

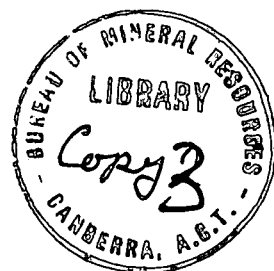
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COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF NATIONAL DEVELOPMENT
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GEOLOGY AND GEOPHYSICS

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DETERMINATION OF DIFFERENCES
IN THE MAGNETIC ELEMENTS
BETWEEN THE ABSOLUTE STATIONS
ON THE NORTH END OF
MACQUARIE ISLAND

by

R. E. ERVIN

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DETERMINATION OF DIFFERENCES IN THE MAGNETIC ELEMENTS BETWEEN THE ABSOLUTE MAGNETIC STATIONS ON THE NORTH END OF MACQUARIE ISLAND

INTRODUCTION

Prior to the establishment of a magnetic observatory at Macquarie Island in July 1950, terrestrial magnetic observations had been made on the northern end of the island by the following expeditions:-

Australasian Antarctic Expedition 1911-14 (Webb 1925).

British, Australian, New Zealand, Antarctic Research Expedition 1929-31 (Farr 1944).

Australian National Antarctic Research Expedition 1947-8 (Chamberlain 1952).

Australian National Antarctic Research Expedition 1950 (unpublished report Schaefer).

The Australasian Antarctic Expedition 1911-14 established four absolute magnetic stations, namely Stations A, B, C and D, the main one being Station A. Subsequent observations were made on Station A until the magnetic observatory came into partial operation on the 10th July 1950, from which date all regular observations have been made in the absolute magnetic building on what is known as Station E.

In 1952, during the course of a series of instrumental intercomparisons an auxiliary station designated Station F was established about 25 feet approximately north-east of Station E.

The location of the various magnetic stations is shown on the attached map.

Because absolute magnetic observations had been made at different stations it was essential that the differences in the magnetic elements between the various stations be determined so that all data could be reduced to a common point. The observations were carried out during the period 31st March to 6th April 1952, whilst the Australian National Antarctic Research Expedition's relief operations were in progress. The writer was assisted by Messrs. W.H. Oldham and P.M. McGregor, Geophysicists of the Bureau of Mineral Resources, Geology and Geophysics.

INSTRUMENTS

The instruments used were:-

La Cour pattern Quartz Horizontal Magnetometers
No's. 177 & 179.

Askania Magnetometer No. 508810.

Watts pattern Vertical Force Magnetic Variometer
No. 15887.

METHODS OF OBSERVATION

The differences in declination and horizontal intensity between Stations A and E were obtained from observations made simultaneously on each station, the instruments being interchanged. The difference in the vertical intensity was obtained from observations made alternately on Station A and Station E, corrections for changes in the vertical field with time being obtained from the magnetograms of the Macquarie Island Magnetic Observatory.

Only the differences in declination and horizontal intensity between Stations E and F were determined. These differences were derived from the results of instrumental intercomparisons made during this period.

Although the magnetic conditions were extremely disturbed throughout the period of observations, the methods of observation used enabled an accurate determination of the station differences to be made.

RESULTS

Considering easterly declination as positive and vertical intensity in the Southern Hemisphere as negative, the following station differences were obtained:-

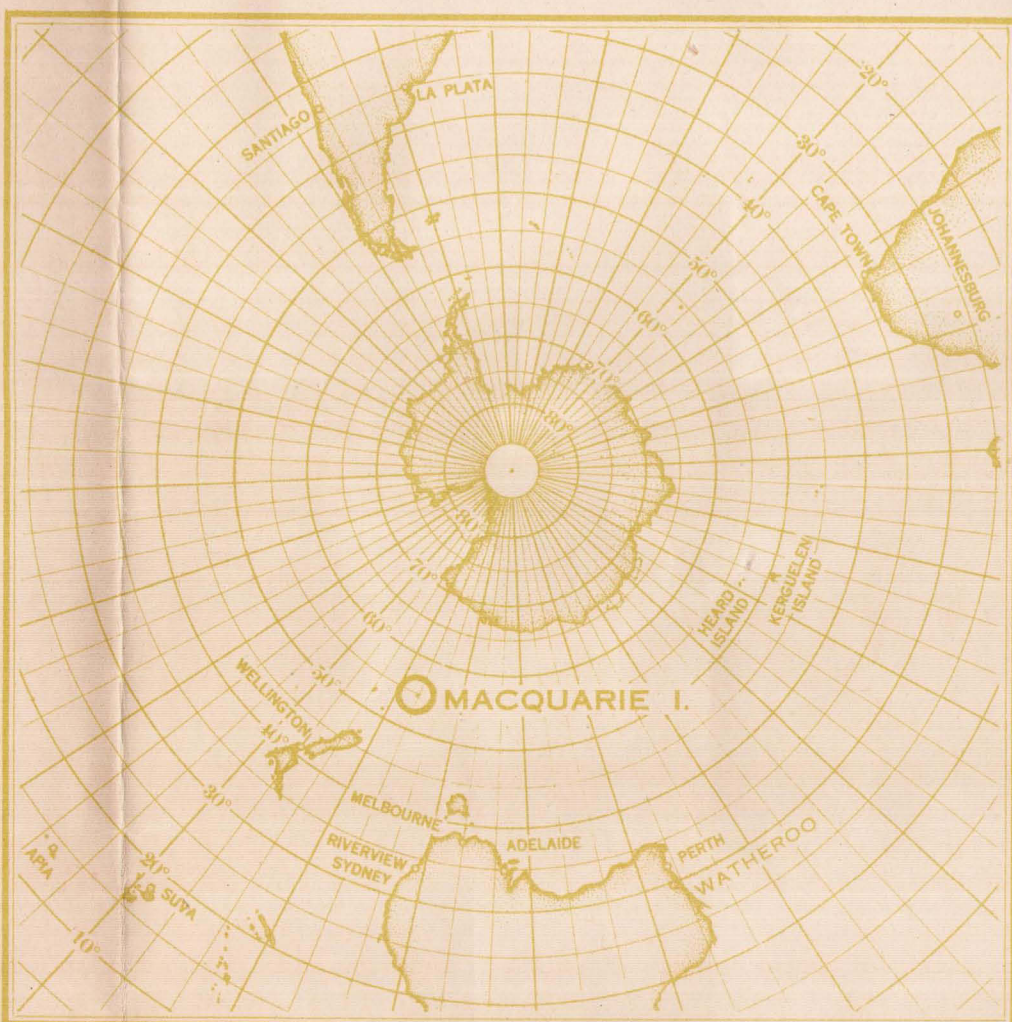
<u>Station A - Station E.</u>	Declination:-	+ 27.0'
	Horizontal Intensity:-	+ 57 gammas.
	Vertical Intensity:-	-51 gammas.
<u>Station E - Station F.</u>	Declination:-	+1.0'
	Horizontal Intensity:-	+2 gammas.

Rex E. Ervin
(Rex E. Ervin)
24/7/52.

Melbourne.

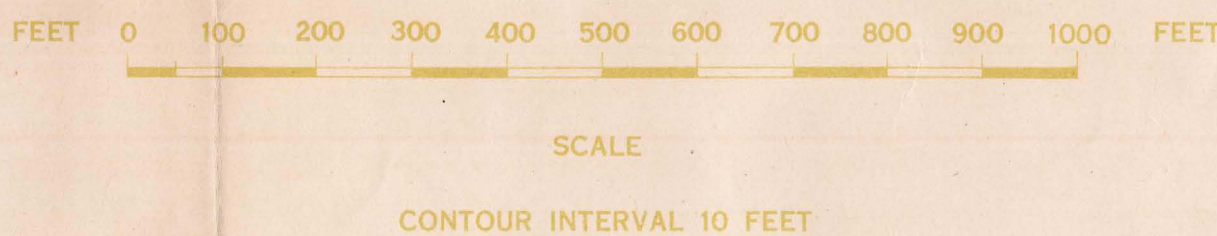
REFERENCES

- (1) Webb, E.N. 1925. Terrestrial Magnetism : Field Survey and Reduction of Magnetic Curves. Australasian Antarctic Expedition 1911-1914, Scientific Reports, Series B. Vol.1, Part I.
 - (2) Farr, C.C. 1944. Terrestrial Magnetism B.A.N.Z. Antarctic Research Expedition 1929-1931. Reports Series A. Vol.IV, Part I.
 - (3) Chamberlain, N.G. 1952. Observations of Terrestrial Magnetism at Heard, Kerguelen and Macquarie Islands 1947-1948. Bureau of Mineral Resources, Geology and Geophysics, Commonwealth of Australia, Report No.5.
 - (4) Schaefer, G.F. 1950. Absolute Magnetic Observations in Sub-Antarctic Areas 1950. Bureau of Mineral Resources, Geology and Geophysics - Unpublished Report.
 - (5) Schaefer, G.F. 1950. Report on Observations of Magnetic Declination at Macquarie Island in 1949. Bureau of Mineral Resources, Geology and Geophysics - Unpublished Report.
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LOCALITY DIAGRAMS

Reference: Seismological Observatory, Lat. $54^{\circ} 29' 54.8''$ S
Long. $158^{\circ} 57' 21.9''$ E.
Astronomical Fix by Dovers, A.N.A.R.E., 1950
Control: Triangulation Survey by Dovers, 1950
Detail: Stadia detail survey by Dovers, 1950 with additional
information from air and ground photography by
Summons, Bureau of Mineral Resources, 1950
Reliability: Accurate.



LEGEND



SKETCH MAP OF
A.N.A.R.E. STATION AREA

MACQUARIE ISLAND

SHOWING THE LOCATION OF THE ABSOLUTE MAGNETIC STATIONS ON THE NORTH END

All Bearings are True Bearings measured from the North