COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1965/20

REGIONAL MAGNETIC SURVEYS IN AUSTRALIA, AUSTRALIAN ANTARCTICA, AND THE TERRITORY OF PAPUA AND NEW GUINEA DURING 1962

by

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This Record describes all regional magnetic work done by the Bureau of Mineral Resources, Geology and Geophysics, during 1962. The surveys are part of a series made under the Bureau's regional magnetic programme. Three elements of the Earth's magnetic field were determined at stations in Australia, in the Territory of Papua and New Guinea, and in Australian Antarctica along the coast and along an inland traverse from Wilkes to Vostok. Observations at first-order stations extended over the daylight hours of at least two days. The magnetic declination was measured in detail over a magnetically anomalous area in the south-western part of Western Australia. The locations of the magnetic stations and the measured values of the magnetic field are presented in tabular form. Isomagnetic maps show the declination in the south-western part of Western Australia, and declination, horizontal intensity, and vertical intensity along the Wilkes-Vostok Traverse in Antarctica.

1. INTRODUCTION

This Record describes all regional magnetic work done by the Bureau of Mineral Resources, Geology and Geophysics, during 1962.

The types of surveys and the areas surveyed were :

(a) A first-order survey of Australia.

(b) A declination survey in the south-western part of Western Australia.

(c) A regional magnetic survey of the Territory of Papua and New Guinea.

(d) Scattered regional magnetic stations along the coast of Australian Antarctic Territory.

(e) A regional magnetic traverse from Wilkes to Vostok in Australian Antarctic Territory.

This work was a continuation of the series of surveys (Parkinson and Curedale, 1962; and van der Linden and Parkinson, 1963) made under the Bureau's regional magnetic programme, which includes the publication of maps showing present values and the rate of secular variation of the elements of the Earth's magnetic field. Three elements, viz. declination (D), horizontal intensity (H), and vertical intensity (Z), were observed at 28 stations in Australia, ten stations in the Territory of Papua and New Guinea, and eight stations in Antarctica. Along the Wilkes-Vostok Traverse of 887 miles, D was observed at 45 stations, H at 27 stations, and Z at 35 stations. Declination measurements were made at 94 stations about five miles apart in the south-western part of Western Australia. Twenty-four stations in Australia, two in the Territory of Papua and New Guinea and four in Antarctica were reoccupations of former stations. The others were new stations. Locations of the stations and the declination of the survey are shown in Plates 1 and 2.

2. ACCOUNT OF SURVEYS

First-order survey of Australia

This survey was done by the author from May to July 1962 and from September to November 1962. The first part of the survey covered the eastern half, and the second part of the survey the western half, of Australia. R.J.S. Hollingsworth joined the field party for the second part of the survey. In July 1962, W.D. Parkinson reoccupied Triabunna and established a new station at Cambridge, both in Tasmania. Observations at Triabunna extended only over one day, and so it cannot be considered a first-order station.

The object of the survey was to create a network of first-order stations that will be reoccupied regularly in future in order to measure more accurately the rate of secular variation of the components of the geomagnetic field over Australia. The stations were selected at a maximum distance of 500 miles (800 km) apart. Nineteen of the stations had been reoccupied a number of times since they were first read in the 1912-1914 period. In central Australia, four recent stations (Wonarah, Giles, Carnegie, and Woomera) were reoccupied.

At each station, almost continuous observations of the magnetic elements were made during the daylight hours of two days. The order of observation was D, H, Z, H, D, H, Z, H, ... The horizontal intensity was measured more frequently because, in Australia, this element is more subject to transient changes than D and Z. During the observations, the field assistant computed and plotted the results; this gave a quick indication of any rapid changes in the magnetic field, and also was a safeguard against observational errors.

Where a station was unfavourably situated for future occupations, a new site was established on a nearby airfield. In such a case, one day of observations at the old station was followed by one day at the new one. New stations were established at Halls Creek, Mackay, Mildura, and Cambridge.

On the first part of the survey, an International AA120, 4 x 4 panel van was used for transport. On the second part, two long-wheel-base Landrovers were used, which proved a much better arrangement as one vehicle could carry all the scientific equipment. The magnetometers (in their carrying cases) were strapped onto the passenger seats; in this way, they were less vulnerable to shocks than when carried in the International van and were immediately available for use on arrival at the station.

Some delays were caused by frequent tyre blowouts on the International, by two broken windscreens in Queensland, and by repairs to the two Landrovers in Perth. The weather was generally good; on only one day was it impossible to make observations, i.e. at Wyndham, when the temperature rose above the range of the instrument thermometers. Proposed stations at Alexandra Bridge, Esperance, and Zanthus, all in Western Australia, were not occupied because the magnetometers had to be returned to Melbourne for the work in Antarctica. Observations at these stations will be made during 1963. Locations of the first-order stations are shown in Plate 1.

Declination survey in Western Australia

This survey was conducted by the author, assisted by R.J.S. Hollingsworth, during the first half of November 1962 and was the first on this scale in Australia. The object of the survey was to obtain more detailed information on the pattern of isogonic lines (lines connecting points of equal declination) over an area in the south-west of the state. This is one of a few anomalous areas in Australia that present problems in the compilation of the isogonic map.

The survey covered an area of 8000 square miles, bounded by the roads connecting Williams, Bunbury, Augusta, Kojonup, and Williams. Declination measurements were made along eight road traverses at intervals of approximately five miles, totalling 570 miles. As maps showing the total magnetic intensity contours of the area (obtained from airborne magnetometer surveys) were available, station positions could be chosen in the least anomalous places. At most stations, small pieces of rock or gravel were tested for magnetism by holding them close to the declinometer. In all cases they caused the magnet needle to deflect; thus these pieces were slightly magnetic and therefore none of the stations was completely undisturbed.

The survey procedure was as follows. As two vehicles were available, the field assistant went ahead in one vehicle to choose a station location and to locate the position on the 4-mile series military map. The observer followed in the other vehicle and made the declination observation.

A location had to satisfy the following conditions:

(a) Be at a sufficient distance from artificial sources of disturbance, e.g. wire fences, telegraph posts, electricity pylons, drains, etc.

(b) Be at least 30 ft away from the road as the road building material in the area was magnetic.

(c) Have an unobstructed view of the sun.

(d) Be away from steep gradients of total intensity as shown on the total magnetic intensity maps.

(e) Be identifiable on the military map.

Over most of the area, the selection of station sites was fairly difficult and time consuming, mainly because of the presence of tall timber and wire fences close to the roads. Only the larger magnetic anomalies shown on the total magnetic intensity map could be avoided. The declination observations were made by a single magnet and mark reading with the Askania declinometer, and the sun observations by one observation with vertical circle left, one with vertical circle right, and one mark reading with the Watts microptic theodolite. The mark was any suitable object. The weather was not good but, on the average, twelve stations per day were observed. Locations of the stations are shown in Plate 3. Latitude and longitude of stations were obtained from military maps.

Regional magnetic survey of the Territory of Papua and New Guinea

This survey was done during August and September 1962 by J.A. Brooks, L. Cookson, and R. Merrick, geophysicists on the staff of the Port Moresby Geophysical Observatory. Stations were reached by aeroplane and locally hired transport. On the mainland eight new stations were observed and first-order reoccupations were made at Wewak and Daru. In some cases, rain prevented astronomical observations, but azimuth data were obtained from resident surveyors. Locations of the stations are shown in Plate 1.

Antarctica

As in previous years, some field magnetic work was done by geophysicists en route to or from Australian Antarctic bases. This work was generally done near the coast. Magnetic work was also done by Walker (in preparation) along the 887-miles inland traverse from Wilkes to Vostok, the main object of which was the measurement of icecap thicknesses by seismic and gravitational methods. Along the Wilkes-Vostok Traverse, D was read at 45 stations, H at 27 stations, and Z at 35 stations. Locations of the coastal stations and the inland traverse are shown in Plate 2.

Along the coast, eight stations were observed. The stations at Davis, Chick Island, Lewis Island, and Commonwealth Bay were exact reoccupations. The last was a reoccupation of the 1930 station; the others were previously occupied during 1961. It was proposed to occupy the magnetic station at Heard Island but adverse weather and lack of time prevented this. The geophysicists engaged in this work were R. Underwood, W. Burch, and J.C. Branson.

3. INSTRUMENTS

The elements measured were declination, horizontal intensity, and vertical intensity. Corrections to be applied to the instruments used are the subject of a separate record by van der Waal (in preparation).

Declination

Declination was measured with an Askania declinometer, except on the Wilkes-Vostok Traverse, where a carefully adjusted magnetic compass was used.

In the first-order survey and the declination surveys in Western Australia, a Hilger and Watts microptic theodolite was used for sun observations to determine the true north direction. In Tasmania and the Territory of Papua and New Guinea, an Askania midget theodolite was used, and on the Wilkes-Vostok Traverse an astro compass. For the other Antarctic stations, true north was supplied by surveyors of the Division of National Mapping, Department of National Development.

Horizontal intensity

The horizontal intensity was measured with the following instruments :

HTM 704 for the eastern part of Australia and Eucla, Western Australia

QHM 306 for the western part of Australia, after the quartz fibre of HTM 704 broke at Eucla

HTM 154 for Antarctica

QHM 172 for Davis, Antarctica

QHM 493 for the Wilkes-Vostok Traverse

HTM 158 and
QHM 173 in the Territory of Papua and New Guinea

Vertical intensity

The vertical intensity was measured with the following instruments :

BMZ 211 in most of Australia

BMZ 221 in the Territory of Papua and New Guinea

BMZ 115 in Tasmania and Antarctica

BMZ 121 on the Wilkes-Vostok Traverse and at Davis

Instruments of the BMZ type are known to be subject to occasional large changes in correction. One such change occurred at Croydon, Queensland, where the unclamped BMZ 211 received a slight jar at the end of a day's observing. Subsequent measurements showed a change of approximately +50 gammas from the previous observations. Comparisons at Toolangi Observatory, after the survey, indicated a change of +42 gammas, and instrument corrections for all the observations made after the ones at Croydon were adjusted accordingly. The value of the vertical intensity at Darwin was such that Z could be measured with BMZ 211 using field magnet C as well as field magnet B. From alternate

measurements it was found that

$$Z(\text{magnet C}) = Z(\text{magnet B}) + 9 \text{ gammas}$$

(Z is considered algebraically, i.e. it is negative in the southern hemisphere).

The BMZ was also used to measure the extent of local irregularities of the magnetic field at all first-order stations by making measurements in four directions at three and six feet from the peg marking the station. This will give an indication of reliability of the values if the peg cannot be found in future reoccupations.

BMZ 121 was compared at Wilkes Observatory before and after the traverse to Vostok. The preliminary results were :

Before traverse, BMZ 121 = BMZ 236 -39 gammas

After traverse, BMZ 121 = BMZ 236 +90 gammas

BMZ 236 is the instrument at Wilkes Magnetic Observatory. This comparison indicates a considerable change in correction for BMZ 121. Because of the uncertainty, no instrument corrections were applied to the observed values.

4. REDUCTIONS AND PRELIMINARY RESULTS

First-order survey

All observations were corrected for diurnal variation, which was obtained from the tables of Vestine et al (1948). The values thus obtained were averaged for the day on which the observations were made. The differences between the averages for two days at the same station were always small and of the following magnitudes :

Declination:	mean difference of all stations	0.44 minutes
	largest difference	±1.15 minutes
Horizontal intensity:	mean difference	6.6 gammas
	largest difference	±14 gammas
Vertical intensity:	mean difference	5.8 gammas
	largest difference	± 10 gammas

The total intensity (F) and inclination (I) were computed from the final values of H and Z using the formulae :

$$F^2 = H^2 + Z^2$$

and

$$\tan I = Z/H$$

The values of the magnetic field at all stations are shown in Table 1.

Territory of Papua and New Guinea

The method used for reducing the observed values was similar to that used for the first-order survey data. The correction for diurnal variation was made using the data from Port Moresby Observatory. These values were different from the data from Vestine et al (1948), but may be more accurate considering the large difference between geographic and magnetic latitude. The results are shown in Table 2.

Declination survey

No correction for diurnal variation was applied, as the quick method of observing and the inaccuracies in scaling of the longitudes and latitudes introduce errors of ± 3 minutes. These are of the same magnitude as the corrections for diurnal variation. The observed values are shown in Table 3. Plate 3 shows the declination contours as derived from the observed values.

The area is magnetically very disturbed. The Precambrian outcrops in the east and west cause strong magnetic anomalies. The sediments in the Perth Basin, which is situated between the lines connecting Busselton to Augusta and Collie to Bridgetown, are covered on the surface by magnetic laterites. The declination contours in Plate 3 have therefore been considerably smoothed to obtain a regional pattern.

In the compilation of the isogonic map of Australia for 1960.5 (Parkinson, 1959) the isogonic lines in this area were plotted using the information from a few magnetically disturbed stations and had to be drawn to conform to a generalised pattern.

In Plate 3, the isogonic lines for minus 3.5, 4.0 and presumably 4.5 degrees deviate from the previous plot by a sharp swing in a westerly direction followed by a swing to the north near the coast.

The higher density of stations thus gave a better assessment of the pattern of the isogonic lines in the surveyed area. However, to obtain a better control of the isogonic lines, it would be advantageous if two more traverses were made, one about 40 miles north and the other about 40 miles south of the surveyed area. These traverses should run where possible at right angles to the isogonic lines. The area they would pass through is less magnetically disturbed.

Antarctica

The results of the magnetic observations in Antarctica are shown in Table 4. No corrections for transient fields were applied because no observatory was close enough to the stations. To indicate reliability, magnetic conditions at Wilkes Observatory are shown by Q (quiet) and D (disturbed).

The results of the magnetic observations along the Wilkes-Vostok Traverse are shown in Table 5. The values of D, H, and Z were plotted and regional curves drawn. Plates 4, 5, and 6 show tentative isomagnetic lines for D, H, and Z respectively, superimposed on isomagnetic lines for 1962. derived from the maps published by the United States Navy Hydrographic Office (1947 & 1959). At the time of compilation of these maps, only data from coastal magnetic observatories and magnetic stations were available. The information obtained from the overland traverse has caused a considerable change in the knowledge of the patterns of the isomagnetic lines shown on the maps from the United States Navy Hydrographic Office.

5. REFERENCES

PARKINSON, W.D.	1959	Isogonic map of Australia and New Guinea, showing predicted values for the epoch 1960.5 Bur. Min. Resour. Aust. Rep. 42.
PARKINSON, W.D. and CUREDALE, R.G.	1962	Isomagnetic maps of eastern New Guinea for the epoch 1957.5. Bur. Min. Resour. Aust. Rep. 63.
UNITED STATES NAVY HYDROGRAPHIC OFFICE	1947	The horizontal intensity of the Earth's magnetic force for the year 1955. Map No. 1701 S.
	1947	The vertical intensity of the Earth's magnetic force for the year 1955. Map No. 1702 S.
	1959	Magnetic variation, epoch 1960.0. Map No. H.O. 1706 S.
VAN DER LINDEN, J. and PARKINSON, W.D.	1963	Regional magnetic surveys in Australia and Australian Antarctica 1960-61. Bur. Min. Resour. Aust. Rec. 1963/61.
VAN DER WAAL, C.A.		Determination of instrument corrections for absolute and semi-absolute magnetic instruments. Bur. Min. Resour. Aust. Rec.(in preparation).
VESTINE, E.H., LAPORTE, L., LANGE, I., COOPER, C., and HENDRIX, W.C.	1948	Description of the Earth's main magnetic field and its secular changes, 1905-1945. Publ. Carneg. Instn. 578.
WALKER, D.J.		Geophysical surveys in Wilkes Land, Antarctica 1962-1963. Bur. Min. Resour. Rec. (in preparation).

STATION LOCATIONS AND MAGNETIC VALUES, FIRST-ORDER STATIONS, AUSTRALIA, 1962

Lat. South ° '	Long. East ° '	Station	Date 1962	Mean Value D ° '	Mean Value Z gammas	Mean Value H gammas	Computed Value I ° '	Computed Value F gammas	Remarks
12 26.7	130 49.9	Darwin	27 June	+ 3 41.1	-29 572	35801	39° 33.5	46434	
			28 June	+ 3 40.5	29 571	35779			
15 28.6	145 14.8	Cooktown	5 June	+ 6 19.9	31 987	34766	42 36.8	47294	
			6 June	+ 6 21.3	31 982	34766			
15 30.9	128 08.6	Wyndham	5 Oct	+ 3 19.7	34 322	34466	44 53.4	48581	
			6 Oct	+ 3 19.6	34 328	34449			
16 17.4	133 22.6	Daly Waters	4 July	+ 4 25.4	34 631	34548	45 04.5	48910	
			5 July	+ 4 26.0	34 630	34530			
17 22.2	123 39.6	Derby	13 Oct	+ 2 42.2	37 150	33540	47 56.3	50044	
			14 Oct	+ 2 43.0	37 157	33512			
18 12.7	142 14.4	Croydon	11 June	+ 6 03.6	36 114	33735	46 57.5	49419	
			12 June	+ 6 03.9	36 122	33725			
18 16.1	127 45.3	Halls Creek B	10 Oct	+ 2 59.9	37 864	33170	48 46.8	50338	
18 14.7	127 40.3	Halls Creek C	11 Oct	+ 2 53.6	37 925	33332	48 41.2	50491	New Station
19 53.6	136 06.9	Wonarah	20 June	+ 5 02.6	39 118	32741	50 04.3	51011	
			21 June	+ 5 03.3	39 117	32739			
20 18.9	118 35.0	Port Hedland	27 Sept	+ 1 17.6	41.455	31506	52 45.6	52067	
			28 Sept	+ 1 16.1	41 452	31513			
21 09.5	149 10.8	Mackay A	28 May	+ 8 05.4	38 888	32444	50 09.7	50645	
		Mackay B	30 May	+ 8 13.4	39 100	32498	50 16.1	50842	New Station
22 23.9	143 03.2	Winton	16 June	+ 6 53.9	41 253	31620	52 31.7	51979	
			17 June	+ 6 53.3	41 256	31625			
23 48.4	133 51.1	Alice Springs	10 July	+ 4 42.3	44 234	30628	55 18.3	53805	
			18 July	+ 4 42.7	44 241	30624			
24 52.5	113 39.3	Carnarvon	22 Sept	- 1 01.6	46 941	28085	59 06.4	54709	
			23 Sept	- 1 02.0	46 953	28094			
25 02.0	128 17.8	Giles	13 July	+ 3 24.0	46 240	29342	57 36.5	54768	
			14 July	+ 3 24.2	46 251	29336			
25 49.3	122 55.9	Carnegie	23 Oct	+ 1 56.4	47 474	28549	58 58.4	55396	
			24 Oct	+ 1 56.9	47 467	28557			
26 53.7	148 46.7	Roma B	21 May	+ 8 45.3	45 298	29771	56 41.0	54209	
			22 May	+ 8 44.3	45 301	29779			
27 25.3	117 52.6	Cue	27 Oct	- 0 08.0	49 287	26879	61 23.3	56139	
			28 Oct	- 0 09.4	49 280	26887			
29 28.3	149 57.4	Moree	10 May	+ 9 48.8	48 537	27978	60 02.2	56027	
			11 May	+ 9 49.0	48 538	27987			
30 03.1	145 57.5	Bourke	7 May	+ 8 54.1	49 534	27343	61 05.5	56585	
			8 May	+ 8 53.0	49 533	27365			
31 06	136 46	Woomera	22 July	+ 5 57.4	51 747	26146	63 11.3	57978	
			23 July	+ 5 57.2	51 743	26160			
31 43.0	128 52.8	Eucla	4 Sept	+ 3 23.8	52 782	25267	64 24.4	58513	
			5 Sept	+ 3 23.7	52 762	25284			
33 06.0	147 08.1	Condobolin	3 May	+ 9 28.5	52 369	25648	63 53.9	58311	
			4 May	+ 9 30.8	52 359	25662			
34 12.2	142 08.1	Mildura A	25 July	+ 8 18.9	54 046	24595	65 31.7	59372	
34 13.9	142 03.0	Mildura B	27 July	+ 8 20.2	54 104	24527	65 36.8	59405	New Station
42 30.6	147 56.4	Triabunna	12 June	+13 12.0	59 850	19495	71 57.5	62945	
42 49.1	147 29.7	Cambridge	10 June	+13 05.7	60 188	19256	72 14.8	63192	New Station
			11 June	+13 04.7	60 175	19282			

TABLE 2

STATION LOCATIONS AND MAGNETIC VALUES, TERRITORY OF PAPUA AND NEW GUINEA 1962

Lat. South	Long. East	Station	Date 1962	Mean Value D ° '	Mean Value Z gammas	Mean Value H gammas	Computed I	Computed F gammas	Remarks
3 33.0	143 37.7'	Wewak B	15 Oct	+ 4 38.2	-15433	37 281	-22° 29.3	40348	Reoccupation
3 33.0	143 38.0	Wewak C	16 Oct	+ 4 42.0	15434	37 297	22 28.9	40361	New Station
5 31.3	143 43.2	Wabag	12 Oct	+ 4 55.4	17851	36 940	25 47.2	40914	"
			13 Oct	+ 4 56.3	17850	36 953			"
5 50	144 15	Mount Hagen	10 Oct	+ 5 01.0	18592	37 060	26 38.5	41461	"
			11 Oct	+ 4 57.9	18593	37 063			
6 05.6	145 24.0	Goroka	8 Oct	+ 5 32.5	18296	36 874	26 23.4	41158	"
7 30.0	144 49.0	Baimuru	22 Aug	+ 5 31.8	20687	36 770	29 21.8	42190	"
7 57.0	145 46.3	Kerema	19 & 20 Aug.	+ 5 29.4	21152	36 622	30 00.6	42297	"
8 015	142 57.4	Balimo	2 Sept.	+ 5 10.4	21787	-	30 44.6	42615	"
			3 Sept.	+ 5 10.4	21782	-			
			4 Sept	-	-	36 631			
8 18.5	146 58.3	Tapini	10 & 11 Sept.	+ 6 00.6	21690	36 654	30 36.9	42591	"
9 05.3	143 12.4	Daru B	28 Aug	+ 5 12.7	23224	36 645	32 24.5	43336	Reoccupation
			29 Aug	+ 5 13.8	23224	36 588			
			30 Aug	+ 5 12.5	23228	36 581			

TABLE 3.

STATION LOCATIONS AND DECLINATION VALUES, S.W. OF WESTERN AUSTRALIA, 1962

Station	Lat. S. ° '	Long. E. ° '	Nov. 1962	G M T	D Observed ° '	D in Degrees
1-1	33° 04'	116° 50.5'	6	6.9	- 2° 30.1'	- 2.5
1-2	33 10	116 50.5	6	7.5	- 2 10.6	- 2.2
1-3	33 13	116 47.5	6	8.1	- 2 24.8	- 2.4
1-4	33 17	116 46	6	9.0	- 2 40.3	- 2.7
1-5	33 20	116 44.5	6	9.5	- 3 01.5	- 3.0
1-6	33 21.5	116 38.5	7	0.9	- 3 01.0	- 3.0
1-7	33 23.0	116 32.5	7	1.4	- 3 10.6	- 3.2
1-8	33 25.0	116 29.2	7	1.6	- 5 57.6	- 6.0
1-9	33 25.5	116 23.0	7	2.0	- 1 52.8	- 1.9
1-10	33 23.5	116 19.0	7	2.4	- 3 11.0	- 3.2
1-11	33 22.5	116 13.5	7	2.9	- 3 15.8	- 3.3
1-12	33 22	116 10.5	7	5.3	- 2 59.5	- 2.5
1-13	33 20.5	116 05.5	7	5.8	- 3 13.0	- 3.2
1-14	33 19.5	116 01.5	7	6.2	- 3 09.7	- 3.2
1-15	33 17	115 55	7	6.7	- 3 16.3	- 3.3
1-16	33 18	115 50	7	7.2	- 4 02.9	- 4.0
1-17	33 19.5	115 42.7	7	7.8	- 3 39.9	- 3.7
1-18	33 21	115 40.5	7	8.2	- 3 27.0	- 3.5
2-1	33 24.5	115. 37	8	7.0	- 3 28.9	- 3.5
2-2	33 28.5	115 35	8	7.4	- 3 29.4	- 3.5
2-3	33 33	115 33.5	8	7.8	- 3 26.1	- 3.4
2-4	33 36.5	115 29	9	1.9	- 3 57.1	- 3.9
2-5	33 38.5	115 25.5	9	2.3	- 2 07.3	- 2.1
2-6	33 39.5	115 18.5	9	2.8	- 3 48.2	- 3.8
2-7	33 41.5	115 13	9	3.3	- 3 25.1	- 3.4
2-8	33 44.5	115 09.5	9	5.4	- 2 49.0	- 2.8
2-9	33 53	115 05	9	6.1	- 6 10.8	- 6.2
2-10	34 02	115 06	9	6.8	- 2 28.1	- 2.5
2-11	34 11	115 06	9	7.3	- 4 40.5	- 4.7
3-1	34 09.5	115 11	9	7.7	- 4 20.7	- 4.3
3-2	34 09.5	115 17	9	8.5	- 3 40.7	- 3.7
3-3	34 09.5	115 22.5	9	8.8	- 4 49.4	- 4.8
3-4	34 10	115 27	9	9.6	- 4 16.5	- 4.3
3-5	34 08	115 33	12	7.4	- 3 19.5	- 3.3
3-7	34 02.5	115 39.5	12	8.0	- 3 00.6	- 3.0
3-8	34 00.2	115 44.5	12	8.6	- 4 47.2	- 4.8
3-9	34 60.2	115 49.5	12	9.1	- 4 21.5	- 4.4
3-10	34 00.2	115 55.5	13	2.7	- 3 58.3	- 4.0
3-11	33 59.0	116 00.2	13	3.1	- 4 15.6	- 4.2
3-12	33 58.5	116 06.5	13	3.4	- 3 44.6	- 3.7
3-13	33 55	116 11	14	1.9	- 3 57.3	- 3.9
3-14	33 52	116 15.5	14	2.2	- 5 09.0	- 5.2
3-15	33 50.5	116 19.5	14	2.6	- 3 41.4	- 3.7
3-16	33 53	116 26	14	3.2	- 3 01.0	- 3.0
3-17	33 55.8	116 30.5	14	7.8	- 3 05.6	- 3.1
3-18	33 55.8	116 36.5	14	8.1	- 3 23.6	- 3.4
3-19	33 56	116 40.5	14	8.4	- 4 19.4	- 4.3
3-20	33 55	116 45	14	8.7	- 3 09.2	- 3.2
3-21	33 53	116 50	14	9.0	- 2 48.6	- 2.8
3-22	33 52	116 54.5	14	9.3	- 3 40.3	- 3.7
3-23	33 50.5	116 59.5	14	9.6	- 3 10.2	- 3.2
4-1	33 53.5	116 05.0	10	5.2	- 3 31.5	- 3.5
4-2	33 50	116 02.5	10	5.7	- 3 50.0	- 3.8
4-3	33 46	115 58.5	10	6.0	- 3 36.6	- 3.6
4-4	33 43.5	115. 54	10	6.7	- 3 34.6	- 3.6
4-5	33 38.2	115 51.5	10	7.3	- 3 45.8	- 3.8
4-6	33 34	115 48.5	10	7.7	- 3 43.2	- 3.7
4-7	33 31	115 44	10	8.1	- 3 57.0	- 3.9
4-8	33 25.5	115 45	10	8.5	- 4 13.3	- 4.2

TABLE 3 (Cont.)

Station	Lat. S.	Long. E.	Nov. 1962	G M T	D Observed	D in Degrees
	o '	o '			o '	
5-1	33° 42'	115° 23.5'	12	2.8	- 3° 59.5'	- 4.0
5-2	33 44	115 28.5	12	3.2	- 4 15.7	- 4.3
5-3	33 45.5	115 33	12	5.1	- 2 44.4	- 2.7
5-4	33 47.5	115 36.5	12	5.4	- 2 40.2	- 2.7
5-5	33 49.5	115 41.5	12	5.8	- 3 21.0	- 3.3
5-6	33 53.5	115 44	12	6.0	- 4 28.9	- 4.5
5-7	33 57	115 45	12	6.5	- 2 59.4	- 3.0
6-1	33 48.5	116 21.5	13	5.1	- 3 23.5	- 3.4
6-2	33 45	116 19	13	5.7	- 3 12.8	- 3.2
6-3	33 40.5	116 15.5	13	6.2	- 2 09.9	- 2.2
6-4	33 38	116 12.5	13	6.5	- 5 22.5	- 5.4
6-5	33 34.5	116 09.5	13	6.8	- 2 35.6	- 2.6
6-6	33 30	116 06	13	7.2	- 2 33.3	- 2.5
6-7	33 26	116 08	13	7.5	- 3 08.4	- 3.1
7-1	33 30	116 28.5	13	8.8	- 3 03.5	- 3.1
7-2	33 32,5	116 32.5	13	9.5	- 2 35.5	- 2.6
7-3	33 37	116 31.5	14	5.3	- 3 15.9	- 3.3
7-4	33 40.5	116 35.5	14	5.5	- 3 21.0	- 3.4
7-5	33 42	116 40.5	14	6.5	- 3 09.4	- 3.2
7-6	33 45	116 40.5	14	6.9	- 3 13.0	- 3.2
7-7	33 50.5	116 40.5	14	7.3	- 3 13.1	- 3.2
8-1	33 48	117 09	15	2.3	- 3 05.0	- 3.1
8-2	33 44	117 08.5	15	2.6	- 2 39.7	- 2.6
8-3	33 39	117 05.5	15	3.0	- 2 46.6	- 2.8
8-4	33 34.5	117 05	15	4.8	- 3 29.8	- 3.5
8-5	33 30	117 04	15	5.3	- 3 03.1	- 3.1
8-6	33 26	117 03	15	5.6	- 3 21.7	- 3.4
8-7	33 21.5	117 025	15	6.0	- 2 52.1	- 2.9
8-8	33 17.5	117 01.5	15	6.5	- 2 34.8	- 2.6
8-9	33 14	116 59.5	15	7.0	- 2 33.6	- 2.6
8-10	33 09.5	116 58.5	15	7.3	- 2 28.7	- 2.5
8-11	33 05.5	116 55.5	15	7.7	- 2 35.4	- 2.6
8-12	33 02	116 53.5	15	8.2	- 2 26.6	- 2.5

TABLE 4

STATION LOCATIONS AND MAGNETIC VALUES, ANTARCTICA, 1962

South Lat. ° '	East Long. ° '	Station	Date	Declination			Hor. Intensity			Vert. Intensity			Quiet or Disturbed
				Instr.	G.M.T	Value ° '	Inst	G.M.T	Value Gammas	Instr. B M Z	G.M.T	Value Gammas	
66° 06	134 22	Lewis Islet reoc.	29 Dec.61	Ask 320	05 08	120 41.1W	HTM 154	05 40	1110	115	06 42	-68800	D
					08 11	125 13.5W		07 12	1188		09 00	68824	D
			30 Dec.61		03 47	121 19.2W		03 58	1308		06 04	68667	D
66 47	121 00	Chick Island B reoc.	23 Jan.62	Ask 320	08 48	90 01.6W	HTM 154	07 52	5952	115	09 42	67668	Q
					09 02	89 58.0W		08 12	6008	115	10 02	67662	Q
					10 17	87 46.5W		10 40	6102		-	-	Q
67 00	142 40	Commonwealth Bay reoc.	31 Jan.62	Ask 320	10 58	68.11.0E	HTM 154	5 39	1242	115	6 24	67422	Q
								11 15	1485				Q
68 35	77 58	Davis reoc.	17 Jan.62	Ask 339	11 08	74 09.0W	HTM 172	-	-	121	12 22	54481	Q
					12 50	74 08.5W		12 01	16462		-	-	Q
			18 Jan.62	Ask 339	10 44	74 07.2W		10 24	16468	121	10 52	54498	Q
			19 Jan.62	" "	10 25	74 05.6W		10 27	16472	121	10 34	54442	D
			21 Jan.62	" "	10 24	74 07.4W		10 28	16514	121	10 28	54474	Q
			22 Jan.62	" "	05 25	74 00.6W		05 25	16418	121	05 26	54454	Q
69 53.2	159 38.3	Mt. Hilary	21 Feb.62	Ask 320	02 38	99 52.3E	HTM 154	-	-	115	01 55	67682	Q
70 21	165 33	Bowers Hills	25 Feb.62	" "	08 10	97 30.4E	" "	03 48	5414	"	04 56	67198	Q
70 37	166 06	Thala Island	11 Feb.62	" "	05 19	97 14.2E	" "	04 12	5684	"	04 03	67071	Q
			14 Feb.62	" "	17 42	96 19.5E	-	-	-	-	-	-	Q
70 41	163 44	Platypus Ridge	19 Feb.62	" "	22 19	100 58.2E	HTM 154	23 16	5169	115	-	-	Q
			20 Feb.62	-	-	-	-	-	-	"	01 30	67262	Q

TABLE 5

STATION LOCATIONS AND MAGNETIC VALUES,

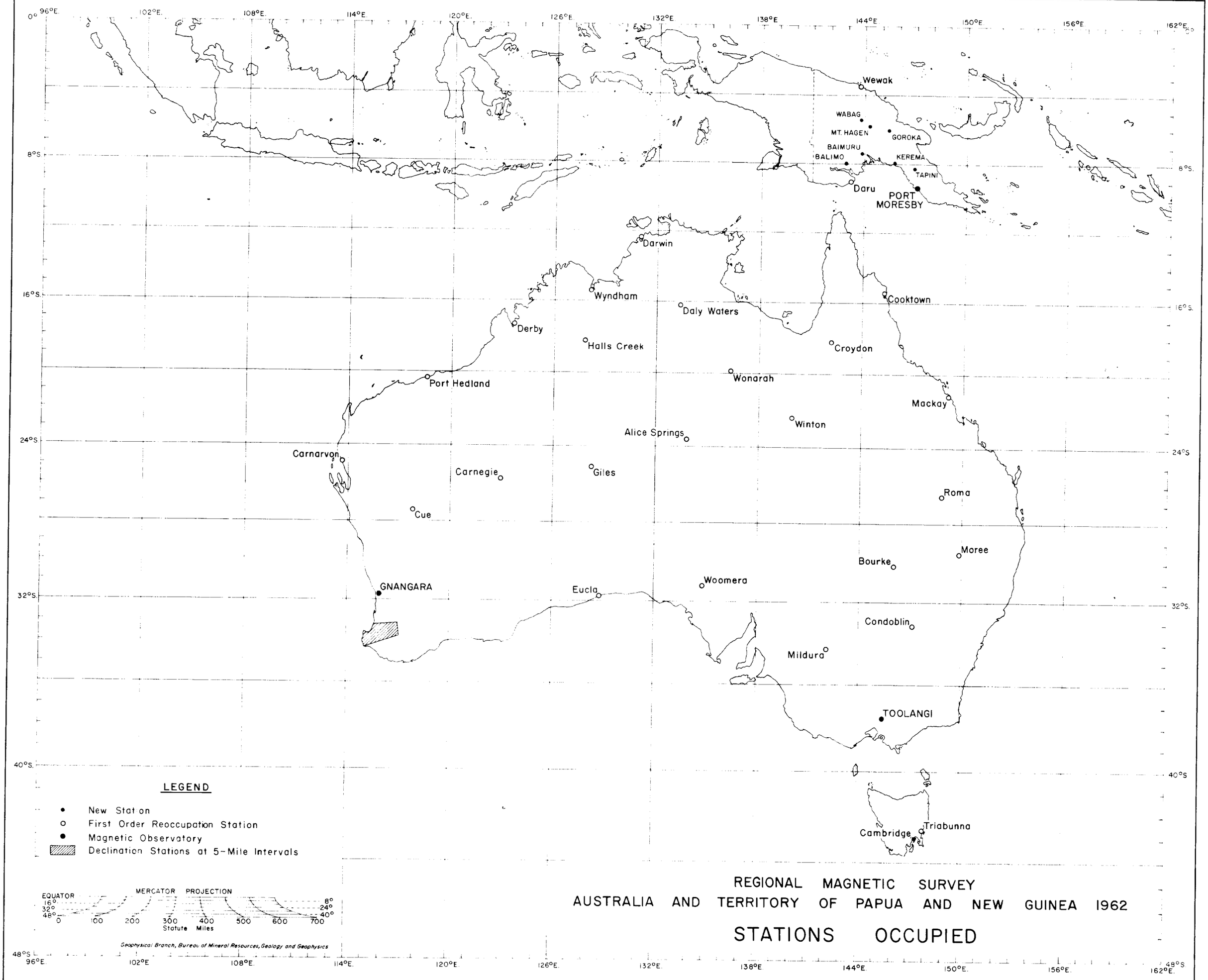
WILKES - VOSTOK TRAVERSE ANTARCTICA, 1962

Station			Latitude S	Longitude E	(West) D observed degrees	H observed gammas	Z observed gammas	Quiet or Disturbed
Wilkes								
D_1	H_1	Z_1	66° 15.4'	110°31.5'	85.0° (mean)	9240 (mean)	-64,900 (mean)	
D_2			66° 26.8	111 48.0	89.0	-	-	
D_3	H_2	Z_2	30.7	112°13.0'	90.0	8107	64 358	D
D_4			56.0	"	91.0	-	-	
D_5	H_3	Z_3	67 00.4	"	89.0	7994	64 466	Q
D_6			15.9	"	91.0	-	-	
D_7			17.7	"	92.0	-	-	
	H_4	Z_4	19.4	"	-	8582	65 354	Q
D_8	H_5	Z_5	39.3	16.0	95.0	8702	65 900	Q
D_9			68 00.9	13.0	94.0	-	-	
D_{10}	H_6	Z_6	14.9	09.5	93.5	8954	65 100	Q
D_{11}			28.4	05.0	95.0	-	-	
D_{12}			41.9	01.0	96.0	-	-	
D_{13}			47.0	111 59.5	97.0	-	-	
D_{14}			50.5	58.5	96.5	-	-	
D_{15}			59.3	56.5	95.5	-	-	
D_{16}	H_7	Z_7	69 04.5	53.0	99.0	9013	64 674	Q
D_{17}			12.5	55.0	96.0	-	-	
		Z_8	14.3	55.0	-	-	64 417	Q
D_{18}			21.3	55.0	96.5	-	-	
	H_8	Z_9	25.8	54.5	-	9136	64 303	Q
D_{19}			27.6	54.5	101.0	-	-	
D_{20}			43.2	53.0	99.0	-	-	
	H_9		55.2	51.0	-	9018	-	Q
		Z_{10}	57.2	51.0	-	-	64 772	Q
D_{21}			70 04.7	50.5	101.5	-	-	
		Z_{11}	10.8	50.0	-	-	64 587	Q
	H_{10}	Z_{12}	24.0	48.5	-	9287	64 298	
D_{22}			26.6	48.0	103.5	-	-	Q
		Z_{13}	27.4	48.0	-	-	64 392	D
D_{23}	H_{11}	Z_{14}	52.2	46.5	103.8	9497	65 148	Q
D_{24}			54.9	45.5	104.5	-	-	
D_{25}			71 15.3	36.5	104.0	-	-	
	H_{12}	Z_{15}	20.4	34.5	-	9746	64 132	Q
D_{26}			38.6	26.5	105.0	-	-	
	H_{13}	Z_{16}	46.2	23.0	-	10056	63 599	Q
D_{27}			48.7	22.0	105.0	-	-	
		Z_{17}	71 59.8	111 17.0	-	-	63 787	D
	H_{14}	Z_{18}	72 12.4	11.0	-	10046	63 550	D

TABLE 5

Station	Latitudes S	Longitude E	D (west) Degrees	H Observed Gammas	Z observed Gammas	Quiet or Disturbed
D_{28}	15.6	09.5	105.0	-	-	
Z_{19}	23.3	06.0	-	-	63 456	D
H_{15} Z_{20}	37.8	110 59.5	-	10253	63 482	D
Z_{21}	45.7	56.0	-	-	63 290	D
D_{29}	46.6	55.5	107.5	-	-	
Z_{22}	73 02.2	48.0	-	-	63 516	Q
D_{30}	05.6	46.0	108.0	-	-	
H_{16} Z_{23}	06.4	45.5	-	10521	63 180	Q
D_{31}	15.0	41.0	107.5	-	-	
H_{17} Z_{24}	32.5	31.0	-	10508	63 302	D
D_{32}	41.0	26.5	108.0	-	-	
D_{33} H_{18} Z_{25}	59.6	15.0	~~110.6~~ 109.3	10726	63 058	Q
D_{34}	74 03.0	14.0	109.5	-	-	
H_{19} Z_{26}	27.4	01.0	-	10984	62 928	D
D_{35}	32.5	109 58.0	111.5	-	-	
D_{36}	35.7	56.0	112.0	-	-	
D_{37} H_{20} Z_{27}	53.0	45.5	112.0	11038	62 888	Q
D_{38}	75 05.7	37.5	113.0	-	-	
H_{21} Z_{28}	18.4	29.0	-	11391	62 592	Q
D_{39} H_{22} Z_{29}	44.3	11.0	113.5	11597	62 356	Q
H_{23} Z_{30}	76 05.3	108 57.0	-	11642	62 128	Q
Z_{31}	10. 6	53.0	-	-	62 048	Q
D_{40}	15.0	50.0	114.5	-	-	
H_{24} Z_{32}	31.8	36.0	-	11452	61 943	Q
D_{41}	49.6	23.0	115.0	-	-	
D_{42} H_{25} Z_{33}	77 02.1	12.0	115.0	12031	62 044	D
H_{26}	28.2	107 48.5	-	12448	-	Q
D_{43}	36.6	40.0	116.2	-	-	
Z_{34}	58.3	16.8	-	-	61 054	Q
D_{44}	78 05.1	10.0	117.0	-	-	
D_{45} H_{27} Z_{35} Vostok	27.0	106 52.0	117.3	12500	61 034	Q

PLATE 1

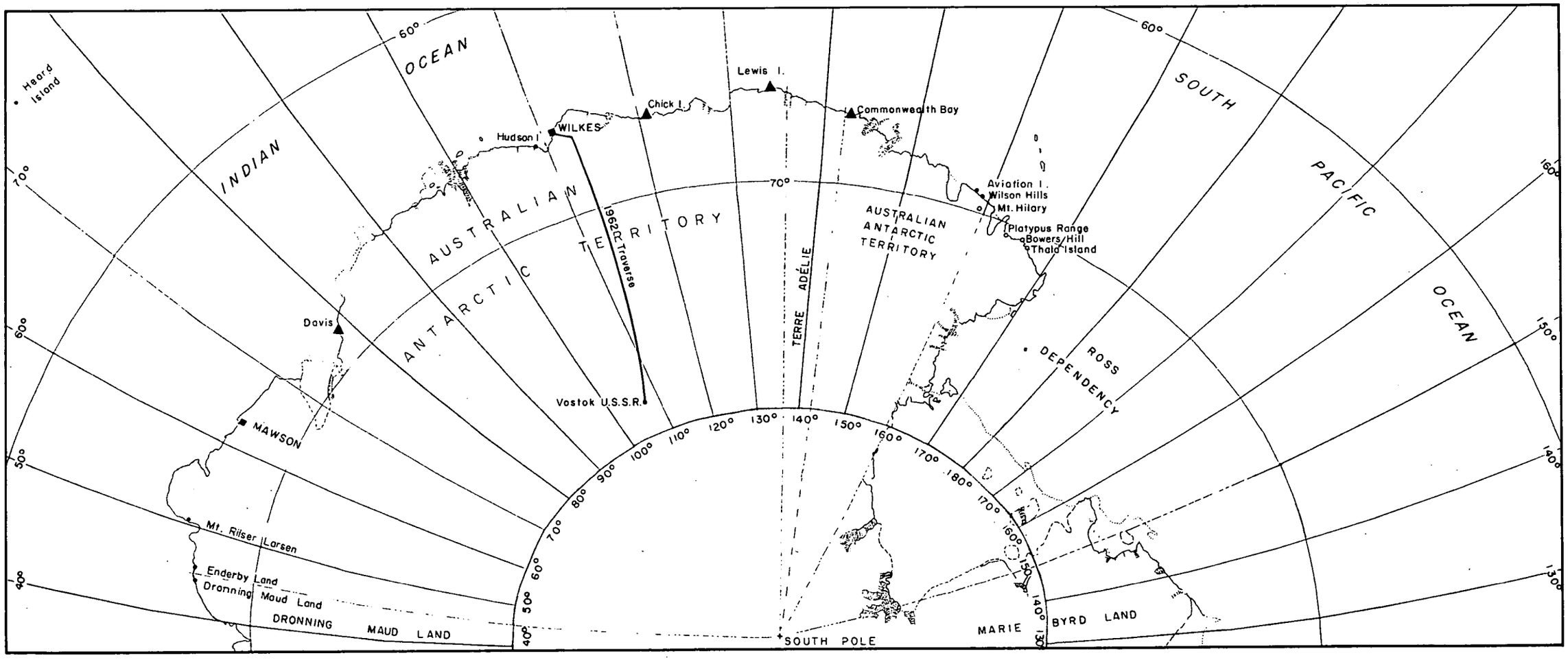


REGIONAL MAGNETIC SURVEY
AUSTRALIA AND TERRITORY OF PAPUA AND NEW GUINEA 1962
STATIONS OCCUPIED

(Based on G20-14)

TO ACCOMPANY RECORD No 1965/20

G96-49



LEGEND

- • FIELD MAGNETIC OBSERVATION 1959-1961
- ○ FIELD MAGNETIC OBSERVATION 1962
- ▲ FIELD MAGNETIC STATION REOCCUPIED IN 1962

SCALE IN MILES

100 0 100 200 300 400 500 600 700 800

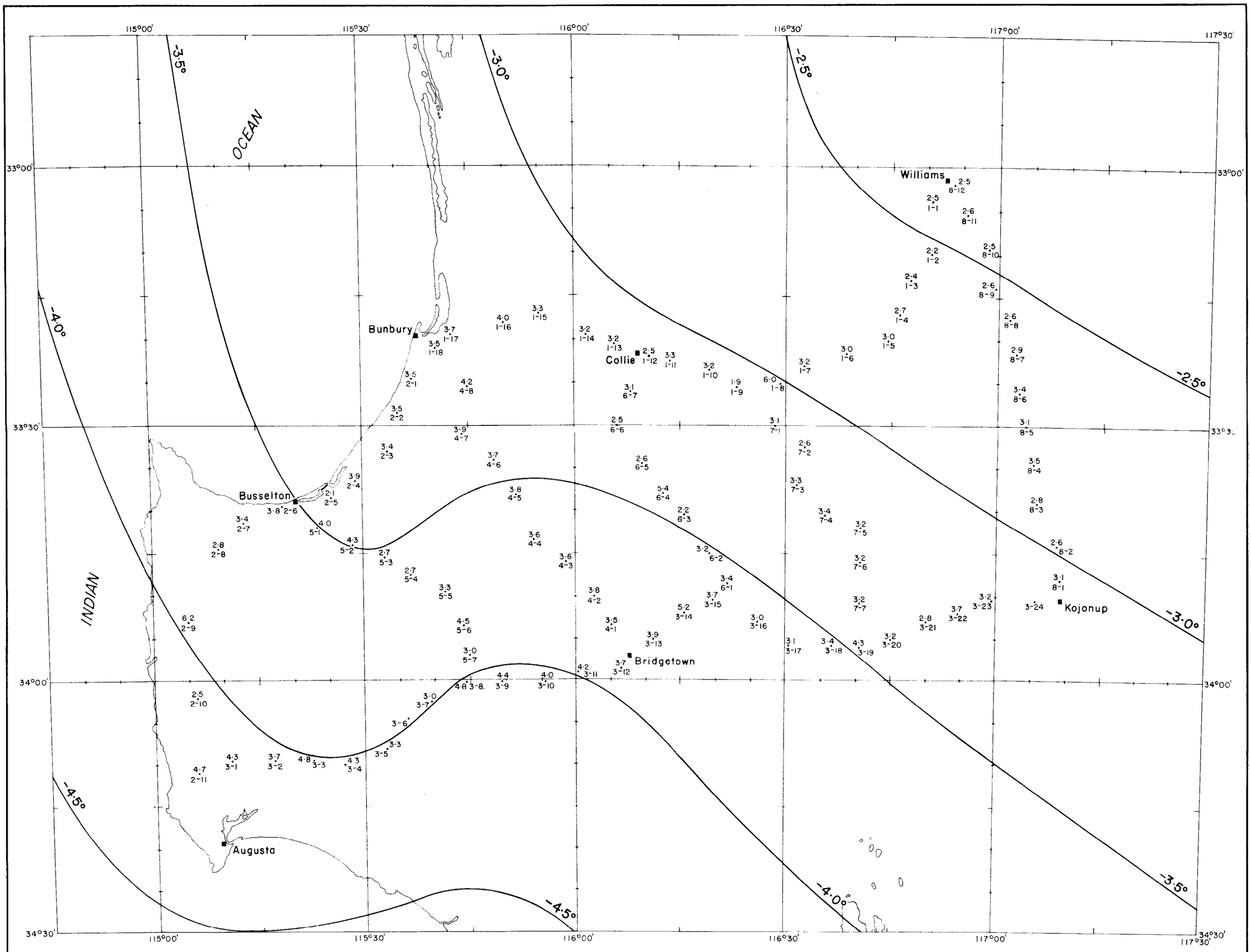
TO ACCOMPANY RECORD No. 1965/20

AUSTRALIAN OBSERVATORIES AND FIELD MAGNETIC STATIONS IN ANTARCTICA 1962

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics

G265-53

PLATE 2



Declination Contours 1962

SOUTH-WESTERN PART OF WESTERN AUSTRALIA

LEGEND

——— West Declination Contour

• 2-10 Station Location

3·6 West Declination in Degrees

MILES

10 5 0 10 20 30

Note:

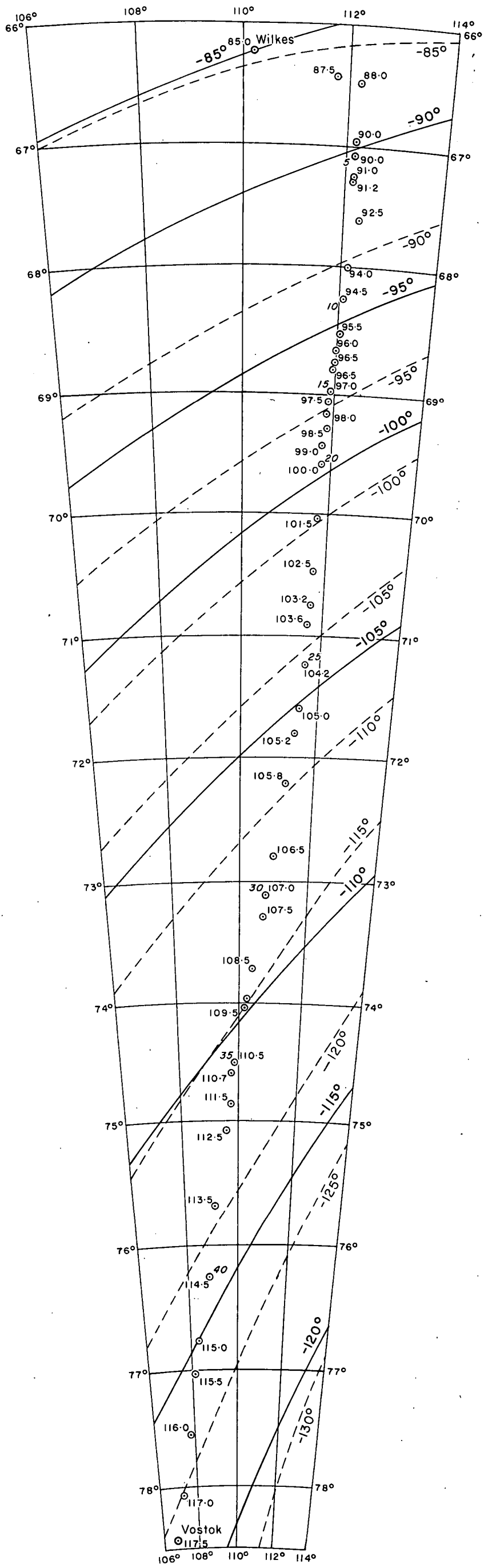
the contours are considerably smoothed to obtain a regional pattern.

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics

TO ACCOMPANY RECORD No 1965/20

G96-69

PLATE 4



LEGEND

— — — Isogonic:
from U.S. Hydrographic Office Map# H.O.1706S (1960·0) adjusted to 1962·0

——— Isogonic:
estimated from smoothed survey results.

87·5 West Declination in degrees (smoothed)

Declination Contours.

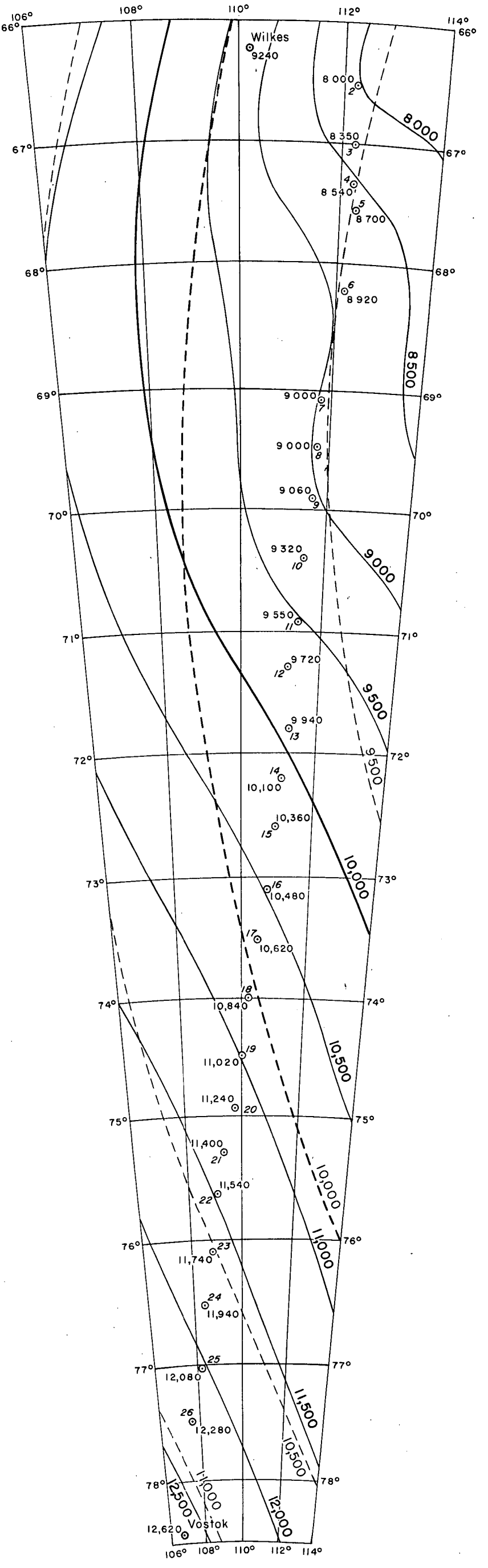
WILKES – VOSTOK 1962

MILES

20 0 20 40 60 80 100

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. TO ACCOMPANY RECORD No. 1965/20 G265-55

PLATE 5



LEGEND

— — — Contour in gammas from U.S. Hydrographic Office Map #1701S adjusted to 1962·0

——— Contour in gammas from traverse

⊙ Station with value of Horizontal Intensity in gammas

Horizontal Intensity Contours
WILKES – VOSTOK 1962

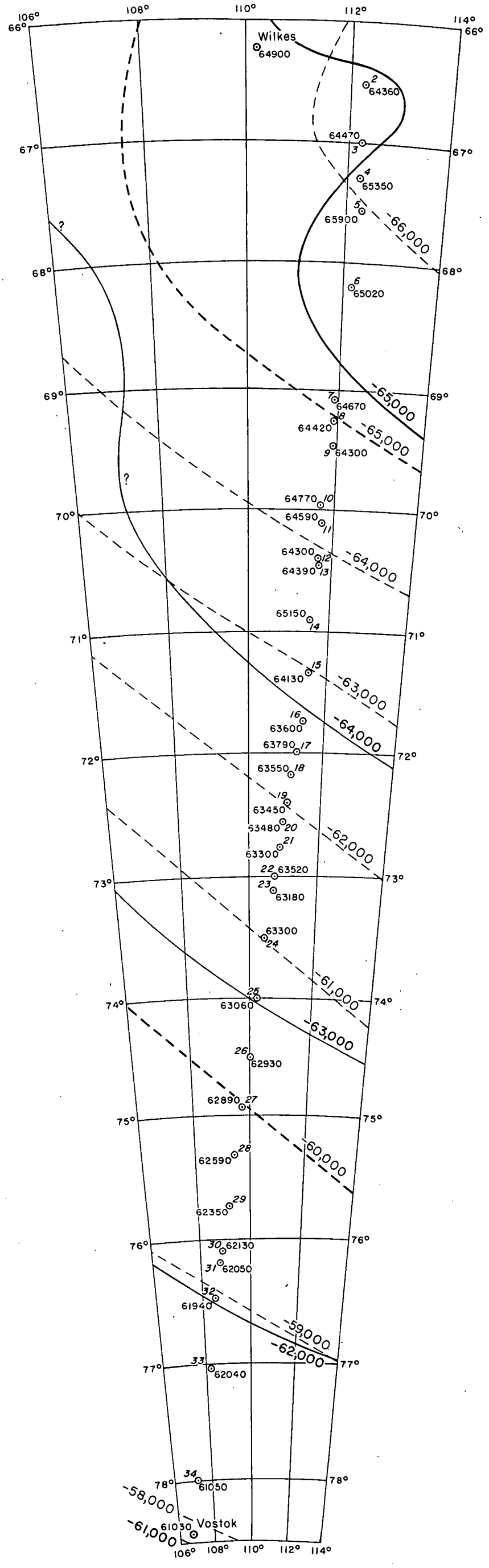
MILES

20 0 20 40 60 80 100

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. TO ACCOMPANY RECORD No. 1965/20

G265-56

PLATE 6



LEGEND

— — — Contours of Vertical Intensity from U.S. Hydrographic Office Map #1702S (1955·0) adjusted to 1962·0

——— Contours of Vertical Intensity from traverse

⊙ Station with value of Vertical Intensity in gammas.

Vertical Intensity Contours
WILKES – VOSTOK 1962

MILES

20 0 20 40 60 80 100

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. TO ACCOMPANY RECORD No. 1965/20

G265-57