

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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REPORT No. 42

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ISOGONIC MAP OF AUSTRALIA AND NEW GUINEA
SHOWING PREDICTED VALUES
FOR THE EPOCH 1960.5.

by

W. D. PARKINSON.



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Issued under the Authority of Senator the Hon. W. H. Spooner, M.M.,
Minister for National Development

BMR PUBLICATIONS COMP 1959
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BMR
555(94)
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LIST OF REPORTS

1. Preliminary Report on the Geophysical Survey of the Collie Coal Basin - N.G. Chamberlain, 1948.
2. Observations on Stratigraphy and Palaeontology of Devonian, Western Portion of Kimberley Division, Western Australia - Curt Teichert, 1949.
3. Preliminary Report on Geology and Coal Resources of Oaklands-Coorabin Coalfield, New South Wales
E. K. Sturmfels, 1950.
4. Geology of the Nerrima Dome, Kimberley Division, Western Australia - D. J. Guppy, J. O. Cuthbert and
A. W. Lindner, 1950.
5. Observations of Terrestrial Magnetism at Heard, Kerguelen and Macquarie Islands, 1947 - 1948 (Carried out
in co-operation with the Australian National Antarctic Research Expedition, 1947 - 1948) - N. G. Chamberlain,
1952.
6. Geology of New Occidental, New Cobar and Chesney Mines, Cobar, New South Wales - C. J. Sullivan, 1951.
7. Mount Chalmers Copper and Gold Mine, Queensland - N. H. Fisher and H. B. Owen, 1952.
8. Geological and Geophysical Surveys, Ashford Coal Field, New South Wales - H. B. Owen, G. M. Burton and
L. W. Williams, 1954.
9. The Mineral Deposits and Mining Industry of Papua-New Guinea - P. B. Nye and N. H. Fisher, 1954.
10. Geological Reconnaissance of South-Western Portion of Northern Territory - G. F. Joklik, 1952.
11. The Nelson Bore, South-Western Victoria; Micropalaeontology and Stratigraphical Succession - I. Crespin, 1954.
12. Stratigraphy and Micropalaeontology of the Marine Tertiary Rocks between Adelaide and Aldinga, South
Australia - I. Crespin, 1954.
13. The Geology of Dampier Peninsula, Western Australia - R. O. Brunnschweiler, 1957.
14. A Provisional Isogonic Map of Australia and New Guinea Showing Predicted Values for the Epoch 1955-5 -
F. W. Wood and I. B. Everingham, 1953.
15. Progress Report on the Stratigraphy and Structure of the Carnarvon Basin, Western Australia - M. A. Condon,
1954.
16. Seismic Reflection Survey at Roma, Queensland - J. C. Dooley, 1954.
17. Mount Philp Iron Deposit, Cloncurry District, Queensland - E. K. Carter and J. H. Brooks, 1955.
18. Petrology and Petrography of Limestones from the Fitzroy Basin, Western Australia - J. E. Glover, 1955.
19. Seismic Reflection Survey, Darriman, Gippsland, Victoria - M. J. Garrett, 1955.
20. Micropalaeontological Investigations in the Bureau of Mineral Resources, Geology and Geophysics, 1927-52
I. Crespin, 1956.
21. Magnetic Results from Heard Island, 1952 - L. N. Ingall, 1955.
22. Oil in Glauconitic Sandstone at Lakes Entrance, Victoria - R. F. Thyer and L. C. Noakes, 1955.
23. Seismic Reflection Survey at Roma, Queensland, 1952-53 - L. W. Williams, 1955.

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

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Department Of National Development

Minister—SENATOR THE HON. W. H. SPOONER, M.M.

Secretary—H. G. RAGGATT, C.B.E.

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A B S T R A C T

The map accompanying this report shows lines of equal declination over Australia and New Guinea predicted for the epoch 1960.5. It continues the series, started in 1950, of isogonic maps published at intervals of five years. The map also contains an isoporic chart showing the expected annual rate of change of declination for the same epoch.

1. INTRODUCTION

Isogonic maps of Australia and the surrounding area have been published for the epochs 1942.5 (Rayner, 1944), 1950.5 (Holmes, 1951) and 1955.5 (Wood and Everingham, 1953). The accompanying map is the next of this series. The main map shows smoothed isogonic lines, i.e. lines of equal magnetic declination. The insets show lines of equal rate of secular variation of declination, and the reliability of the data.

2. SOURCES OF DATA

Since the corresponding map for the epoch 1955.5 was compiled, numerous magnetic observations have been made in Victoria, New South Wales and Queensland. The data from these have been incorporated in a series of iso-magnetic maps for the epoch 1957.5, (Parkinson and Curedale, 1958). These are accompanied by maps showing the rate of secular variation in all elements. In addition to these observations, 51 magnetic stations were occupied in 1957, 30 in the Northern Territory, 6 in South Australia, 8 in Western Australia, 6 in New Guinea and one at Lord Howe Island. Of these, 11 are suitable for deriving information on the rate of secular variation. Information on the declination over the oceans surrounding Australia was obtained from a world-wide compilation (Vestine, Laporte, Lange, Cooper and Hendrix, 1948).

3. TREATMENT OF DATA

The isogonic map for the epoch 1955.5 forms the basis of the present map. A map showing the secular variation for the interval 1955.5 to 1960.5 was superimposed on the 1955.5 map, and preliminary isogonic lines were drawn for 1960.5. Using the same secular variation data, declination values for 1960.5 were derived for all stations occupied in 1957. Values read from the corners of every two-degree square in Queensland, New South Wales and Victoria, using smoothed data from the 1957.5 map, were treated in the same way. The preliminary declination values were then modified to fit the recent observations. Only negligible changes had to be made in most of the southern part of the country. However, in South Australia, Northern Territory, northern Western Australia, north-western Queensland and New Guinea, the provisional isogonic lines had to be moved westward, i.e. preliminary declination values were too low algebraically, by about 20' on the average. The observed value at Lord Howe Island is about one degree higher than that expected from the 1955.5 map.

To derive values over the oceans surrounding Australia, data were taken from the report by Vestine et al (1948), which presents magnetic data for the world for the epoch 1945.0. Declination values from that publication were tabulated for the corners of every five-degree square between the Equator and 40°S, and between 110°E and 170°E. By comparing these values with the modified isogonic lines, differences between 1945 and 1960.5 were obtained for the central part of the table of declination values, i.e. between 15° and 35°S and 115° and 150°E. These were extrapolated to the outer parts of the table, and combined with the 1945 values to obtain 1960.5 values over the oceans. Effectively, this process uses the 1945 data to establish station differences between land and sea locations. Considerable uncertainty is introduced in extrapolating secular variation values from the mainland of Australia to the surrounding oceans. Also, the 1945 data could contain errors, as they are based on a very few observations over the oceans. The positions of isogonic lines far from the coast must therefore be considered very tentative.

4. PRESENTATION OF RESULTS

As with the previous isogonic maps, integral and half integral values of declination in degrees are drawn on the 1960.5 declination map. The half-degree lines, however, are not continued over the oceans, where values are less reliable. Positive values indicate an easterly declination and negative values a westerly declination.

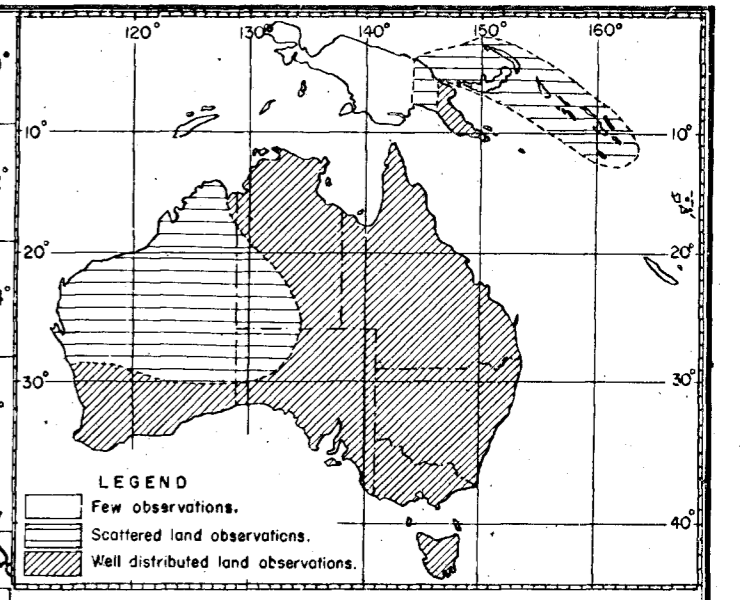
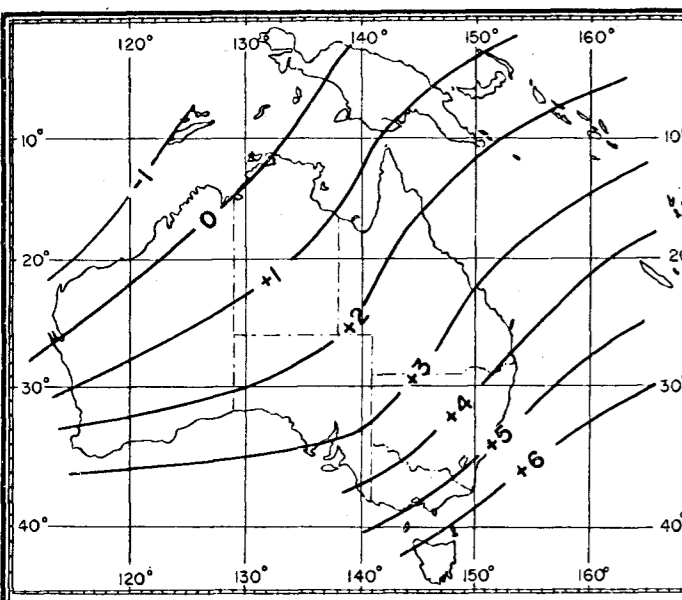
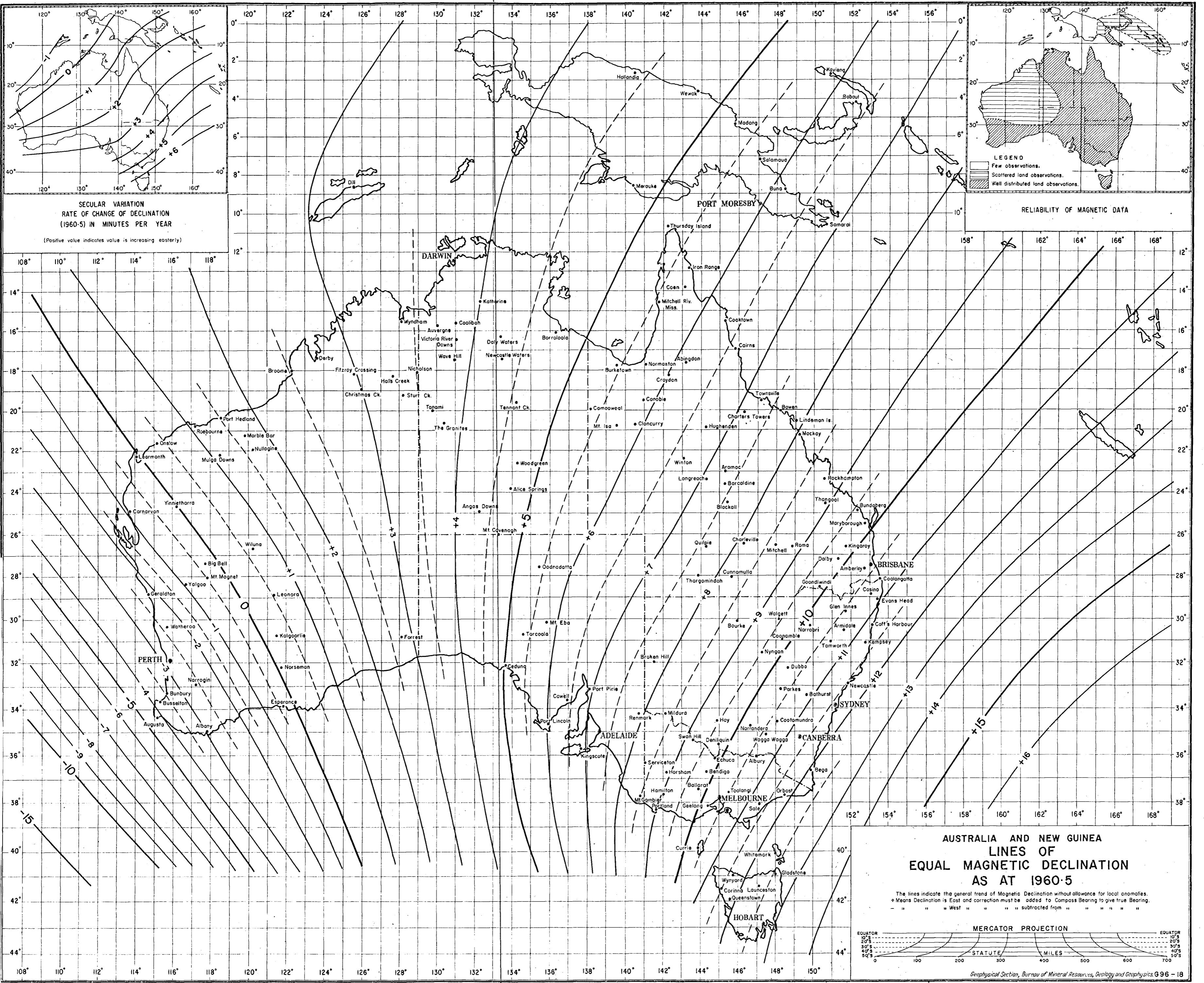
Isogonic lines are drawn to a regular smooth pattern except where several stations indicate a large-scale departure from such a pattern. No attempt has been made to make them agree with values at every station.

In addition to the main map, there are two insets. One shows the rate of secular variation, in minutes per year. The same convention of signs is used as with declination, i.e. a positive secular variation indicates an increasing easterly or decreasing westerly declination. In calculating the rate of secular variation at 1960.5 it has been assumed that this is constant (at any one place) between 1950 and 1960. The only definite information available on this point is furnished by annual means from the Bureau's Observatories at Toolangi, Victoria and Watheroo, Western Australia. There is no indication from either of these observatories of a significant change in the rate of variation since 1945.

The other inset indicates the reliability of the magnetic data. In the regions designated "well distributed land observations" almost every 2-degree square contains at least one magnetic station. In regions designated "scattered land observations" several magnetic stations have been established, but they are confined to stock routes, coast lines, islands, etc., and do not cover the area satisfactorily. Over the rest of the map, data is furnished by land observations made on widely scattered islands and a few ocean observations made on board the "Carnegie", (Ault et al, 1926).

5. REFERENCES

- Ault, J.P., Mauchly, S.J., Peters, W.J., Bauer, L.A. and Fleming, J.A. (1926) -
Ocean Magnetic and Electric Observations 1915-1921, C.I.W. Publication
No. 175, Vol. 5.
- Holmes, W.M., (1951) -
A Provisional Isogonic Map of Australia and New Guinea for the Epoch
1950.5. Bur. Min. Resour. Aust., Records 1951, No. 44.
- Parkinson, W.D. and Curedale, R.G., (1958) -
Iso-magnetic Maps of Queensland, New South Wales and Victoria for the
Epoch 1957.5. Bur. Min. Resour. Aust. (Report in preparation).
- Rayner, J.M., (1944) -
Lines of Equal Magnetic Declination as at June, 1942. Map published
by the Mineral Resources Survey of the Department of Supply and Shipping,
Canberra.
- 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 Change
1905 - 1945. C.I.W. Publication No. 578, Washington.
- Wood, F.W., and Everingham, I.B., (1953) -
A Provisional Isogonic Map of Australia and New Guinea showing Predicted
Values for the Epoch 1955.5. Bur. Min. Resour. Aust., Rep. 14.
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**AUSTRALIA AND NEW GUINEA
 LINES OF
 EQUAL MAGNETIC DECLINATION
 AS AT 1960-5**

The lines indicate the general trend of Magnetic Declination without allowance for local anomalies.
 + Means Declination is East and correction must be added to Compass Bearing to give true Bearing.
 - " " " " West " " " " subtracted from " " " " "

MERCATOR PROJECTION

EQUATOR
 20'S
 30'S
 40'S
 50'S

STATUTE MILES
 0 100 200 300 400 500 600 700

Geophysical Section, Bureau of Mineral Resources, Geology and Geophysics. G 96-18

24. Sedimentary Environment as a Control of Uranium Mineralization in the Katherine - Darwin Region, Northern Territory - M. A. Condon and B. P. Walpole, 1955.
25. Papers on Tertiary Micropalaeontology - I. Crespin, F. M. Kicinski, S. J. Patterson and D. J. Belford, 1956.
26. Eruptive Activity and Associated Phenomena, Langila Volcano, New Britain - G. A. Taylor, J. G. Best and M. A. Reynolds, 1957.
27. Magnetic Results from Macquarie Island, 1952 - P. M. McGregor, 1956.
28. The Identification of the Boundary between Coal Measures and Marine Beds, Singleton - Muswellbrook District, N.S.W. - M. A. Reynolds, 1956.
29. The Geology of the South-west Canning Basin - D. M. Traves, J. N. Casey and A. T. Wells, 1957.
30. Magnetic Results from Heard Island, 1953 - J. A. Brooks, 1956.
31. Magnetic Results from Macquarie Island, 1953 - P. B. Tenni and J. A. Brooks, 1956.
32. Geophysical Investigations for Radioactivity in the Harts Range Area, Northern Territory - J. Daly and D. F. Dyson, 1956.
33. The Tulumán Volcano, St. Andrews Strait, Admiralty Islands - M. A. Reynolds, 1957.
34. Magnetic Results from Heard Island, 1954 - K. B. Lodwick, 1957.
35. Magnetic Results from Macquarie Island, 1954 - C. S. Robertson, 1957.
36. Geophysical Survey of the Rye Park Scheelite Deposit, New South Wales - J. Horvath and R. J. Davidson, 1958.
37. The Geology of the Southern Part of the Carnarvon Basin, Western Australia, by M. C. Konecki, M. A. Condon, J. M. Dickins and T. Quinlan.
38. Papers on the Stratigraphy and Palaeontology of Western Australia.
39. Magnetic Results from Mawson, Antarctica, 1955 - W. H. Oldham.
40. Magnetic Results from Mawson, Antarctica, 1956 - P. M. McGregor.
41. Summary of Oil-Search Activities in Australia and New Guinea to the end of 1957.
42. Isogonic map of Australia and New Guinea, showing predicted values for the Epoch 1960.5 by W. D. Parkinson.
43. Detailed Gravity Survey of Rough Range Anticline near Learmonth, Western Australia, by J. C. Dooley and I. B. Everingham.

