COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1966/141

ISOGAL GRAVITY BASE STATIONS, THURSDAY ISLAND (QUEENSLAND) AND DARU (TPNG), 1966

by

B.C. BARLOW

RECORD No. 1966/141

ISOGAL GRAVITY BASE STATIONS, THURSDAY ISLAND (QUEENSLAND) AND DARU (TPNG), 1966

by

B.C. BARLOW

CONTENTS

ILLUSTRATIONS

SUMMARY

Isogal gravity base stations were established at Thursday Island (Horn Island) in Queensland and at Daru in the Territory of Papua and New Guinea in May 1966 in order to provide control for part of a BMR helicopter gravity survey and to extend the coverage of the Australian National Gravity Network.

1. INTRODUCTION

During 1964 and 1965 the Australian National Gravity Network was considerably strengthened by a number of regional gravity meter surveys referred to as the 'Isogal' project (Barlow, in preparation). This network provides gravity base stations at intervals of about 150 miles throughout most of Australia.

Additional Isogal gravity base stations were established at Thursday Island (Horn Island) in Queensland, and at Daru in the Territory of Papua and New Guinea during May 1966 to provide gravity control for the northern part of the 1966 BMR contract helicopter gravity survey and to further extend the existing coverage.

2. TRANSPORTATION

The forward trip from Canberra to Thursday Island and air ties between the aerodromes at Weipa, Thursday Island (Horn Island), and Daru were made in aircraft provided by Helicopter Utilities Pty Ltd. A Bell 47J helicopter provided by Helicopter Utilities Pty Ltd was used to make a short gravity tie from Horn Island to Thursday Island. Commercial and private transport was used for ground ties and the return trip from Thursday Island to Canberra.

3. GRAVITY METERS AND CALIBRATIONS

Three gravity meters were used for this work: Master Worden 548, Sharpe Canadian 145, and La Coste G20. The meters were calibrated at Canberra before the field measurements and afterwards at Townsville and Canberra. The gravity meter calibration ranges at these places are described by Barlow (1965). Except for a jump of +0.17 milligal detected in the La Coste G20 meter during the calibration in Canberra on 5th May, the drifts of all meters were very good. Results were as follows :

Range	Canberra	Townsville	Canberra
Accepted interval (mgal)	54.72	60.51	54.72
Date	5.5.66	14.5.66	17.5.66
No. of readings	3-2	3-2	4-3
MW548 scale divisions	499.7	552.7	500.2
mgal/scale division	0.10951	0.10949	0.10939
S145 scale divisions	514.3	568.2	514.1
mgal/scale division	0.10641	0.10649	0.10643
G20 Intervals computed from La Coste table (mgal)	54.69	60.55	54.70

The following mean calibration factors were accepted for calculation of the field work :

Master Worden 548	:	0.10946 mgal/scale division
Sharpe 145	:	0.10644 mgal/scale division
La Coste G20	:	Calibration table supplied by La Coste.

4. RESULTS

The accepted datum for all observed gravity values at Thursday Island and Daru is 978,302.74 milligals, previously established at Isogal station 6491.0167 at Weipa airstrip (Barlow, in preparation). The resulting May 1965 Isogal values' are as follows :

Informal station name	Station number	Observed gravity (mgal)
Horn Island airstrip (secondary base)	6691.9001	978 244.14
Horn Island airstrip (excentre)	6691.1001	244.16
Thursday Island Customs House	6691.2001	240.64
Thursday Island wharf	6691.3001	241.04
Daru airstrip (primary base)	6691.9972	202.62
Daru District Office	6691.0172	202.56

Earlier values at Thursday Island and Daru are as follows :

Station 6691.1001 : 978,244.4 mgal by L.W. Williams (BMR file 58503). Based on a value of 978,500.1 mgal at Cairns pendulum station 52, (Isogal value 978,500.6 mgal).

Station 6691.0172 : 978,203.2 mgal by J.E. Shirley (University of Tasmania T.P.N.G. data). Based on a value of 978,214.9 mgal at Port Moresby WA3046 (estimated Isogal value approximately 978,214.9 mgal).

5. STATION DESCRIPTIONS

The locations of the new Isogal stations are shown in Plates 1-4. Additional descriptive data including photographs, pin-pricked air photos, and maps are held by the BMR. All stations except 6691.3001 have been marked with brass discs, which have also been emplaced at stations 6491.9967 and 6491.0167 (both at Weipa).

6. DATA STORAGE

The meter calibration data referred to above are stored in the BMR calibration files of the relevant meters. Field and drift sheets are filed in the BMR Isogal files under the heading "E W1 A", and station descriptive data are filed under 'Thursday Island' and 'Daru'.

7. ACKNOWLEDGEMENTS

Acknowledgement is made of the assistance given by other organisations including :

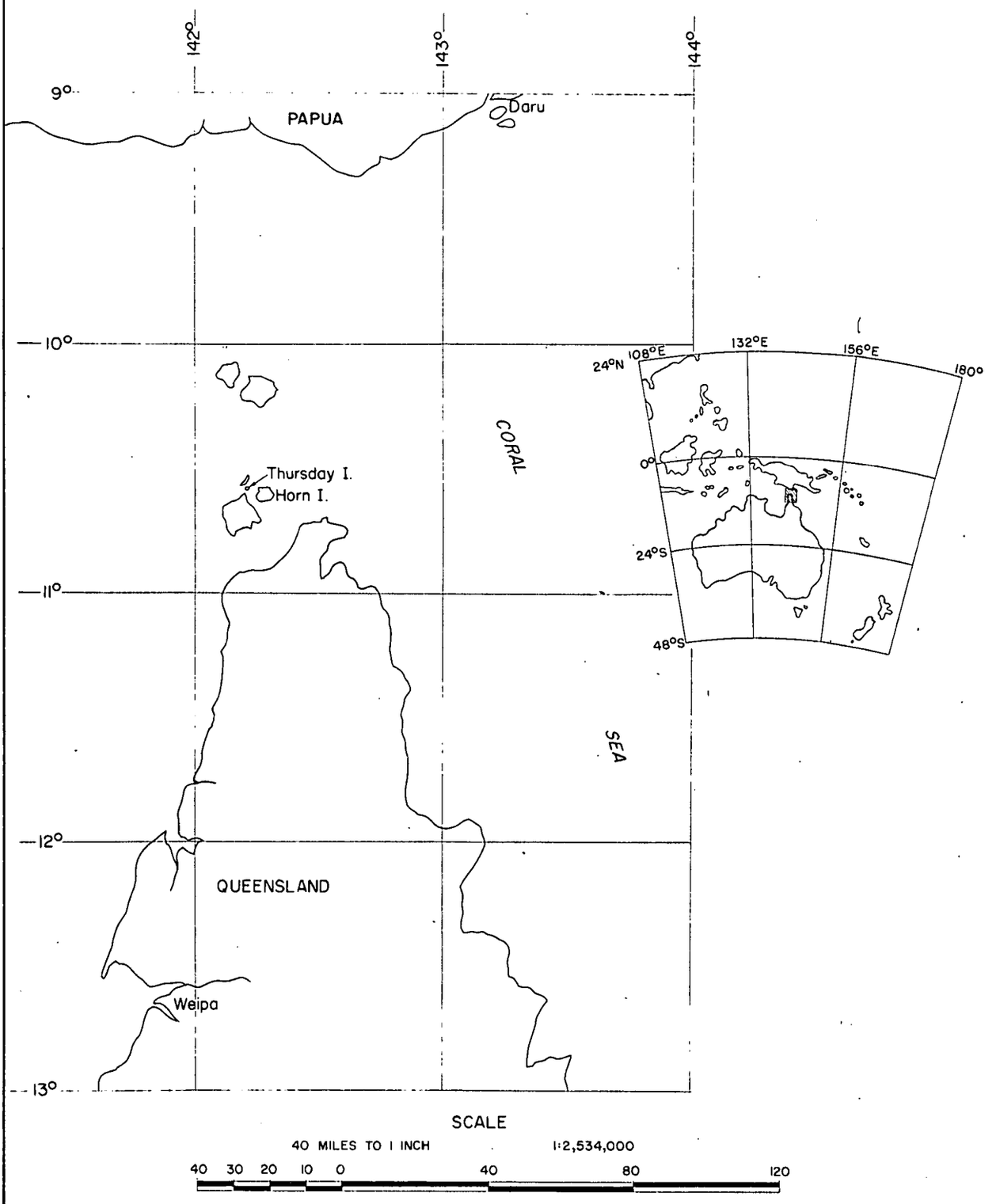
Helicopter Utilities Pty Ltd
Department of Civil Aviation (Horn Island Aerodrome)
Department of Customs and Excise (Thursday Island)
District Office (Daru)
Stol Air Services Pty Ltd (Daru)
Ansett-ANA

8. REFERENCES

BARLOW, B.C. 1965 Establishment of gravity meter calibration ranges in Australia, 1960-61. Bur. Min. Resour. Aust. Rec. 1965/19.

BARLOW, B.C. Australian Isogal gravity survey, 1964-65. Bur. Min. Resour. Aust. Rec. (in preparation).

PLATE 1



SCALE

40 MILES TO 1 INCH 1:2,534,000

40 30 20 10 0 40 80 120

ESTABLISHMENT OF ISOGAL GRAVITY BASE STATIONS

THURSDAY ISLAND, QLD, AND DARU, TPNG, 1966

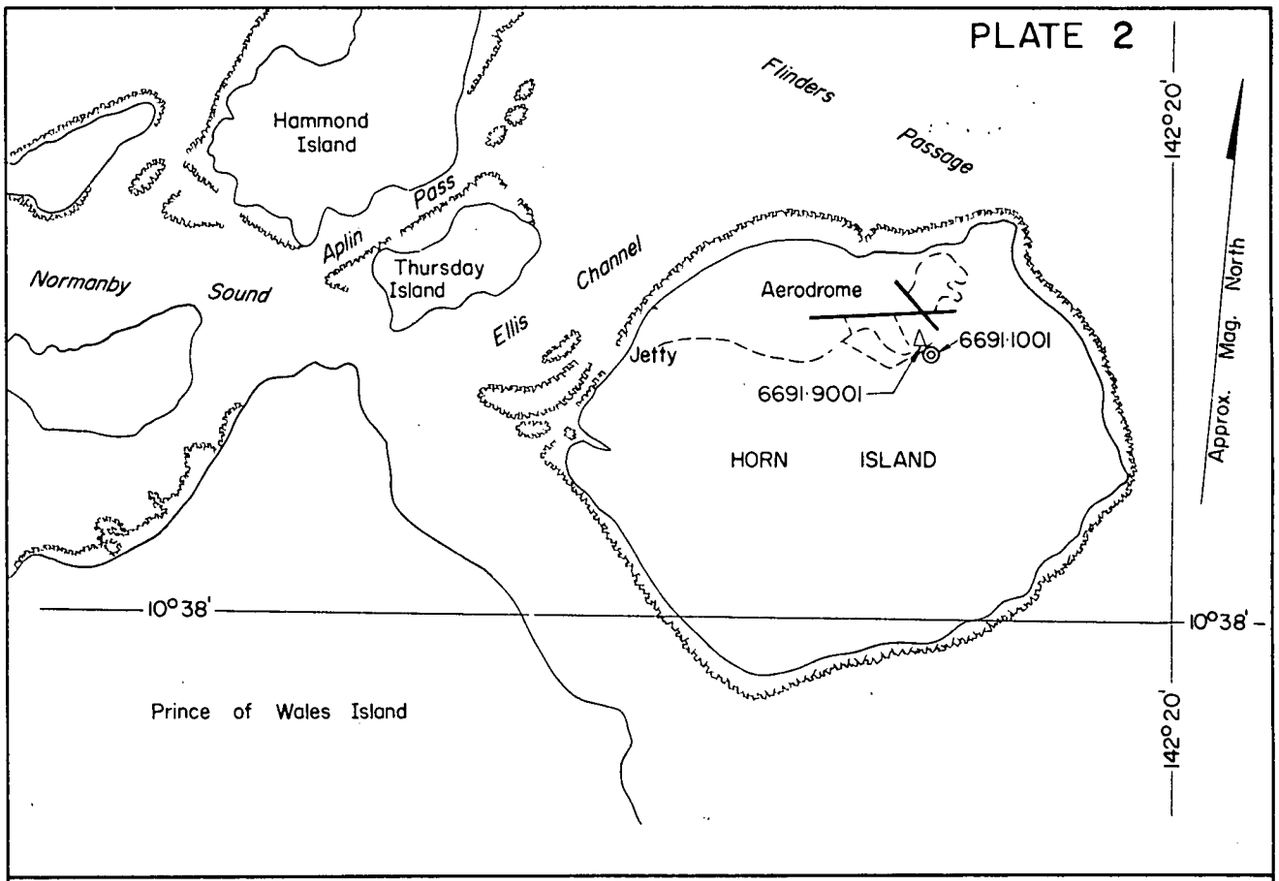
LOCALITY MAP

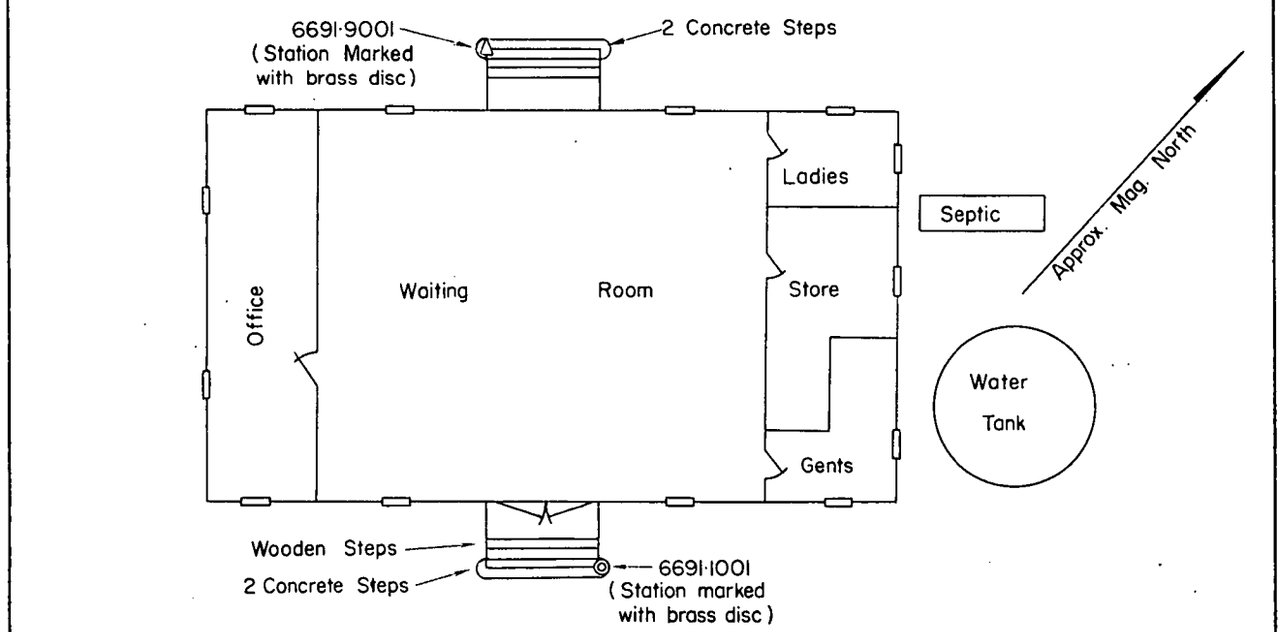
C54/82-19

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics

TO ACCOMPANY RECORD NO. 1966/141

PLATE 2





▲ Primary base
△ Secondary base
◎ Excentre

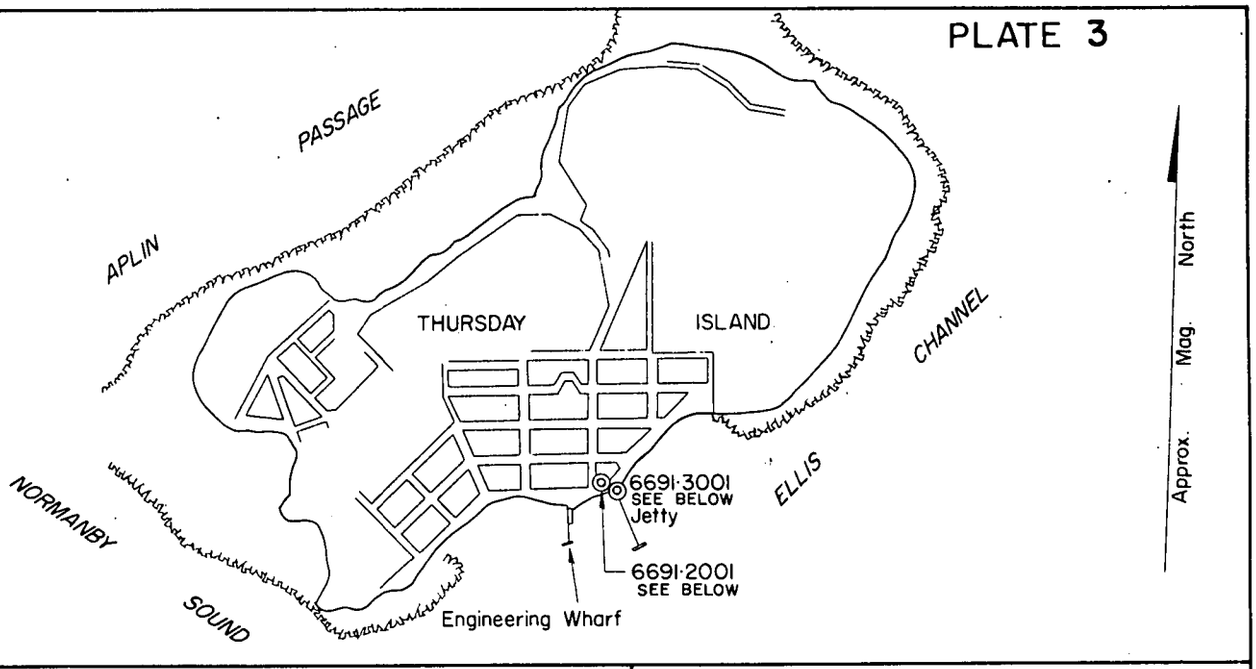
THURSDAY ISLAND (HORN ISLAND) QLD

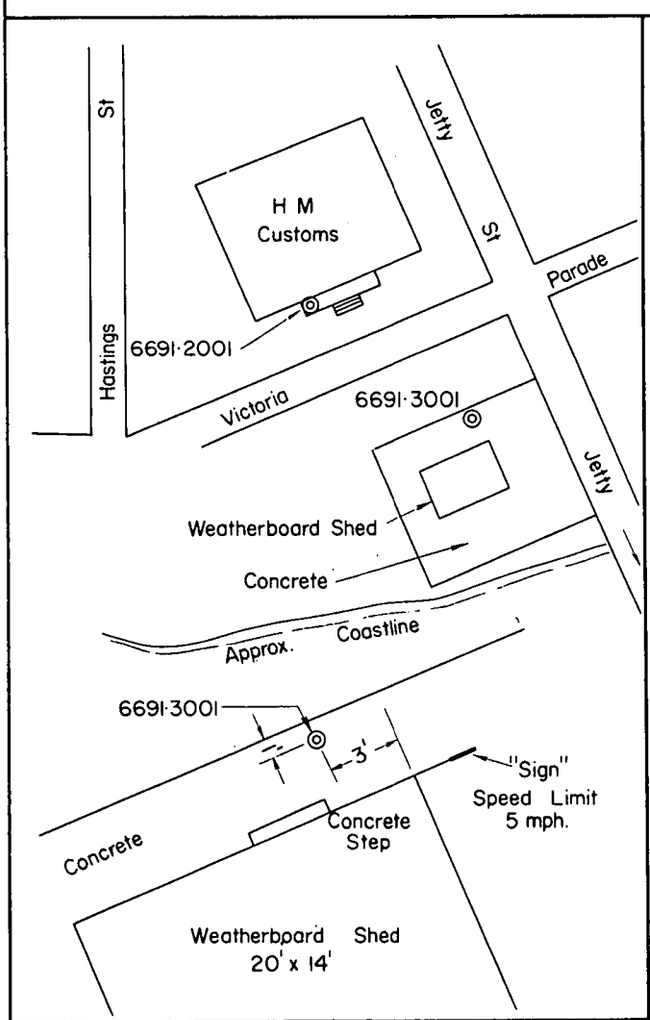
C54/B2-20

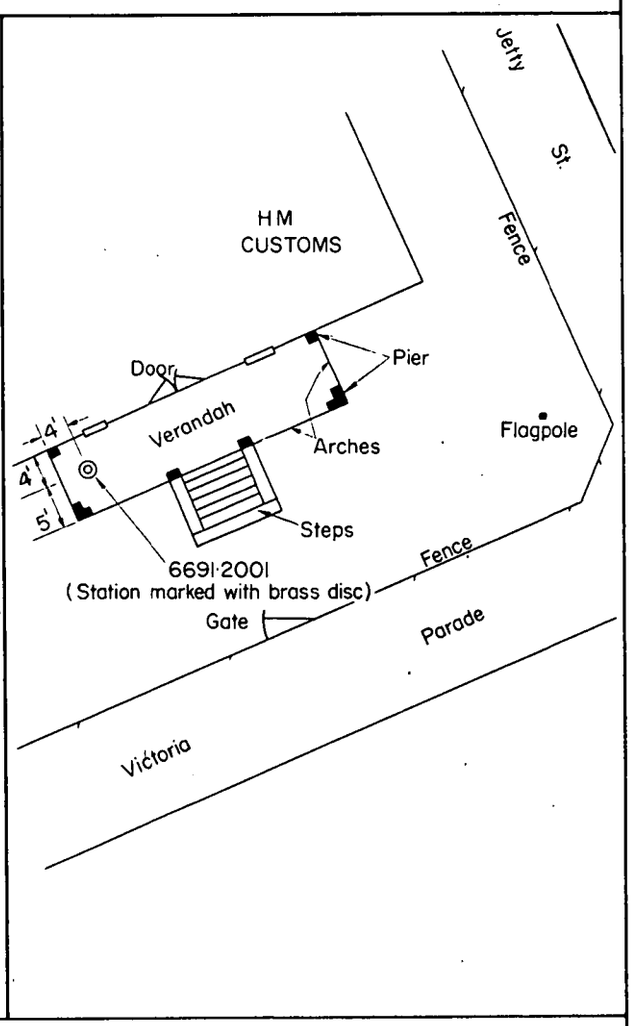
GRAVITY STATIONS
AUSTRALIAN NATIONAL GRAVITY NETWORK

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics
TO ACCOMPANY RECORD NO. 1966/141

PLATE 3







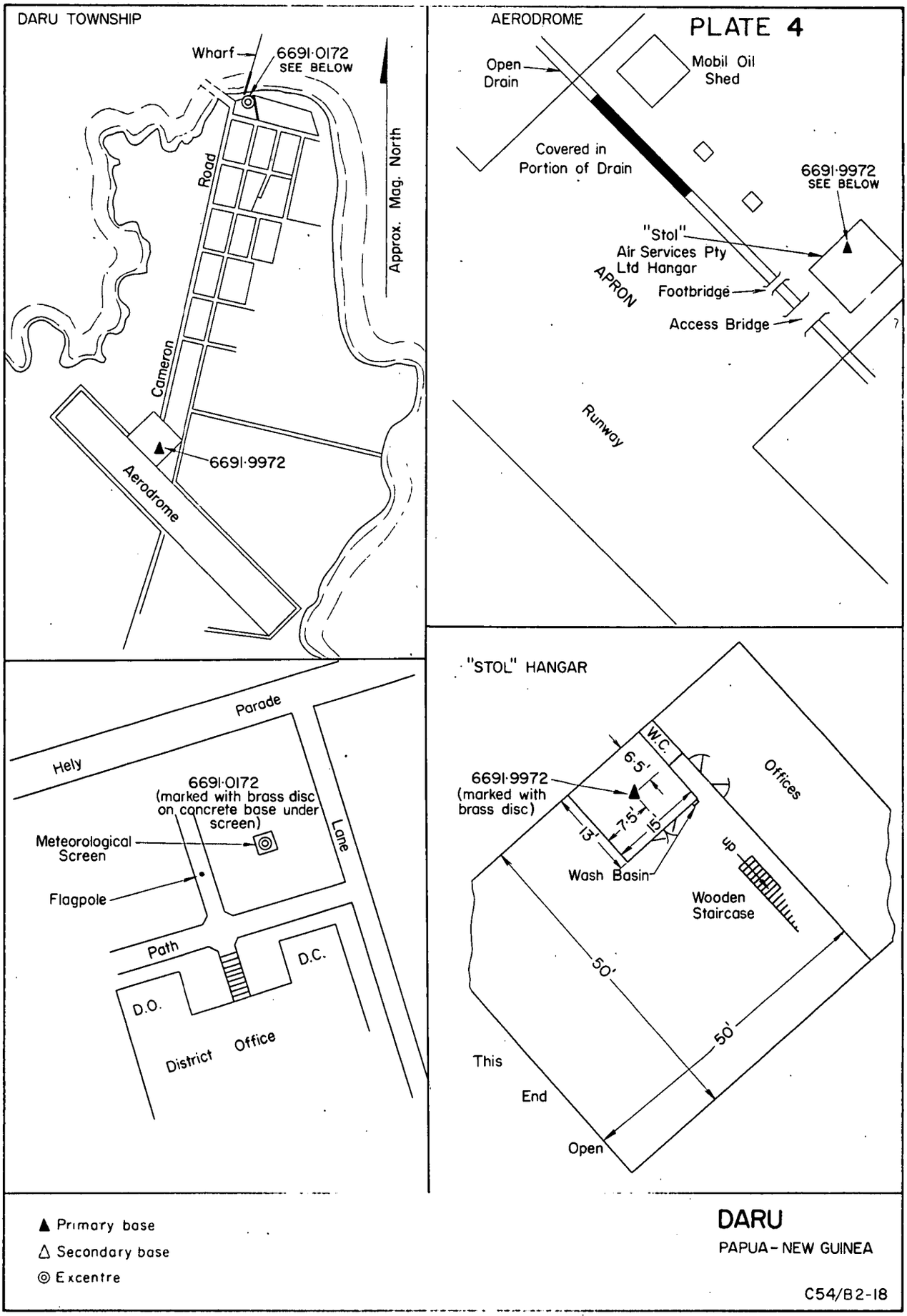
▲ Primary base
△ Secondary base
◎ Excentre

THURSDAY ISLAND QLD

C54/82-21

GRAVITY STATIONS
AUSTRALIAN NATIONAL GRAVITY NETWORK

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics
TO ACCOMPANY RECORD NO. 1966/141



GRAVITY STATIONS
AUSTRALIAN NATIONAL GRAVITY NETWORK

Geophysical Branch, Department of National Resources, Geology and Geophysics

TO ACCOMPANY RECORD NO. 1966/141