COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record 1972/60

EUCLA BASIN AIRBORNE MAGNETIC AND RADIOMETRIC SURVEY, S.A. 1970

by

D.R. Waller, J.H. Quilty, S.S. Lambourn

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CONTENTS

ILLUSTRATIONS

SUMMARY

An airborne magnetic and radiometric survey was carried out in the COOK, OOLDEA, and BARTON 1:250 000 Sheet areas within the Eucla Basin between April and August 1970.

The magnetic character of the crystalline basement delineated by the survey showed good correlation with known geology and with gravity data in the BARTON area of the Gawler Platform.

Depths to crystalline basement and the basement topography were interpreted from the magnetic data in the COOK and OOLDEA areas. Troughs containing sediments up to 2 500 metres thick were delineated in both areas. Elsewhere the basement was shown to be 500 to 1000 metres deep with local areas less than 500 metres. The interpreted structures show reasonably good correlation with available borehole data and with gravity and seismic data.

Areas of anomalous surface radioactivity were delineated in the Nullarbor limestone and sand-covered areas of BARTON and northeast OOLDEA.

1. INTRODUCTION

At the request of Department of Mines, South Australia, for airborne magnetic and radiometric coverage of COOK, OOLDEA, BARTON, COOMPANA, NULLARBOR and FOWLER, 1:250 000 sheet areas within the Eucla Basin, the Bureau of Mineral Resources (BMR) carried out a survey of COOK, OOLDEA, and BARTON between April and August 1970. The other three areas are programmed for survey in 1972. The location of the survey area is shown in Plate 1.

COOK, OOLDEA, and BARTON are adjacent areas in the eastern part of the Eucla Basin, north of the Great Australian Bight. These areas are traversed by the Transcontinental Railway. BARTON lies on the Gawler Platform and is an area of sand dunes overlying crystalline basement, which crops out in many parts. Westward, OOLDEA and COOK contain sediments generally less than 1 000 metres thick with individual troughs where the sedimentary thickness increases to 2 500 metres. The crystalline basement underlies these sediments.

The objects of the airborne survey were to determine the depth, topography, and general characteristics of the basement from the magnetic anomaly pattern. The surface radioactivity was to be measured simultaneously with the magnetic recording, to delineate areas of significant radioactivity.

The survey commenced early April 1970, and consisted of a grid of east-west flight-lines spaced approximately 1.5 km apart across the three sheet areas. The flight-line grid was intersected at selected spacing by north-south tie-lines for use in reduction of the magnetic data. The survey altitude was approximately 150 metres above ground level.

The survey was based at Ceduna, where the DC.3 survey aircraft VH-MIN and support vehicles were assembled. Operations commenced on 6 April. Forrest was used on occasions as an overnight base, for economy of survey flying in the western part of the area.

The operations took longer than was expected, owing to navigation difficulties when the aircraft's gyro-compass developed intermittent faults. The field operations were completed early in August.

2. GEOLOGY

Miocene limestone outcrop of the Nullabor Plain covers COOK and the major part of OOLDEA (plate 2). Quaternary sand dunes and alluvium cover BARTON, forming a thin veneer over the crystalline basement of the Gawler Platform. The dunes extend into the northern part of OOLDEA. In the southwest corner of BARTON, calcrete deposits occupy the boundary between the sand dunes and the Nullarbor Limestone. In northeast OOLDEA and north BARTON, outcrops of flat-lying sandstone (Cambrian?) are found, which are probably marginal remnants of sediments within the Officer and Great Artesian Basins (Forbes, 1970).

The Gawler Platform consists of Carpentarian (Proterozoic) and Archaean granite and gneiss with basic and ultrabasic units. South of BARTON, hornblende gneiss and meta-adamellite, which have undergone retrograde metamorphism, are included. Hematite formations (jaspilites), basic rocks, and ultrabasics are known in northeast BARTON. It is possible that Adelaidean (Upper Proterozoic) sediments may overlie the crystalline basement. It is presumed that the above rock types constitute the crystalline basement beneath the eastern part of the Eucla Basin and are the sources of the recorded aeromagnetic anomalies.

The age of sediments within the Basin ranges from Proterozoic to Tertiary. Levels of sediments penetrated in boreholes are shown in Appendix 1. Forbes states that, in the subsurface west and southwest of Maralinga, are reddish siltstone and sandstone of possible Cambrian age (Observatory Hill Beds), which may be over 600 metres thick and are possibly accompanied by volcanics. South of the survey area at the head of the Bight, Mallabie No. 1 borehole penetrated 350 metres of Tertiary and Cretaceous and 90 metres of Permian sediments, followed by 900 metres of Cambro-Ordovician sediments and altered volcanics. The volcanics (altered amygdaloidal basalt) were 290 metres thick at the base of the Cambro-Ordovician section. Beneath the volcanics was 140 metres of Proterozoic or younger sediments. Basement rock (Archaean granite gneiss) was encountered at 1 350 metres depth. The collar of the bore was 60 metres above sea level.

Above the Cambrian, sediments reported to be flat-lying range from Permian to Miocene. The types of sediments penetrated in boreholes include marine and paralic claystone, sandstone, siltstone, and shale covered by Nullarbor Limestone.

Tectonic activity in the Tertiary caused uplift and faulting of the region. Northeast lineaments and faults predominate in the eastern part of the survey area and are prominent in southeast OOLDEA. North and northwest lineaments, possibly due to faults and joints, are evident in the northwestern part of the area.

The Eucla Basin provides artesian water of poor quality. Nullarbor Limestone is used for railway ballast. The basin potential for petroleum accumulation and reservoirs has not been fully evaluated at this stage.

The crystalline basement is considered a prospective area for iron ore and other mineral deposits. Low-grade lacustrine alunite is found near Lake Ifould in southeast BARTON, and uranium prospecting has commenced in this and other claypan areas showing anomalous radioactivity. Opal gouging has been conducted in east BARTON.

3. PREVIOUS GEOLOGICAL AND GEOPHYSICAL INVESTIGATIONS

The survey area has been covered by gravity surveying. Some aeromagnetic reconnaissance traverses have been flown in Eucla Basin. Detailed photogeological interpretation is available for the COOK and OOLDEA sheets. Seismic data are confined to a few traverses in the south of the Basin, near the coastline. Several boreholes have penetrated part of the sedimentary section, but few entered crystalline basement.

Aeromagnetic

In 1954, aeromagnetic reconnaissance traverses were flown by BMR over the Eucla Basin; some of these crossed the present survey area. Depth estimates showed that magnetic basement depth is about 700 metres or less in the eastern margin of the basin and between 0 and 200 metres over the Gawler Platform (Quilty & Goodeve, 1958).

The region north of the survey area was covered by aeromagnetic reconnaissance traverses in 1964 for Exoil Pty Ltd, at an altitude of 700 metres above sea level. Groups of three traverses, oriented north-south and spaced 2 km apart, were separated by 15 km. Basement depth estimates along latitude 30°00'S range from sea level north of BARTON to more than 2 500 metres below sea level near the Western Australian border.

An aeromagnetic survey was flown in 1966 over the Great Australian Bight for Outback Oil Company, at an altitude of 500 metres above sea level with north-south flight-lines spaced 10 km apart. Basement depth estimates ranged from sea level to 2 000 metres below sea level.

Gravity

BMR conducted regional gravity survey traverses in 1954-55 across the Eucla Basin. One of these traverses followed the Transcontinental Railway. The Bouguer anomalies were considered to be mainly an expression of basement rock density variations (Gunson & van der Linden, 1956).

In 1970, OOLDEA and BARTON were covered by BMR gravity survey on a 7-km grid system. The data were processed by computer and the contoured results were produced by computer plotter. With the above data were incorporated the results of a gravity survey conducted for Outback Oil Co. N.L. (1969) on a 5-km grid within the areas of COOK and part of OOLDEA. Correlation of the present aeromagnetic survey data with the most recently processed gravity data is described in the next chapter.

Seismic

The South Australian Mines Department carried out seismic refraction surveys in the Eucla Basin in 1965 (Kendall, 1967). The seismic traverses were located: (i) along the Eyre Highway near the head of the Bight; (ii) along longitude 130°30'; and (iii) southeast of Cook. From the results, it was inferred that there is a northwest-trending basement trough roughly 2 000 metres deep at the coastline near the head of the Bight. This trough was postulated to extend northward into the southern part of OOLDEA.

Photogeology

Photogeological interpretation of COCK and COLDEA areas was done for Outback Oil Co. N.L. by Photogravity Co. Inc. of Houston, Texas, USA. Several surface lineaments and scarps, possibly due to subsurface structure, were interpreted from this work.

4. MAGNETIC RESULTS AND INTERPRETATION

Magnetic profiles at reduced vertical and horizontal scales are shown in Plates 2 to 6. The profiles of all flight-lines and tie-lines are shown in stacks in Plates 3 to 6, and selected profiles are shown in relation to geology in Plate 2. In each of the above plates the baseline to the profile is the flight-line position obtained by constructing an east-west line of best fit through a series of control points identified at intervals along the flight-line. Where tie-line profiles are shown, the baseline represents similarly the tie-line position.

Interpretation of near-surface basement areas

The magnetic data recorded over subcropping crystalline basement in BARTON and southeast OOLDEA were interpreted using a system of numbered zones to designate the magnetic character of each zone (Plate7). The intensity range of anomalies and the elongation of the anomalies established by joining anomaly maxima from line to line (termed magnetic anomaly linearity) were the criteria used to designate magnetic character.

Eight zone types were used:

Zone type	Anomaly range, gammas	Magnetic linearity
1	less than 100	poor
2	100 - 250	poor
3	250 - 500	poor
4	greater than 500	poor
5	less than 100	good
6	100 - 250	good
7	250 - 500	good
8	greater than 500 (up to 3000)	good

Since the intensity of the anomalies is proportional to the magnetic content (for similar rock dimensions), zone types 1 to 4 indicate increasing basicity in rocks that exhibit no or minor linear features. Zone types 5 to 8 are similarly related to increasing basicity in rocks of considerable linear features.

(a) BARTON

Zones 1 and 2 are interpreted as areas of granitic to intermediate rocks. They broadly correspond with gravity 'lows' (Plate 8).

Lineated zones 5 and 6 are generally not large. They are interpreted as acid to intermediate rock areas, probably sediments or intrusives.

Zones 3 are moderate in area and are probably due to rocks of intermediate to basic composition. The well lineated zones 7 are interpreted as country rock remnants not subjected to granitization, and intermediate to basic intrusives including some dolerite.

Zones 4 are ascribed to basic rocks. The large zone 4 east of Lake Ifould corresponds with a gravity 'high' and may be interpreted as a major metamorphic area.

Zones 8 are elongate in plan and well lineated, with intense anomalies whose sources are basic to ultrabasic rocks, e.g. gabbro, ironstone, and jaspilite.

(b) OOLDEA and COOK

It is not possible to extend the zoning beyond the boundary of the sedimentary basin. The general character of the crystalline basement is nevertheless shown by patterns of magnetic anomaly lineations. These lineations appear to be concentrated in the vicinity of longitude 131°30' and on the central western boundary of OOLDEA. The orientation of the lineations is north to north-northwest in contrast to the north and northeast orientation in BARTON. These lineated areas correspond mostly to gravity 'highs'.

A concentration of lineations occurs in a zone extending diagonally from about longitude 129°30' on the northern boundary of COOK to 131°00' on the southern boundary of OOLDEA. Smaller areas of concentration are located in western COOK and on its central southern boundary. The lineations are predominantly oriented northwest except in the southwest corner and to the south of Denman.

Intense negative anomaly lineations are shown in western COOK and are considered to be due to remanently magnetized basic to ultrabasic intrusive rocks in the basement.

Basement contours and estimated basement depths (Plate7)

The magnetic basement contours, which are assumed to correspond with the surface of the crystalline basement, and estimates of depth to basement below ground level are shown in Plate 7.

(a) BARTON and OOLDEA

The basement is shown to be shallow throughout BARTON and the eastern part of OOLDEA, where its depth over a large area is less than 500 metres and nowhere exceeds 1 000 metres. West of longitude 131°30', however, basement deepens to 2 000 metres in a narrow trough which strikes north and widens at the northern and southern boundaries of the area. The eastern margin of the trough coincides with the western flank of a gravity 'high' centred on Watson. In the western part of OOLDEA, basement is generally 500 to 1 000 metres deep with several closures less than 500 metres. Part of a smaller trough 2 000 metres deep is shown in the southern boundary (long. 130°45'); this trough corresponds to a gravity 'low'.

(b) COOK

A broad trough corresponding to a gravity 'low' strikes northwest across the central part of COOK and extends to the northern boundary. Separated from it by a ridge is a trough near the eastern boundary. Part of a narrow trough is shown on the southern boundary (long. 129°40').

5. RADIOMETRIC RESULTS AND INTERPRETATION

The radiometric results are shown in Plate 9, and details of the equipment in Appendix 2.

Radiometric data were recorded using a 10-second time constant to detect broad fluctuations in intensity, and using a 2-second time constant to detect the more localized sources.

Data recorded using the 10-second time constant were interpreted, and broad anomalies were selected by choosing only those that had a peak count rate of greater than ten times the Standard Deviation (S.D.) of the background count rate. This is given by:

$$S.D. = (N/2T)^{\frac{1}{2}}$$

where N is the count rate and T is the time constant of the counter.

Anomaly shape is a function of cource configuration and location relative to the detector. The width (W) of an anomaly at half peak amplitude is related to these factors. For this interpretation the acceptance limits were set between 15 and 25 seconds. This width criterion results in the acceptance of a continuous series of sources between the limiting cases of (1) a source with a radius of 1 500 ft, centred on the flight-paths, and (2) a point source at a distance of 5 000 ft from the flight-path.

The general radiometric background level recorded over sand dune country in BARTON and northeast OOLDEA is 40 counts per second, whereas the radiometric background over Nullarbor Limestone in COOK and OOLDEA is 80 counts/s. The boundary between the sand dunes and limestone is well defined by this change of level. The outcropping remnants of Mesozoic sandstone in the northern parts of BARTON and OOLDEA have a radiometric background of 60-80 counts/s.

Anomalies up to 200 counts/s from localized sources were recorded in northern OOLDEA and in various parts of BARTON. Many of these coincide with salt lakes. The larger salt lakes in northern BARTON show consistently intense anomalies. Other anomalies are attributed to granite outcrops sparsely distributed over the sand dune country of BARTON and northern OOLDEA.

In southeast BARTON, in a transition zone between sand dune country in the east and limestone in the west, the outcrops are described as calcrete in Bakara soil with Ripon calcrete at the base - pink nodular and platy carbonate accretions. There is also granite outcrop along the northern shore of Ifould Lake. Intense anomalies recorded in this area are again mainly confined to salt lakes. This area is worth further investigation to determine the source of the radioactive mineral concentration.

Numerous anomalies of intensity 60-100 counts/s from localized sources were recorded over Nullarbor Limestone. Such anomalies correlate with features on the airphotos; most of them are attributed to depressions in the limestone surface, the larger and more intense anomalies being due to claypans. The distribution of these anomalies is shown in COOK and OOLDEA (Plate 9). In COOK they are confined to the southern half of the sheet and the density of anomalies varies within the southern part of the sheet. In OOLDEA, the anomalies are more densely distributed in the western part and the southeastern part of the limestone outcrop.

The source of the anomalies is evidently a concentration of radioactive mineral by solution and precipitation in the depressions and pans. Not all depressions or areas with depressions show this phenomenon, however.

Further tests with gamma-ray spectrometer equipment on the anomalous areas are recommended.

6. CONCLUSIONS

The three major depressions in the basement are: (i) an elongate trough striking north through the central part of OOLDEA, widening at the northern and southern boundaries of the sheet; (ii) a trough striking northwest in the eastern part of COOK: and (iii) a broad trough striking northwest across the central part of COOK and extending to the northern boundary. Part of a trough is shown in the southwestern part of OOLDEA, and another on the southern boundary of COOK. The northern boundary of COOK is also an area of deep basement.

Since the Cambrian surface lies at a depth of 300 metres or less in boreholes within the survey area and 410 metres in Mallabie No. 1 bore south of the survey area, Cambro-Ordovician and Proterozoic sediments evidently constitute the major part of the sections in the basement troughs.

The possibility of the magnetic anomalies in 'shallow basement' areas being due to intrasedimentary volcanics, particularly in the region near COOK and FISHER, is to be considered. The basement contours would not then show a true picture of crystalline basement. However, the altered basalt in Mallabie No. 1 lay just above the crystalline basement separated by a small interval of sandstone. If this is the case within the survey area, the basement contours as shown would not be significantly affected by the volcanics.

The airborne radiometric results have delineated localized sources of radioactivity corresponding with salt lake deposits in both the sand dune covered areas of BARTON and with salt lakes, claypans, and shallow depressions in the Miocene Nullarbor Limestone in COOK and OOLDEA. Certain radioactive anomalies correspond with mapped calcrete deposits in southwest BARTON.

In view of the current interest in sedimentary uranium deposits, it is recommended that a selection of the radioactive salt lake, claypan, or sinkhole sources in the Nullarbor Limestone, the calcrete deposits, and the sand areas of the Gawler Platform be further investigated by airborne gamma-ray spectrometer to determine the predominant radioactive element in these precipitate deposits.

7. REFERENCES

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2. GUNSON, S., & VAN DER LINDEN, J., 1956 - Regional gravity traverses across the Eucla Basin. Bur. Miner. Resour. Aust. Rec. 1956/145 (unpubl.).

3. KENDALL, G.W., 1967 - Report on reconnaissance seismic refraction survey in South Australian Portion of Eucla Basin, 1964. S. Aust. Dept. Mines Rep. 60/30.

4. OUTBACK OIL CO. N.L., 1969 - Mallabie No. 1 Well completion report. BMR File 69/2013.

5. QUILTY, J., & GOODEVE, P., 1958 - Reconnaissance airborne magnetic survey of the Eucla Basin S.A. BMRGG Record 1958/87.

11

APPENDIX 1

BOREHOLE DATA

	Hughes No. 1	Hughes No. 2	Hughes No. 3	Denman No. 1	Cook	Cook No. 1	Mallabie No. 1
Locality	See Plate 7	See Plate 7	See Plate 7	See Plate 7	See Plate 7	See Plate 7	Near coastline at head of Bight
Level of Tertiary	Ground level	Ground level	Ground level	Ground level	Ground level	Ground level	Ground level
" " Cretaceous	110 m	75 m	8 m	70 m	145 m	105 m	185 m ?
" " Cambrian	260 m	230 m	175 m	290 m	160 m	195 m	410 m (Precambrian basement at 1350 m)
Total depth	420 m	245 m	280 m	545 m	280 m	390 m	1500 m
Level of bore collar above sea level	140 m	Not known	Not known	Not known	Not known	Not known	60 m

APPENDIX 2

OPERATIONAL DETAILS

Staff

Party Leader	D. Waller
Geophysicist	B. Grewal
Technical Officer	R. Curtis-Nuthall
Draftsman	K. Barrett
Technical Assistants	K. Mort
	D. Park
TAA Pilots	F. O'Grady (Captain)
	R. Smith (First Officer)

Equipment

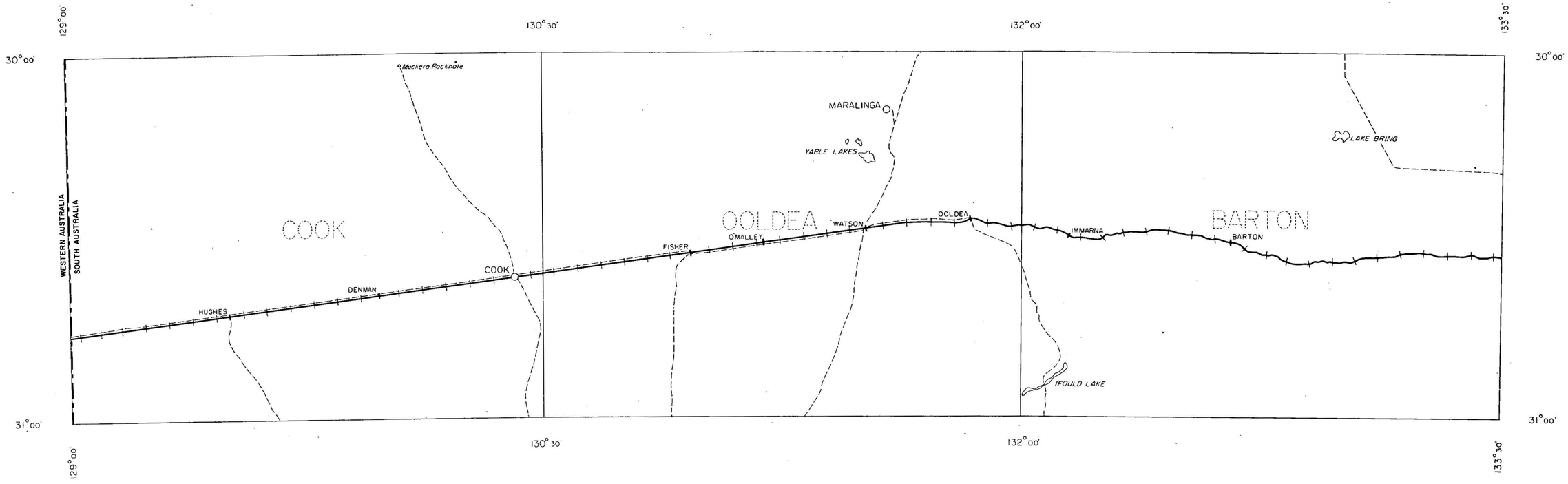
Aircraft	DC.3 VH-MIN
Magnetometer	MFS-5 saturable-core fluxgate, tail boom installation, coupled to Speedomax recorder. MFD-3 saturable-core fluxgate ground installation for storm warning, coupled to Esterline-Angus recorder.
Scintillographs	Twin crystal (thallium activated sodium iodide) MEL scintillation detector heads inboard. Total volume of crystal used was 50 cu. ins. The detectors were coupled to De Var recorders.
Radio altimeter	Pilot control.
Air position indicator	Track recorded by De Var recorder.
Camera	BMR 35-mm strip camera

Survey specifications

Line spacing	1.5 km approx.
Line orientation	East-west
Tie system	Single lines spaced approx. 20 km apart
Altitude	Approx. 150 metres above ground level
Navigation control	Aerial photographs
Magnetometer sensitivity	
MFS-5	100 gamma/inch
MFD-3	20 gamma/inch

Scintillometer specifications

	ENERGY RANGE	SENSITIVITY	TIME CONSTANT
CHANNEL 1	0.050 - 3.0 MeV	50 counts/s/inch	10 seconds
CHANNEL 2	0.50 - 3.0 MeV	125 counts/s/inch	2 seconds



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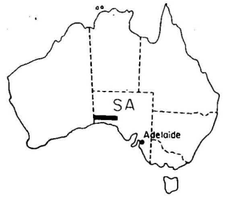


AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA, 1970

LOCALITY MAP

MILES 10 0 10 20 30 40 50 60 70 80 MILES

KILOMETRES 10 0 10 20 30 40 50 60 70 80 90 100 KILOMETRES

REFERENCE TO 1 : 250,000 MAP SERIES

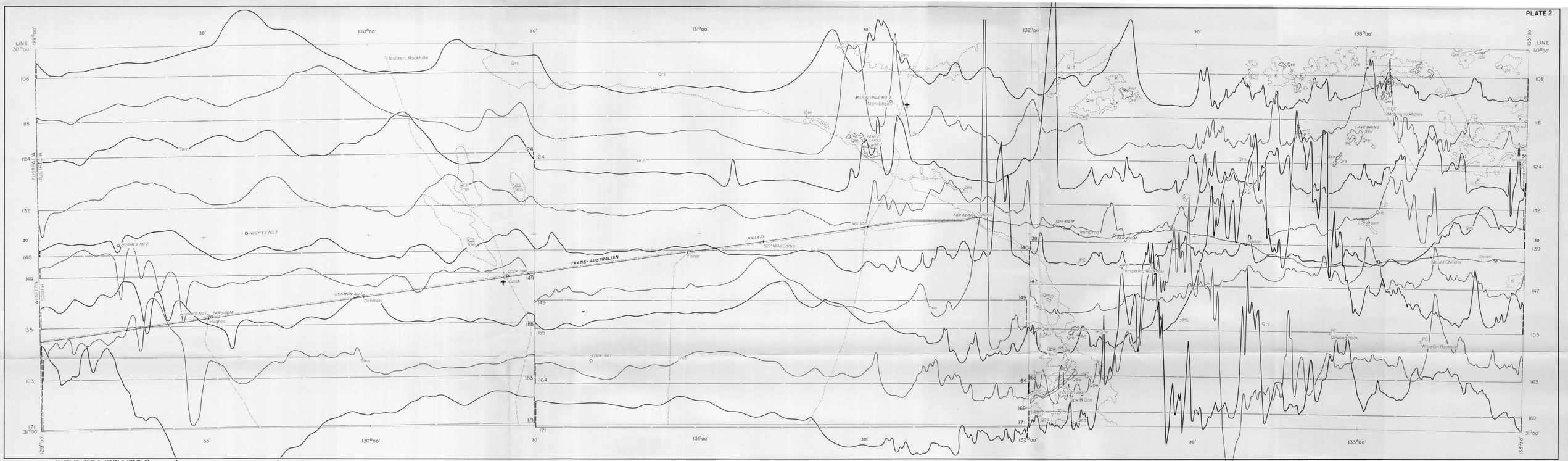
MASON	WYOLA	MAURICE	TALLARINGA	COOBER PEDY
FORREST	COOK	OOLDEA	BARTON	TARCOOLA
EUCLA	COOMPANA	NULLARBOR	FOWLER	CHILDARA

TO ACCOMPANY RECORD NO. 1972/60

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

H52/B1-2

PLATE 2



(BASED ON H52/BI-3, H52/BI-4, H52/BI-11)

LOCATION DIAGRAM

REFERENCE TO 1:250,000 MAP SERIES

MASON	WYOLA	MAURICE	TALLA-RINGA	COOBER PEDY
FORREST	COOK	OODLEA	BARTON	TARCOOLA
EUCLA	COOMPANA	NULLARBOR	FOWLER	CHILDARA

PROFILE SCALE

1000 GAMMAS
900
800
700
600
500
400
300
200
100
0

AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA 1970

TOTAL MAGNETIC INTENSITY PROFILES AND GEOLOGY

5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 KILOMETRES

5 0 5 10 15 20 25 30 35 MILES

EXPLANATORY NOTES

The survey was made with a DC3 aircraft at an altitude of 150 metres above ground level along lines spaced 1.6 kilometres apart. The flight lines are idealised and serve as baselines to the profiles. They approximate the actual flight path with a probable error of ± 0.8 kilometre.

Profiles recorded at approximate intervals of 12.9 kilometres as shown on the map.

The profiles have been corrected for the south component of a regional gradient in total magnetic intensity. This component amounts to 5.3 gammas per kilometre.

TOPOGRAPHICAL LEGEND

- Cook — Named place
- Road or track
- Hughes — Railway and siding
- State boundary
- Salt — Lake
- Aerodrome or landing ground

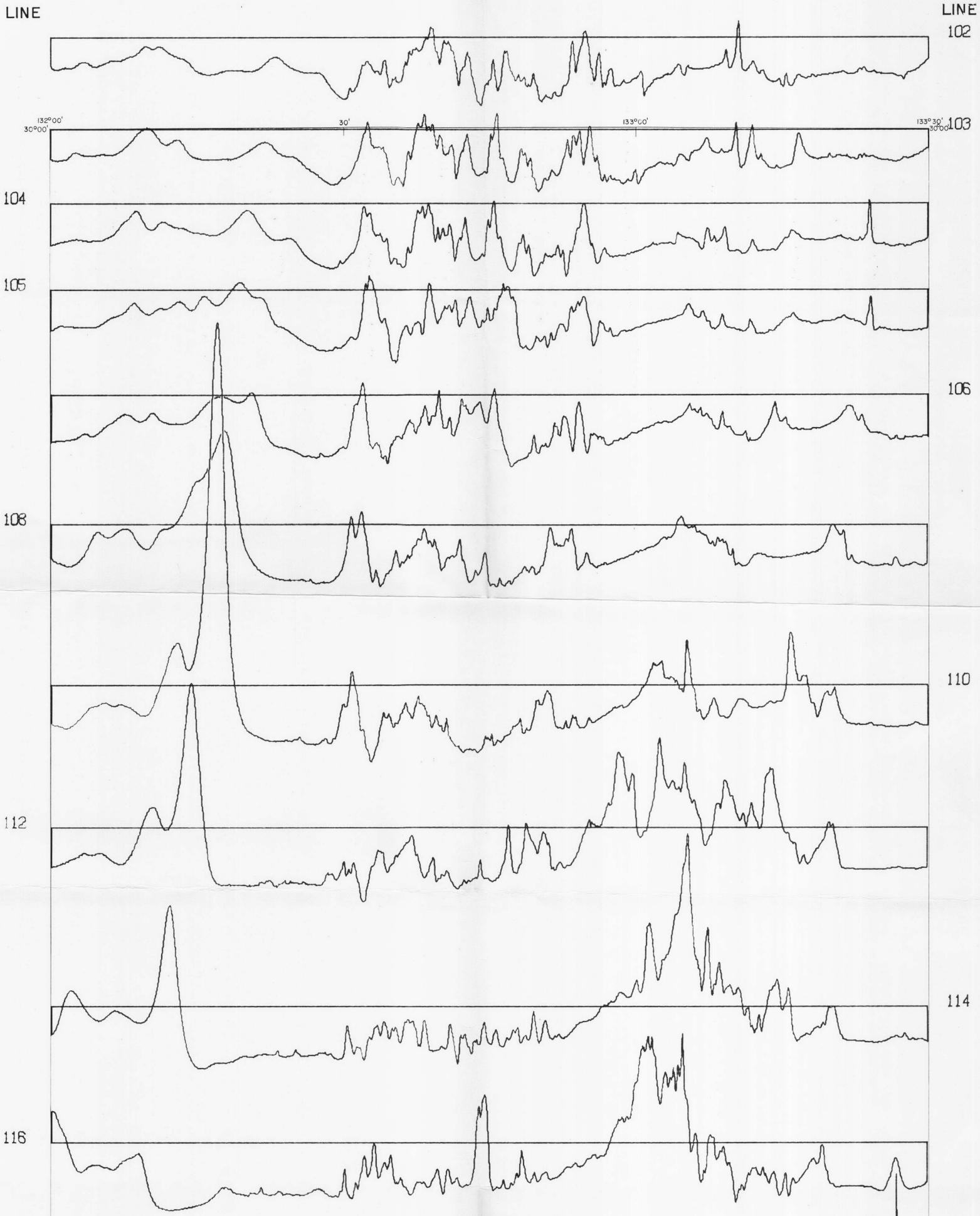
GEOLOGICAL LEGEND

- Qrs — Fixed siliceous sand dunes and quaternary alluvium
- Qre — Undifferentiated lake deposits
- Qpw — Woorinen Formation: equivalent:— pale brown aeolian calc. silt—sand sheet
- Qca — Calcrete in Bakara Soil with Ripon Calcrete at the base-pink nodular and platy carbonate accretions
- Tmn — Nullarbor limestone
- K — Sandstones of unknown age - possibly mesozoic
- PC — Granites and granite gneiss (g.gneiss, gneiss and some amphibolite in Pidinga area) all other outcrop as far as is known is granite
- Geological boundary
- Borehole
- Mine

TO ACCOMPANY RECORD NO. 1972/60

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

H52/BI-12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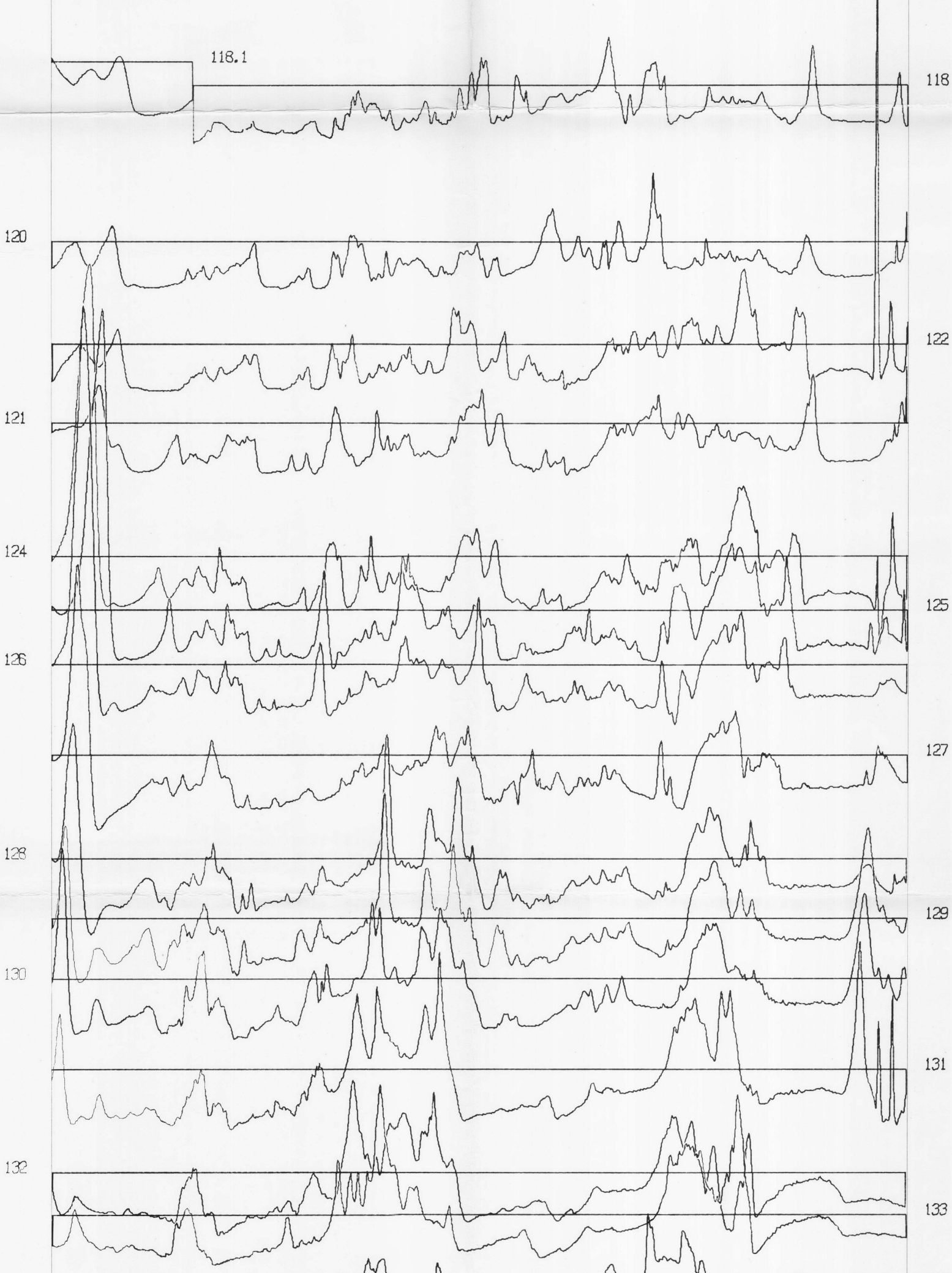
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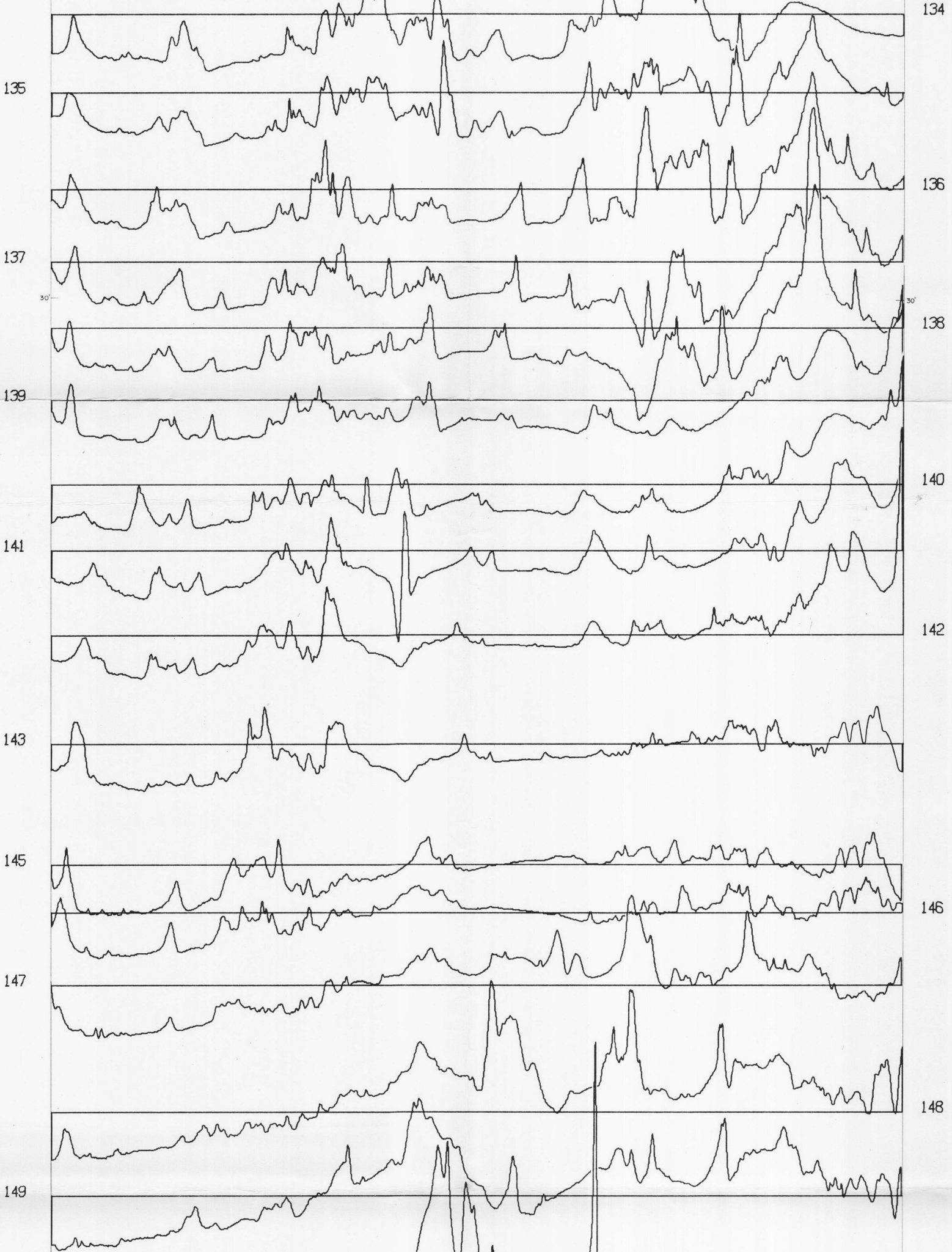
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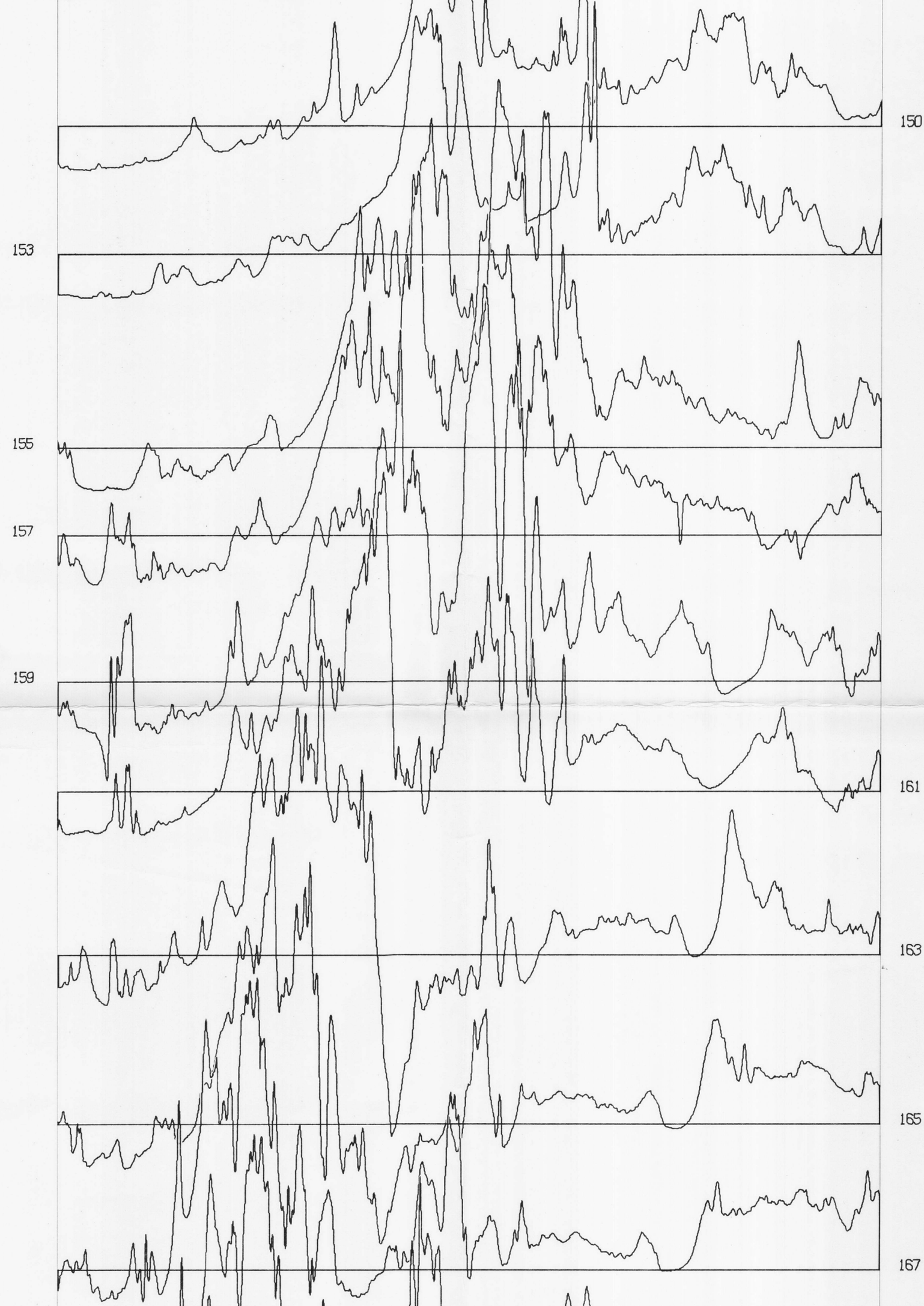
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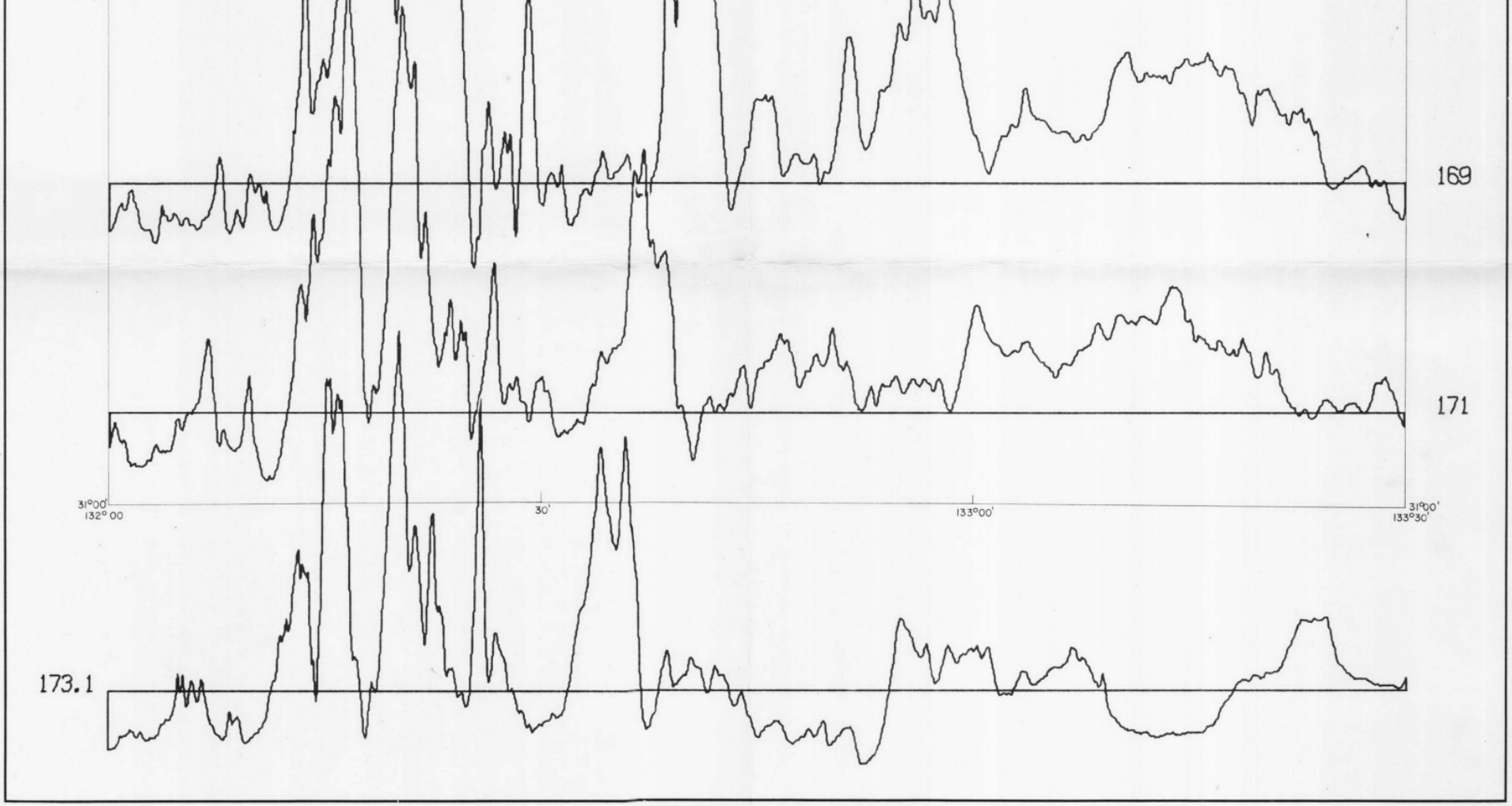
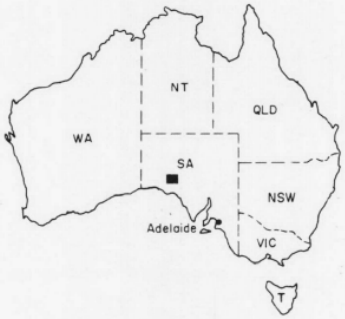
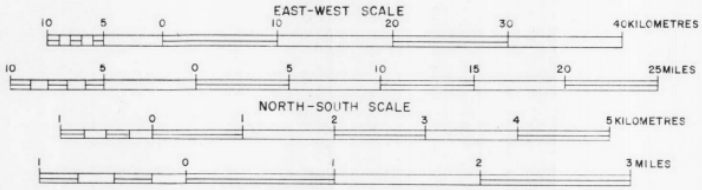


LOCATION DIAGRAM

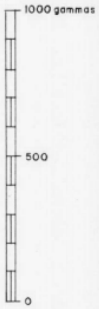


AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA 1970

TOTAL MAGNETIC INTENSITY PROFILES



PROFILE SCALE



REFERENCE TO 1:250,000 MAP SERIES

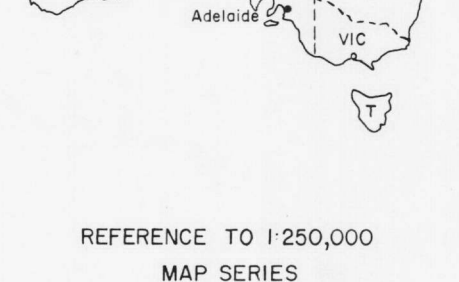
MAURICE	TALLARINGA	COOBER PEDY
OOLDEA	BARTON	TARCOOLA

EXPLANATORY NOTES

THE SURVEY WAS MADE WITH A DC.3 AIRCRAFT AT AN ALTITUDE OF 150 METRES ABOVE GROUND LEVEL ALONG LINES SPACED 1·6 KILOMETRES APART. THE FLIGHT-LINES ARE IDEALISED AND SERVE AS BASELINES TO THE PROFILES. THEY APPROXIMATE THE ACTUAL FLIGHT PATH WITH A PROBABLE ERROR OF ± 0·8 KILOMETRE.

THE PROFILES HAVE BEEN CORRECTED FOR THE SOUTH COMPONENT OF A REGIONAL GRADIENT IN TOTAL MAGNETIC INTENSITY. THIS COMPONENT AMOUNTS TO 5·3 GAMMAS PER KILOMETRE.

LOCATION DIAGRAM



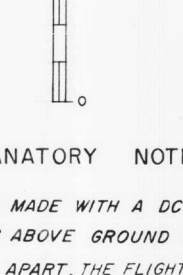
REFERENCE TO 1:250,000 MAP SERIES

WYOLA	MAURICE	TALLARINGA

AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA 1970

TOTAL MAGNETIC INTENSITY PROFILES

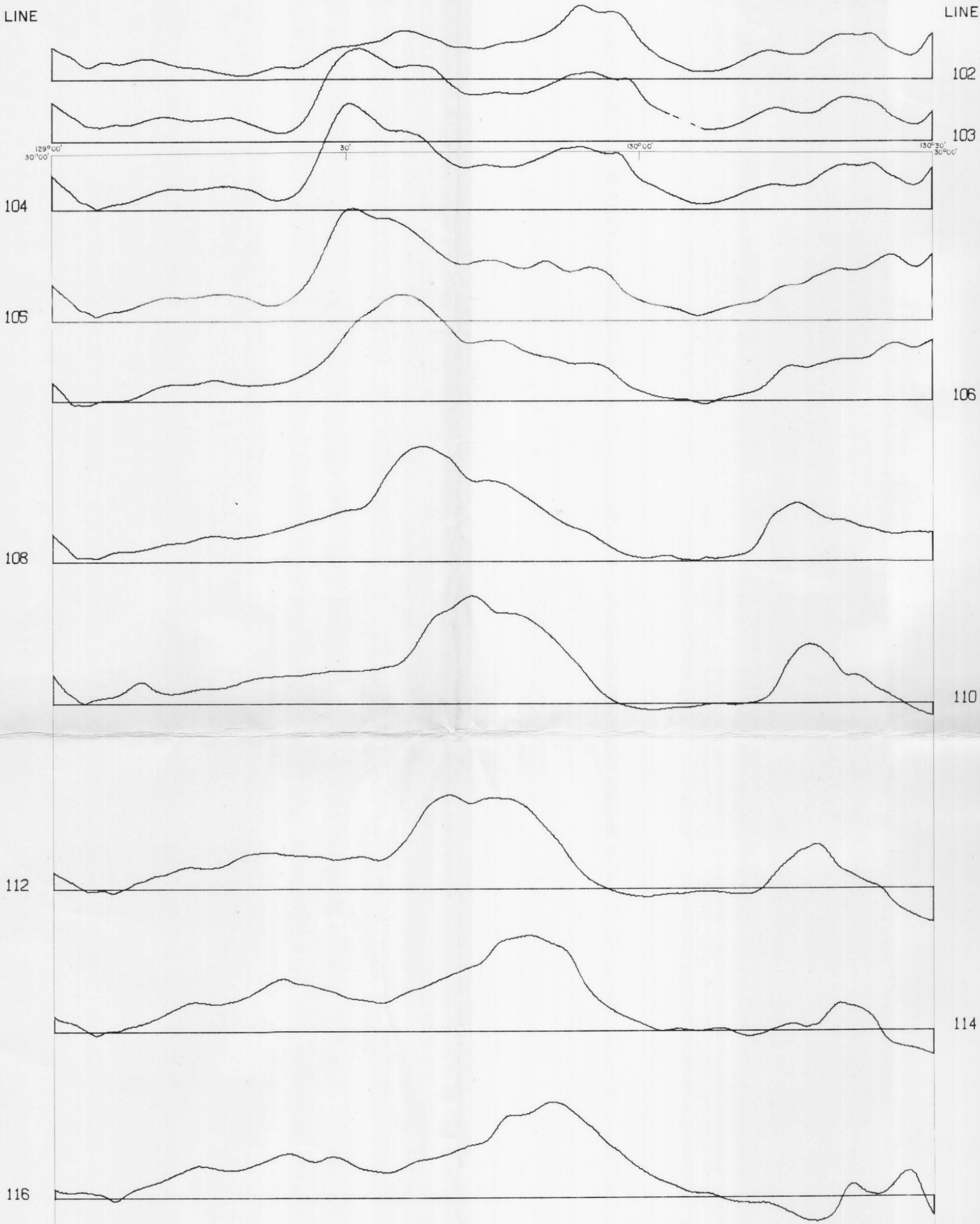
PROFILE SCALE

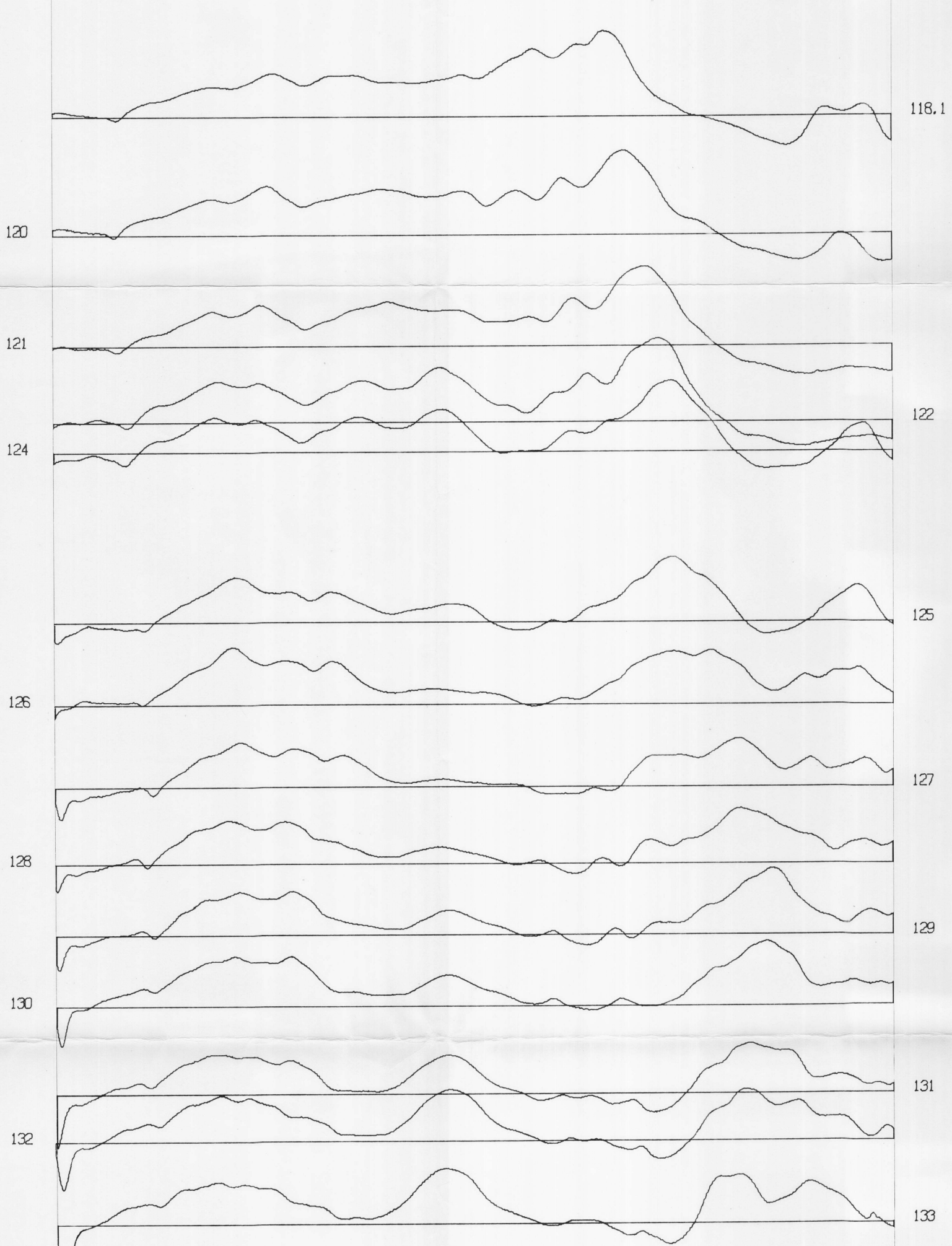


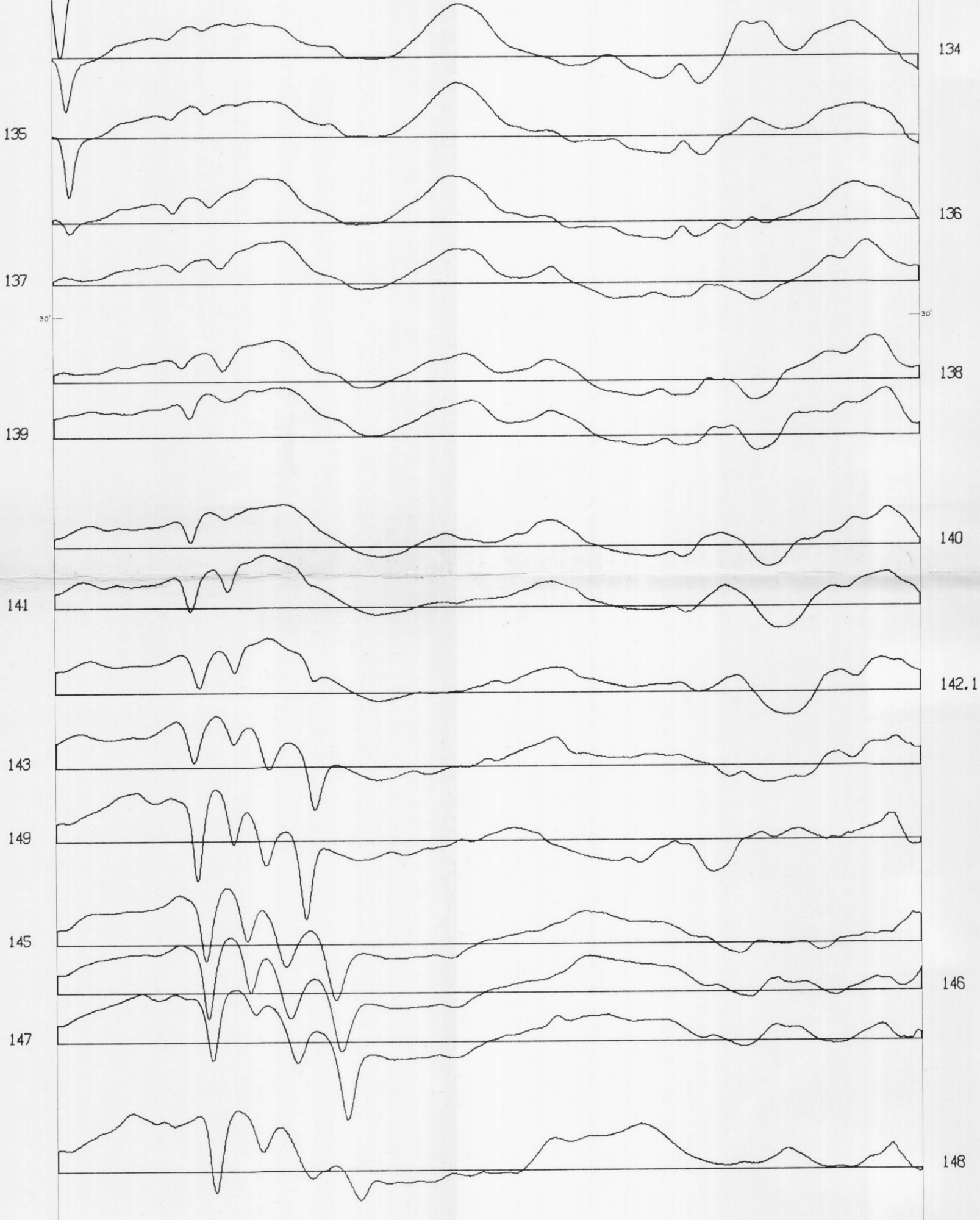
EXPLANATORY NOTES

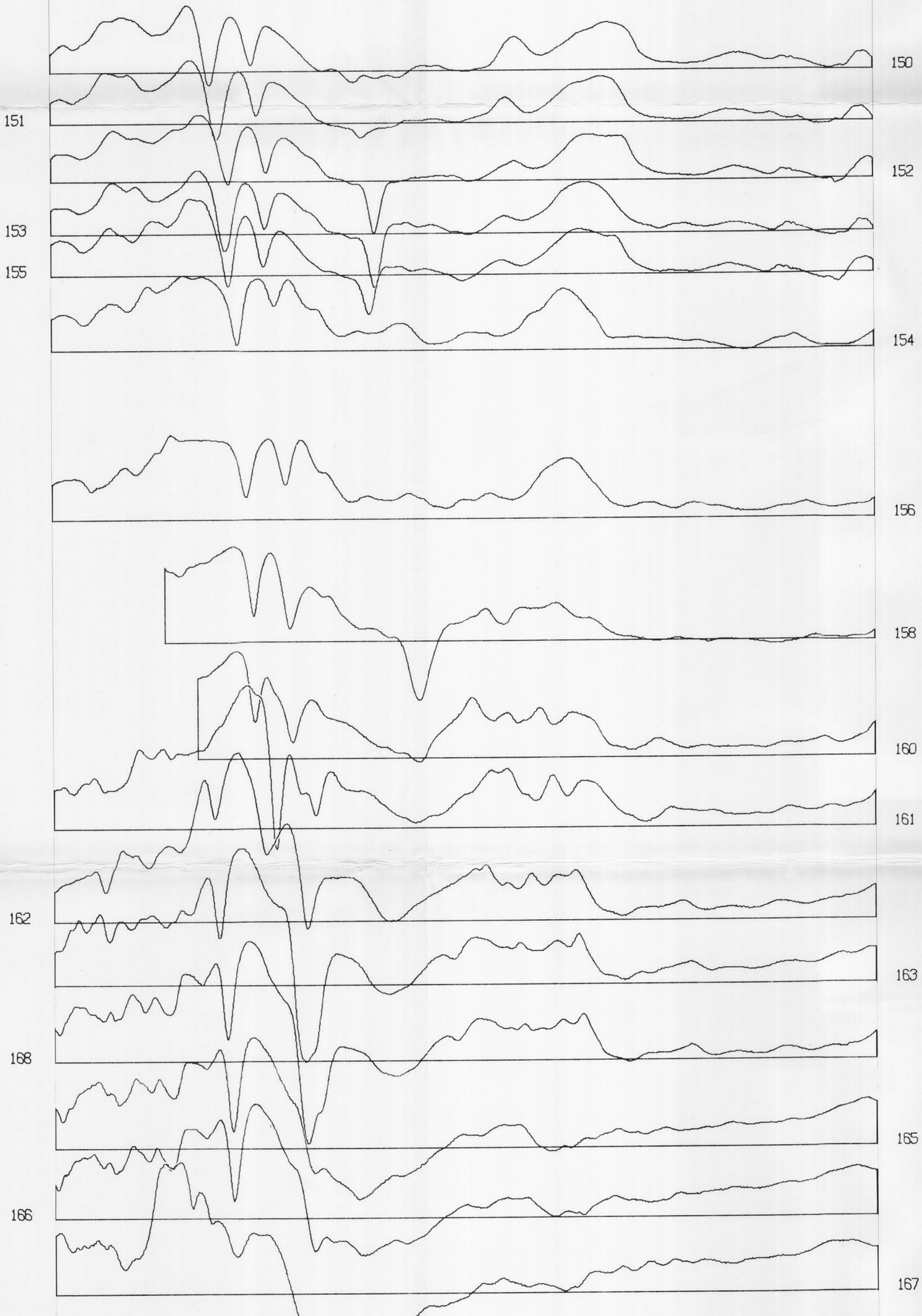
THE SURVEY WAS MADE WITH A DC.3 AIRCRAFT AT AN ALTITUDE OF 150 METRES ABOVE GROUND LEVEL ALONG LINES SPACED 1·6 KILOMETRES APART. THE FLIGHT-LINES ARE IDEALISED AND SERVE AS BASELINES TO THE PROFILES. THEY APPROXIMATE THE ACTUAL FLIGHT PATH WITH A PROBABLE ERROR OF ± 0·8 KILOMETRE.

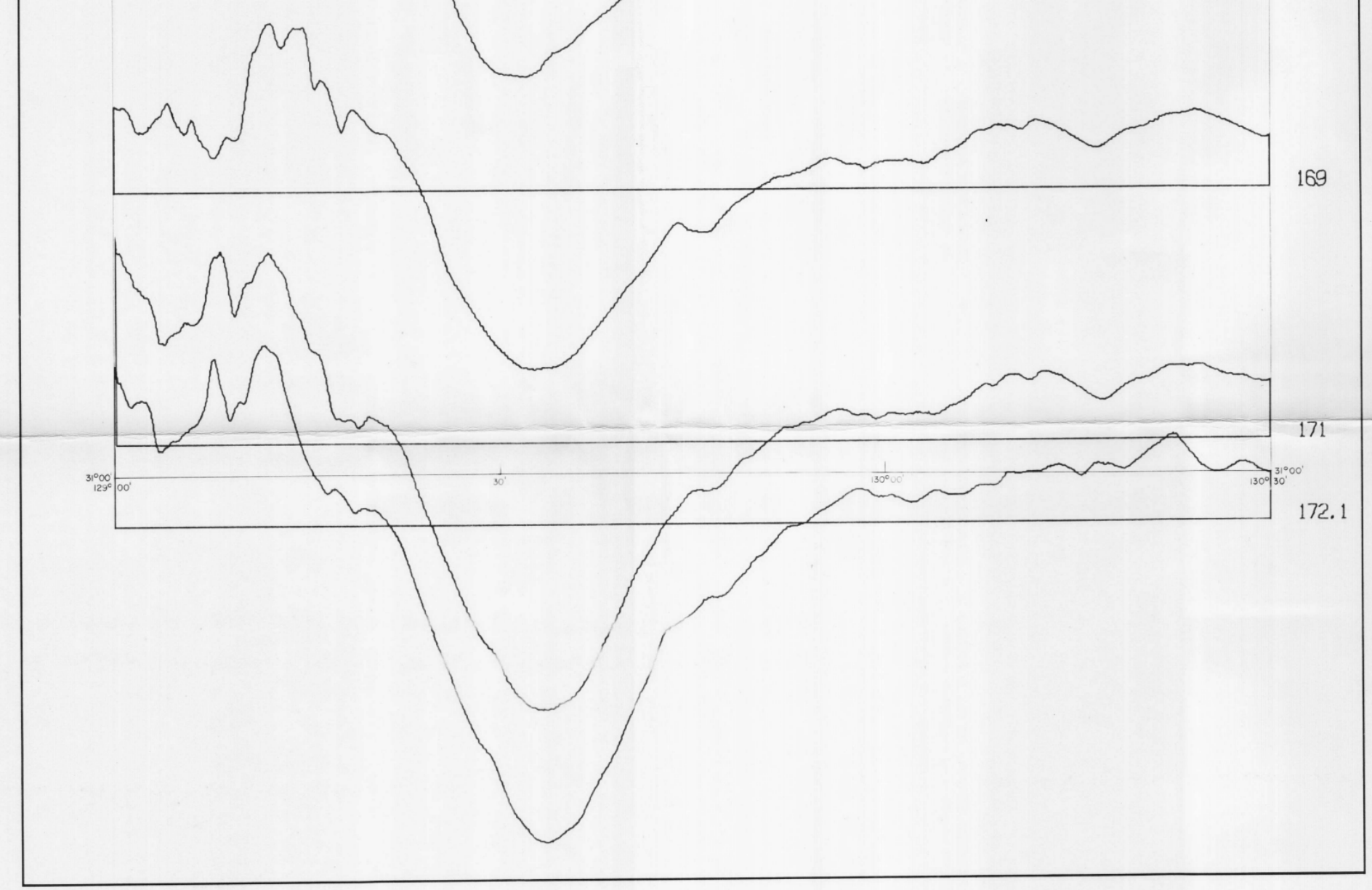
PLATE 5


LINE
LINE
102
103
129°00'
30°00'
30'
130°00'
130°30'
30°00'
104
105
106
108
110
112
114
116

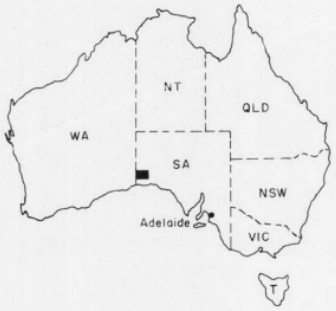

118.1
120
121
122
124
125
126
127
128
129
130
131
132
133


134
135
136
137
30'
30'
138
139
140
141
142.1
143
149
145
146
147
148


150
151
152
153
155
154
156
158
160
161
162
163
168
165
166
167



LOCATION DIAGRAM



AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA 1970

TOTAL MAGNETIC INTENSITY PROFILES

EAST-WEST SCALE

10 5 0 10 20 30 40KILOMETRES

10 5 0 5 10 15 20 25MILES

NORTH-SOUTH SCALE

1 0 1 2 3 4 5KILOMETRES

1 0 1 2 3MILES

PROFILE SCALE

1000gammas

500

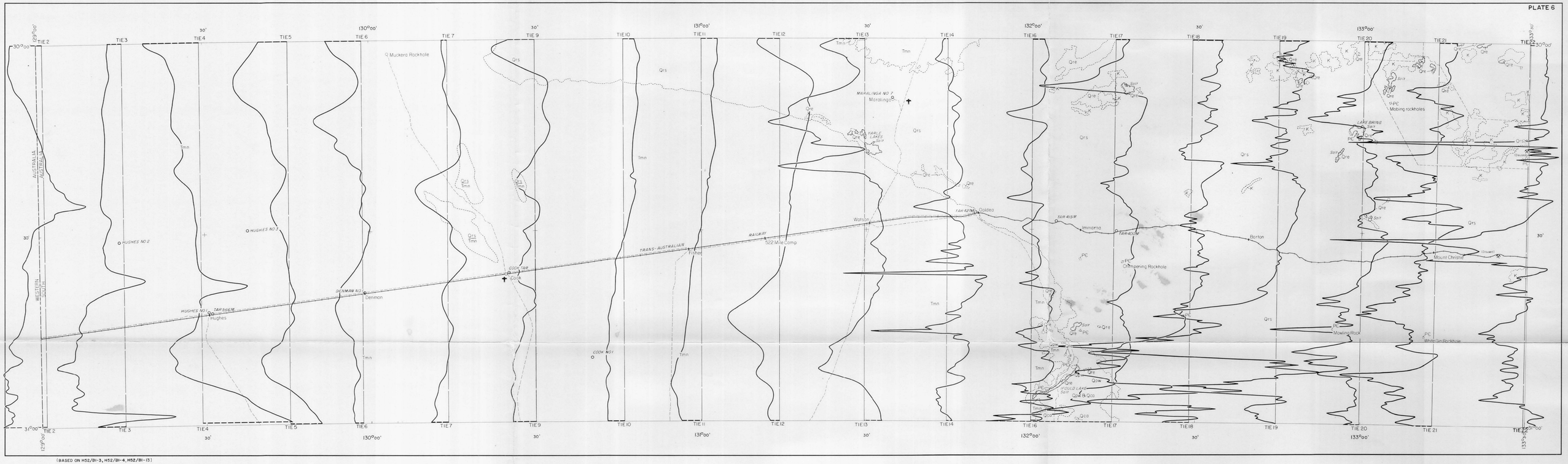
0

REFERENCE TO 1:250,000

EXPLANATORY NOTES

THE SURVEY WAS MADE WITH A DC.3 AIRCRAFT AT AN ALTITUDE OF 150 METRES ABOVE GROUND LEVEL ALONG LINES SPACED 1·6 KILOMETRES APART. THE FLIGHT-LINES ARE IDEALISED

PLATE 6



(BASED ON H52/BI-3, H52/BI-4, H52/BI-13)

LOCATION DIAGRAM

REFERENCE TO 1:250,000 MAP SERIES

MASON	WYOLA	MAURICE	TALLA-RINGA	COOBER PEDY
FORREST	COOK	OOLDEA	BARTON	TARCOOLA
EUCLA	COOMPANA	NULLARBOR	FOWLER	CHILDARA

PROFILE SCALE

AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA 1970

TOTAL MAGNETIC INTENSITY PROFILES

AND

GEOLOGY

EXPLANATORY NOTES

The survey was made with a DC3 aircraft at an altitude of 150 metres above ground level along lines spaced 1.6 kilometres apart and tie lines of 24 kilometres spacing. The flight-lines are idealised and serve as baselines to the profiles. They approximate the actual flight path with a probable error of ± 0.8 kilometre.

The tie line profiles are shown on the map.

The profiles have been corrected for the south component of a regional gradient in total magnetic intensity. This component amounts to 5.3 gammas per kilometre.

TOPOGRAPHICAL LEGEND

- Cook — Named place
- Road or track
- Hughes — Railway and siding
- State boundary
- Salt — Lake
- Aerodrome or landing ground

GEOLOGICAL LEGEND

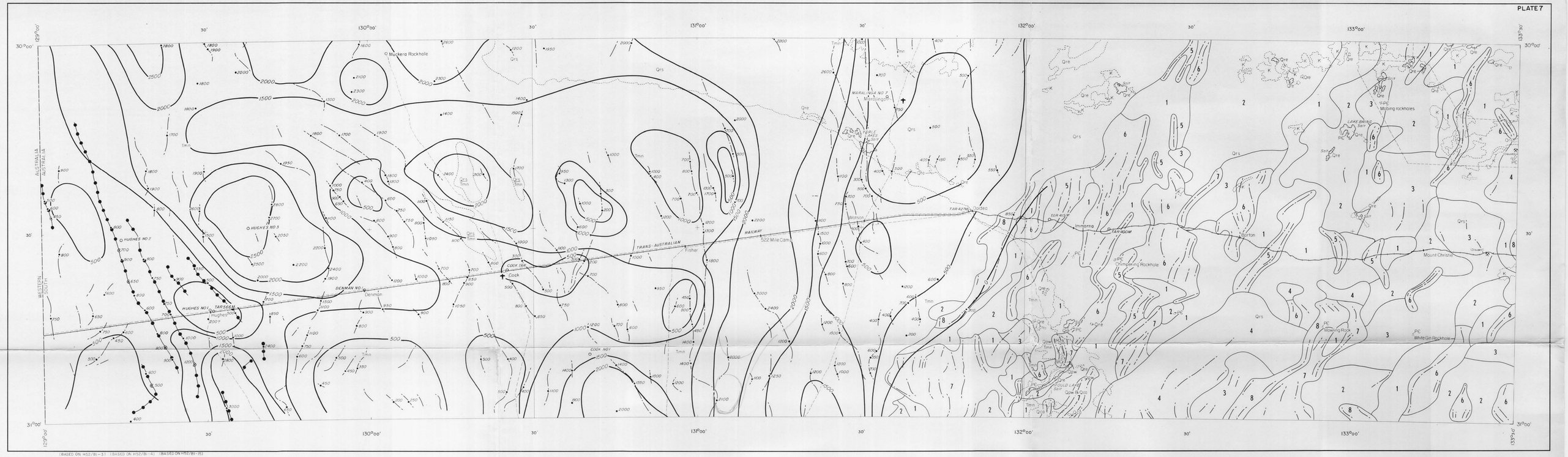
- Qrs — Fixed siliceous seif dunes and quaternary alluvium
- Qre — Undifferentiated lake deposits
- Qpw — Woorinen Formation equivalent:— pale brown aeolian calc. silt–sand sheet
- Qca — Calcrete in Bakara Soil with Ripon Calcrete at the base- pink nodular and platy carbonate accretions
- Tmn — Nullarbor limestone
- K — Sandstones of unknown age - possibly mesozoic
- PC — Granites and granite gneiss (g.gneiss, gneiss and some amphibolite in Pidinga area) all other outcrop as far as is known is granite
- Geological boundary
- Borehole
- Mine

TO ACCOMPANY RECORD NO. 1972/60

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

H52/BI-14

PLATE 7



LOCATION DIAGRAM

REFERENCE TO 1:250,000 MAP SERIES

MASON	WYOLA	MAURICE	TALLA-RINGA	COOBER PEDY
FORREST	COOK	OODLEA	BARTON	TARCOOLA
EUCLA	COOMPANA	NULLARBOR	FOWLER	CHILDARA

AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA 1970

GEOPHYSICAL INTERPRETATION

AND

GEOLOGY

5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 KILOMETRES

5 0 5 10 15 20 25 30 35 MILES

GEOPHYSICAL LEGEND

- 3 — Magnetic basement zone
- Positive magnetic trend
- Negative magnetic trend
- 1000 / 500 — Magnetic basement depth contour (depth in metres below assumed ground level)
- 1000 — Point of depth estimate

TOPOGRAPHICAL LEGEND

- Cook — Named place
- Road or track
- Hughes — Railway and siding
- State boundary
- Salt — Lake
- Aerodrome or landing ground

GEOLOGICAL LEGEND

- Qrs — Fixed siliceous soil dunes and quaternary alluvium
- Qre — Undifferentiated lake deposits
- Qdw — Woorinen Formation equivalent:— pale brown aeolian calc. silt–sand sheet
- Qco — Calcrete in Bakara Soil with Ripon Calcrete at the base- pink nodular and platy carbonate accretions
- Tmn — Nullarbor limestone
- K — Sandstones of unknown age - possibly mesozoic
- PC — Granites and granite gneiss (g.gneiss, gneiss and some amphibolite in Pidinga area) all other outcrop as far as is known is granite
- Geological boundary
- Borehole
- Mine

TO ACCOMPANY RECORD NO. 1972/60

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

H52/BI-16

PLATE 8

(BASED ON H52/BI-3) (BASED ON H52/BI-4) (BASED ON H52/BI-19)

LOCATION DIAGRAM

REFERENCE TO 1:250,000 MAP SERIES

MASON	WYOLA	MAURICE	TALLA-RINGA	COOBER PEDY
FORREST	COOK	OOLDEA	BARTON	TARCOOLA
EUCLA	COOMPANA	NULLARBOR	FOWLER	CHILDARA

AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA 1970

BOUGUER ANOMALY CONTOURS

AND

GEOLOGY

5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 KILOMETRES

5 0 5 10 15 20 25 30 35 MILES

GEOPHYSICAL LEGEND

- 'High' Anomaly
- 'Low' Anomaly
- Isogal

EXPLANATORY NOTES

Data in OOLDEA and BARTON sheets are based on a compilation of B M R (Seismic Gravity and Marine Section).
For the calculation of Bouguer anomalies 2.2g/cm³ has been adopted as the average rock density.
Data in COOK sheet are based on a survey for Outback Oil Company N.L.
For the calculation of Bouguer anomalies 2.4g/cm³ has been adopted as the average rock density.

TOPOGRAPHICAL LEGEND

- Cook — Named place
- Road or track
- Hughes — Railway and siding
- State boundary
- Salt — Lake
- Aerodrome or landing ground

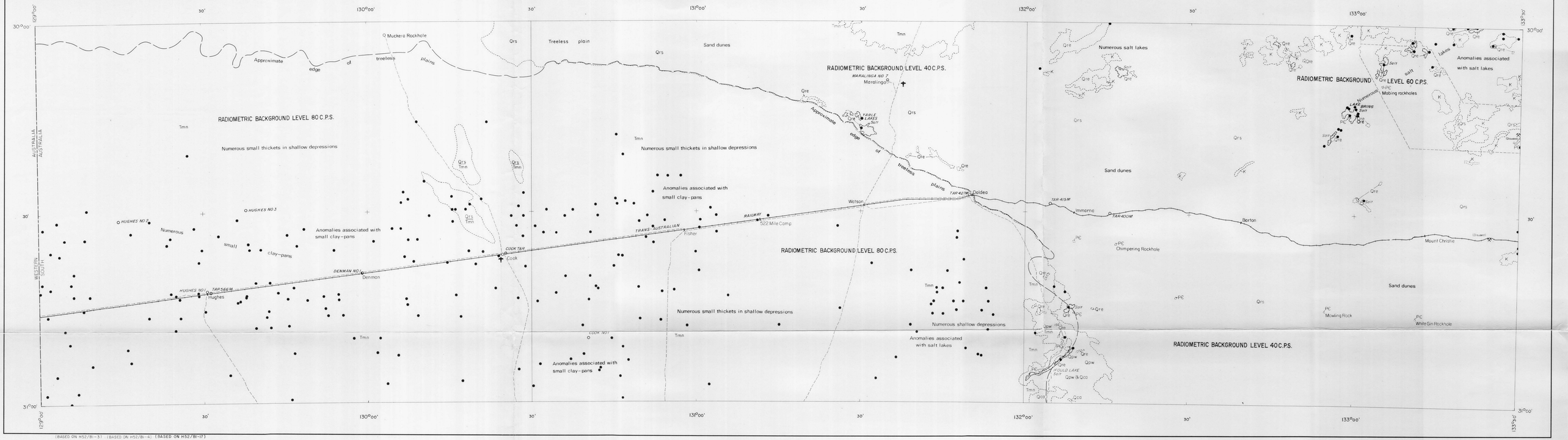
GEOLOGICAL LEGEND

- Qrs — Fixed siliceous seif dunes and quaternary alluvium
- Qre — Undifferentiated lake deposits
- Qpw — Woorinen Formation equivalent:- pale brown aeolian calc. silt-sand sheet
- Qcs — Calcrete in Bakara Soil with Ripon Calcrete at the base-pink nodular and platy carbonate accretions
- Tmn — Nullarbor limestone
- K — Sandstones of unknown age - possibly mesozoic
- PC — Granites and granite gneiss (g.gneiss, gneiss and some amphibolite in Pidinga area) all other outcrop as far as is known is granite
- Geological boundary
- Borehole
- Mine

TO ACCOMPANY RECORD NO.1972/60
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

H52/BI-20

PLATE 9



(BASED ON H52/BI-3) (BASED ON H52/BI-4) (BASED ON H52/BI-17)

LOCATION DIAGRAM

REFERENCE TO 1:250,000 MAP SERIES

MASON	WYOLA	MAURICE	TALLA-RINGA	COOBER PEDY
FORREST	COOK	OCLDEA	BARTON	TARCOOLA
EUCLA	COMPANA	NULLARBOR	FOWLER	CHILDARA

AIRBORNE SURVEY, EUCLA BASIN, SOUTH AUSTRALIA 1970

RADIOMETRIC RESULTS AND GEOLOGY

5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 KILOMETRES

5 0 5 10 15 20 25 30 35 MILES

GEOPHYSICAL LEGEND

- Radiometric sources

TOPOGRAPHICAL LEGEND

- Named place
- Road or track
- Railway and siding
- State boundary
- Lake
- Aerodrome or landing ground

GEOLOGICAL LEGEND

- Qrs — Fixed siliceous seif dunes and quaternary alluvium
- Qre — Undifferentiated lake deposits
- Qpw — Woorinen Formation equivalent:— pale brown aeolian calc. silt–sand sheet
- Qca — Calcrete in Bakara Soil with Ripon Calcrete at the base– pink nodular and platy carbonate accretions
- Tmn — Nullarbor limestone
- K — Sandstones of unknown age - possibly mesozoic
- PC — Granites and granite gneiss (g.gneiss, gneiss and some amphibolite in Pidinga area) all other outcrop as far as is known is granite
- Geological boundary
- Borehole
- Mine

TO ACCOMPANY RECORD NO. 1972/60

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

H52/BI-18