
Zone of dipole-dipole anomaly greater than 2% at n = 2

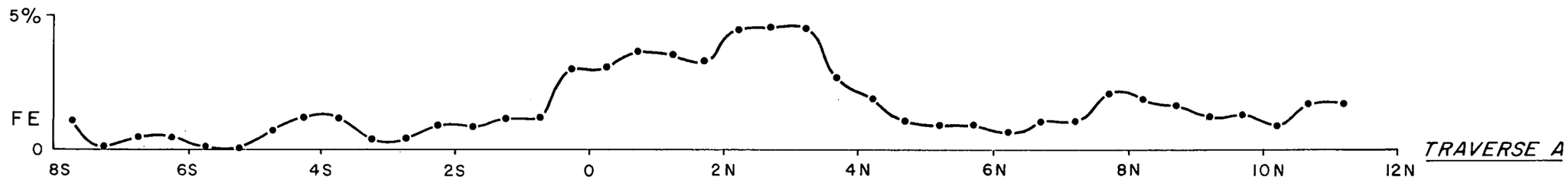
Frequencies 0·3/3·0 Hz

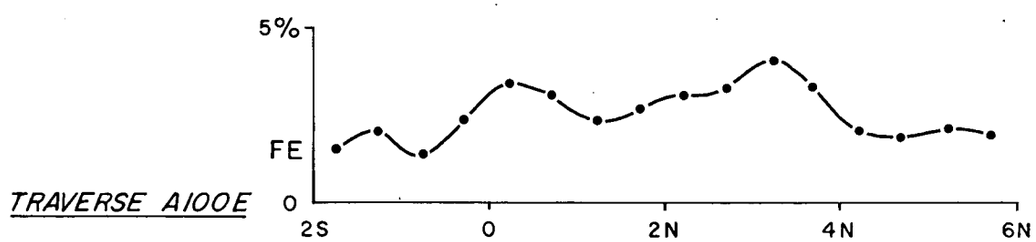
100 0 100 200 300 METRES

400 200 0 400 800 1200 FEET







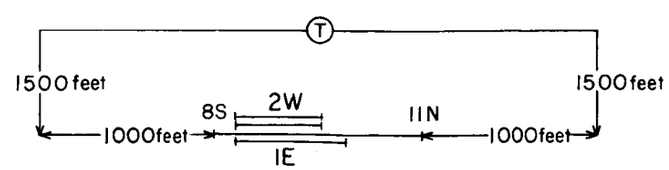


STRANGWAYS RANGE NT

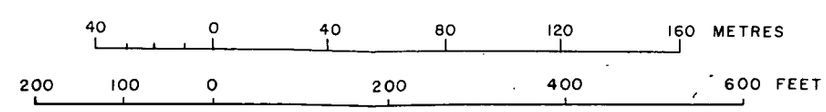
JOHNNIES REWARD GRID

IP RESPONSE USING A GRADIENT ARRAY

PARALLEL TO THE STRIKE



GRADIENT ARRAY LAYOUT



FREQUENCIES 3·0/0·3 Hz

TO ACCOMPANY RECORD No. 1971/18

F53/B7-22