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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1964/47

REGIONAL MAGNETIC STATIONS ON
SOME ISLANDS IN THE PACIFIC
AND INDIAN OCEANS, 1957 AND 1959

by

J. VAN DER LINDEN

The information contained in this report has been obtained by the Department of National Development as part of the policy of the Commonwealth Government to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

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SUMMARY

Regional magnetic work done in 1957 and 1959 on some islands in the Pacific and Indian Oceans is described.

Three elements of the Earth's magnetic field were determined on seven islands. The locations of magnetic stations and the values of the magnetic field are presented in tabular form; sketches of station locations are given.

On West Island (Cocos Is.) a site for possible installation of a magnetic variograph was selected.

1. INTRODUCTION

This Record describes regional magnetic work done in 1957 and 1959 on some islands in the Pacific and Indian Oceans. The work was part of the Bureau of Mineral Resources, Geology and Geophysics regional magnetic programme. The results of the measurements on the islands survey were not included in previous Reports or Records.

2. OPERATIONS

In 1957 three magnetic elements (D, H, and I) were measured on Lord Howe Island in the Pacific Ocean by C.A. van der Waal. This station was a close re-occupation of the 1915 site.

In 1959 three magnetic elements (D, H, and Z) were measured on Christmas Island and in the Cocos Group on Direction Island and West Island in the Indian Ocean, and on Nauru, Ocean Island, and Willis Island in the Pacific Ocean. The stations on West and Direction Islands were exact re-occupations of the 1946 sites (Chamberlain, 1960). Also, a proposed site for a magnetic variograph on West Island was investigated (Plate 1). The site shown on Plate 1 has electric power (240 V A.C.) nearby and has no large local magnetic anomalies. It is easily accessible and, being on the aerodrome, is free from public interference.

The observers for the 1959 surveys were J. van der Linden for the Indian Ocean islands and R.G. Curedale for the Pacific Ocean islands.

Direction and West Islands were reached by commercial aircraft, Christmas Island, Nauru, and Ocean Island by ships operated by the British Phosphate Commission, Willis Island by the lighthouse relief ship, and Lord Howe Island by a boat belonging to the Royal Australian Army. Sketches of station positions are given in Plates 2 to 8.

3. INSTRUMENTS

The instruments used on these surveys, and the adopted corrections, are as follows (van der Waal, in preparation):

<u>Location</u>	<u>Magnetic element</u>	<u>Instrument</u>	<u>Correction</u>
Lord Howe	H	H.T.M.158	+ 33 gammas/gauss
	D	H.T.M.158	0.0'
	I	Askania	
		E-I 172	0.0'
Indian Ocean	H	H.T.M.158	+ 130 gammas/gauss
	D	H.T.M.158	0.0'
	Z	B.M.Z.211	0 gammas
Nauru and Ocean Island	H	H.T.M.704	+ 9 gammas/gauss
	D	H.T.M.704	0.0'
	Z	B.M.Z.121	-15 gammas

4. REDUCTION OF RESULTS

The stations were too far from a magnetic observatory to apply corrections for instantaneous variations in the magnetic field at the time of observations. However, after applying the instrument corrections, corrections were made for diurnal variation at the time of observations at the latitude of the station. The correction for diurnal variation was obtained from Vestine et al. (1948).

The results presented in Table 1 consist of the position of the stations, the mean values of the magnetic elements at the date of observation, the values for 1947 of West and Direction Islands, and the values for 1915 of Lord Howe Island.

5. REFERENCES

- | | | |
|---------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| CHAMBERLAIN, N.G. | 1960 | Cocos Islands magnetic survey 1946. <u>Bur. Min. Resour. Aust. Rec. 1960/124</u> (unpubl) |
| VESTINE, E.H., LAPORTE, L., 1948
LANGE, I., COOPER, C., and
HENDRIX, W.C. | | Description of the Earth's main magnetic field and its secular change 1905-1945. <u>Publ. Carneg. Instn 578.</u> |
| van der WAAL, C.A. | - | Determination of instrument corrections for absolute and semi-absolute magnetic instruments. <u>Bur. Min. Resour. Aust. Rec.</u> (in preparation). |

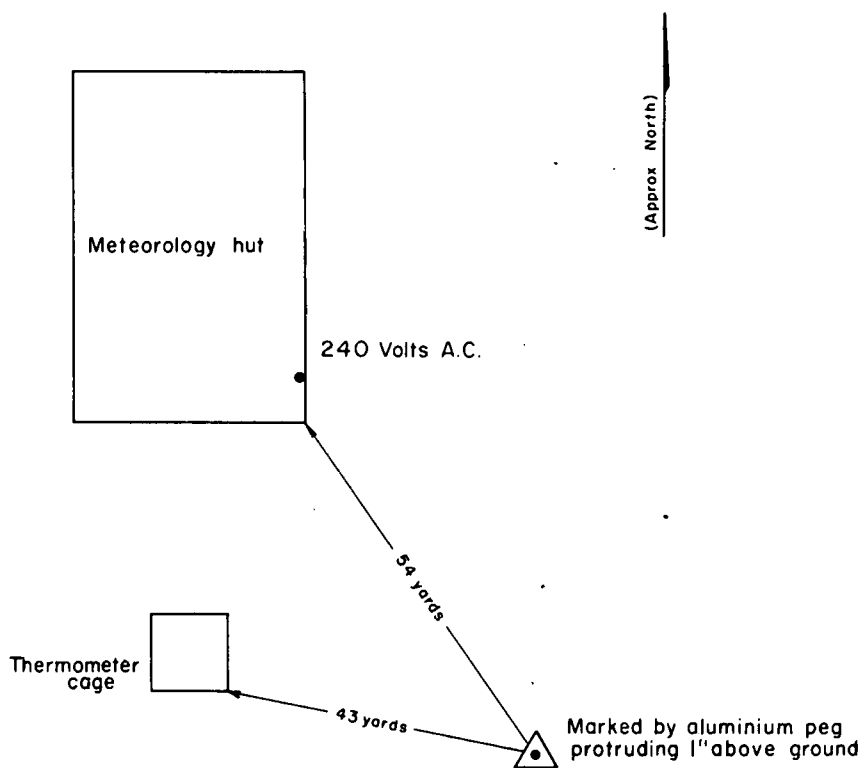
TABLE 1

STATION LOCATIONS AND MAGNETIC VALUES

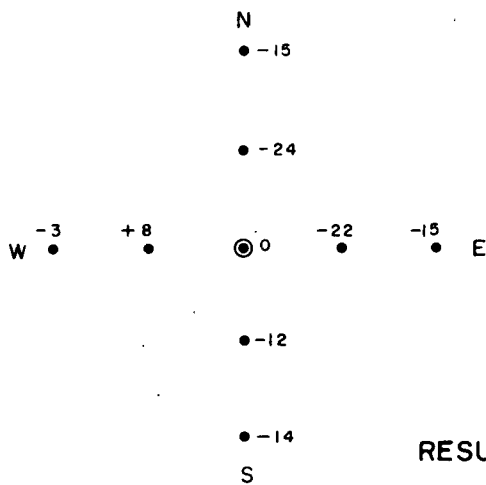
STATION	<u>Lat. S.</u> 0 1	<u>Long. E.</u> 0 1	<u>D</u> 0 1	H gammas	Z gammas	<u>I</u> 0 1	DATE
Nauru	0 33.3	166 55.2	+ 9 19.7	35303	- 6702		27th June 1959
Ocean Island	0 50.9	169 32.0	+ 9 12.9	35754	- 5632		26th June 1959
Christmas Island	10 25.1	105 40.6	+ 0 43.6	35088	- 30066		29th July 1959
Direction Island (R)	12 06.1	96 52.5	- 2 33.4	33416	- 33400		14th July 1959
" ") Cocos			- 3 00.0	33140		- 45 11.7	9th March 1947
West Island (R)	12 12.2	96 49.6	- 2 50.6	33140	- 33293		12th July 1959
" ") Is.			- 3 05.8	32862		- 45 20.0	2nd March 1947
Willis Island	16 17.8	149 58.5	+ 7 20.6	34518	- 32365		29th September 1959
Lord Howe Island (R)	31 31.5	159 03.9	+ 14 00.6	27734		- 60 21.1	24th September 1957
" " "			+ 11.2	28414		- 59 15.3	22nd March 1915

(R) repeat station.

COCOS ISLANDS
PROPOSED VARIOGRAPH SITE
WEST ISLAND



(Not to scale)

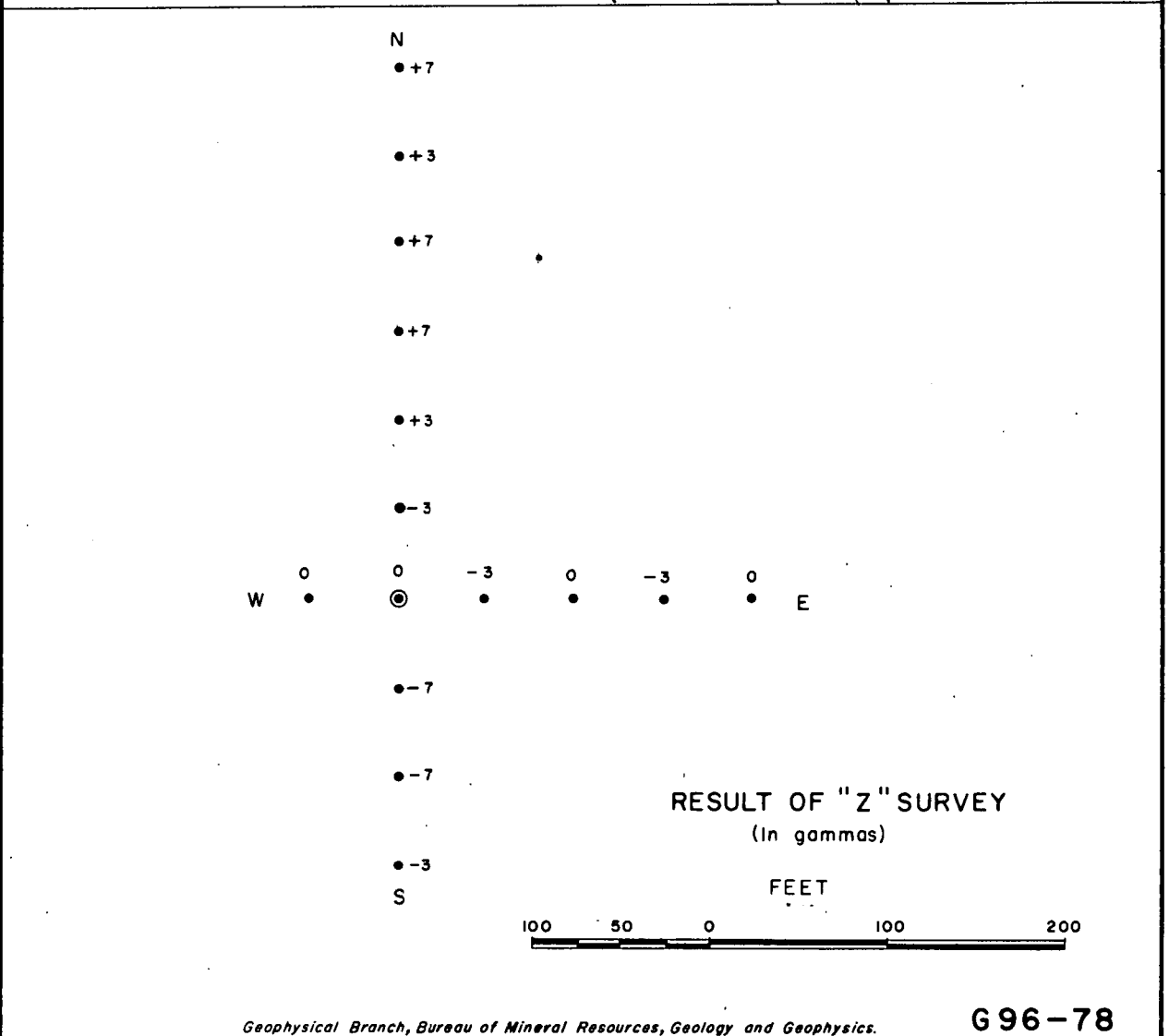
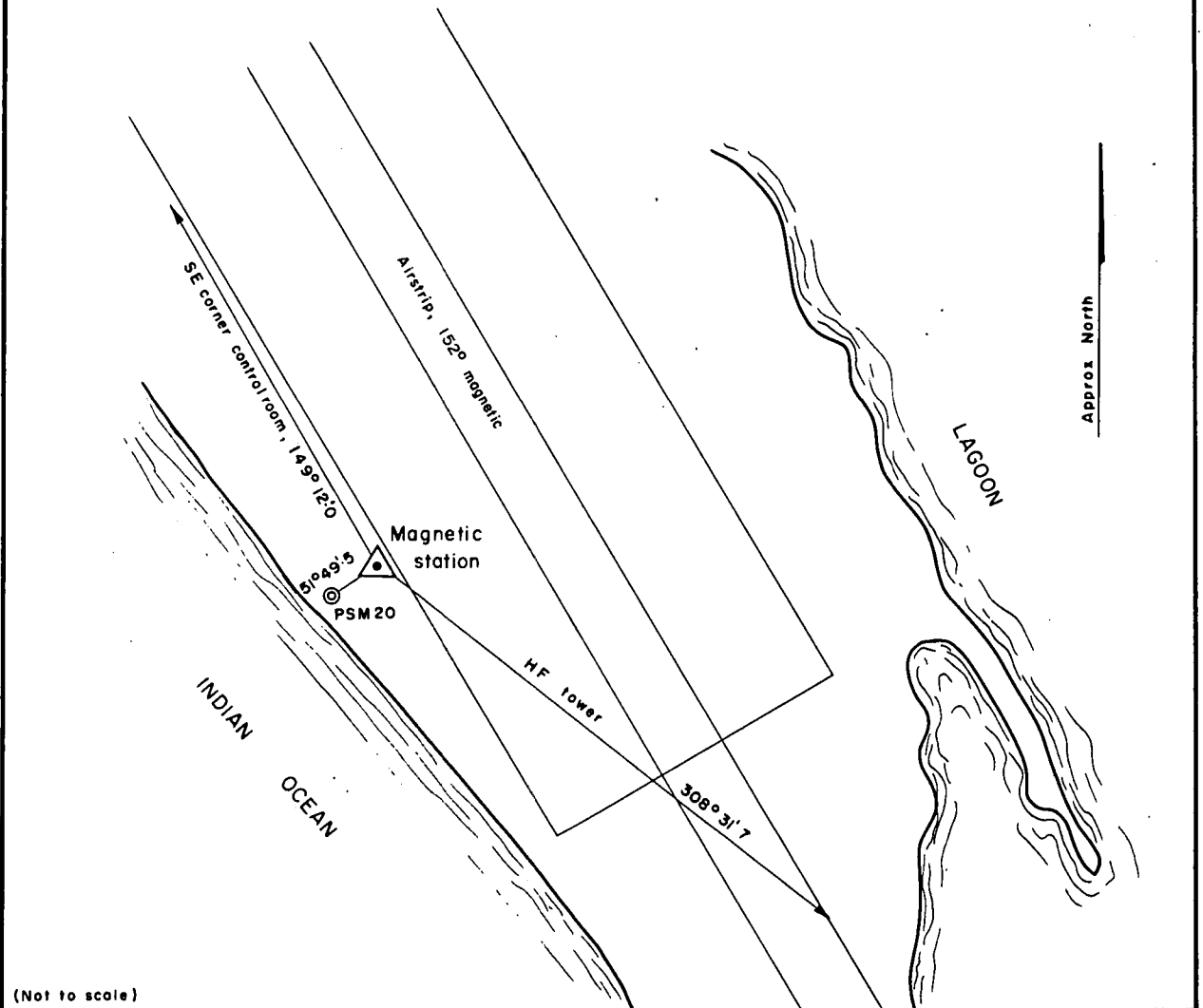


RESULT OF "Z" SURVEY
(In gammas)

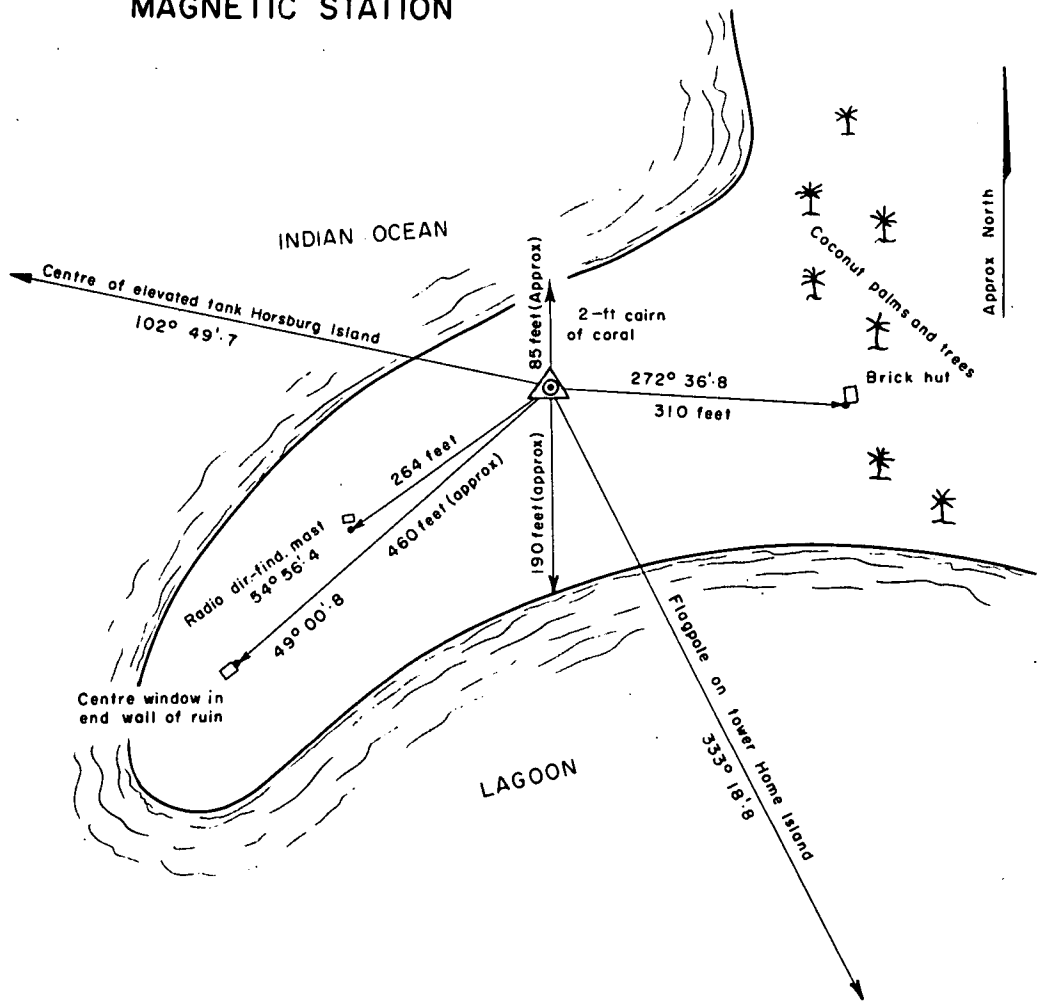


WEST ISLAND, COCOS IS. MAGNETIC STATION

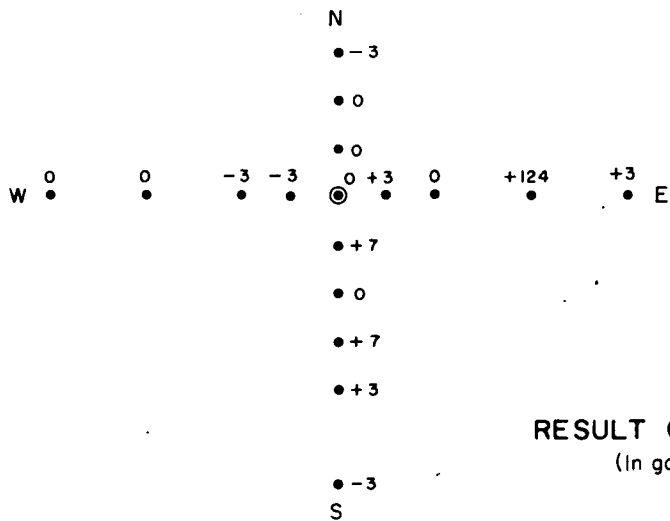
PLATE 2



DIRECTION ISLAND, COCOS IS.
MAGNETIC STATION



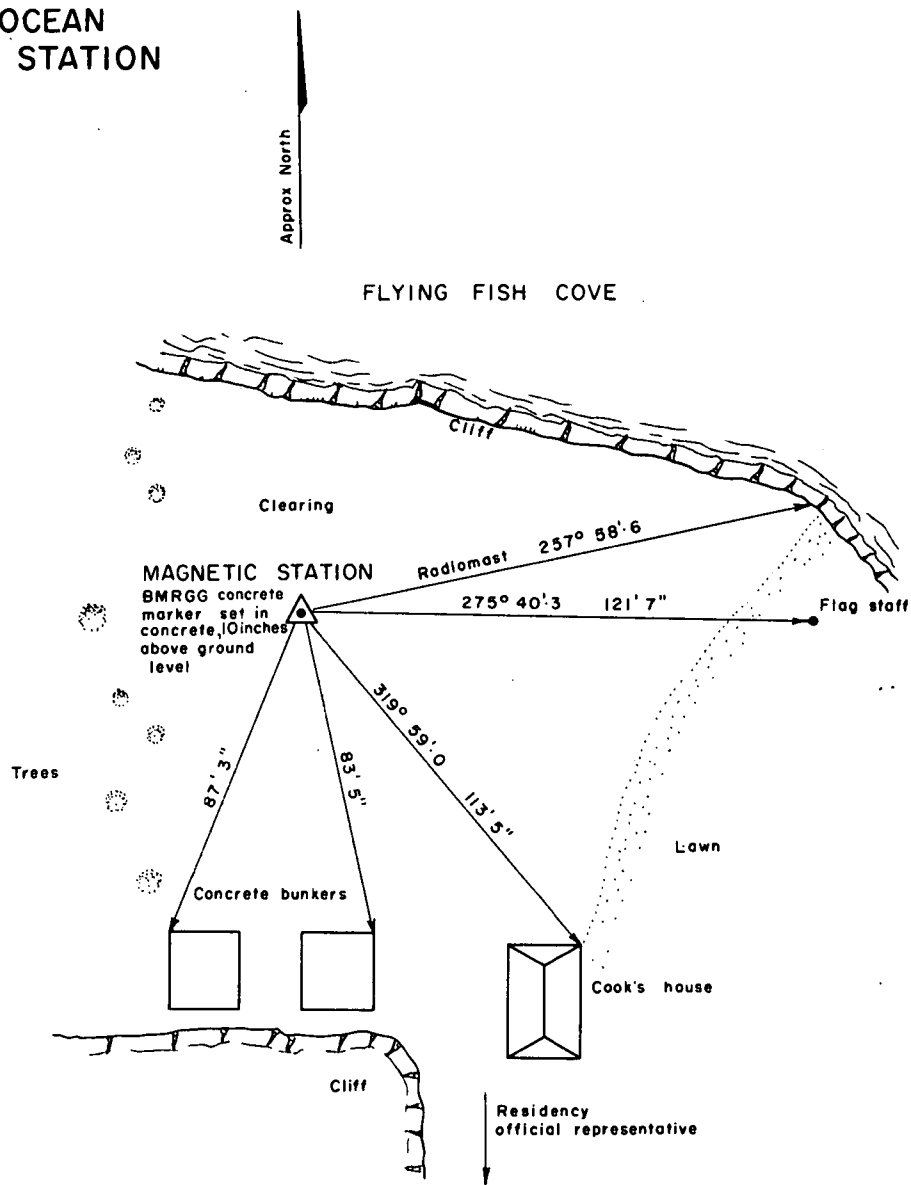
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RESULT OF "Z" SURVEY
(In gammas)



CHRISTMAS ISLAND
INDIAN OCEAN
MAGNETIC STATION



(Not to scale)

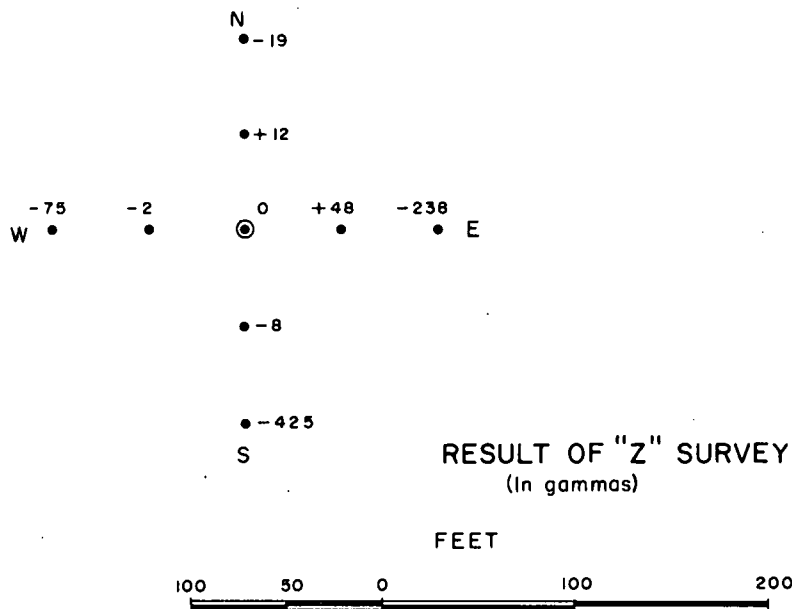
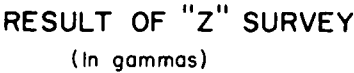
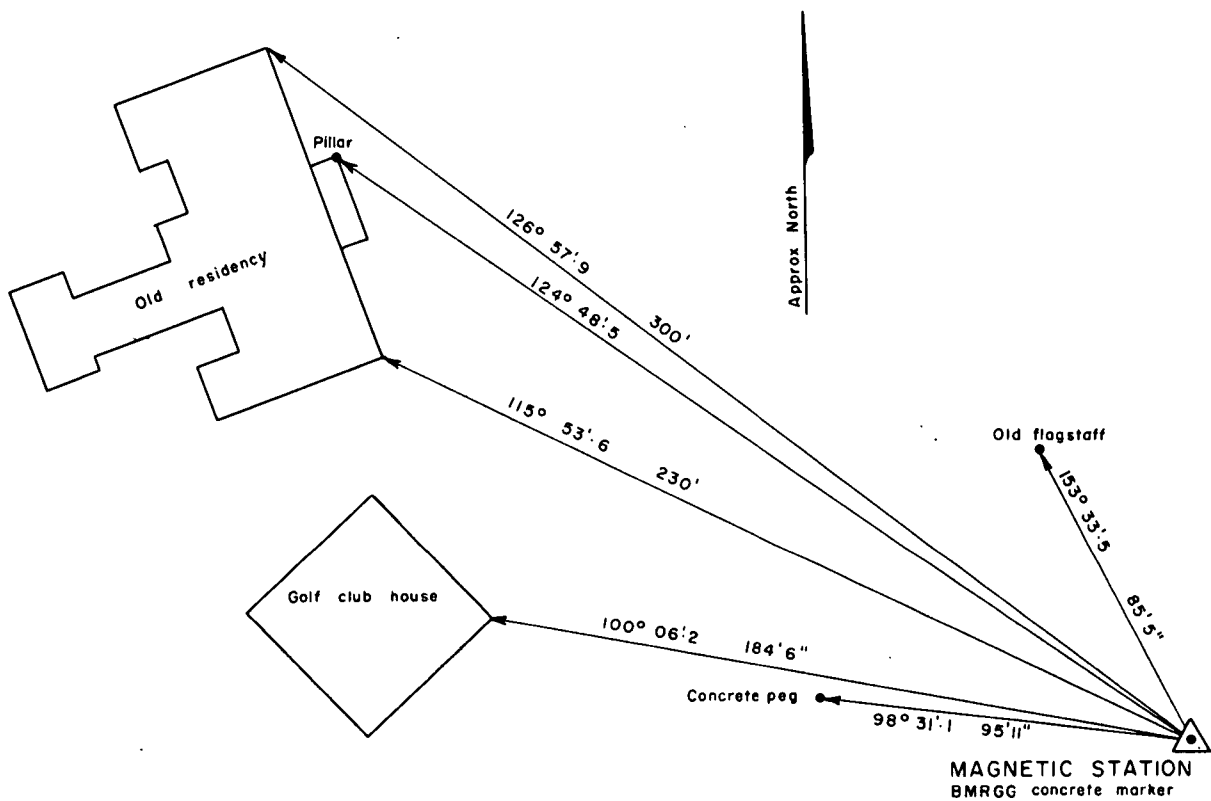


PLATE 5



OCEAN ISLAND
PACIFIC OCEAN
MAGNETIC STATION

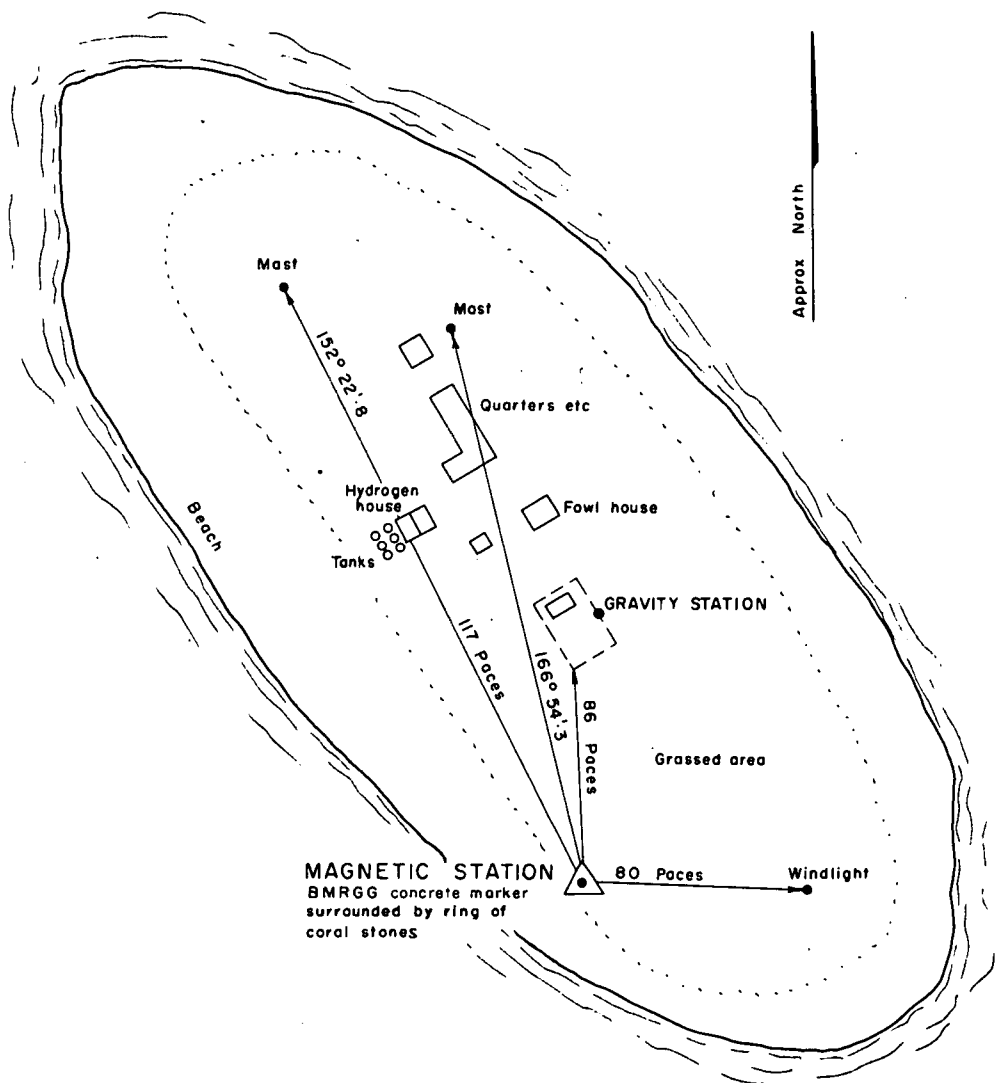


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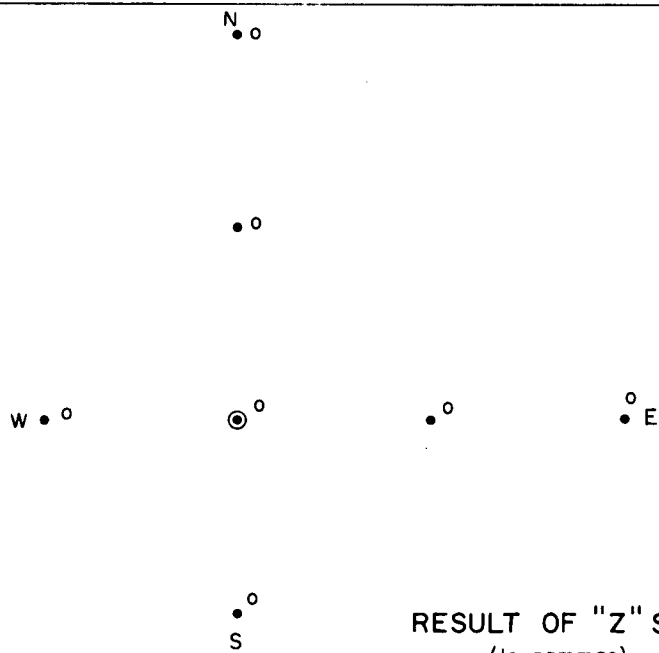
NO "Z" SURVEY RESULT

WILLIS ISLAND
PACIFIC OCEAN
MAGNETIC STATION

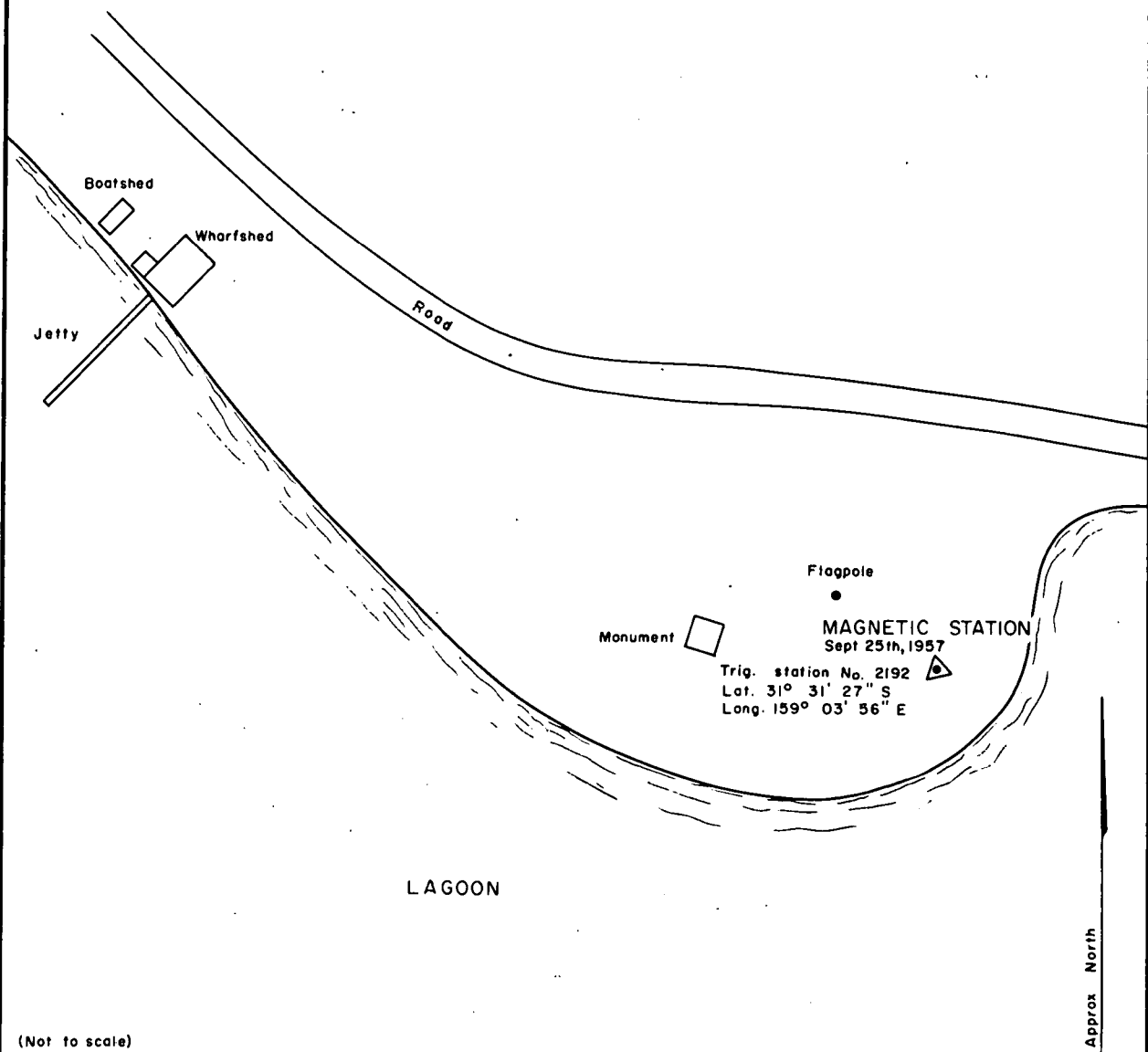
PLATE 7



(Not to scale)



LORD HOWE ISLAND
PACIFIC OCEAN
MAGNETIC STATION



NO "Z" SURVEY RESULT