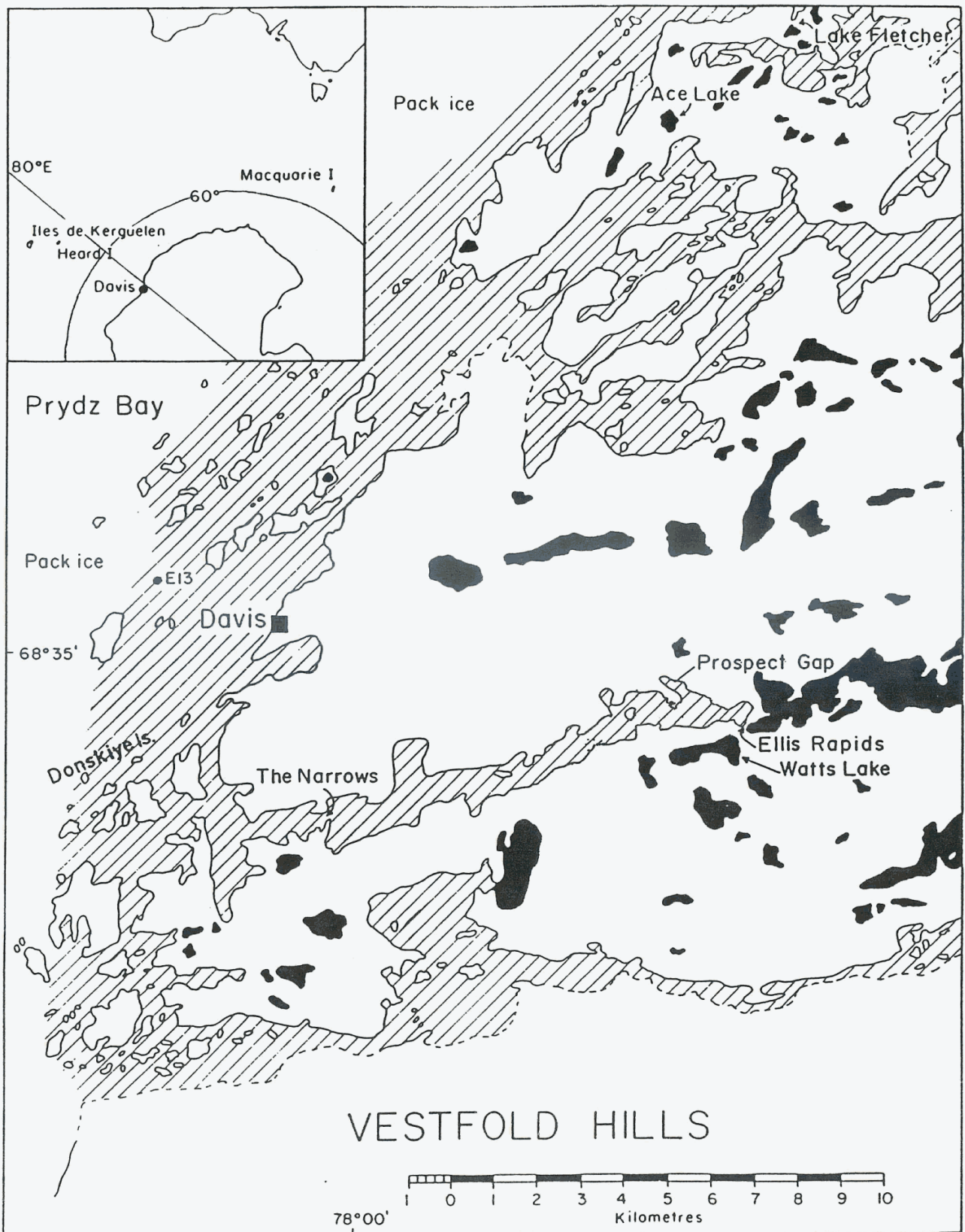


AUSTRALIAN ANTARCTIC TERRITORY

1984-85, 1985-86 SUMMER SEASON

VESTFOLD HILLS

PERSONNEL:	B.A. MURPHY	1985
	I.P. KACZEREPA	1984-85
	R.A. SHERIDAN	1984-85, 1985-86
	E.W. MacGIBBON	1985-86



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1. INTRODUCTION

1.1 Aim

The primary aim of the 1984-85 summer surveying program was to continue with the establishment of a vertical control network on Long, Broad and Mule Peninsulas which would enable periodic and accurate monitoring of water level fluctuations of specified fresh and saline lakes in the Vestfold Hills.

1.2 Survey Equipment

- Hilger and Watts Autoset level.
- Brookeades 5 metre telescopic aluminium staves (feet/metric)
- Staff bubbles
- Wild T2 Theodolites
- Sokkisha Red 1A short range EDM
- CA 1000 Tellurometer
- 100 metre steel band
- Lucas lights
- 1502 Magnavox satellite receivers

1.3 Departure - Arrival Davis

Departed Hobart on the Danish ship 'Nella Dan' on Friday 2 November 1984 at 2000 hours. After two short stopovers at Casey and Mawson the ship finally arrived at Davis on the 4 December 1984.

2. LEVELLING

As there would be no helicopter support after Voyage 6, the levelling program was divided into three areas of priority based on remoteness from Davis.

- Priority One - Long Peninsula
- Priority Two - Mule Peninsula
- Priority Three - Broad Peninsula

Using aerial photographs, the route of the level traverse between bench marks could be planned before levelling commenced each day. Also a reconnaissance over the proposed route was carried out by helicopter. We found this worked quite well and saved a lot of time as reconnaissance by foot was very time consuming.

2.1 Marking

All bench marks, unless otherwise stated, consist of a brass rod, 20 mm in diameter and 20 cm long, placed in a drill hole in solid rock and set with grout. A brass plate approximately 100 mm by 75 mm stamped with the bench mark number was affixed to nearby rock with epoxy resin and grout. Each mark can be identified by a white cross painted onto surrounding rock, the arms of the cross being approximately 1 metre long and 100 mm wide. Also a 1 metre high rock cairn was erected within 10 metres.

Good permanent marking was made possible with the use of a two-stroke Atlas 'Cobra' rock drill, and transport to each bench mark site was by helicopter which could land within 30 metres of the bench marks, thus providing easy access for future monitoring of water levels.

The marks are generally placed such that only one setup will be required to obtain a difference in height with water level.

2.2 Staff Readings

The centre hair was read on both feet and metric sides of the staff. Stadia hairs were observed in metres only. The mean of the feet and metre readings was adopted and temperature-corrected.

2.3 Temperature Correction, Aluminium Staves

For all levelling in the Vestfold Hills the following temperature correction was applied.

Staff standard at 27°C

Correction 0.234 mm per metre per 10°C difference from standard

2.4 Long Peninsula

The level traverse on Long Peninsula was commenced at bench mark NMV/S/39 (GR 885 996). Mean Sea Level Davis 1983 was transferred to this bench mark by simultaneous reciprocal vertical angles and CA 1000 distance from control station NMS 257, LIED BLUFF.

A total of 18 bench marks were placed on Long Peninsula. Level connections to two existing control stations, NMS 264 and NMS 265 were observed.

All reduced levels on Long Peninsula are based on control station NMS 264 being 61.2 metres above Mean Sea Level Davis 1983.

It is proposed to accurately transfer levels between Broad and Long Peninsula during the 1985/86 summer season.

2.5 Mule Peninsula

Commencing from trig station NMS 263 a level traverse was run as follows: MP1, MP2, NMV/S/58, MP3, NMV/S/59, MP4, NMV/S/60, MP5, NMV/S/61, NMV/S/62, NMV/S/57 and closing back on MP1, forming a loop closure, approximate distance of 16.7 km with misclose 0.002 metres.

From MP3 a level traverse was run to NMV/S/14, Burton Lake.

In January 1982, a one way foot/metric level run was observed by P. Naughton between NMS 263 and NMV/S/14.

ΔH NMS 263 to NMV/S/14	-65.405 (P. Naughton)
ΔH NMS 263 to NMV/S/14	-65.579 (Kaczerepa/Sheridan)

Difference	0.174
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As there was a discrepancy between the two runs, we decided to rerun MP1 to NMS 263 and NMV/S/14 to MP3. Since the run between MP1 and MP3 was part of a loop closure, it was decided not to double run this section.

ΔH NMS 263 to NMV/S/14 -65.405 (P. Naughton)
 ΔH NMS 263 to NMV/S/14 -65.584 (Mean) (Kaczerepa/Sheridan)

Difference 0.179

A difference of height between NMS 263 and NMV/S/14 of -65.584 was adopted.

2.6 Broad Peninsula

Commencing at bench mark NMV/S/64, a one way feet/metric connection was observed to NMV/S/63.

A loop closure was then formed using water levels to check against possible gross errors beginning from NMV/S/63 through NMV/S/34, NMV/S/33, NMV/S/32, NMV/S/65, NMV/S/30, NMV/S/29, NMV/S/28, NMV/S/27, NMV/S/26, NMV/S/66, water level Lake McNeill, water level Lake Cowan, water level Zvezda Lake and closing back on NMV/S/63. This was an approximate distance of 16 km with a misclose of 0.000 metres.

From NMV/S/26, a traverse using water levels again to check against possible gross errors was run connecting the following bench marks: NMV/S/66, NMV/S/67, NMV/S/68, NMV/S/69, water level Lake Jabs, water level Club Lake, NMV/S/20. Then beginning from NMV/S/26 once more connected bench marks; NMV/S/23, NMV/S/22, water level Shield Lake, water level triple Lake and NMV/S/19. Using previous provisional reduced levels on NMV/S/19 and NMV/S/20 a misclose of 0.023 mm was achieved over a distance of approximately 4 km.

From NMV/S/9 Deep Lake, a level run, also using water levels was run to NMV/S/63 connecting the following bench marks: NMV/S/70, NMV/S/71, NMV/S/77, NMV/S/31, NMV/S/72, water level Druzhby Lake, water level Zvezda Lake and closing back to NMV/S/63.

Adopting a value of -48.478 from NMV/S/9 and connecting to NMV/S/20, a misclose of 3.5 metres was calculated. It was then decided to connect by water level between club Lake, Deep Lake and NMV/S/9, thus forming a loop of our own work, a misclose of 0.022 metres. It was therefore suspected that a possible error in the provisional reduced level of NMV/S/20 (established by Yates and Taylor) existed.

After a check of the field books used, the misclose was finally attributed to the wrong sign being applied to the height difference between NMV/S/7 to NMV/S/16 and NMV/S/16 to NMV/S/17. The misclose between NMV/S/9 to NMV/S/20 was then recalculated to be 0.023 metres.

Listed below are the amended provisional reduced levels of the bench marks affected.

<u>Bench Mark</u>	<u>Provisional Reduced Level</u>
NMV/S/16	+ 2.655
17	+ 1.067
18	- 0.650
19	- 8.145
20	-34.308
21	-26.109
22	- 4.376

Additional traverses were run from D37 (established by ASO in 1982/83) connecting trig station NMS 333 and NMV/S/79 to NMV/S/60; a level traverse from NMV/S/31 at Ellis Rapids to NMV/S/14, Burton Lake, forming a loop closure of the following bench marks; D37, D36, D35, NMV/S/6, NMV/S/15, NMV/S/7, NMV/S/9, NMV/S/70, NMV/S/71, NMV/S/77, NMV/S/31, NMV/S/78, NMV/S/14, TBM MP3, NMV/S/59, TBM MP4, NMV/S/60, NMV/S/79 and trig station NMS 333; an approximate distance of 61.3 km with a misclose of 0.033 metres. See Annex 2.

Correction to Reduced Level D38

A level check was carried out between D38 and D37. A difference in height of +0.087 was observed. A height difference of -0.087 was shown as observed by the Australian Survey Office. The value should have been +0.087 and the Australian Survey Office was notified of the error.

2.7 Lake Levels Along Traverse Routes

Listed below are the grid co-ordinates, water level, time (UT) and date of lake levels lying along level traverse routes on Long, Broad and Mule Peninsula's.

<u>Long Peninsula</u>			
<u>Grid Co-ordinate</u>	<u>Reduced Level of Lake</u>	<u>Time (UT)</u>	<u>Date</u>
E 883 N 998	1.3	0347	18/12/84
888 007	16.9	0618	18/12/84
888 009	21.6	0632	18/12/84
885 009	15.3	0702	18/12/84
878 018	7.7	0938	18/12/84
874 017	7.7	1000	18/12/84
873 023	18.3	0344	19/12/84
854 024	8.8	0237	26/12/84
848 032	5.7	0300	26/12/84
879 040	1.4	0940	28/12/84
873 040	1.1	-	17/02/85
873 041	0.4	-	17/02/85

Broad Peninsula

<u>Grid Co-ordinate</u>	<u>Reduced Level of Lake</u>	<u>Time (UT)</u>	<u>Date</u>
E 964 N 973	3.2	0855	07/01/85
929 979	8.1	0855	08/01/85
924 969	0.4	0320	09/01/85
913 935	21.2	0815	16/01/85
895 929	6.5	0330	20/01/85
881 877	11.6	0715	22/01/85
895 882	8.7	0940	22/01/85
912 874	35.9	0405	23/01/85
928 958	25.4	0500	25/01/85
831 861	19.3	-	11/02/85
843 866	12.1	-	11/02/85

Mule Peninsula

<u>Grid Co-ordinate</u>	<u>Reduced Level of Lake</u>	<u>Time (UT)</u>	<u>Date</u>
E 786 N 822	10.5	0700	31/12/84

2.8 Sea Level Connections

<u>Bench Mark</u>	<u>Reduced Level of Bench Mark</u>	<u>ΔH Bench Mark and Sea Level</u>	<u>Sea Level</u>	<u>Time (UT)</u>	<u>Date</u>	<u>Remarks</u>
NMV/S/14	6.171	6.35	-0.18	0255	15/1/85	Crooked Fjord
NMV/S/31	5.360	5.27	0.10	0345	22/1/85	Ellis Fjord
NMV/S/31	5.360	5.47	-0.11	0325	12/1/85	Ellis Fjord
NMV/S/77	0.972	1.21	-0.24	0915	28/1/85	Ellis Fjord
NMV/S/4	2.182	2.58	-0.40	0900	04/2/85	Davis
NMV/S/4	2.182	2.40	-0.22	1035	06/2/85	Davis
NMV/S/4	2.182	2.69	-0.51	0430	13/2/85	Davis
NMV/S/4	2.182	2.67	-0.49	0515	16/2/85	Davis
NMV/S/4	2.182	2.38	-0.20	1240	20/2/85	Davis
NMV/S/79	1.072	1.65	-0.58	0700	05/2/85	Ellis Fjord (above "Narrows")

2.9 Levelling Adjustment

All levelling carried out during the summer of 1984/85 was combined with previous levelling and adjusted using the Natmap Levelone adjustment programme. All levels are based on NMS 5 Davis being 27.835 m above Mean Sea Level Davis 1983. See Annex 1-11, Field books 13321-13324, 13326.

3. DAVIS MAGNETIC AND GRAVITY STATIONS

3.1 BMR Magnetic Station 'A'

BMR Magnetic Station 'A' was marked as requested, see Annex 12. The mark consists of a brass pin, 20 mm diameter and a brass plaque approximately 50 x 100 mm stamped BMR MAGNETIC STN A was affixed to nearby rock. See field books 19598, 13326, 19498.

3.2 BMR Magnetic Station 'C' and 'C1'

BMR Magnetic Station 'C' and 'C1' which are co-incident, consist of a wooden pier upon which is erected a BMR absolute magnetometer, see Annex 13), field books 13326, 19498, 19598.

3.3 BMR Magnetic Station 'D'

BMR Magnetic Station 'D' was established in 1981. A plaque approximately 50 x 100 mm, stamped BMR MAGNETIC STN D was affixed to nearby rock. See field books 13326, 19498, 19598.

To co-ordinate BMR Magnetic Stations 'A' and 'D' a traverse was run from control station D8 to control station D14, see Annex 14, field books 19498, 19598.

Results

BMR Magnetic Station 'A'

Latitude	68 34 36.8025
Longitude	77 57 58.2588
Reduced Level	10.122

BMR Magnetic Station 'C', 'C1'

Latitude	68 34 38.3545
Longitude	77 58 22.6595
Reduced Level	28.237

BMR Magnetic Station 'D'

Latitude	68 34 47.6579
Longitude	77 57 54.4800
Reduced Level	24.803

3.4 BMR Gravity Stations

The following BMR Gravity stations were co-ordinated and levelled, see Annex 14, 15, 18, field books 13326, 19498, 19598.

<u>Gravity Station</u>	<u>Co-ordinates</u>	<u>Reduced Level</u>
6905.0020	Lat 68 34 33.6840 Long 77 57 52.5043	6.744
6905.0021	Lat 68 34 29.5521 Long 77 57 50.7356	11.666
8007.0000	Lat 68 34 38.3945 Long 77 58 20.8181	27.57

3.5 Absolute Magnetometer Pillar

A survey of the new position of the absolute magnetometer pillar was carried out and sun observations for azimuth were observed to the reference object on Anchorage Island. See Annex 13, field books 19498, 19598.

4. DEPARTMENT OF HOUSING AND CONSTRUCTION SITE SURVEYS

While at Davis, National Mapping was requested by the DHC construction supervisor, Neill Walls, to carry out site surveys of proposed and existing buildings, roads, helipads and other miscellaneous constructions. See field books 13325, 19620.

The following is a list of the work which was completed:

1. Plan of proposed building sites
 - (a) Fire Tender Building
 - (b) Recreation Building
 - (c) Waste Treatment Building
 - (d) Area South-East of Power House No. 1
2. Plan of new road north-west side of living quarters.
3. Plan and location of new incinerator building.
4. Plan and location of new concrete helipad and road intersection.
5. Location in relation to NMS 5 Davis of the absolute magnetometer building, fluxgate magnetometers, induction coils and ionosonde mast.
6. Finished bridge levels around Davis.

5. CO-ORDINATION OF RAN MINIRANGER SITES, DAVIS

During the Voyage 6 stopover of the MV "Icebird" at Davis, Lt Cdr R. Ward and CPO (SR) P. Eddy of the RAN Hydrographic Office undertook some exploratory hydrographic surveys near Davis using Miniranger for position-fixing. The echosounder and Miniranger console were installed aboard an Army LARC.

Three transponder sites were chosen but time prevented the RAN personnel from co-ordinating them. National Mapping was requested to co-ordinate these sites and this task was duly completed. The accompanying diagram shows the three sites which were co-ordinated, namely:

1. Davis (RAN)
2. Torckler Rocks (RAN)
3. Gardner Island (RAN)

All three sites were fixed by Wild T2 theodolite intersection from existing control stations NMS 115 Anchorage Island, NMS 274 Gardner Island and D8. See Annex 16.

All observations were adjusted using Natmap adjustment program GANET.

6. DEPLOYMENT OF TIDE GAUGES

Two Aanderaa bottom mounted tide recorders were deployed at Davis during the summer by B. Gallagher of the Antarctic Division. One at Davis station and the other in Ellis Fjord (GR 763897).

6.1 Davis Station

The tide recorder was placed approximately 200 metres NW of the disused desalination building and a tide staff erected nearby. A 24 hour watch was carried out on the 23/1/85 and readings taken every 10 minutes.

The zero mark on the tide staff was 0.9 metres below Davis MSL 1983.

During the deployment of the tide recorder, sea level was observed on an opportunity basis and the results are listed below. Datum is Davis MSL 1983. See field books 13324, 13326.

<u>Sea Level</u>	<u>Time UT</u>	<u>Date</u>
-0.41	0900 Z	04/02/85
-0.23	1035 Z	06/02/85
-0.52	0430 Z	13/02/85
-0.51	0515 Z	16/02/85
-0.21	1240 Z	20/02/85

6.2 Ellis Fjord

In Ellis Fjord the tide gauge was deployed at GR 865883, bench mark NMV/S/77 was established nearby and sea level was observed. See field book 13324.

<u>Sea Level</u>	<u>Time UT</u>	<u>Date</u>
-0.24	0915 Z	28/01/85

7. HORIZONTAL CONTROL STATION SURVEYS

7.1 Anchorage Island NMS115 Reference Mark Survey

A survey of the reference marks at NMS115 was carried out using RM1 and NMS115E as primary and secondary set ups with an observed eccentric angle subtended by NMS5 Davis. Also simultaneous reciprocal vertical angles were observed between NMS115E and NMS5 Davis. See Annex 25.

7.2 Horizontal and Vertical Angle Observations

Horizontal and vertical angle (single ended) were observed at the following stations.

FROM		TO	
NMS 236	Turner Island	NMS 275E	Lucas Island
		NMS 274E	Gardiner Island
		NMS 236E	Turner Island
NMS 275	Lucas Island	NMS 115	Anchorage Island
		NMS 275E	Lucas Island
NMS 274	Gardiner Island	NMS 115	Anchorage Island
		NMS 236E	Turner Island
NMS 319		NMS 236E	Turner Island
		NMS 275E	Lucas Island
		NMS 115	Anchorage Island

After computation the results were incorporated into the horizontal and vertical control network and readjusted. See Annex 25, 26.

7.3 Connections to Drum Beacons

Connections to drum beacons were carried out at the following control stations.

NMS 153	Filla Island
NMS 236	Turner Island
NMS 274	Gardiner Island
NMS 275	Lucas Island

See Annex 17, 18, field books 19599, 19523.

7.4 Renumbering of Control Station M9

Control station M9 (GR 767904), which was established in 1977 was incorrectly numbered M15 in 1983. This station has been renumbered to its original number M9.

7.5 Control Station NMS 333

Control station NMS 333, established in 1983 by the Australian Survey Office, was permanently marked by a 0.13 mm brass rod grouted into bedrock. A brass plaque stamped with the station number was grouted onto nearby rock.

8. METEOROLOGICAL THEODOLITE

While at Davis National Mapping was requested to examine the meteorological theodolite for vertical accuracy.

The meteorological personnel use the theodolite for tracking weather balloons each day and can obtain their relative position using Anchorage Island trigonometrical station as a reference object. An obvious error was found when a depression angle was observed to Anchorage Island which was obviously, by line of sight, an elevation angle.

We set about to obtain the true elevation between the met theodolite axis and cross beacon NMS 115 Anchorage Island. The vertical angle was computed to be +1 01'37". See Annex 19.

9. SATELLITE TRANSLOCATION

During the inclusive period 1-10 February, a Magnavox MX1502 Geceiver was run continuously at Davis. The antenna was set over NMS5 Davis whilst the receiver was housed in the absolute magnetometer hut where 240 VAC mains power was available for connection to the receiver through a 240 AC/12VDC transformer.

During this period, translocation was undertaken between Davis, Mawson and Casey. Mr Sheridan departed Davis aboard "Icebird" on 3 February, taking with him the second MX1502 which was set up on Mawson. Pageos site (ISTS No. 051) upon arrival of the ship there on 6 February. Approximately 32 hours of common translocation data was obtained between the Pageos sites at Mawson and Casey and at NMS5 Davis. The balance of the inclusive period 1-10 February was used to gather translocation data between Casey and Davis. A JMR-4 receiver was used at Casey.

The following information is relevant to this translocation:

Station	Observation Time Frame (1985)	Cassette Nos.
Davis NMS5	0100Z 1 Feb - 1045Z 10 Feb	145 - 149 incl
Mawson ISTS No. 051	0427Z 6 Feb - 1242Z 7 Feb	150
Casey ISTS No. B052	1200Z 1 Feb - 1352Z 10 Feb	3 x JMR-4 Cassettes

Results and analysis of the translocation data are held by Survey Information and Geodetic Analysis Branch.

10. SCULLIN MONOLITH

General

Enroute to Mawson during Voyage 6 it was planned to stop at Scullin Monolith to place a permanent bench mark and two reference marks with intervisibility between all three. These marks were to be panelled for aerial photography and the PSM connected to Murray Monolith and sea level. Also it was proposed to carry out a survey of petrel colony areas for the biologists.

Equipment

- Wild DI20, adaptor, power supply
- T2 theodolites
- Radios
- PSM and marking equipment
- Ranging pole and prisms
- Plastic Panelling

Tasks Completed

Access to Scullin Monolith summit and other high areas was by helicopters and due to the general slope being 45 - 50°, it was far too prohibitive for any survey of petrel colony areas.

Placement of the permanent survey mark NMS 235 on the summit and two other reference marks, all with intervisibility, was carried out. Connection to Murray Monolith was possible, however a sea level connection was not, due to conditions and time restrictions. Plastic panelling of all three marks was completed ready for aerial photography as well.

The following morning I was prohibited from flying the spot photography and subsequently had to quickly instruct an ABC crewman in what was required. The final results were unfortunately unacceptable. See Annex 22.

11. ACKNOWLEDGEMENT

We wish to gratefully acknowledge the assistance given to us by all those that gave up their free time to act as bookers in the field.

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INTRODUCTION

1.1 Aim

During the 1985-86 summer survey program two major tasks were to be undertaken. The first was to complete loop closures of vertical control networks on Long, Broad and Mule Peninsulas and the second to co-ordinate Dr Gallagher's long/cross section origin points along the length of Ellis Fjord.

1.2 Survey Equipment

- Hilger Watts autaset level
- Brookeades 5 metre telescopic aluminium staves feet/metric
- Wild T2 theodolites
- Sokkisha Red 1A short range EDM - (DHC)
- CA1000 Tellurometer
- 100 metre steel band
- Lucas Light
- 2 JMR satellite receivers

1.3 Departure - Arrival at Davis

Departed Hobart on MV Icebird Tuesday 12 November 1985 at 1700 hours. After diverting to Heard Island and the icebound Nella Dan the Icebird arrived at Davis 10 December 1985.



"MV ICEBIRD"

2. ELLIS FJORD TRAVERSE

Due to time constraints concerning ice conditions and having only one helicopter at the station it was decided to carry out the survey on Ellis Fjord immediately while vehicles could still be driven safely over the ice.

The purpose of the traverse was to co-ordinate "origin" terminals of long/cross sections for Dr Gallagher.

The "origin" terminals were wooden stakes or day glow orange spots of paint on rock. Each mark was placed as close as possible to the edge of the fjord which indicated the start and end points of an individual cross section. See diagram. See Annex 23.



"ELLIS FJORD" looking west at two different levels.

Along each cross-section Dr Gallagher drilled at intervals of 50 metres through the sea ice where he observed water depth, current, and salinity.

Accuracy of co-ordinating "origin" terminals was to be at least stadia.

The task was completed using a primary traverse connected at either end to a trig station with radiations to the "origin" terminals from each intermediate traverse point.

3. LEVELLING

3.1 Marking

Bench marks this summer were placed at strategic lakes or points which enabled loop closures to be formed and therefore strengthen the vertical control network in the Vestfold Hills.

There were a total of eight bench marks placed over a levelled distance of approximately 70 Km. Each mark consisted of a brass rod 0.020 metres diameter and 0.20 metres long, placed in a drill hole in solid rock and set with grout. A brass plate 100 mm by 75 mm stamped with the bench mark number was affixed to a nearby rock with epoxy resin and grout. Each mark can be identified by a white painted cross on surrounding rock and a one metre high rock cairn erected within 10 metres.

The marks are generally placed such that only one set up will be required to obtain a difference in height with water levels.



Levelling western end of Lake Druzhy adjacent to Ellis Fjord with Watts Lake in background.

3.2 Staff Readings

The centre hair was read on both feet and metric sides of the staff. Stadia hairs were observed in metres only. The mean of the feet and metre readings were adopted and temperature corrected.

3.3 Temperature Correction

For all levelling with aluminium staves in the Vestfold Hills the following temperature correction was applied:

Correction 0.234 mm per metre per 10°C difference from standard

Staff standard at 27°C

3.4 Broad-Mule Peninsula

3.4.1 A level run between Davis NMS5 and D37 was re-run to strengthen this particular connection since all other levelling in the Vestfold Hills swung around this line. Also, level run NMV/S/6 Lake Dingle to M1 was re-run for the final time to locate the source of misclosure in a loop around Davis Station. See Annex 2.

3.4.2 It was decided to complete the major loops first and continue later with minor level runs. The first level run started at NMV/S/73 Crooked Lake through NMV/S/83 North Druzhby Lake, NMV/S/82 GR 926915 and closing on NMV/S/68 Hook Lake. This run together with level run NMV/S/69 Lake Jabs to NMV/S/20 Club Lake forms the largest loop traverse in the Vestfolds. See Annex 3.

3.4.3 A level closure was completed in the Platcha Hut area of the Vestfold Hills north-west of Davis commencing bench mark NMV/S/66 Lake McNeill, through NMV/S/81 Lake Cowan, NMV/S/80 at GR.946966 finishing on bench mark NMV/S/34 Breid Basin within an hour's walk from Platcha Hut. The following day saw the completion of a double run from NMV/S/34, through NMV/S/63 and finishing on NMV/S/84. See Annex 3.

3.5 Levelling on Long Peninsula

Previous to this summer a strong height connection between Broad and Long Peninsula had not been achieved (apart from the 1984/85 connection from Lied Bluff over approx. 7-8 km). New mark NMV/S/85 was established as close as possible to the edge of Long Fjord on Broad Peninsula and using NMV/S/39 (established 1984/85 on Long Peninsula), simultaneous reciprocal vertical angles over a measured distance of 546 metres were observed. Over this short distance height difference could be considered to be similar to a fourth order levelling connection.

Assuming this, levelling on Long Peninsula can be combined with the bulk network on the other two Peninsulas, Broad and Mule, and adjusted as a whole using the levelone heighting program.

To strengthen other individual sections on Long Peninsula, two double runs were completed as follows:

NMV/S/50, NMV/S/49, NMV/S/48, NMV/S/76, NMV/S/46, NMV/S/45

finishing on NMV/S/44, and

NMS 265, NMV/S/42, NMV/S/41, NMV/S/40 and finishing on NMV/S/39.

See Annex 1.

3.6 Lake Levels

Water levels of lakes encountered along traverse routes were taken on an opportunity basis. The grid co-ordinates, reduced level, date and U.T. times are listed below:

<u>Grid Co-ordinate</u>	<u>Reduced Level</u>	<u>Time U.T.</u>	<u>Date</u>
3924 E 23882 N	20.092	0315	27.12.85
3956 E 23972 N	17.966	0845	29.12.85
3965 E 23974 N	5.145	1103	29.12.85
3884 E 23997 N	1.302	0510	8. 1.86

Lakes previously levelled in the 1984/85 summer were also re-observed on an opportunity basis.

NMV/S/66	Lake McNeill 0206 UT	W.L.	27.471
NMV/S/81	Lake Cowan 0430 UT	W.L. 1.480 below BM	
NMV/S/80	Lake Tanusoski 0655 UT	W.L. 2.897 below BM	
NMV/S/63	Lake Zvezda 0933 UT	W.L.	13.926
NMV/S.69	Lake Jabs 0145 UT	W.L.	- 36.664
NMV/S/20	Club Lake 0800 UT	W.L.	- 37.377
NMV/S/41	East Lake 0906 UT West Lake 0907 UT	W.L. W.L.	7.826 7.674
NMV/S/40	Lake Abraxas 0420 UT	W.L.	12.989
NMV/S/84	Crooked Lake 0530 UT	W.L. 1.607 below BM	
NMV/S/74	Oblong Lake 0845 UT	W.L.	- 2.740
NMV/S/36	Lebed Lake 0930 UT	W.L. 2.947 below BM	
NMV/S/35	Watts Lake	W.L. 9.408 below BM	

NMV/S/70 0352 UT	GR 3855E 2390N	W.L.	48.341
NMV/S/8	Deep Lake	W.L.	-50.099
NMV/S/83	Druzby Lake 0400 UT	W.L. 3.203 below BM	
NMV/S/82 0230 UT	GR 3925E 23912N	W.L. 1.462 below BM	

4. DOPPLER JMR TRANSLOCATION

It was proposed to conduct translocations from Davis to Murphy Rocks and Davis to Filla Island. However, the former was the only translocation completed due to constraints imposed by having one helicopter for a long flight past the Sorsdal Glacier to Filla Island. This was considered dangerous as regards to search and rescue capabilities.

The results of the Davis-Murphy Rocks translocation confirmed previous precise ephemerides positioning to be satisfactory and a more accurate position was therefore achieved from the data obtained this year. See Annex 24.

5. MISCELLANEOUS SURVEY TASKS

5.1 Operations Building

The Department of Housing and Construction requested National Mapping's assistance in establishing building lines for the new operations building which will comprise the new radio room, OIC office, radio technician lab. and mezzanine observation floor.



Operations building, foreground right.

From local construction marks CON 8 and CON 6, building grid lines No. 1 and No. 11 were established. Temporary recovery marks were placed nearby for reference. After concrete pads were formed the North East corner of the building was located and from these angles and distances observed for holding bolts.

Angles were observed with a T2 theodolite and RED 1A distance measure.

Reduced levels on the start points of grid line position No. 1 and No. 11 were observed with a Hilger and Watts level.

5.2 Tarbuck Crag

During December 1985 a radio repeater station was erected on Tarbuck Crag powered by both wind generator and solar cells.

The wind generator is a good beacon clearly visible from most locations in the Vestfolds. It was decided to observe an angle and distance for future reference from NMS 273.



TARBUCK CRAG, wind generator and solar cell to power radio transmitter
Foreground shows survey mark NMS 273 (centre of painted white cross)

5.3 Anchorage Island, NMS 115

A new memorial cross was erected on Anchorage Island for Steve Bunning who passed away in October 1985. It was placed in the same position as the previous cross. However, the centre has changed slightly due to the size of the tubular steel construction. See Annex 25.



ANCHORAGE ISLAND, theodolite set over eccentric mark,
New Memorial cross erected October 1985.

A re-survey found that reference mark No. 3 had been destroyed and the centre of the new beacon cross is 0.062 metre south and 0.024 metre west of the station mark.

5.5 Deployment of Tide Gauge, Davis Station

National Mapping was requested by Dr Barry Gallagher to help deploy an Aanderaa tide gauge 50 metres offshore from benchmark D8 which is about 30 metres from the biological lab at Davis base. Water level was taken before and after the tide gauge was placed to later confirm results obtained from the tidal information.



DAVIS STATION, North-east view showing location of tide gauge placed in 1986.

6. ACKNOWLEDGEMENT

We would like to sincerely thank the expeditioners who were invaluable as bookers and appreciate the enthusiasm in which they performed the task allotted them. Their help certainly made for a most productive and even more enjoyable 1985-86 Summer in the Vestfold Hills.

7. GENERAL INFORMATION

Transportation of Equipment/Luggage

The Antarctic Division classifies luggage and equipment into three categories:

1. Personal luggage: which is stored in the cabin.
2. Wanted on Voyage (WOV): which is stored in a specified container on hold and also accessible during the voyage, providing weather permits.
3. Other Cargo: which is locked in sea containers and inaccessible until unloaded at the base.

Our advice is to carry delicate instruments on board yourself and securely store them in the 'WOV' area. The cabins are four berth and have very little storage space except for your two kit bags.

Clothing

The Antarctic Division has standard clothing issues for expeditioners. The issue is quite adequate and no extra work clothing should be required.

However make sure you are issued with Rossi boots which are excellent if walking all day over the rocky landscape; Canadian Sorel snow boots with felt inners, which are good if standing around on cold rock for long periods; silk gloves for instrument work even though they wear quickly; a Down coat which you can get on base. See Annex ... for a copy of a clothing issue form. Its advisable you receive all items you are entitled to while at the Antarctic Division as despite what you may be told the bases often are in short supply of particular items.

Personal Items

During the voyage and while on base the living areas are quite warm and comfortable. The following are a few suggested clothing items.

- Jumper 1
- Jeans or trousers 2
- T-shirts 2
- Shirts 2
- Runners or comfortable shoes 1
- Shorts and tracksuit (if sportsminded)
- Warm jacket (for on deck or walking between huts)

Also for your own entertainment, a cassette player/radio, books and perhaps a deck of cards or backgammon to pass 'spare' time on board the ship.

Communication

Telex: You are required to fill out a list of names and addresses of people you wish to contact and this is held by the Personnel Officer, Antarctic Division, Hobart. Each address is given a five letter code. You are also provided with a code book which lists common phrases and a corresponding five letter code e.g. YIZFO means 'I have been for a walk on the sea ice'. Make sure the people you are sending telexes to have a code book also. During 1984/85 summer, telexes were free of charge providing you were sensible about their length.

Telephone: Radio telephone communications are available at the base. The RO relays the name and number to be contacted to Sydney Radio. Its advisable to book a day or two in advance to make sure someone is home to receive your call. At Davis you can call from 0800-0900 and 1400-1500 Base time (approx 4 hours behind Canberra). The cost of a call is about \$1.50 per minute and an account is kept at the Antarctic Division.

Letters: Mail can both be received and sent on re-supply vessels. Arrival and departure times of ships from Hobart can be obtained from Antarctic Division. Stamps and envelopes are on sale at the base Post Office (Radio Room).

News: Selected items of news are sent each day via telex to all stations to keep you informed on what is happening around the world and at home.

On Base

Most things for general day to day living are provided at the base including:

Toiletries: Soap, washing powder, razors, shampoo, toothpaste and brushes, boot polish and cleaning agents.

Water: Showers and washing should be kept to a minimum during the summer months due to the number of extra expeditioners. However while at Davis, this year the tarn was put on line which alleviated the problem even though the water was dirty. Usually you can shower once every other day at all stations.

Beer: There is a ration of one carton a month of either beer or soft drink and if additional supplies are needed you should buy more from the re-supply ship. Spirits should also be bought from the ship on a duty free basis. "Home brew" is available in large quantities and is quite reasonable to drink.

Cigarettes: Are rationed to 200 cigarettes a month. However, these are often in short supply so additional supplies should also be bought from the ship at duty free prices.

Meals: Three meals a day are provided and are of a very high standard. Fresh bread is baked every second day.

Base Duties: You may be required to perform kitchen duties "slushy" and/or night duties. A roster is drawn up by the OIC and through suitable arrangements two people can perform these duties at the same time.

All expeditioners are required to help with the loading/unloading of supply ships unless told otherwise.

Accommodation: Sleeping quarters for summerers at Davis was in sea containers fitted out with two sets of double bunks, shelving and hanging space. You are also provided with all bedding.

Incidentals

Souvenirs: Badges, T-shirts, jumpers, postcards and other paraphenalia are organised each year for the bases. Enquiries at the Antarctic Division will provide you with information about the purchase of such items.

Photography

Camera: A 35 mm SLR camera should be all you require and most brands have been used down south including Cannon, Minolta, Nikon, Olympus and Pentax. Fully automatic cameras should have a manual override due to difficult exposure situations. Also due to cold conditions, spare batteries should be carried.

Lenses: The normal 50 mm lens plus a 28 mm wide angle and a zoom lens, say 135 mm or 80-200 mm will cover all situations. However a 28-80 mm would be the ideal lens as it is excellent for panoramas and very useful for closer shots.

Film: The amount of film you take with you is very much an individual thing. However the recommended type of film is as follows:

- Colour slides 64 Kodachrome/Ektachrome
- 100 or 200 print film
- Black and white film which produces excellent results.

Video Camera: Gives an excellent record of your experiences and of work conditions. They are highly recommended if you are prepared to carry them around.

8. SUMMARY OF ANNEXURES

- ANNEX 1 SCHEMATIC DIAGRAM OF LEVELLING ON LONG PENINSULA
- ANNEX 2 SCHEMATIC DIAGRAM OF LEVELLING ON BROAD AND MULE PENINSULA EAST
- ANNEX 3 SCHEMATIC DIAGRAM OF LEVELLING ON BROAD AND MULE PENINSULA WEST
- ANNEX 4 METRIC LEVELLING DATA SHEET
- ANNEX 5 METRIC LEVELLING DATA SHEET
- ANNEX 6 METRIC LEVELLING DATA SHEET
- ANNEX 7 METRIC LEVELLING DATA SHEET
- ANNEX 8 ADJUSTED HEIGHTS FROM 'LEVELONE' PROGRAM - TRIG HEIGHT ADJUSTMENT
- ANNEX 9 ADJUSTED HEIGHTS FROM 'LEVELONE' PROGRAM - LONG AND BROAD
PENINSULA, 'D' NUMBERS 1 TO 19
- ANNEX 10 ADJUSTED HEIGHTS FROM 'LEVELONE' PROGRAM - BROAD AND MULE
PENINSULA
- ANNEX 11 ADJUSTED HEIGHTS FROM 'LEVELONE' PROGRAM - BROAD AND MULE
PENINSULA
- ANNEX 12 LOCATION OF BMR MAGNETIC STATION 'A'
- ANNEX 13 LOCATION OF BMR ABSOLUTE MAGNETOMETER STATIONS C, C1
- ANNEX 14 LOCATION OF BMR GRAVITY AND MAGNETIC STATIONS
- ANNEX 15 LOCATION OF BMR GRAVITY STATION 8007-0000
- ANNEX 16 LOCATION OF ROYAL AUSTRALIAN NAVY NAVIGATION MARKS
- ANNEX 17 CONNECTIONS TO DRUM BEACONS OF TURNER AND LUCAS ISLANDS
- ANNEX 18 CONNECTIONS TO DRUM BEACONS OF FILLA AND GARDNER ISLANDS
- ANNEX 19 COMPUTATION OF VERTICAL ANGLE BETWEEN MET THEODOLITE AND
NMS 115 BEACON
- ANNEX 20 DAVIS STATION MINOR CONTROL NETWORK - GANET
- ANNEX 21 DAVIS STATION COMBINED MAJOR CONTROL NETWORK ADJUSTMENT - GANET
- ANNEX 22 STATION SUMMARY OF SCULLIN MONOLITH AND MURRAY MONOLITH
- ANNEX 23 LOCATION OF ELLIS FJORD - DIAGRAM OF TRAVERSE - FINAL RESULT
- ANNEX 24 TRANSIT - DOPPLER PROCESSING SHEETS FOR DAVIS, MURPHY ROCKS
AND FILLA ISLAND
- ANNEX 25 ANCHORAGE ISLAND STATION SUMMARY
- ANNEX 26 RELEVANT STATION SUMMARIES FOR 1984/85/86 SUMMERS
INCLUDING - DAVIS NMS 5
- CASEY B052 PAGEOS
- MAWSON ISTS 051
- TARBUCK CRAG NMS 273
- LIED BLUFF NMS 257
- MULE PENINSULA NMS 263

- TURNER ISLAND NMS 236
- LUCAS ISLAND NMS 275
- GARDNER ISLAND NMS 274
- PLOUGH ISLAND NMS 319
- FILLA ISLAND NMS 153
- SUTER POINT NMS 333
- BURTON LAKE NMV/S/14

9. SUMMARY OF FIELD BOOKS USED

LEVELLING BOOKS:	13172 DAVIS 1978/79	13323 DAVIS 1984/85
	13238 " /MAWSON 1980	13324 " 1984/85
	13254 " 1981/82	13325 " 1984/85
	13257 " 1981/82	13326 " 1984/85, 1985/86
	13300 " 1983	13330 " 1985/86
	13321 " 1984/85	13331 " 1985/86
	13322 " 1984/85	

GENERAL BOOKS:	15861 TELLEUROMETER 1985	19514 DAVIS 1983
	19001 " 1979	19522 MAWSON ISTS 051
	19010 MAWSON, ISTS 051	19523 DAVIS 1984/85, 1985/86
	19498 DAVIS 1985	19620 DAVIS STADIA 1985
	19499 DAVIS/MAWSON 1982	

HORIZONTAL:	19582 ELLIS FJORD 1985/86
	19598 1985 GENERAL
	19599 1985 GENERAL
	19631 ELLIS FJORD 1985/86
	19632 ELLIS FJORD 1985/86

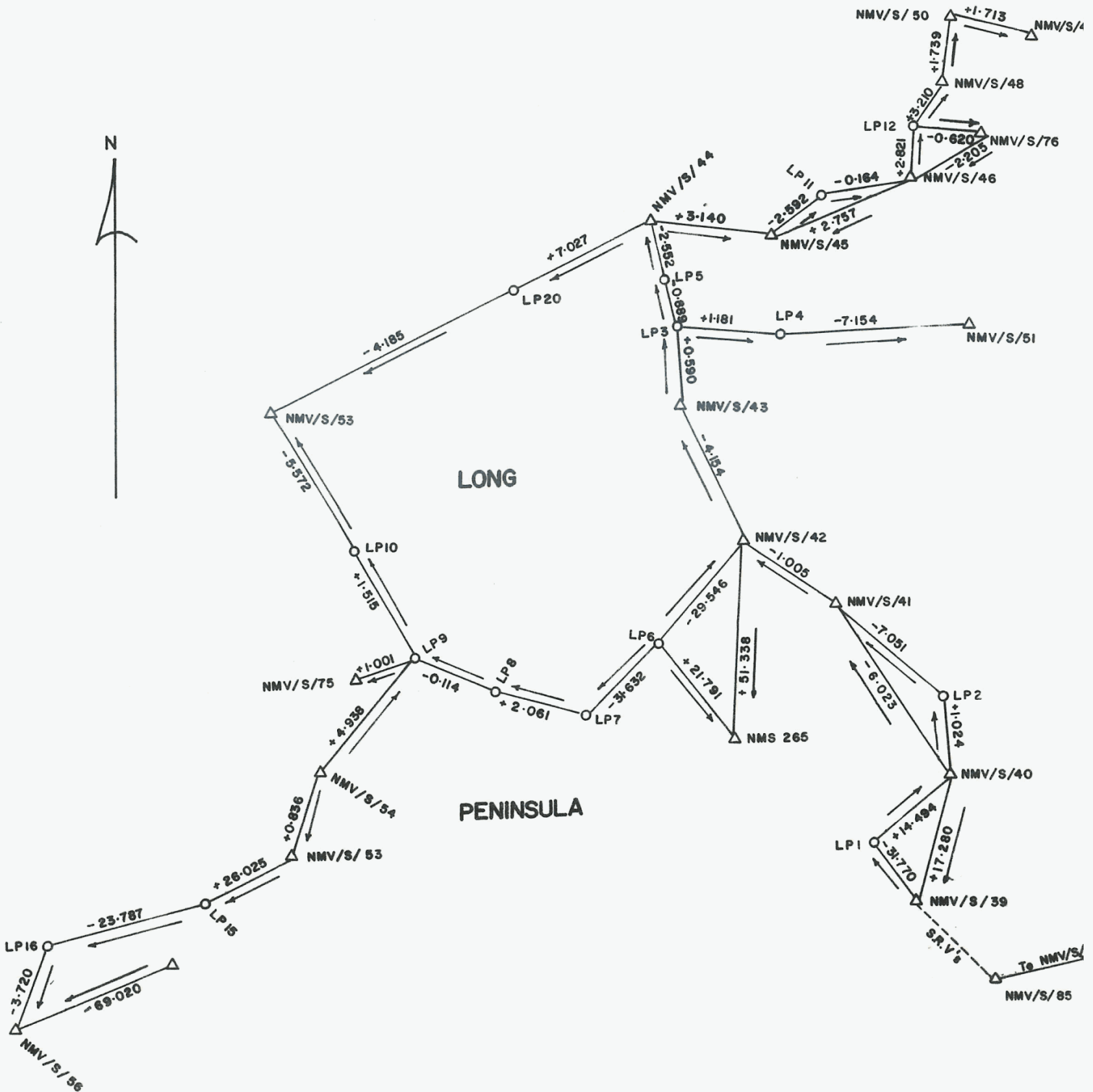
LEVEL CONTROL NETWORK

LONG PENINSULA

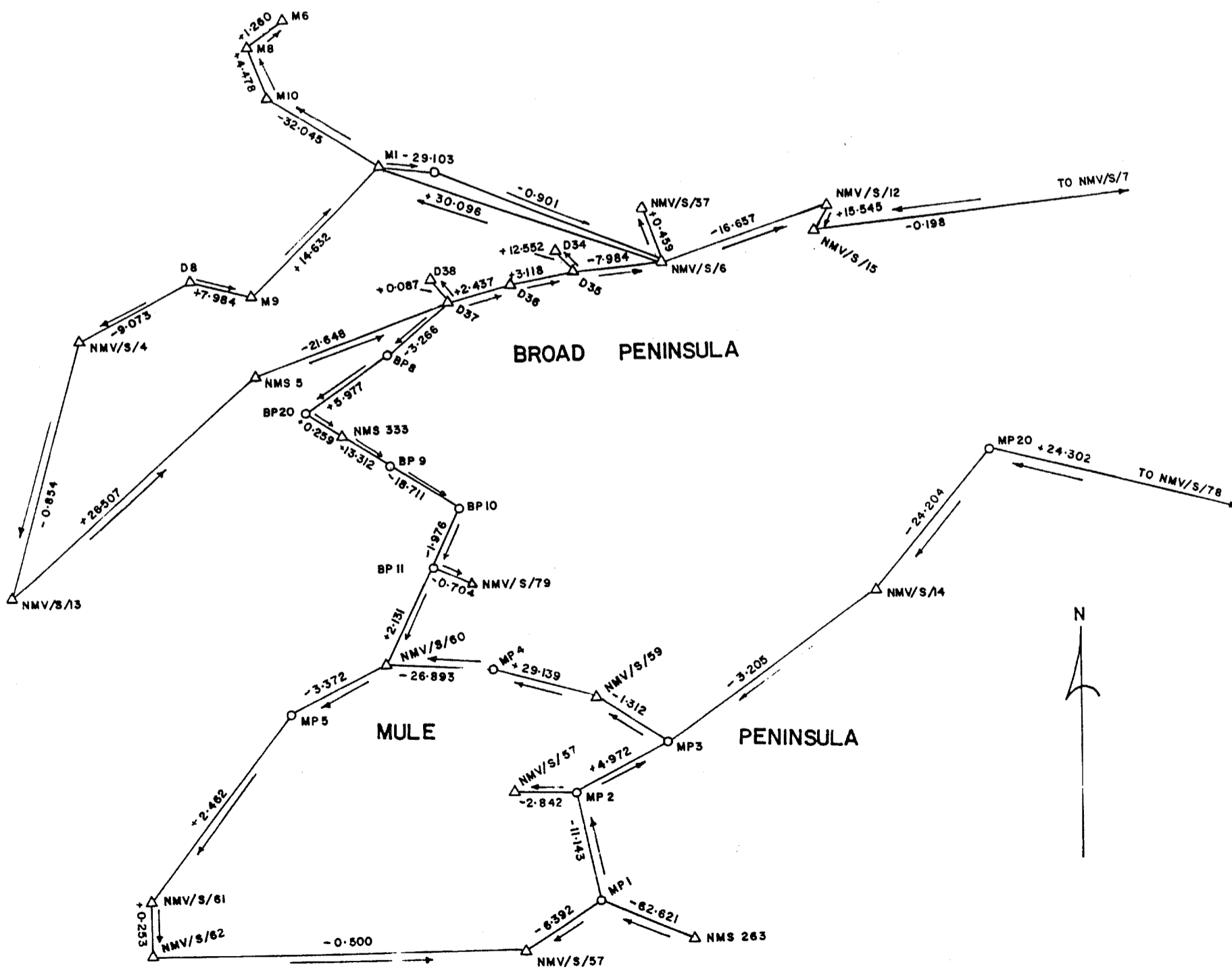
VESTFOLD HILLS

ANTARCTICA

NOT TO SCALE

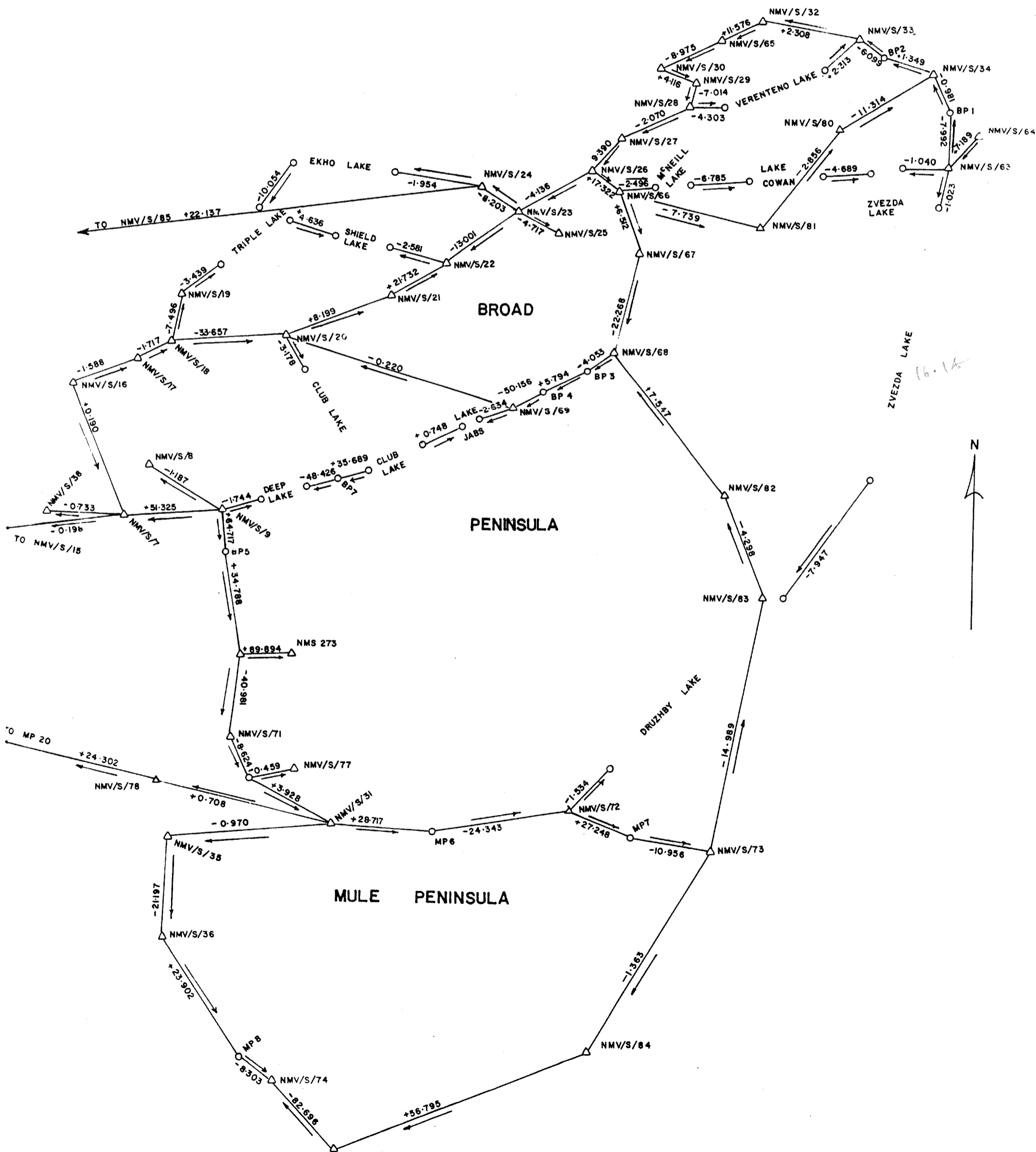


LEVEL CONTROL NETWORK
 BROAD AND MULE PENINSULA
 VESTFOLD HILLS
 ANTARCTICA
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LEVEL CONTROL NETWORK
BROAD AND MULE PENINSULA
VESTFOLD HILLS
ANTARCTICA

NOT TO SCALE



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 METRIC LEVELLING DATA SHEET

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FIELD BOOK No..... Pages.....	INSTRUMENT Type <u>HILLER WATTS</u> No.....	SURVEYOR <u>SHERIDAN, KAZEREA</u> Date: <u>1964/05 SUMMER</u>	CALIBRATION OF STAFF INTERVAL Type of Staves <u>BROOKHEADS AL'</u> Staff No..... Date..... Interval..... Date..... interval..... Mean of Interval.....	ORDER OF LEVELLING <u>4TH</u>
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BENCH MARKS				DIST KM	MEAN OBSD. DIFF METRES	LATITUDE			LONGITUDE			PRELIM. HT	LOCALITY DESCRIPTION
FROM	TO	DEG.	MIN.			SEC.	DEG.	MIN.	SEC.				
2 NMS 5	2 NMS 5	1 0 -	21 7 35	68 34 38	77 58 21	27	835	DAVIS STATION					
2 D38	2 D38	0 4 +	0 0 87	34 36	59 44	6		HEIDEMANN					
2 D37	2 NMS 333	3 8 +	2 9 70	34 39	59 47	6		"					
2 NMS 333	2 NMS 333	4 5 -	8 0 79	35 50	56 01	9		THE LOOKOUT					
2 NMV / S / 79	2 NMV / S / 79	1 7 +	2 8 35	36 58	59 31	1		ELLIS FJORD					
2 NMV / S / 60	2 NMV / S / 60	4 2 -	0 9 10	37 27	58 32	4		CEMETERY					
2 NMV / S / 61	2 NMV / S / 61	0 1 +	0 2 53	38 29	54 34	3		GR 746827					
2 NMV / S / 62	2 NMV / S / 62	4 2 -	0 5 00	38 34	54 34	3		GR 745822					
2 NMV / S / 57	2 NMV / S / 57	1 4 +	69 0 13	38 58	77 58 53	3		LATERANULA					
2 NMS 263	2 NMS 263	1 9 -	76 6 06	39 01	78 00 04	7		"					
2 NMV / S / 58	2 NMV / S / 58	4 0 +	6 5 02	38 32	77 59 53	5		CLEAR					
2 NMV / S / 59	2 NMV / S / 59	2 7 +	2 2 46	37 44	78 00 45	2		M'CALLUM					
2 NMV / S / 59	2 NMV / S / 60			68 37 27	77 58 32	4		CEMETERY					
2 NMV / S / 59	2 NMV / S / 14	6 2 +	4 5 17	68 37 31	78 05 12	6		BURTON					
2 NMV / S / 14	2 NMV / S / 78	4 9 +	0 0 98	36 23	1 0 07	6		ANDERSON					
2 NMV / S / 78	2 NMV / S / 31	2 5 -	0 7 08	35 58	1 3 38	5		ELLIS RAPIDS					
2 NMV / S / 31	2 NMV / S / 72	5 8 +	4 3 74	35 52	1 8 47	10		ORZHEBY					
2 NMV / S / 72	2 NMV / S / 73	2 8 +	16 2 92	68 36 37	78 20 51	26		CROOKED LAKE					
2 NMV / S / 31	2 NMV / S / 35	1 8 -	0 9 70	68 36 21	78 11 48	4		WATTS					
2 NMV / S / 35	2 NMV / S / 36	0 6 -	21 1 97	68 36 39	78 11 53	17		LE-BED					
2 NMV / S / 36	2 NMV / S / 74	3 3 +	15 5 99	68 37 31	78 14 06	1		OBLONG					
2 NMV / S / 31	2 NMV / S / 77	0 9 -	4 3 87	68 35 39	78 12 44	1		ELLIS FJORD					
2 77	2 71	2 5 +	9 0 83	35 05	1 1 22	10		CORRIERSON					
2 71	2 70	1 5 +	40 9 81	34 34	1 1 36	51		GR 5904					
2 70	2 9	2 4 -	99 5 05	33 56	1 1 34	49		DEEP					
2 9	2 7	1 4 +	51 3 25	33 52	1 1 15	3		DEEP					
2 7	2 15	5 1 -	0 1 98	32 54	0 5 50	3		STINEAR					
2 15	2 12	0 2 -	15 5 45	34 03	0 6 13	13		STINEAR					
2 NMV / S / 12	2 NMV / S / 6	1 0 +	16 6 57	68 34 18	78 04 46	4		DINGLE					

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 Date: 15/7/85

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FIELD BOOK No. Pages	INSTRUMENT Type <u>HILGER WATTS</u> No.	SURVEYOR <u>SHERIDAN, KACZERA</u> Date <u>19/05/85</u>	Type of Staves <u>BROCKADES AL</u>	CALIBRATION OF STAFF INTERVAL Date Interval Date Interval Mean of Interval	ORDER OF LEVELLING <u>4TH</u>
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1	BENCH MARKS		4	5	6	7	8			9			10	LOCALITY DESCRIPTION	11		
	FROM	TO					DEG.	MIN.	SEC.	DEG.	MIN.	SEC.					
2	NMV/S/6	NMV/S/6		1	2	+	7	9	84	68	34	18	78	04	46	4	DINGLE
2	D35	D35		1	2	-	3	1	18	68	36	21	78	11	48	12	WATTS
2	D36	D36		0	9	-	2	4	37	68	33	58	78	11	53	9	LE-BED
2		D37		0	9	-	2	4	37	68	33	58	78	04	55	6	DINGLE
2	NMSS	NMV/S/13		1	3	-	26	50	7	68	35	00	77	57	02	1	DAVIS STATION
2	NMV/S/13	NMV/S/4		1	1	+	0	8	54	68	34	34	77	57	48	2	
2	NMV/S/4	DB		0	1	+	9	0	73	68	34	31	77	57	50	11	
2	DB	M9		0	6	+	7	9	84	68	34	18	77	58	27	19	TO
2	M9	M1		1	4	+	14	6	32	68	33	56	78	00	14	34	
2	M1	M10		1	0	-	32	0	45	68	33	41	77	59	50	2	
2	M10	M8		0	4	+	4	4	78	68	33	32	77	59	33	6	
2	M8	M6		2	0	+	1	2	60	68	32	52	78	01	13	8	LAW CAIRN
2																	
2	NMV/S/9	NMV/S/8		0	9	-	1	1	87	68	33	32	78	11	32	50	DEEP
2																	
2	NMV/S/7	NMV/S/38		0	5	-	0	7	33	68	33	37	78	10	11	2	ST NEAR EAST
2																	
2	NMV/S/6	NMV/S/37		0	7	+	0	4	59	68	33	58	78	04	65	4	DINGLE
2																	
2	D35	D34		0	3	+	12	5	52	68	34	12	78	02	53	24	DINGLE
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FIELD BOOK No. Pages.....	INSTRUMENT Type <u>WILDER WATS</u> No.....	SURVEYOR <u>SHENDON, KACZERA</u> Date <u>1981/6 SUMMER</u>	CALIBRATION OF STAFF INTERVAL				Mean of Interval "C"	ORDER OF LEVELLING <u>4TH</u>
			Type of Staves <u>BROCKENDES AL.</u>	Staff No	Date	Interval		

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
FROM	BENCH MARKS		TO	DIST	MEAN	DIFF	LATITUDE			LONGITUDE			PRELIM.	LOCALITY DESCRIPTION																																																																	
	①	②	③	KM	⑤	⑥	DEG	MIN	SEC	DEG	MIN	SEC	HT.																																																																		
2	NMV/S/7		NMV/S/7	3.3	0	190	68	33	52	78	11	15		DEEP																																																																	
2	16		NMV/S/16	1.5	1	588	68	32	30	78	11	25		BROCKEN HUT																																																																	
2	17		NMV/S/17	0.3	1	717	68	32	23	78	13	21		TASSIE																																																																	
2	18		NMV/S/18	1.7	33	657	68	32	21	78	13	39		TRIDENT																																																																	
2	20		NMV/S/20	0.7	8	199	68	32	22	78	15	41	31	CLUB																																																																	
2	21		NMV/S/21	0.8	8	199	68	32	04	78	16	26	23	OUAL																																																																	
2	22		NMV/S/22	0.8	21	732	68	31	52	78	16	06	1	SHIELD																																																																	
2	23		NMV/S/23	1.6	13	001	68	31	39	78	18	04	9	GR900962																																																																	
2	26		NMV/S/26	0.6	4	136	68	31	25	78	20	10	3	GR912963																																																																	
2	27		NMV/S/27	0.4	9	390	68	31	20	78	20	44	3	GR920967																																																																	
2	28		NMV/S/28	0.9	2	070	68	31	05	78	22	41	0	VERETENO																																																																	
2	29		NMV/S/29	0.7	7	014	68	30	53	78	22	51	13	GR930975																																																																	
2	30		NMV/S/30	0.4	4	116	68	30	45	78	22	22	13	GR925975																																																																	
2	32		NMV/S/32	0.7	8	975	68	30	39	78	23	33	17	GR933977																																																																	
2	33		NMV/S/33	1.9	2	308	68	30	35	78	24	18	3	GR941981																																																																	
2	34		NMV/S/34	0.9	4	50	68	30	48	78	26	24	3	GR956977																																																																	
2	34		NMV/S/34	0.6	4	973	68	30	57	78	28	16	13	BRIED BASIN																																																																	
2	63		NMV/S/63	0.4	7	189	68	31	36	78	28	04	10	ZVENDA																																																																	
2	64		NMV/S/64				68	31	28	78	28	20	10	BISERNOYE																																																																	
2	NMV/S/26		NMV/S/66	0.8	17	322	68	31	41	78	21	00	30	M'NEILL																																																																	
2	NMV/S/66		NMV/S/67	1.7	6	512	68	32	20	78	21	09	37	BRAUNSTEFFER																																																																	
2	NMV/S/67		NMV/S/68	2.1	22	268	68	33	02	78	19	32	14	GR903933																																																																	
2	NMV/S/68		NMV/S/69	3.0	48	415	68	33	22	78	16	18	34	JABS																																																																	
2	NMV/S/23		NMV/S/24	0.4	8	203	68	31	26	78	17	40	0	EKHO																																																																	
2	NMV/S/23		NMV/S/25	0.4	4	717	68	31	42	78	18	27	4	FARRELL																																																																	
2	NMV/S/18		NMV/S/19	0.5	7	496	68	32	08	78	13	49	8	TRIPLE																																																																	

NMP/81/144.59

Certified free from copying errors:
 Date:

**DIVISION OF NATIONAL MAPPING
AUSTRALIAN LEVELLING SURVEY
METRIC LEVELLING DATA SHEET**

Page 4 of 4 Pages

FIELD BOOK
No
Pages

INSTRUMENT
Type HILGER WATTS
No

SURVEYOR
SHERIDAN, KACZASPA
Date 1981/05/Summer

CALIBRATION OF STAFF INTERVAL
Type of Staves BROCKLADES AL Staff No. _____ Date _____ Interval _____ Date _____ Interval _____ Mean of Interval _____
"C"

ORDER OF LEVELLING
4th

1		2		3		4		5		6		7		8			9			10		11	
FROM		BENCH MARKS		TO		DIST. KM		MEAN OBSD. DIFF. METRES		LATITUDE			LONGITUDE			PRELIM. HT.		LOCALITY DESCRIPTION					
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑	㉒		
2	NMS 265	NMS 265		1.5-	51.337	68 28 42	78 13 29	61	1	LONG PENINSULA													
2	NMV/S/42	NMV/S/42		1.3-	4.154	28 23	14 49	10		GRB74020													
2	↓	↓		2.8-	5.383	27 52	14 40	6		PENDANT													
2	↓	↓		3.2+	2.522	27 48	16 47	0		GR887032													
2	↓	↓		4.1+	2.842	27 16	15 31	3		FLETCHER													
2	↓	↓		1.7+	5.058	27 32	11 22	6		ORGANIC													
2	NMV/S/75	NMS 265		4.6+	50.475	28 19	11 36	10		ACE													
2						68 28 42	78 13 29	61		LONG PENINSULA													
2	NMV/S/75	NMV/S/54		1.6-	5.939	68 28 45	78 10 40	5		GRB46011													
2	NMV/S/54	NMV/S/55		1.3+	0.836	29 06	09 13	6		GR836006													
2	NMV/S/55	NMV/S/56		5.0-	1.482	29 50	04 22	4		ROOKERY													
2	NMV/S/56	NMS 264		1.7+	69.020	68 29 53	78 05 44	73		ROOKERY													
2	NMV/S/42	NMV/S/41		0.9+	1.005	68 28 34	78 15 40	11		GR877016													
2	NMV/S/41	NMV/S/40		1.9+	6.027	68 29 24	78 16 44	17		ABRAXAS													
2	NMV/S/40	NMV/S/39		1.0+	17.276	68 29 37	78 16 22	34		GR885995													
2	NMV/S/44	NMV/S/45		0.1+	3.140	68 27 18	78 15 38	6		GR877037													
2	↓	↓		0.7-	2.756	27 18	16 07	3		GR882040													
2	↓	↓		0.6+	2.201	27 05	16 13	5		GR882047													
2	↓	↓		1.1+	3.830	26 37	16 41	9		GR885053													
2	↓	↓		0.7+	1.739	26 18	16 56	11		GR886059													
2	NMV/S/50	NMV/S/49		0.2+	1.713	68 26 17	78 17 11	13		GR887057													

NMP/B1/144.59

Certified free from copying errors: _____
Date: _____

Program LEVEL ONE

Computed Mon Jun 2, 1986 1:09 pm

National Levelling Adjustment of Australia

Adjustment of

~~WESTFOLD HILLS TRIG HEIGHT ADJ 1986~~

All Heights are in Metres

Station Name	Adjusted Height Above Adopted Datum	Source of Height
filed points		
1 DAVIS NMS 9	27.835	1983 MSL D
2 MULD PENINSULA NMS 263	71.768	1985-6 LEV
98 M1	33.866	1985-6 LEV
41 M10	1.221	1985-6 LEV
7 SUTER POINT NMS 337	9.158	1985-6 LEV
57 TRYNE ISLANDS NMS 259	29.660	MSL CON. 19
40 WYATT EARP IS NMS 272	40.850	MSL CON. 19
50 MCCALLIE BAS NMS 267	15.910	MSL CON. 19
51 MURPHY BAS NMS 268	22.390	MSL CON. 19
36 M6	7.559	1985-6 LEV
32 D34	24.300	1985-6 LEV
40 M8	6.299	1985-6 LEV
7 TARBUCK CRAG NMS 273	140.933	1985-6 LEV
52 SORSDAL KNOLL NMS 262	81.496	1985-6 LEV
56 LONG PEN. NMS 265	61.287	1985-6 LEV
5 ROSEMARY LAKE NMS 264	73.252	1985-6 LEV
27 LONG PEN. NMS 269	34.250	1985-6 LEV
adj. points		
6 HEIDEMANN BAY NMS 321	37.064	
8 THE LOOKOUT NMS 322	77.768	
9 HAWKER ISLAND NMS 269	38.743	
10 LAKE MCCALLUM NMS 323	76.073	
11 BELA HILL NMS 324	106.401	
12 LAKE STINEAR NMS 326	92.518	
13 WARMAN NMS 325	120.389	
15 DEEP LAKE NMS 327	85.942	
14 NMS 331	74.239	
16 DOSSER NMS 328	125.183	
17 FITZGERALD NMS 329	108.299	
4 LIED BLUFF NMS 257	127.468	
18 SHIROKAYA PT NMS 330	56.419	
20 M4	80.061	
19 PARTIZAN IS NMS 318	40.585	
21 POWELL POINT NMS 317	30.721	
22 PLOUGH IS NMS 319	52.793	
23 LUGG ISLAND NMS 320	23.725	
24 LUCAS ISLAND NMS 275	35.393	
25 ANCHORAGE IS. NMS 115	51.024	
26 GARDNER IS NMS 274	35.244	
33 M2	37.979	

Point	Adjusted Height Above Adopted Datum	Source of Height
99 M1	31.103	
24 M7 ECLL	31.850	
35 D28	13.528	
37 D27	16.387	
39 D29	15.648	
38 M5	39.049	
42 D31	1.566	
43 D30	7.956	
44 D32	4.406	
45 D33	3.139	
47 M13	2.783	
46 M14	3.305	
90 M3	46.661	
48 TURNER IS NMS 236	43.513	
53 BOULDER HILL NMS 261	157.440	
54 STALKER HILL NMS 268	142.576	
55 LICHEN VALLEY NMS 258	137.107	
58 NMS 271	8.940	
59 NMS 270	23.840	

Program LEVELONE
 Computed Tue May 20, 1986 11:49 am

National Levelling Adjustment of Australia

Adjustment of

VESTFOLD HILLS 4TH ORDER LEVELLING

All Heights are in Metres

Station Name	Adjusted Height Above Adopted Datum	Original Height
fixed points NMS 5	27.835	MAL 1957
D37	6.189	ADJ 1986
M1	33.866	ADJ 1986
D8	11.252	ADJ 1986
D35	11.748	ADJ 1986
NMV/S/9	-48.469	ADJ 1986
NMV/S/7	2.854	ADJ 1986
NMV/S/6	2.765	ADJ 1986
NMV/S/34	8.177	ADJ 1986
NMV/S/23	8.626	ADJ 1986
NMV/S/18	-0.646	ADJ 1986
adj. points D38	6.101	
M10	1.821	
M8	6.299	
M6	7.559	
NMV/S/8	-49.656	
NMV/S/38	2.121	
NMV/S/37	4.224	
D34	24.300	
NMV/S/63	17.150	
NMV/S/64	9.961	
NMV/S/25	3.909	
NMV/S/19	-8.142	
D16	23.437	
D17	16.138	
D18	16.644	
D1	23.974	
D15	12.332	
D14	26.682	
D19	10.959	
D7	16.815	
D6	17.720	
D5	19.912	
D4	18.919	
D3	23.075	
D2	23.812	
D11	15.199	
D10	14.488	
D9	15.034	

Station Name	Adjusted Height Above Adopted Datum	Source of Height
adj points D12		
D13	17.954	
NMV/S/24	18.914	
NMV/S/85	0.423	
NMV/S/39	22.560	
NMV/S/40	34.250	
NMV/S/41	16.970	
NMV/S/42	10.947	
NMV/S/43	9.947	
NMV/S/51	5.792	
NMV/S/44	0.405	
NMV/S/53	2.924	
NMV/S/75	5.761	
NMS 265	10.817	
NMV/S/54	61.287	
NMV/S/55	4.878	
NMV/S/56	5.714	
NMS 264	4.232	
NMV/S/45	73.252	
NMV/S/46	6.064	
NMV/S/76	3.307	
NMV/S/48	5.512	
NMV/S/50	9.342	
NMV/S/49	11.084	
	12.798	

Program LEVELONE
 Computed From May 1986 to 31.01.1986

National Levelling Adjustment of Australia

Adjustment of

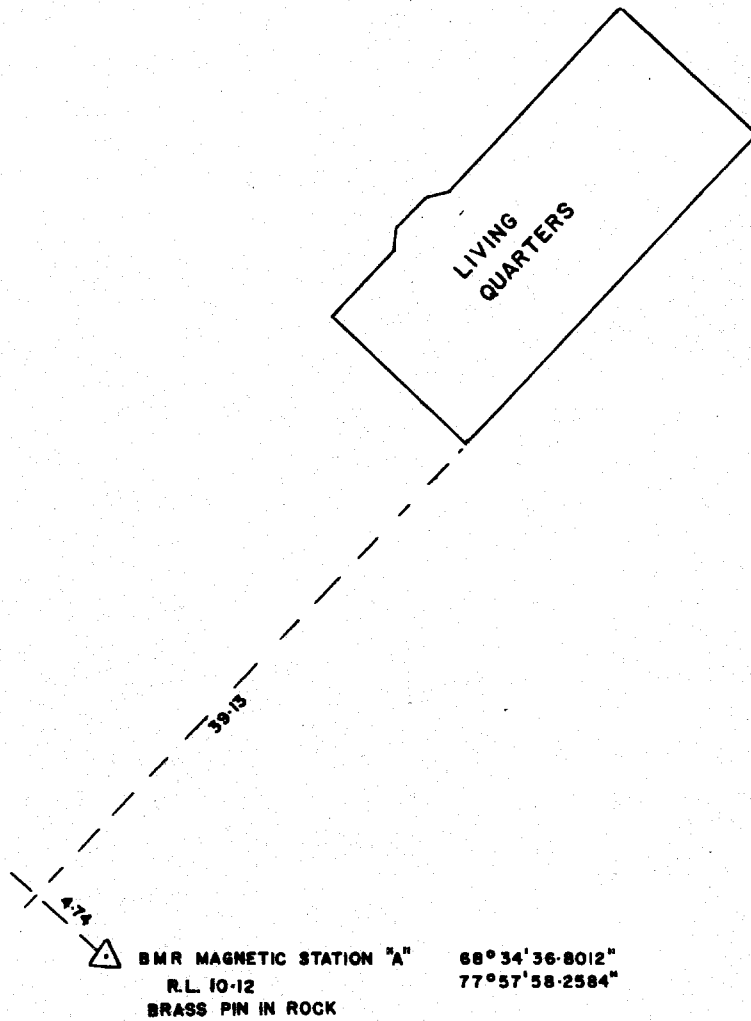
VESTFOLD HILLS 4TH ORDER LEVELLING

All Heights are in Metres

Station Name	Adjusted Height Above Adopted Datum	Source of Height
fixed points NMS 5	27.835	S.L 1983
adj. points D37		
NMS 333	6.189	
NMV/S/79	9.158	
NMV/S/60	1.077	
NMV/S/61	3.911	
NMV/S/62	3.001	
NMV/S/57	3.254	
NMS 263	2.755	
NMV/S/58	71.768	
NMV/S/59	-4.838	
NMV/S/14	1.664	
NMV/S/78	6.178	
NMV/S/31	6.078	
NMV/S/72	5.369	
NMV/S/73	9.755	
NMV/S/35	26.053	
NMV/S/36	4.395	
NMV/S/74	-16.791	
NMS 262	-1.196	
NMV/S/84	81.496	
NMV/S/83	24.695	
NMV/S/82	11.070	
NMV/S/68	6.774	
NMV/S/77	14.326	
NMV/S/71	0.981	
NMV/S/70	10.061	
NMV/S/9	51.039	
NMV/S/7	-48.469	
NMV/S/15	2.854	
NMV/S/12	2.654	
NMV/S/6	-12.891	
D35	3.765	
D36	11.748	
NMV/S/13	8.628	
NMV/S/4	1.326	
D8	2.179	
M9	11.252	
M1	19.235	
	33.866	

Station Name	Adjusted Height Above Adopted Datum	Source of Height
adj points NMS 273	140.933	
NMV/S/16	2.661	
NMV/S/17	1.071	
NMV/S/18	-0.646	
NMV/S/20	-34.305	
NMV/S/21	-26.106	
NMV/S/22	-4.374	
NMV/S/23	8.626	
NMV/S/26	12.761	
NMV/S/27	3.371	
NMV/S/28	5.440	
NMV/S/29	12.454	
NMV/S/30	8.338	
NMV/S/65	17.313	
NMV/S/32	5.736	
NMV/S/33	3.428	
NMV/S/34	8.177	
NMV/S/80	19.490	
NMV/S/81	22.345	
NMV/S/66	30.083	
NMV/S/67	36.595	
NMV/S/69	-34.087	

DAVIS STATION
AUSTRALIAN ANTARCTIC TERRITORY
B.M.R. MAGNETIC STATION "A"
NOT TO SCALE

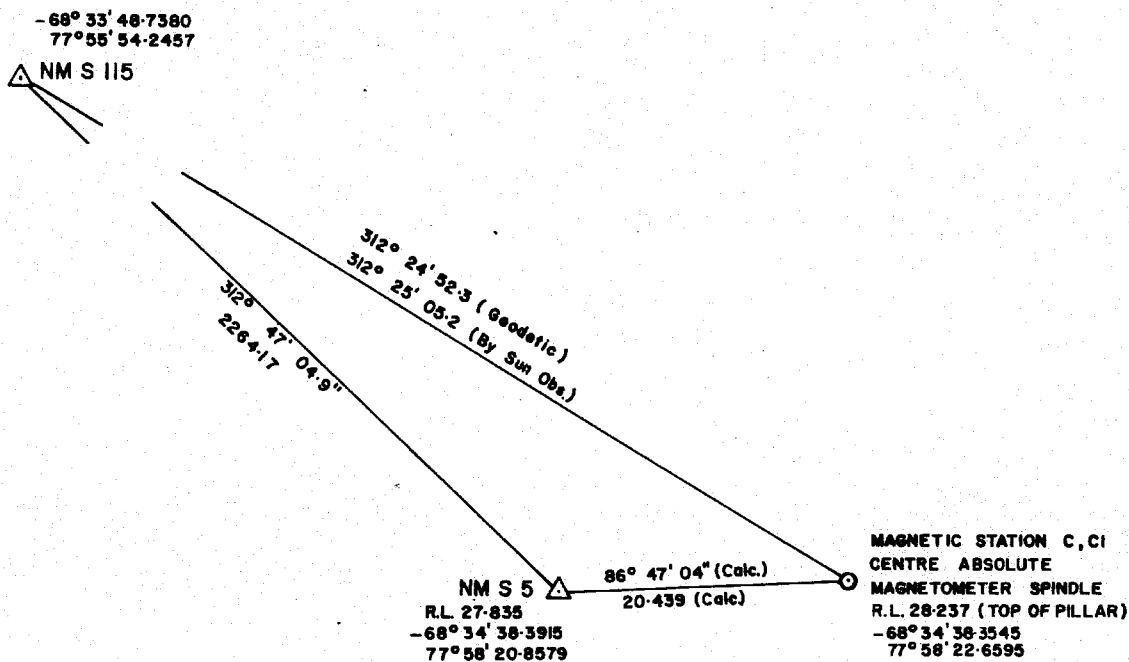


Horizontal Datum WGS 72
Vertical Datum Mean Sea Level 1983
Bearings are TRUE
Distances in METRES
Field Books

S.P. Kaczmarek
21 May 1985

DAVIS STATION
 AUSTRALIAN ANTARCTIC TERRITORY
 B.M.R. ABSOLUTE MAGNETOMETER
 B.M.R. MAGNETIC STATION C, CI

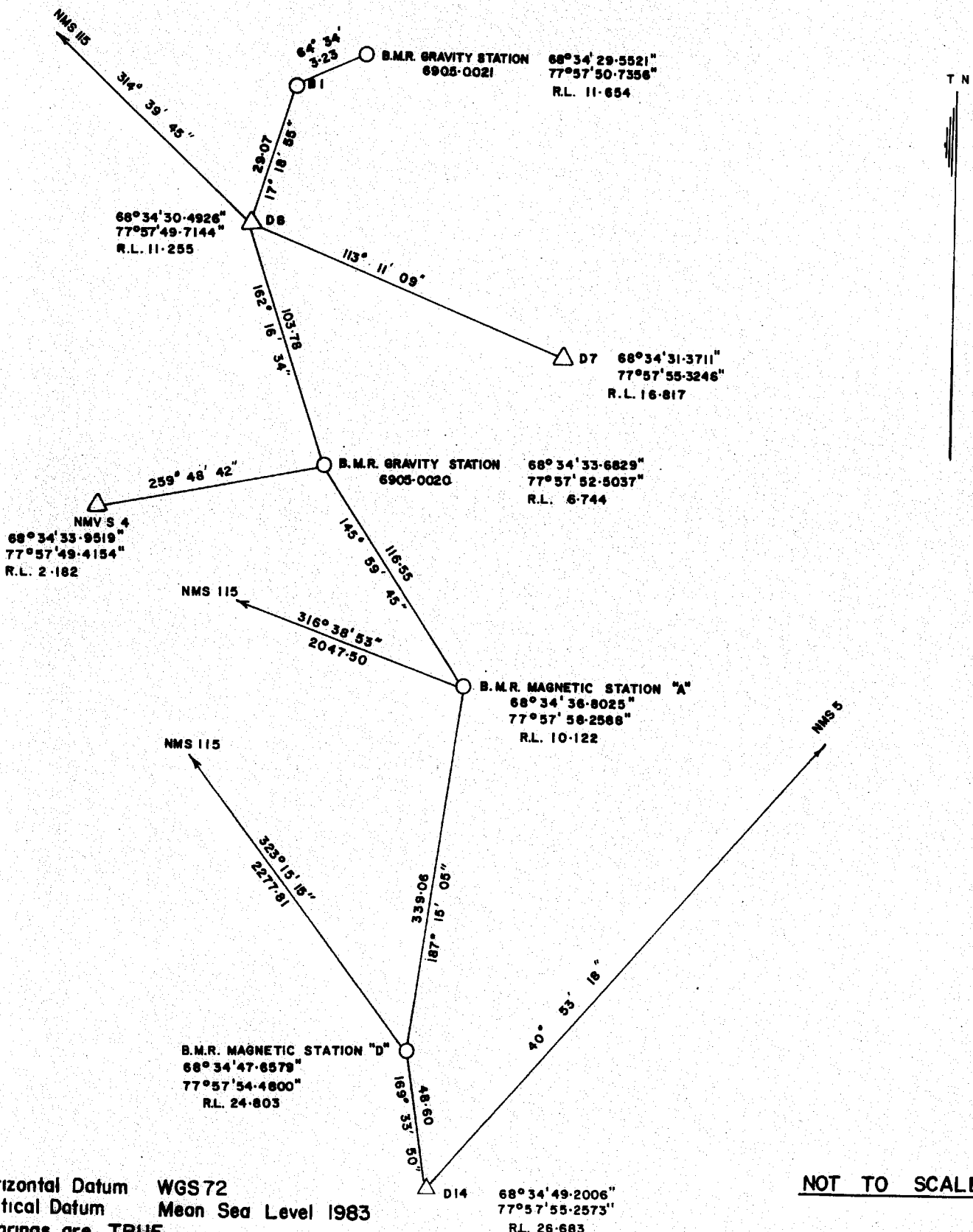
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 Vertical Datum : Mean Sea Level 1983
 Bearings are TRUE
 Distances in METRES
 Field Books 19498, 13326

J. P. Kagerepa
 21 May 1985

DAVIS STATION
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 B.M.R. GRAVITY AND MAGNETIC STATIONS
 TRAVERSE

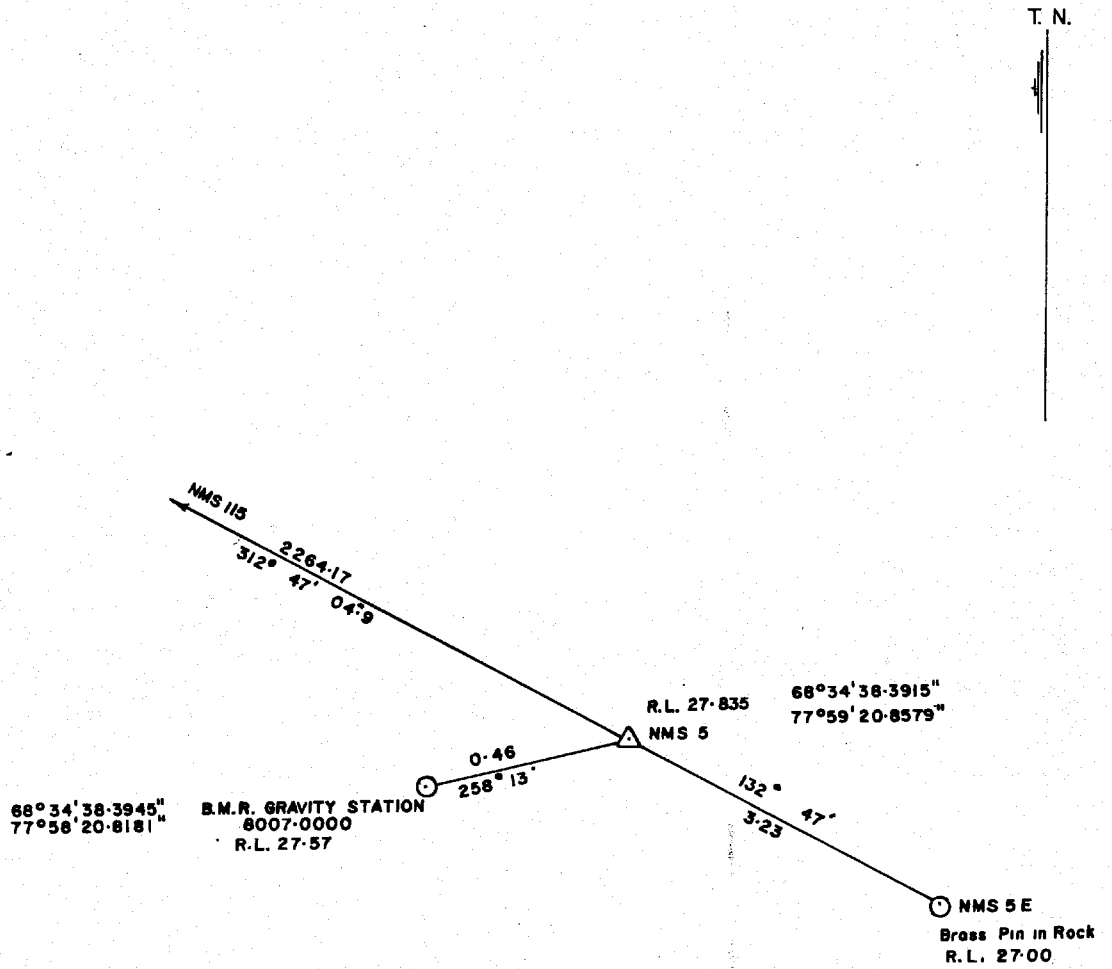


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 Bearings are TRUE
 Distances in METRES
 Field Books 19498 19598 13326

NOT TO SCALE

f. p. Hayes

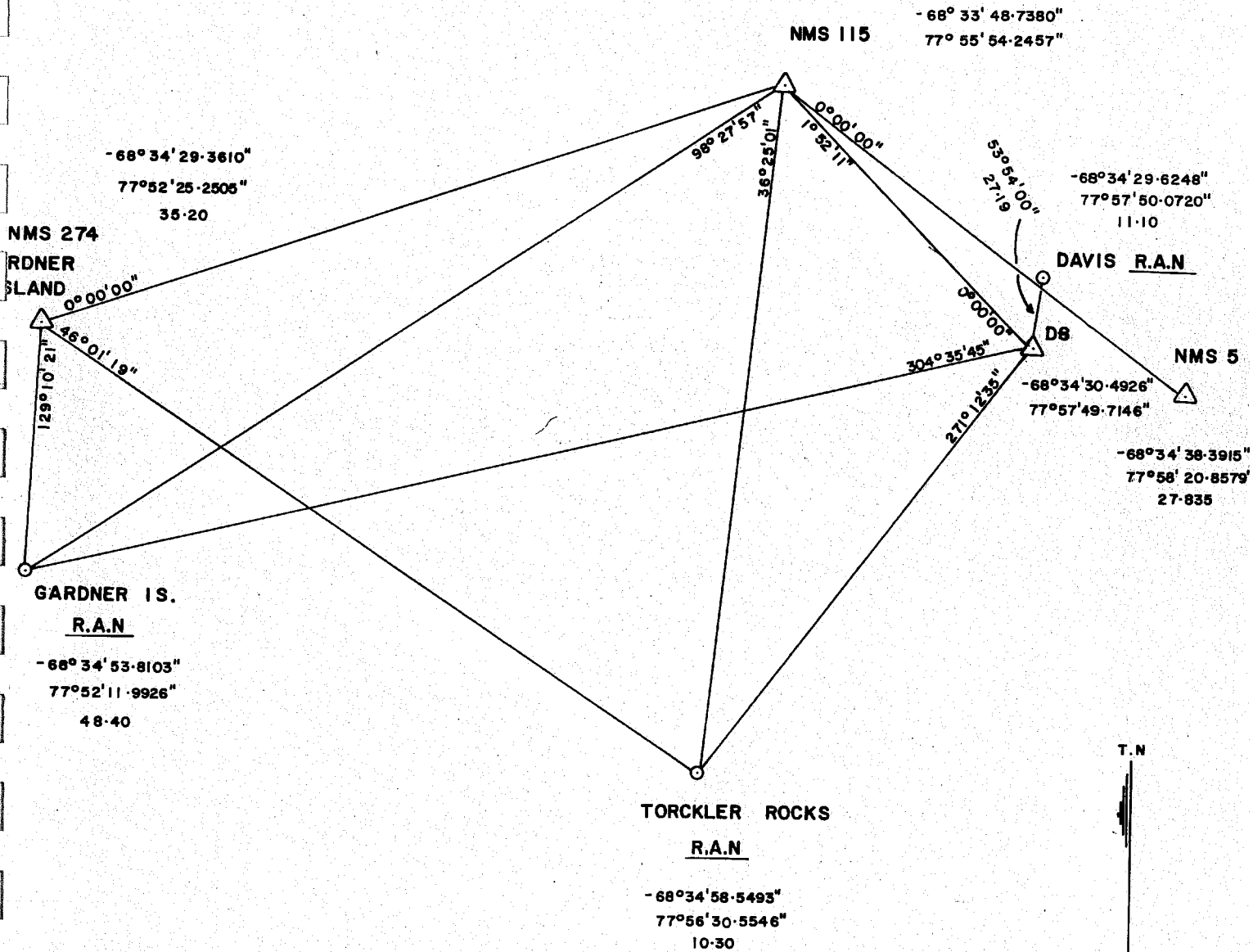
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 B.M.R. GRAVITY STATION 8007-0000
NOT TO SCALE



Horizontal Datum WGS72
 Vertical Datum Mean Sea Level 1983
 Bearings are TRUE
 Distances in METRES
 Field Book 19498

J.P. Kaogerepa
 21 May 1985

DAVIS STATION
AUSTRALIAN ANTARCTIC TERRITORY
R.A.N NAVIGATION MARKS.

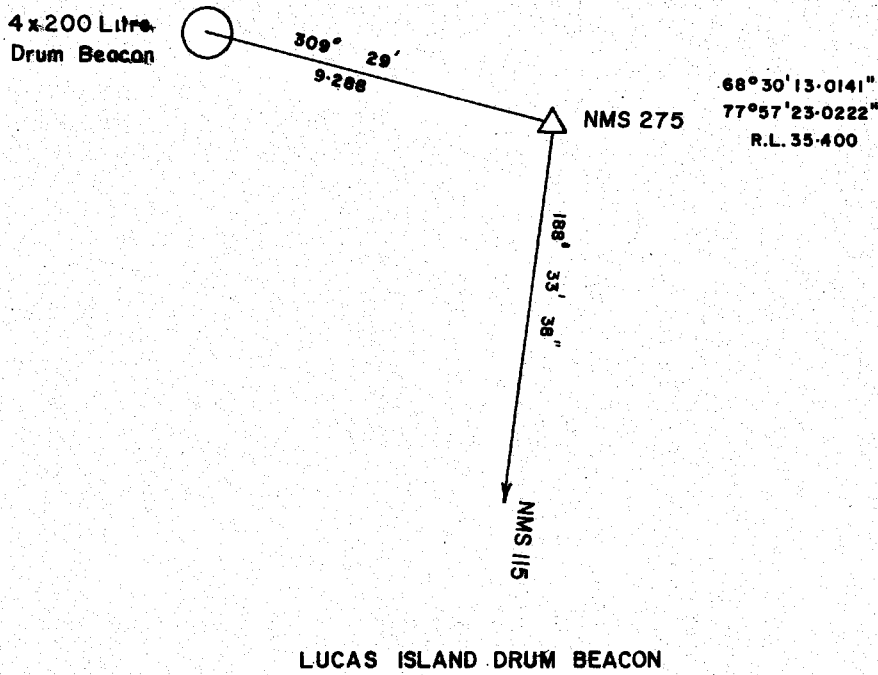
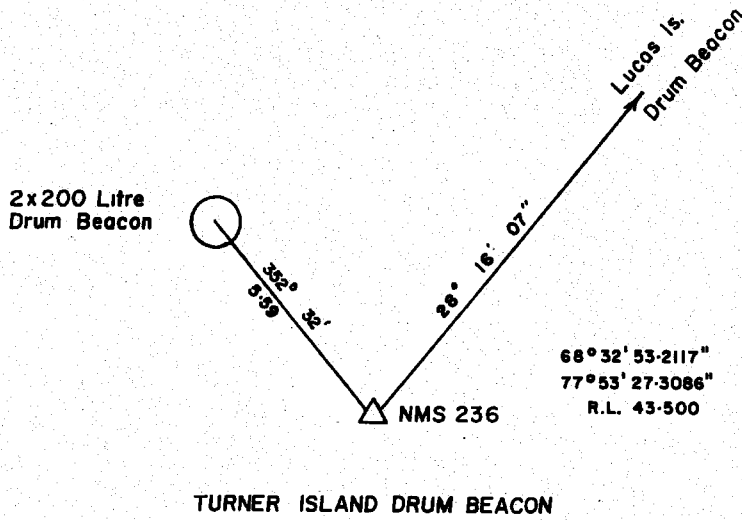


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VERTICAL DATUM : MEAN SEA LEVEL 1983
FIELD BOOK : 19598, 19599

NOT TO SCALE

[Signature]
22nd Mar 1985

DAVIS STATION
 AUSTRALIAN ANTARCTIC TERRITORY
 CONNECTIONS TO DRUM BEACONS

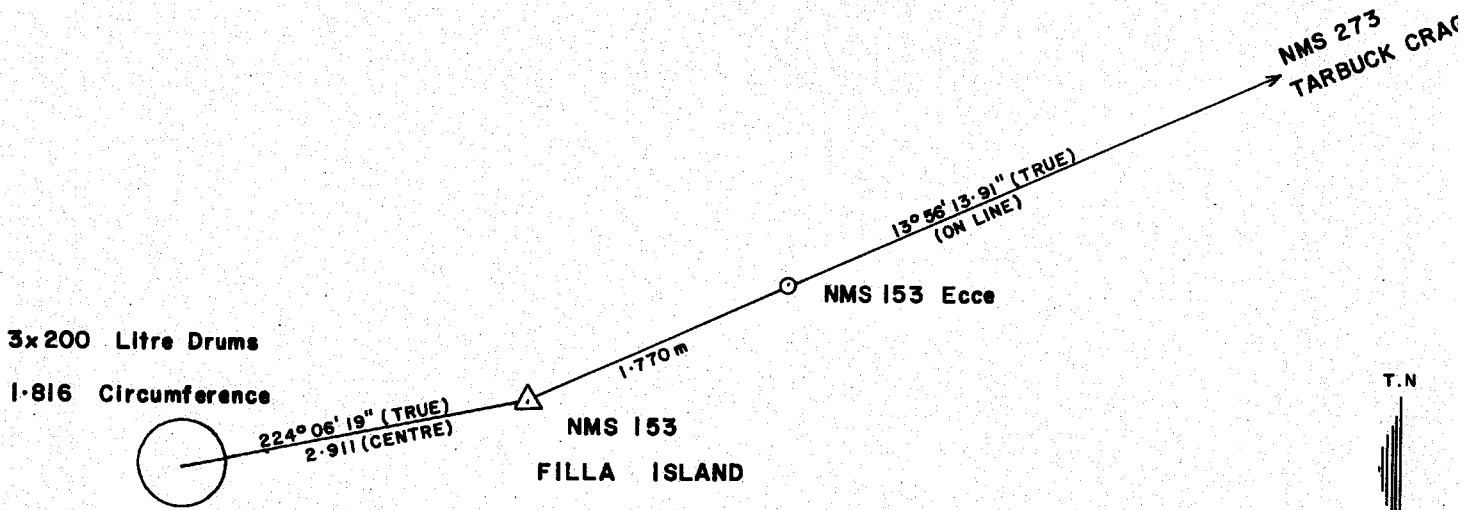


Horizontal Datum : WGS 72
 Vertical Datum : Mean Sea Level 1983
 Bearings are TRUE
 Distances in METRES
 Field Book 19599

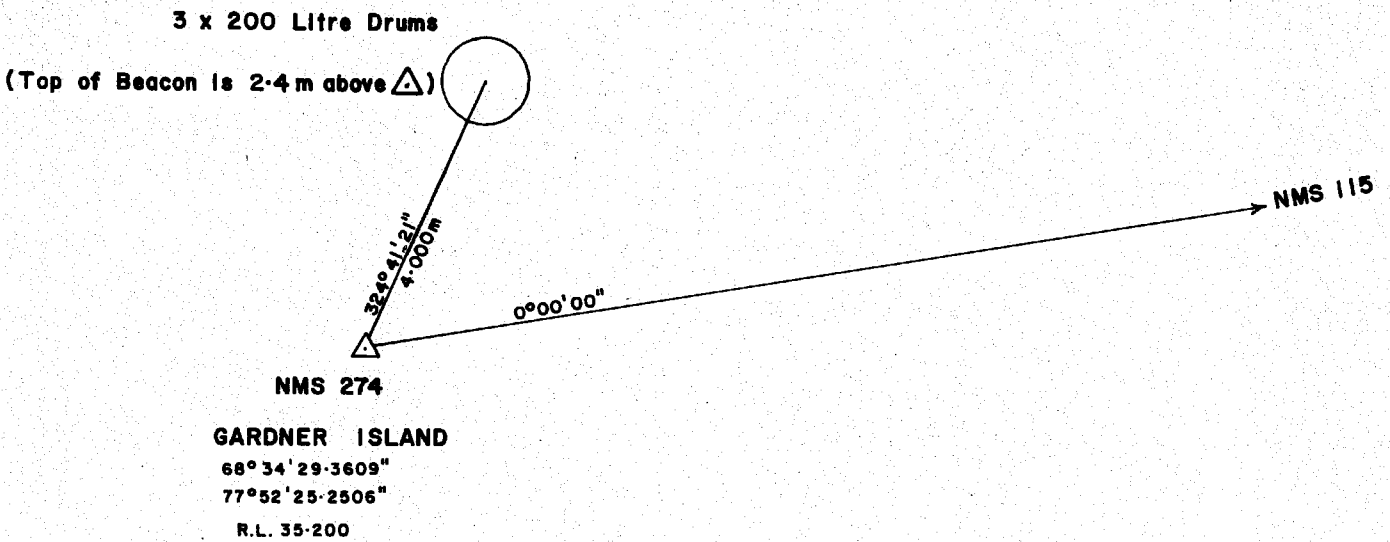
NOT TO SCALE

J. P. Kaye
 30th May 1985

DAVIS STATION
AUSTRALIAN ANTARCTIC TERRITORY
CONNECTIONS TO DRUM BEACONS



T.N

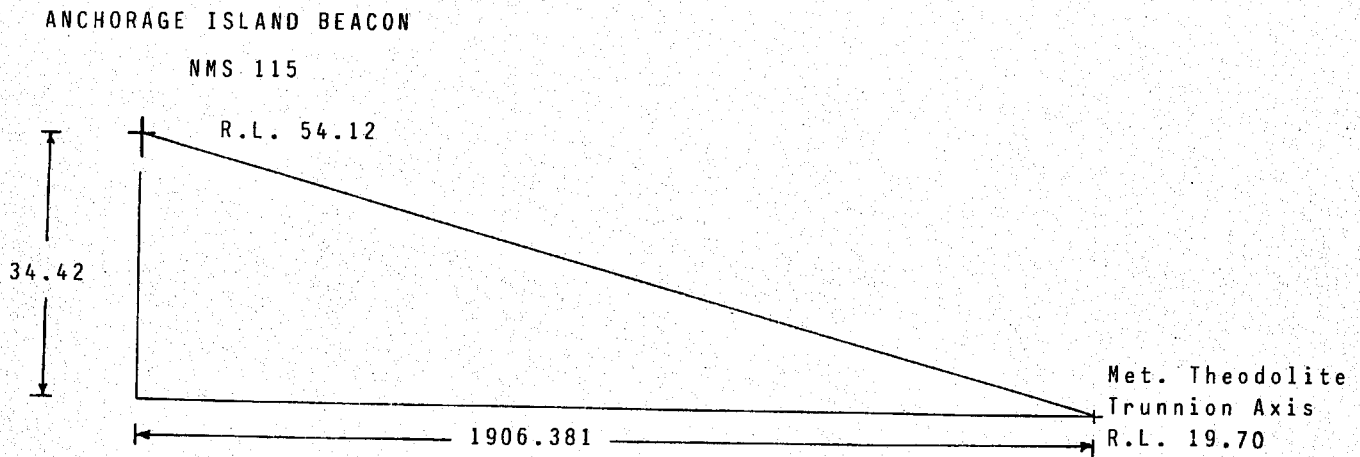


HORIZONTAL DATUM : WGS 72
VERTICAL DATUM : MEAN SEA LEVEL 1983
FIELD BOOK : 19523

NOT TO SCALE

DAVIS STATION
AUSTRALIAN ANTARCTIC TERRITORY

COMPUTATION OF VERTICAL ANGLE BETWEEN MET. THEODOLITE AXIS AND CROSS BEACON
NMS 115 ANCHORAGE ISLAND FROM KNOWN ELEVATION DIFFERENCE AND AN ASSUMED
VALUE FOR THE COEFFICIENT OF REFRACTION



$$\begin{aligned} \tan A &= \frac{H_B - H_A - \frac{S^2}{2R} + \frac{kS^2}{2R}}{S} \\ &= \frac{34.42 - 0.284 + 0.036}{1906.381} \\ &= 0.017927 \\ &= + 1^\circ 01' 37'' \end{aligned}$$

$$\begin{aligned} R^2 &= pz \\ p &= 6390960.04 \\ z &= 6396713.00 \\ \therefore R &= 6393835.87 \\ H_B - H_A &= 34.42 \\ S &= \text{Spheroidal Distance} \\ k &= 0.128 \text{ ASSUMED} \\ \frac{S^2}{2R} &= \text{Correction for Curvature} \\ \frac{kS^2}{2R} &= \text{Correction for Refraction} \end{aligned}$$

Division of National Mapping
 Three Dimensional Adjustment Program GANET
 Version 8.0 Created January 1987

Two Dimensional Adjustment
 fhop 2

Date of Computation 18/06/87

VESTFOLD HILLS - COMBINED MAJOR & MINOR CONTROL NETWORKS

WGS72

Icode	Station	Order Network	Adjusted Positions		Standard Ellipse			Elev. Metres	Order	Deflec. MC	Comp. PVC
			Latitude	Longitude	Semi- Major (m)	Semi- Minor (m)	Orient				
***** Warning ***** The variance ratio test has not been satisfied. . . . Exercise care in using results											
Error ellipses are scaled by the a PRIORI variance factor of 1.0000											
4	26 HEIDEMANN BAY	NMS 321 3	68 35 21.51447 S	77 57 9.84149 E	.028	.006	120.2		37.100		
		43.	620253.334	2388547.151	2 44 57.4222						
		44.	375899.348	2388359.437	-2 50 14.3691						
4	27 GARDNER ISLAND	NMS 274 3	68 34 29.33978 S	77 52 25.24663 E	.065	.016	3.0		35.200		
		43.	617111.221	2390314.049	2 40 31.4221						
		44.	372600.089	2389812.103	-2 54 38.3882						
4	28 D37	3	68 34 40.41996 S	77 59 46.96535 E	.018	.005	2.7		6.189 S		
		43.	622091.626	2389732.718	2 47 22.9716						
		44.	377613.508	2389718.332	-2 47 47.2488						
4	29 D36	3	68 34 30.03565 S	78 0 59.82051 E	.032	.007	171.1		8.628 S		
		44.	378421.977	2390079.750	-2 46 39.2049						
		43.	622931.437	2390013.723	2 48 30.6191						
4	30 D34	3	68 34 14.21637 S	78 2 56.09058 E	.054	.006	166.4		24.300 S		
		44.	379713.798	2390632.694	-2 44 50.6334						
		43.	624270.957	2390438.299	2 50 18.5880						
4	31 M9	3	68 34 17.76329 S	77 58 26.51144 E	.012	.005	96.6		19.235 S		
		43.	621215.519	2390477.922	2 46 7.6197						
		44.	376669.020	2390374.719	-2 49 1.7359						
4	32 D20	3	68 34 25.17891 S	77 59 4.70874 E	.018	.012	140.8		37.700		
		43.	621636.553	2390227.537	2 46 43.3304						
		44.	377112.430	2390166.505	-2 48 26.3081						
4	33 NDB	4	68 34 14.75735 S	77 58 22.09311 E	.014	.008	90.1		10.700		
		43.	621170.025	2390573.347	2 46 3.4484						
		44.	376614.454	2390465.263	-2 49 5.7924						
4	34 M10	3	68 33 40.71540 S	77 59 50.04203 E	.035	.015	120.1		1.821 S		
		43.	622216.462	2391578.329	2 47 24.6973						
		44.	377558.105	2391567.332	-2 47 43.2421						
4	35 M8	3	68 33 31.45506 S	77 59 32.81104 E	.037	.015	111.7		6.299 S		
		43.	622035.363	2391874.350	2 47 8.4762						
		44.	377349.054	2391844.422	-2 47 59.1093						

-----+-----
 | Division of National Mapping |
 | Three Dimensional Adjustment Program GANET |
 | Version 8.0 Created January 1987 |
 -----+-----

fhop 2
 Two Dimensional Adjustment

Date of Computation 18/06/87

-----+-----
 VESTFOLD HILLS - COMBINED MAJOR & MINOR CONTROL NETWORKS
 -----+-----

WGS72

Icode	Station	Order Network	Adjusted Positions		Standard Ellipse			Elev. Order	Deflec. Comp	PVC
			Latitude	Longitude	Semi-Major (m)	Semi-Minor (m)	Orient			

***** Warning ***** The variance ratio test has not been satisfied. Exercise care in using results

Error-ellipses are scaled by the a PRIORI variance factor of 1.0000

4	36 D29	3	68 33 29.83758 S	77 59 55.38563 E	.040	.015	117.1	15.600	
		43.	622293.359	2391911.949	2 47 29.4652				
		44.	377602.165	2391906.852	-2 47 38.0584				
4	37 D30	3	68 33 32.31103 S	78 0 3.32870 E	.039	.015	120.2	8.000	
		44.	377695.819	2391834.708	-2 47 30.7096				
		43.	622379.546	2391831.032	2 47 36.9086				
4	38 D32	3	68 33 42.62297 S	78 0 50.14450 E	.041	.016	135.7	4.400	
		44.	378241.285	2391541.435	-2 46 47.3140				
		43.	622893.878	2391486.060	2 48 20.6985				
4	39 D33	3	68 33 46.21182 S	78 2 43.58621 E	.056	.017	152.9	3.100	
		44.	379530.683	2391492.408	-2 45 1.7505				
		43.	624172.391	2391311.764	2 50 6.4006				
4	40 M14	3	68 33 43.86250 S	78 2 45.23113 E	.057	.017	151.6	3.300	
		44.	379545.809	2391565.994	-2 45 .1747				
		43.	624194.609	2391383.529	2 50 7.8867				
4	41 M13	3	68 33 43.24709 S	78 2 10.74725 E	.052	.015	147.0	2.800	
		44.	379154.567	2391566.257	-2 45 32.2726				
		43.	623805.245	2391421.871	2 49 35.7646				
4	42 M12	3	68 33 42.66772 S	78 1 38.39252 E	.053	.027	128.5	4.000 U	
		44.	378787.475	2391566.508	-2 46 2.3887				
		43.	623439.918	2391457.851	2 49 5.6259				
4	43 M11	3	68 33 41.80051 S	78 0 50.14455 E	.054	.026	112.4	3.900	
		44.	378240.050	2391566.883	-2 46 47.2983				
		43.	622895.126	2391511.507	2 48 20.6827				
4	44 M7	3	68 33 25.29286 S	78 1 7.53181 E	.038	.033	90.0	31.100	
		44.	378412.099	2392087.196	-2 46 30.7946				
		43.	623117.002	2392012.606	2 48 36.5556				
4	45 D28	3	68 33 13.50663 S	78 0 56.09002 E	.043	.031	90.0	13.500	
		44.	378264.865	2392445.592	-2 46 41.2242				
		43.	623005.348	2392383.632	2 48 25.6753				

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Two Dimensional Adjustment

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Date of Computation 18/06/87

VESTFOLD HILLS - COMBINED MAJOR & MINOR CONTROL NETWORKS

WGS72

Station	Order Network	Adjusted Positions		Standard Ellipse			Elev. Metres	Order Deflec. MC	Comp. PVC
		Latitude	Longitude	Semi- Major (m)	Semi- Minor (m)	Orient			
		Zone							Convergence
* Warning ***** The variance ratio test has not been satisfied. . . . Exercise care in using results.									
Error ellipses are scaled by the a PRIORI variance factor of 1.0000									
46 M6	3	68 32 51.83137 S	78 1 12.98688 E	.062	.015	120.6	7.559 S		
	44.	378423.698	2393125.525	-2 46 25.0799					
	43.	623229.603	2393044.882	2 48 40.9909					
47 D27	3	68 32 43.52091 S	78 1 44.09096 E	.068	.015	123.0	16.400		
	44.	378763.568	2393399.704	-2 45 55.9628					
	43.	623594.545	2393284.684	2 49 9.7906					
48 M5	3	68 32 38.35065 S	78 2 51.61630 E	.078	.016	129.9	39.000		
	44.	379520.781	2393596.512	-2 41 52.9966					
	43.	624367.323	2393406.866	2 50 12.5602					
49 M3	3	68 33 30.21164 S	78 2 57.18329 E	.062	.016	146.9	46.700		
	44.	379660.231	2391994.871	-2 44 48.7889					
	43.	624350.829	2391799.179	2 50 18.7510					
50 M1	3	68 33 56.07180 S	78 0 14.26296 E	.032	.016	135.6	33.866 S		
	44.	377855.415	2391105.564	-2 47 20.9818					
	43.	622467.414	2391089.816	2 47 47.5445					
51 TURNER ISLAND	NMS 236 3	68 32 53.19573 S	77 53 27.30673 E	.124	.043	30.2	43.500		
	43.	617953.163	2393256.123	2 41 27.4424					
	44.	373151.691	2392822.242	-2 53 38.6900					
128 D38	4	68 34 38.43205 S	77 59 45.88580 E	.018	.007	179.1	6.101 S		
	43.	622082.412	2389794.820	2 47 21.9284					
	44.	377598.293	2389779.243	-2 47 48.2161					
130 D35	4	68 34 17.19572 S	78 2 52.73051 E	.053	.008	167.9	11.748 S		
	44.	379680.204	2390538.683	-2 44 53.8183					
	43.	624228.372	2390348.003	2 50 15.5169					
134 D31	4	68 33 40.71210 S	77 59 49.93796 E	.035	.015	119.6	1.600		
	43.	622215.289	2391578.489	2 47 24.6004					
	44.	377556.923	2391567.377	-2 47 43.3389					
1 ANCHORAGE ISLAND	NMS 115 3	68 33 48.72058 S	77 55 54.25026 E	.036	.020	44.1	51.000		
	43.	619535.618	2391459.226	2 43 45.2910					
	44.	374901.559	2391187.858	-2 51 22.9582					

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Three Dimensional Adjustment Program GANET										Two Dimensional Adjustment	
Version 8.0 Created January 1987											
										Date of Computation 18/06/87	
VESTFOLD HILLS - COMBINED MAJOR & MINOR CONTROL NETWORKS										WGS72	
Icode	Station	Order	Adjusted Positions		Standard Ellipse			Elev.	Order	Deflec.	Comp.
		Network	Latitude	Longitude	Semi-Major	Semi-Minor	Orient	Metres	MC	PVC	
		Zone			(m)	(m)				Convergence	
***** Warning ***** The variance ratio test has not been satisfied. Exercise care in using results											
Error ellipses are scaled by the a PRIORI variance factor of 1.0000											
4	5 DAVIS	NMS 5	68 34 38.37290 S	77 58 20.84500 E	Fixed Position			27.835 S			
		43.	621120.584	2389843.333	2 46	2.7331					
		44.	376636.307	2389733.899	-2 49	7.4098					
4	53 FILLA ISLAND	NMS 153	68 48 36.12289 S	77 48 8.72529 E	.301	.232	125.6	88.200			
		43.	613014.037	2364244.222	2 36	47.5799					
		44.	371062.017	2363466.108	-2 58	54.4234					
4	52 MURPHY ROCKS	NMS 268	68 13 54.80192 S	78 43 55.08414 E	.562	.142	124.0	22.400			
		44.	406152.840	2429558.592	-2 6	23.2412					
4	8 SENTINAL KNOLL	M2 3	68 34 5.91440 S	78 2 48.34549 E	.053	.006	161.7	37.970 S			
		44.	379613.827	2390885.364	-2 44	57.6895					
		43.	624196.055	2390699.503	2 50	11.2146					
4	9 LUGG ISLAND	NMS 320 3	68 32 14.21969 S	77 57 29.31410 E	.071	.017	84.1	23.700			
		43.	620752.233	2394331.769	2 45	12.0283					
		44.	375832.842	2394165.211	-2 49	52.6049					
4	10 PLOUGH ISLAND	NMS 319 3	68 32 15.40717 S	77 59 58.10080 E	.073	.017	106.1	52.800			
		43.	622436.407	2394213.379	2 47	30.5705					
		44.	377520.553	2394211.280	-2 47	34.1068					
4	11 LUCAS ISLAND	NMS 275 3	68 30 12.99372 S	77 57 23.01590 E	.140	.068	90.8	35.400			
		43.	620861.125	2398086.115	2 45	3.8776					
		44.	375575.900	2397912.376	-2 49	56.1142					
4	12 POWELL POINT	NMS 317 3	68 31 18.23757 S	78 5 19.73228 E	.123	.015	128.1	30.700			
		44.	381081.384	2396155.385	-2 42	33.6093					
		43.	626169.561	2395801.768	2 52	28.8864					
4	13 PARTIZAN ISLAND	NMS 318 3	68 31 17.42276 S	78 7 27.02433 E	.138	.015	135.3	40.600			
		44.	382523.682	2396248.491	-2 40	35.1013					
		43.	627614.113	2395754.087	2 54	27.3694					
4	14 M4	3	68 32 17.31876 S	78 1 52.89861 E	.099	.015	136.2	80.100			
		44.	380863.834	2394312.859	-2 42	59.6882					
		43.	625773.738	2393989.119	2 52	5.0676					
4	15 SHIROKAYA POINT	NMS 330 3	68 31 46.65983 S	79 11 50.55233 E	.166	.014	149.9	56.400			
		44.	385553.409	2395481.683	-2 36	30.3159					
		43.	630554.960	2394596.059	2 58	33.2933					

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 Two Dimensional Adjustment

 Date of Computation 18/06/87

VESTFOLD HILLS - COMBINED MAJOR & MINOR CONTROL NETWORKS

WGS72

Icode	Station	Order Network	Adjusted Positions		Standard Ellipse			Elev. Metres	Order MC	Deflec. PVC	Comp Convergence
			Latitude	Longitude	Semi- Major (m)	Semi- Minor (m)	Orient				
***** Warning ***** The variance ratio test has not been satisfied. Exercise care in using results.											
Error ellipses are scaled by the a PRIORI variance factor of 1.0000											
4	16 DEEP LAKE	NMS 327 3	68 32 58.70045 S	78 11 38.03178 E	150	.011	161.1	85.900			
		44.	385513.161	2393245.947	-2 36 43.2605						
		43.	630297.315	2392474.747	2 58 23.1035						
4	17 FITZGERALD	NMS 329 3	68 32 45.09347 S	78 17 11.10019 E	208	.014	164.6	108.300			
		44.	389267.187	2393836.297	-2 31 32.9304						
		43.	634091.197	2392696.955	3 3 32.9498						
4	18 DOSSER	NMS 328 3	68 34 12.34899 S	78 15 20.70632 E	181	.015	175.9	125.200			
		44.	388137.013	2391080.624	-2 33 17.2323						
		43.	632698.088	2390064.191	3 1 51.9695						
4	19 NMS331	NMS 331 3	68 33 25.85607 S	78 10 2.88680 E	132	.034	165.2	74.200			
		44.	384474.210	2392356.247	-2 38 12.3342						
		43.	629176.655	2391690.354	2 56 55.0602						
4	20 WARMAN	NMS 325 3	68 34 20.89143 S	78 8 14.67746 E	107	.014	174.9	120.400			
		44.	383328.286	2390596.536	-2 39 54.0905						
		43.	627864.844	2390050.475	2 55 15.3995						
4	21 LAKE STINEAR	NMS 326 3	68 33 25.75083 S	78 6 27.96359 E	095	.009	157.8	92.500			
		44.	382040.635	2392246.255	-2 41 32.4460						
		43.	626743.847	2391817.745	2 53 34.9309						
4	22 BELA HILL	NMS 324 3	68 35 17.38780 S	78 6 6.76078 E	086	.019	11.6	106.400			
		44.	381963.366	2388780.590	-2 41 54.2480						
		43.	626329.589	2388375.972	2 53 17.3924						
4	23 LAKE MCCALLUM	NMS 323 3	68 37 20.09938 S	78 1 53.34331 E	088	.016	64.9	76.100			
		44.	379281.509	2384847.029	-2 45 52.5732						
		43.	623277.449	2384722.147	2 49 23.7403						
4	24 THE LOOKOUT	NMS 322 3	68 36 18.19907 S	77 57 14.55279 E	.052	.006	104.0	77.800			
		43.	620222.331	2386790.671	2 45 2.8749						
		44.	376039.496	2386608.262	-2 50 11.0793						
4	25 SUTER POINT	NMS 333 3	68 35 49.93903 S	77 56 6.18824 E	.045	.008	124.3	9.158 S			
		43.	619491.718	2387702.088	2 43 58.6716						
		44.	375223.610	2387444.229	-2 51 14.2062						

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Date of Computation 12/06/87

VESTFOLD HILLS - COMBINED MAJOR & MINOR CONTROL NETWORKS

WG972

Icode	Station	Order Network	Adjusted Position		Standard Ellipse		Orient	Elev. Metres	Order	Deflec. MC	Comp PVC
			Latitude	Longitude	Semi-Major (m)	Semi-Minor (m)					
***** Warning ***** The variance ratio test has not been satisfied. . . . Exercise care in using results											
Error ellipses are scaled by the a PRIORI variance factor of 1.0000											
4	4 TARBUCK CRAG	NMS 273 3	68 34 38.55310 S	78 11 54.15800 E	.144	.015	179.8	140.933 S			
		44.	385836.564	2390164.361	-2 36 30.0286						
		43.	630319.242	2389376.167	2 58 40.1527						
4	7 HAWKER ISLAND	NMS 269 3	68 38 2.89459 S	77 50 51.42060 E	.131	.016	129.5	38.700			
		43.	615743.679	2383755.200	2 39 7.9175						
		44.	371877.591	2383151.044	-2 56 10.0449						
4	6 MULE PENINSULA	NMS 263 3	68 39 .45694 S	78 0 3.55187 E	.131	.013	82.1	71.768 S			
		44.	378193.614	2381621.713	-2 47 36.7585						
		43.	621886.477	2381677.804	2 47 43.3771						
4	54 SORSDAL KNOLL	NMS 262 3	68 38 58.71146 S	78 12 59.58919 E	.210	.089	38.8	81.496 S			
		44.	386941.222	2382147.317	-2 35 33.7015						
		43.	630638.076	2381289.251	2 59 46.4057						
4	55 BOULDER HILL	NMS 261 3	68 36 18.51116 S	78 30 1.86075 E	.345	.092	8.5	157.400			
		44.	398268.118	2387600.952	-2 19 38.7735						
4	56 STALKER HILL	NMS 260 3	68 31 29.63608 S	78 27 42.94118 E	.320	.072	163.7	142.600			
		44.	396329.364	2396477.218	-2 21 43.4818						
		43.	641377.523	2391638.262	3 13 19.6192						
4	3 LIED BLUFF	NMS 257 3	68 30 58.18949 S	78 15 52.42777 E	.215	.015	150.1	127.500			
		44.	388228.814	2397105.061	-2 32 44.3081						
		43.	633375.794	2396051.477	3 2 17.4710						
4	2 ROOKERY LAKE	NMS 264 3	68 29 53.17245 S	78 5 43.81710 E	.160	.021	119.6	73.252 S			
		44.	381230.239	2398900.425	-2 42 9.6117						
		43.	626575.075	2398419.834	2 52 49.6265						
4	57 LICHEN VALLEY	NMS 258 3	68 27 59.43629 S	78 24 30.95601 E	.328	.063	143.6	137.100			
		44.	393878.211	2402891.819	-2 24 38.7056						
		43.	639561.873	2401261.611	3 10 16.3007						
4	58 LONG PENINSULA	NMS 265 3	68 28 42.04382 S	78 13 29.43219 E	.243	.063	134.5	61.287 S			
		44.	386416.712	2401245.453	-2 34 54.9958						
		43.	631975.020	2400348.783	3 0 1.5492						
4	59 TRYNE ISLAND	NMS 259 3	68 22 28.08686 S	78 25 27.63581 E	.411	.108	128.9	29.700			
		44.	394093.682	2413173.632	-2 23 40.4949						
		43.	640776.237	2411474.799	3 11 1.7801						

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Three Dimensional Adjustment Program GANET	
Version 8.0 Created January 1987	
	Date of Computation 18/06/87

VESTFOLD HILLS - COMBINED MAJOR & MINOR CONTROL NETWORKS

WGS72

Icode	Station	Order	Adjusted Positions		Standard Ellipse		Orient	Elev. Metres	Order	Deflec. MC	Comp. PVC
			Latitude	Longitude	Semi-Major (m)	Semi-Minor (m)					
			Zone								Convergence
***** Warning ***** The variance ratio test has not been satisfied. . . . Exercise care in using results											
Error ellipses are scaled by the a PRIORI variance factor of 1.0000											
4	60 WYATT EARP IS	NMS 272 3	44	68 21 22.39395 S	78 32 46.29301 E	.488	.107	131.8			40.800
				399020.621	2415411.317	-2 16 51.5705					
4	61 MCCALLIE ROCKS	NMS 267 3	44	68 18 38.04867 S	78 38 36.18908 E	.476	.115	130.0			15.900
				402824.106	2420654.213	-2 11 23.7723					
4	62 NMS 271	4	44	68 18 32.58678 S	78 38 39.27076 E	.477	.123	130.2			8.900
				402852.927	2420824.618	-2 11 20.8252					
4	63 NMS 270	4	44	68 13 53.28643 S	78 44 11.23696 E	.566	.145	123.9			23.800
				406336.708	2429612.320	-2 6 8.2148					
4	64 TARBUCK CRAG	NMS 154 3	44	68 34 38.55117 S	78 11 54.16124 E	.144	.015	179.8			140.933 S
				385836.598	2390164.423	-2 36 30.0256					
				630319.282	2389376.224	2 58 40.1557					

***** Warning ***** The variance ratio test has not been satisfied. . . . Exercise care in using results

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: **NM/S/235 SCULLIN MONOLITH**

Order: **DOPPLER 4**

Original Station Established by: Australian Survey Office	Date: 2 February 1985	Map Name: Scullin Monolith	Map Number: SO 41-42/15	Scale: 1: 250 000
Existing Station Marked by: Australian Survey Office	Date: 2 February 1985	DATUM: World Geodetic System 1972		
Reference Books: A.S.O. Q1240, Q1254		RECTANGULAR COORDINATES: Universal Transverse Mercator Grid: In Metres		
		GRID BEARING = ADJ AZIMUTH + CONVERGENCE		
		HEIGHTS: In Metres Above Mean Sea Level		

Cadastral Location: State Antarctica	County/District	SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
Parish/Hundred	Allotment/Section/Portion	67 47 09.9411	66 44 12.5944	42	404533.722	2479240.257	-2 05 43.26	442.7

Access and Locality Sketch: Particulars of station marking and beacon:

ACCESS: By helicopter in 1985

LOCALITY: See diagram below.

STATION MARK: Australian Survey Office plaque grouted into bedrock on summit.

BEACON: Nil.

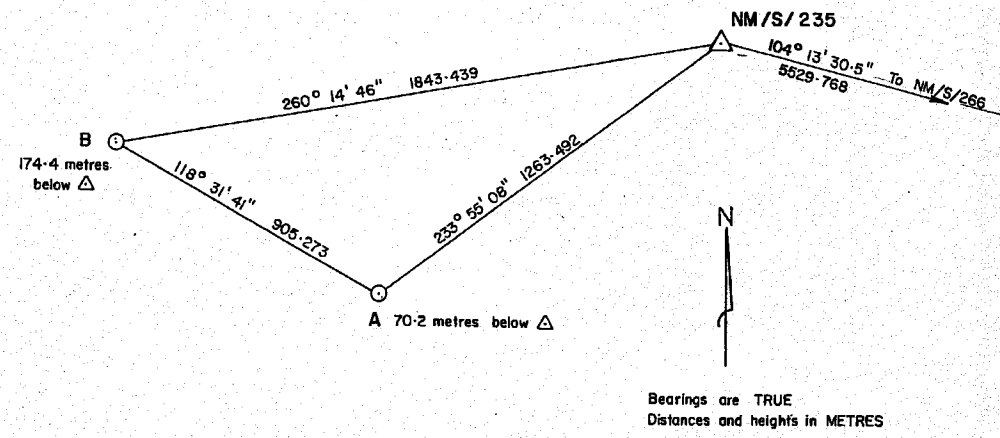
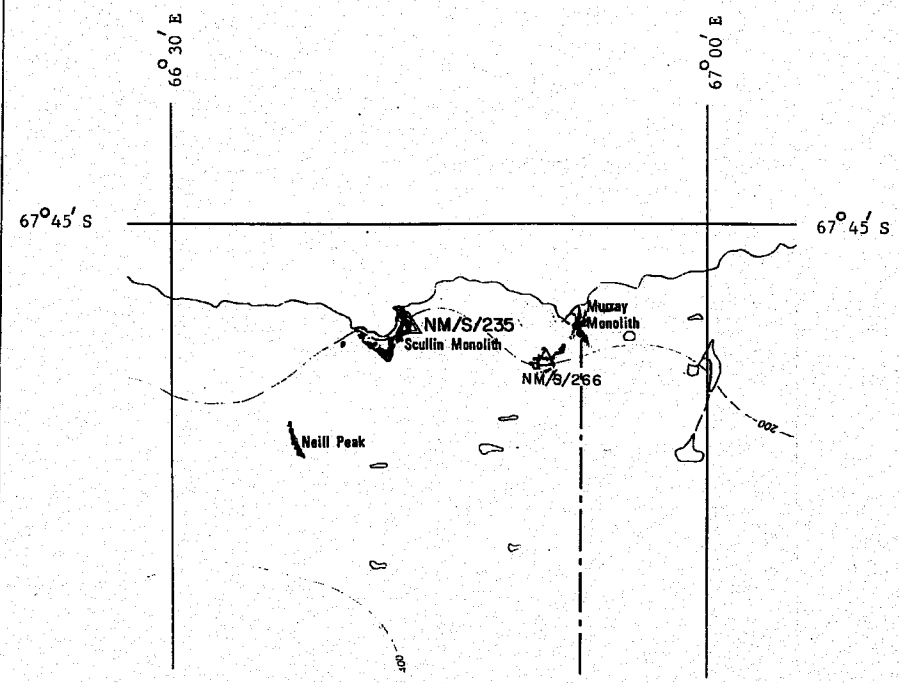
PHOTO CONTROL POINTS A and B: Ramset nails driven into bedrock.

WITNESS MARKS: Nil.

To ADJ AZIMUTH ADJ LENGTH

The mean sea level elevation of the summit of Scullin Monolith was photogrammetrically determined to be 442.7 metres.

The coordinates for NM/S/235 have been derived from the Doppler observations at NM/S/266 Murray Monolith to which have been applied the measured sea level distance and sun azimuth observation at NM/S/266.



Cadastral Connections & Reference Marks.

Photo Identification: CAS/C 4000 Run 3 Macey Island to Murray Monolith.

Certified free of transcription errors: *J. Green* Date: **22 May 1987**

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No _____

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: NM/S/266 MURRAY MONOLITH

Order: Doppler 4

Original Station Established by: DIVISION OF NATIONAL MAPPING	Date: 4 January 1979
Existing Station Marked by: DIVISION OF NATIONAL MAPPING	Date: 4 January 1979
Reference Books: JMR Doppler Satellite Observations Work File Field Books NM 14987, 19011	
Cadastral Location: State	County/District
Parish/Hundred	Allotment/Section/Portion

Map Name: SCULLIN MONOLITH	Map Number: SQ41-42/15	Scale 1:250 000
DATUM: World Geodetic System 1972		
RECTANGULAR COORDINATES: Universal Transverse Mercator Grid: In Metres		
GRID BEARING = ADJ AZIMUTH + CONVERGENCE		
		HEIGHTS: In Metres Above Mean Sea Level
SOUTH LATITUDE	EAST LONGITUDE	ZONE EASTING NORTHING CONVERGENCE HEIGHT
67° 47' 53.6236"	66° 51' 50.0219"	42 409938.441 2478078.649 - 1° 58' 40.31" 422.46

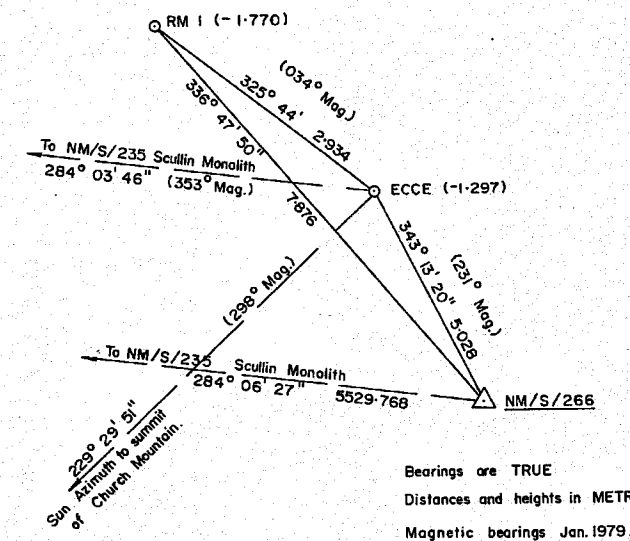
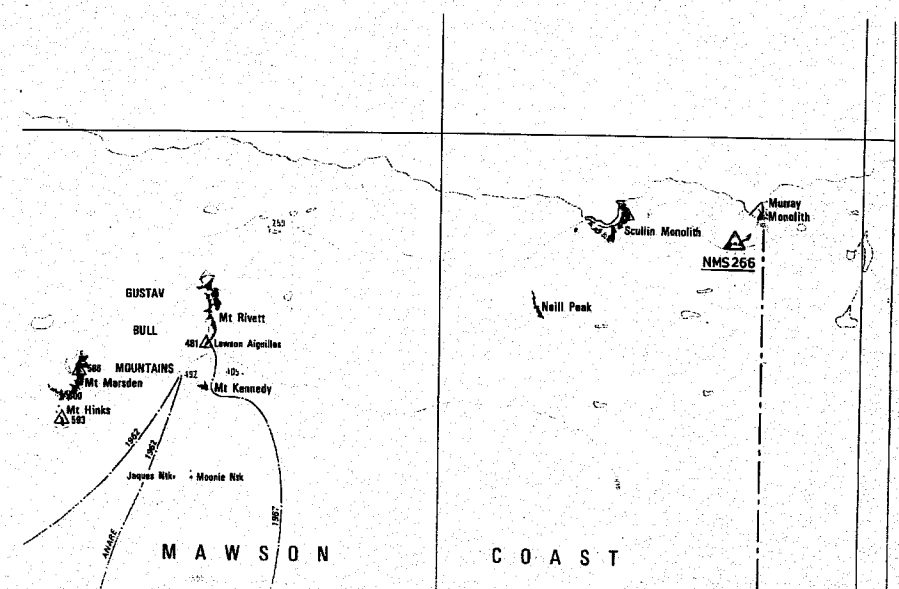
Access and Locality Sketch:
ACCESS: By helicopter in 1979. There are no suitable areas of ice/snow which are easily accessible for camping. There are several rock pools close by the summit which could be used for fresh water supplies.
LOCALITY SKETCH: See diagram below.

Particulars of station marking and beacon:
STATION MARK: Tapered brass pin 0.06 m high fixed to bedrock with Araldite epoxy resin.
ECCENTRIC MARK: Circular brass plaque 0.08 m in diameter fixed to bedrock with Araldite epoxy resin. The plaque is inscribed DOPPLER SATELLITE STATION DIVISION OF NATIONAL MAPPING AUSTRALIA and is also stamped NMS 266. A small brass plate approx. 75 mm x 25 mm stamped ECCE is fixed to rock with Araldite very close to the plaque.
BEACON: Rock cairn 1.5 m high erected over station mark.
REFERENCE MARK: Steel Ramset nail driven into crack in rock.

To ADJ AZIMUTH ADJ LENGTH

Coordinates are for mapping only.
Doppler satellite observations January 1979.

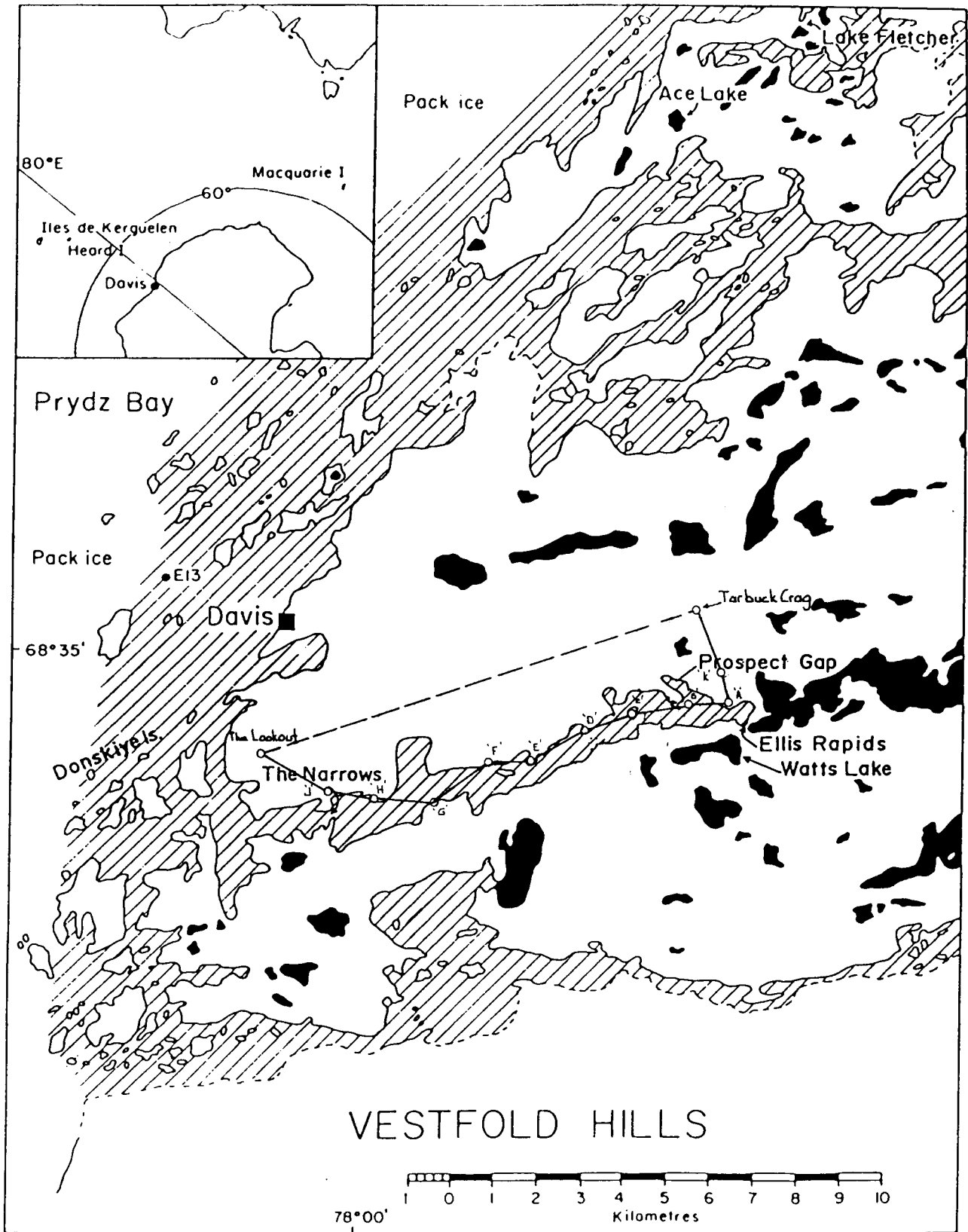
The mean sea level elevation of the summit of Scullin Monolith was photogrammetrically determined to be 442.7 metres. Using this determination plus the observed mean sea level distance and simultaneous reciprocal vertical angles (February 1985) between NM/S/266 and NM/S/235 Scullin Monolith, the mean sea level elevation of NM/S/266 was deduced to be 400.2 m.

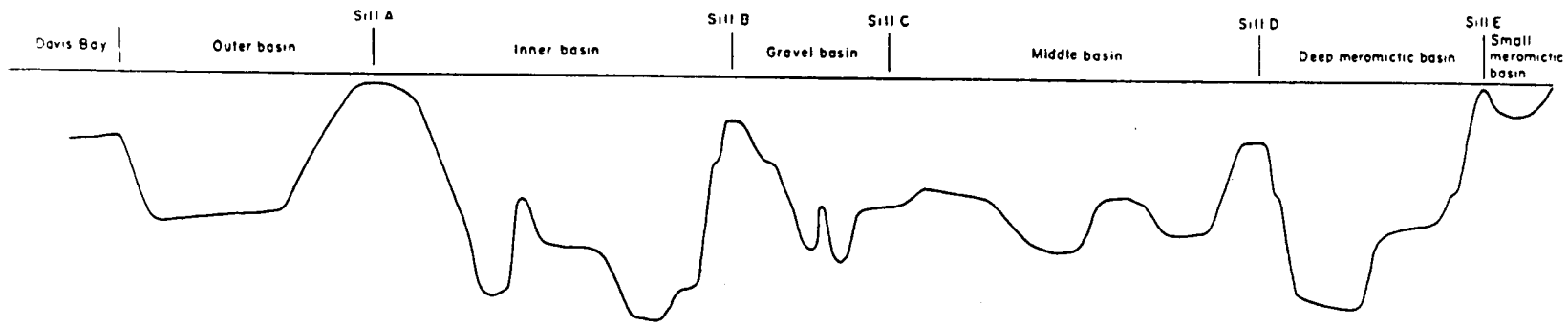
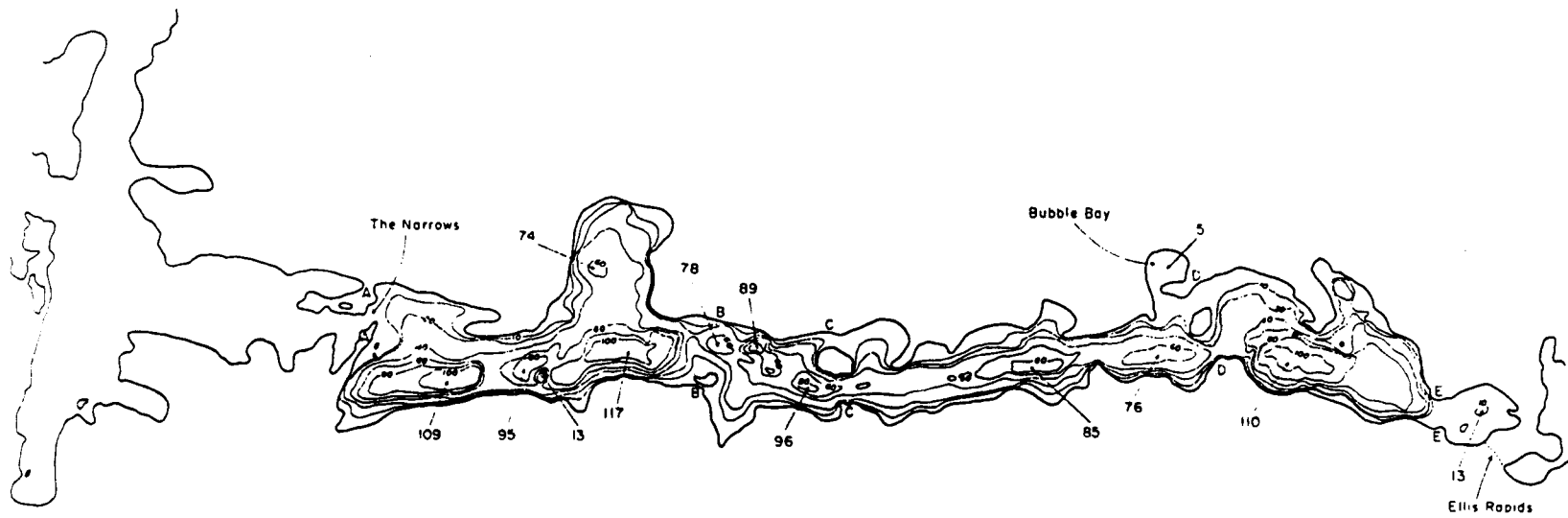


Cadastral Connections & Reference

CAS/C 4000 Run 3 Macey Island to Murray Monolith, Exposures 79 and 80.
CAS/C 8443 Exposures 2-4 and 6-8 inclusive (35 mm Spot Photography). Also
Photo Identification: 25 exposures terrestrial and aerial obliques.

Certified free of transcription errors: *[Signature]* Date: 6 Mar 81





PLANE TRAVERSE COMPUTATION

AUSTRALIAN MAP GRID

Traverse from TARBUCK CRAGTo THE LOOKOUTZone 44

$$E_2 = E_1 + L \sin \theta_1$$

$$N_2 = N_1 + L \cos \theta_1$$

	Station	Angle	$\sin \theta \pm$	$\cos \theta \pm$	EASTING	NORTHING
	Plane Distance L	Plane Bearing θ				
	1	2	3	4	5	6
0	ANCHORAGE IS.					
		95 20 45				
1	TARBUCK CRAG				385 836.711	2 390 164.118
	1298.049	155 16 47.7				
2	ELLIS K				386 379.536	2 388 985.020
	853.245	160 20 49.5				
3	ELLIS A				386 666.501	2 388 181.479
	864.556	276 49 51.2				
4	ELLIS B				385 808.082	2 388 284.309
	1328.971	255 59 42.9				
5	ELLIS C				384 518.614	2 387 962.695
	1170.823	245 34 28.6				
6	ELLIS D				383 452.579	2 387 478.550
	1381.998	240 31 13.4				
7	ELLIS E				382 249.507	2 386 798.450
	1080.627	261 58 55.1				
8	ELLIS F				381 179.444	2 386 647.719
	1437.266	232 47 42.8				
9	ELLIS G				380 034.691	2 385 778.654
	1463.971	266 12 05.5				
10	ELLIS H				378 573.936	2 385 681.670
	932.456	284 57 41.3				
11	ELLIS J				377 673.091	2 385 922.402
	1771.593	292 45 20				
12	THE LOOKOUT				376 039.727	2 386 607.757
		346 02 34			376 039.392	2 386 607.655
13	ANCHORAGE IS					
14					CLOSING BEARING	73° 03' 04.9
					CLOSING DISTANCE	0.3499
					ACCURACY	1:38,821
15						
16						
17						
18						
19						
20						

OBSERVING AUTHORITY: DIVISION OF NATIONAL MAPPING

STATION: NM 5 05
(DAVIS)

OBSERVER: S. YATES

STATE: ANTARCTIC

Type and number of Satellite receiver: JMR-1 75209
Date of occupation: 51-54, 1983
Field Books: NIL: Log sheets on computation file.

The Satellite observations were taken at STATION MARK, the height of the electrical centre of the aerial was 0.305 m above this mark. All values shown on this summary refer to the station mark; and are quoted in either seconds of arc or metres.

Geodetic Datum:

Australian Geodetic (AGD)

OR

Derived Australian Geodetic (AGD)

Geoidal heights H are referred to the Australian Height Datum (AHD).
N values are in terms of N = m at Johnston Geodetic Station.
 ϕ : X: -
 λ : Y: +
H: Z: -
N:

Ephemeris coordinates converted to AGD using either 1, 2 or 3

1) xyzcord;
 $\Delta x =$
 $\Delta y =$
 $\Delta z =$

2) Pointra;
 $\Delta x =$
 $\Delta y =$
 $\Delta z =$
 $\lambda \text{ ppm} =$
 $\omega =$
 $\psi =$
 $\epsilon =$

AHD:
X: -
Y: + 27.8
Z: -
MSL height = 27.8m

SATELLITE DATUM:

ϕ : -68 24 38.389
 λ : 77 58 20.585
N + H: 40.76
X: 486863.88
Y: 2285098.31
Z: -5314759.47

Internal Accuracy

.39
.42
.31

Del. Gate = 1.
Residual RMS = .46

Station uncertainty relating to AGD and AHD

Estimate: \pm m

3) Graphical Interpolation

$\Delta \phi =$
 $\Delta \lambda =$
 $N_{\text{corr}} =$

COMPUTER PROGRAM USED

DOPPLER 1970 (JMR VERSION)

SATELLITES OBSERVED

NO. OF PASSES

EPIHEMERIS

Sat 20120 (59) \checkmark 17
Sat 20140 (60) \checkmark 14
Sat 20170 (68) Z 8
Sat 20200 (77) X 6
Sat 20480 (105) X 17

After Preprocessing = 84
After Final Processing = 62

PRECISE IN TERMS OF NSWG 922

[Signature]

Lata Hashim

Plac.

Date 16/6/83

Date 16 June, 1983.

16 June 1983

OBSERVING AUTHORITY: NATIONAL MAPPING STATION: *NMS 268¹*
Murphy Rocks
 OBSERVER: *B. MURPHY* STATE: *ANTARCTIC*

Type and number of Satellite receiver: *JMR-1,
75.209¹*

Date of occupation: *DAY 37 TO DAY 40,
1979¹*

Field Books: *14966, 15511 AND 15515.*
LOG SHEETS ON COMPUTING FILE.
NMS 268 IS A CIRCULAR BRASS /
PLAQUE (0.08 M IN DIAM) SET IN
SURFACE IN A DRILL HOLE IN ROCK.

The Satellite observations were taken
 at *STATION MARK¹*, the
 height of the electrical centre of the aerial
 was *0.570¹* m above this mark.

All values shown on this summary refer to
 the station mark; and are quoted in either
 seconds of arc or metres.

Geodetic Datum:

Australian Geodetic (AGD)

OR

Derived Australian Geodetic (AGD)

Geoidal heights H are referred to the
 Australian Height Datum (AHD).

N values are in terms of N = m at
 Johnston Geodetic Station.

ϕ : X: -
 λ : Y: +
 H: Z: -
 N:

Ephemeris coordinates converted to AGD using either 1, 2 or 3

1) xyzcord;
 $\Delta x =$
 $\Delta y =$
 $\Delta z =$

2) Pointra;
 $\Delta x =$
 $\Delta y =$
 $\Delta z =$
 $\lambda_{ppm} =$
 $\omega =$
 $\psi =$
 $\epsilon =$

AHD:

X: -
 Y: +
 Z: -

MSL = 22.4 m

SATELLITE DATUM:

NWL 9D.
 ϕ : *-68 13 54.797¹*
 λ : *78 43 54.697¹*
 N + H: *35.950¹*
 X: *463532.425¹*
 Y: *2326485.176¹*
 Z: *-5900773.582¹*

Internal Accuracy

1.13¹
1.48¹
1.20¹

Station uncertainty
 relating to AGD and
 AHD

Estimate: \pm m

3) Graphical Interpolation

$\Delta \phi =$
 $\Delta \lambda =$
 $N_{corr} =$

COMPUTER PROGRAM USED

DOPPLER (J.M.R. VERSION¹)

SATELLITES OBSERVED

NO. OF PASSES

EPHEMERIS

SAT 68 (30190) 17¹
SAT 77 (30200) 8¹

25¹

PRECISE IN TERMS OF
NWL 9D.

Compiled by: *M.K. DOUCH*

Date: *2nd April 1979*

Certified free of transcription errors: *J Howard*

Date: *4th April 1979*

Approved by:

[Signature]

Date: *9/4/79.*

OBSERVING AUTHORITY: DIVISION OF NATIONAL MAPPING

STATION: NM S 153 FILLI ISLAND

OBSERVER: B. MURPHY

STATE: ANTARCTIC

Type and number of Satellite receiver: JMR - 1
75.209

Date of occupation: DAY 41 TO DAY 44 1979

Field Books: NIL. LOG SHEETS ON
COMPUTING FILE ONLY.
STATION MARK IS ROCK PITON (0.15m long)
UNDER SMALL ROCK CAIRN 0.5 M HIGH

The Satellite observations were taken
at NM S 153 ECCE, the
height of the electrical centre of the aerial
was 0.550 m above this mark.
All values shown on this summary refer to
the station mark; and are quoted in either
seconds of arc or metres.

Geodetic Datum:

Australian Geodetic (AGD)

OR

Derived Australian Geodetic (AGD)

Geoidal heights H are referred to the
Australian Height Datum (AHD).

N values are in terms of N = m at
Johnston Geodetic Station.

ϕ : X: -
 λ : Y: +
H: Z: -
N:

Ephemeris coordinates converted to AGD using either 1, 2 or 3

1) xyzcord;

$\Delta x =$
 $\Delta y =$
 $\Delta z =$

2) Pointra;

$\Delta x =$
 $\Delta y =$
 $\Delta z =$
 $\lambda_{ppm} =$
 $\omega =$
 $\psi =$
 $\epsilon =$

AHD:

X: -
Y: +
Z: -

MSL = 88.0 m

SATELLITE DATUM:
NWL 9D

ϕ : -68 48 36.157 ✓
 λ : 77 48 08.568 ✓
N + H: 102.39 ✓
X: 488536.953
Y: 2260027.398 ✓
Z: -5924448.953 ✓

Internal Accuracy

1.10 ✓
1.56 ✓
1.10 ✓

Station uncertainty
relating to AGD and
AHD

Estimate: ± m

3) Graphical Interpolation

$\Delta \phi =$
 $\Delta \lambda =$
 $N_{corr} =$

COMPUTER PROGRAM USED

DOPPLER (JMR VERSION) ✓

SATELLITES OBSERVED

SAT 68 (30190) 13 ✓
SAT 77 (30200) 7 ✓

NO. OF PASSES

20 ✓

EPHEMERIS

PRECISE IN TERMS
OF NWL 9D ✓

Compiled by: Laini Hashim

Date: 4th April 1979

Certified free of transcription errors: J Howard

Date: 4th April 1979

Approved by:

Pleed

Date: 9/4/79

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No. _____

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: **NMS 115 ANCHORAGE ISLAND**

Order: **3**

Original Station Established by: DIVISION OF NATIONAL MAPPING	Date: 2 March 1974
Existing Station Marked by: DIVISION OF NATIONAL MAPPING	Date: 2 March 1974
Reference Books: Ground Control Traverse 12803 Spot Photography 14512 General 19499, 15862, 19632	
Cadastral Location: State ANTARCTICA	County/District
Parish/Hundred	Allotment/Section/Portion

Map Name: VESTFOLD HILLS	Map Number: Part of SR43-44-283	Scale 1: 50 000
DATUM: World Geodetic System 1972		
RECTANGULAR COORDINATES: Universal Transverse Mercator Grid: In Metres		
GRID BEARING = ADJ AZIMUTH + CONVERGENCE		
HEIGHTS: In Metres Above Mean Sea Level.		
SOUTH LATITUDE	EAST LONGITUDE	ZONE
68 33 48.7380	17 55 54.2457	43
		EASTING
		374901.531
		NORTHING
		2391458.751
		CONVERGENCE
		+2 43 45.29
		HEIGHT
		51.0

Access and Locality Sketch:

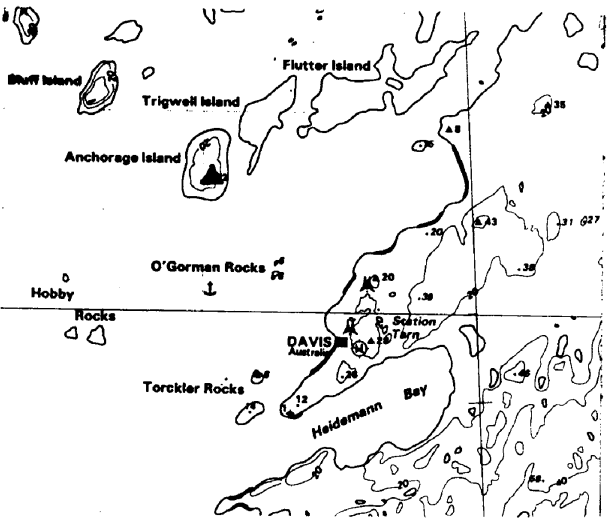
ACCESS: By helicopter in 1979, 1984, 1986.

LOCALITY: See diagram below.

WITNESS MARK: Nil.

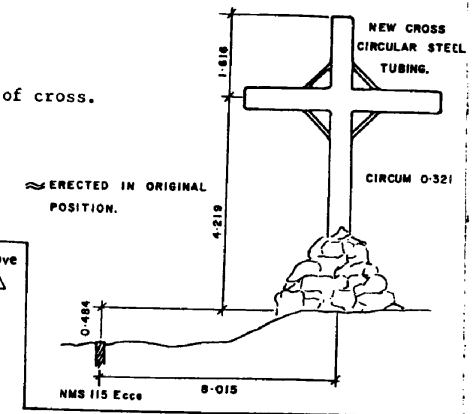
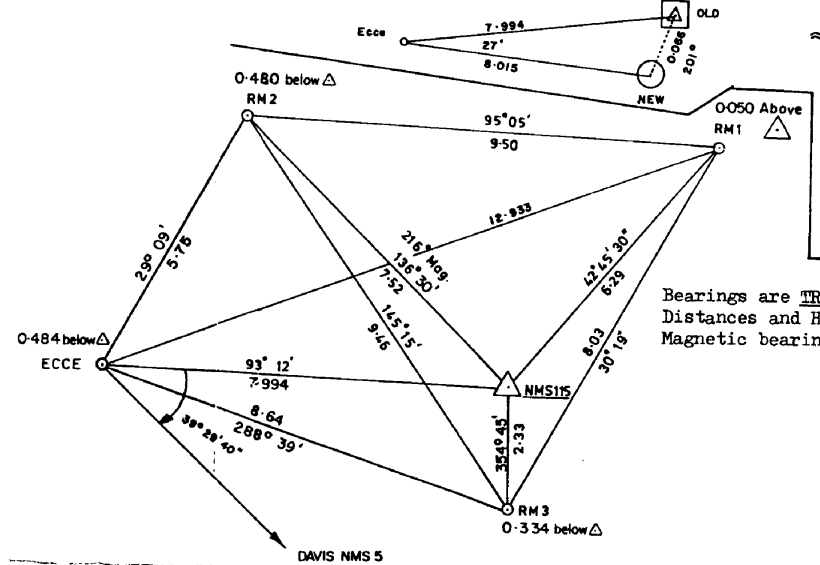
Particulars of station marking and beacon:
STATION MARK: Not marked. The station mark was the centre of the base of the original wooden cross beacon which was replaced in 1985. The centre of the base of the new tubular steel beacon is 0.062 metre south and 0.024 metre west of the (inaccessible) station mark. See diagram.
BEACON: Tubular steel beacon erected in 1985. See diagram.
REFERENCE MARKS: Rock pitons set in unconsolidated material and covered with small rock cairns.
ECCENTRIC MARK: Brass rod set in sulphur in solid rock.

TO	SERIAL	ADJ AZIMUTH	ADJ LENGTH
FARBUCK CRAG	NMS 154 19	98 12 07.27	10985.448
DAVIS	NMS 5 2	132 49 21.40	2264.170
HOOKERY LAKE	NMS 264 10	42 35 41.45	9901.727
LONG PENINSULA	NMS 265 12	51 43 11.83	15292.457
LIED BLUFF	NMS 257 9	68 54 51.43	14585.319
FARBUCK CRAG	NMS 273 3	98 12 08.47	10985.420
MOULDER HILL	NMS 261 7	101 34 55.63	23646.139
SORSDAL KNOLL	NMS 262 6	129 45 28.78	15059.646
FILLA ISLAND	NMS 153 20	190 44 30.63	27991.918
HAWKER ISLAND	NMS 269 4	203 28 24.95	8588.587



Visited by Australian Survey Office January, 1984
 Height of NMS 115 refers to ground level at base of cross.

VISITED BY NATIONAL MAPPING JANUARY, 1986.
 RM3 NOT LOCATED 1986.



Bearings are TRUE
 Distances and Heights in METRES
 Magnetic bearings 2 March 1974

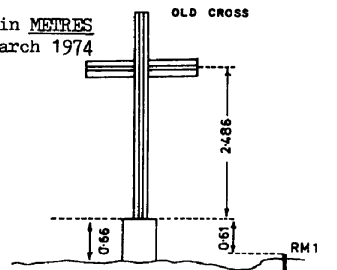


Photo Identification: Film No. CAS/C 8916, Exposure Nos. 32 - 39 incl. and 49 - 53 incl. (Hasselblad Spot Ph). Terrestrial photographs taken 2 March 1974 (See FB 12803 page 26 for details).

Certified free of transcription errors: REC SWEDLOAN

Date: 1st May 1986

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Authority DIVISION OF NATIONAL MAPPING

Serial No

Station Number and Name: NM/S/5 DAVIS

Order: 3

Original Station Established by: DIVISION OF NATIONAL MAPPING Date: 2 March 1974

Map Name: VESTFOLD HILLS Map Number: Scale 1: 50 000

Existing Station Marked by: DIVISION OF NATIONAL MAPPING Date: 2 March 1974

DATUM: World Geodetic System 1972

Ground Control Traverse 12802, Level 13326
Reference Books: Trigonometrical 11722, 14966, 14969, 14988, 14989, 14965, 19598
Tellurometer 19001 Spot Photography 14512
General 19122, 19498

RECTANGULAR COORDINATES: Universal Transverse Mercator Grid: In Metres

GRID BEARING = ADJ AZIMUTH + CONVERGENCE

HEIGHTS: In Metres Above Mean Sea Level 1983

Cadastral Location: State County/District
Parish/Hundred Allotment/Section/Portion

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
						27.835

Access and Locality Sketch:

The station is situated on the high ground to the south-east of the main group of buildings which comprise Davis Station from which it is but an easy five minute walk. If required, a vehicle can be driven to the station mark.

Particulars of station marking and beacon:

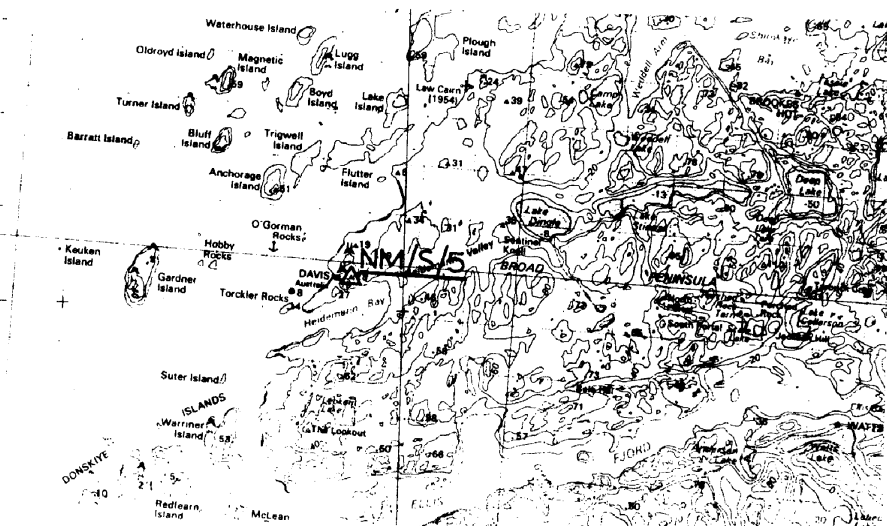
STATION MARK: Steel drill stem (approx 0.025 m in diam) driven into rock. The top of the stem is 0.25 metre above ground level. A small brass plate (0.075m x 0.025 m approx) stamped NM/S/5 is affixed to nearby rock. In 1979 a white cross with arms approx 1.5 m long and 0.5 m wide was found painted on the rock for aerial spot photography purposes.

BEACON: Nil

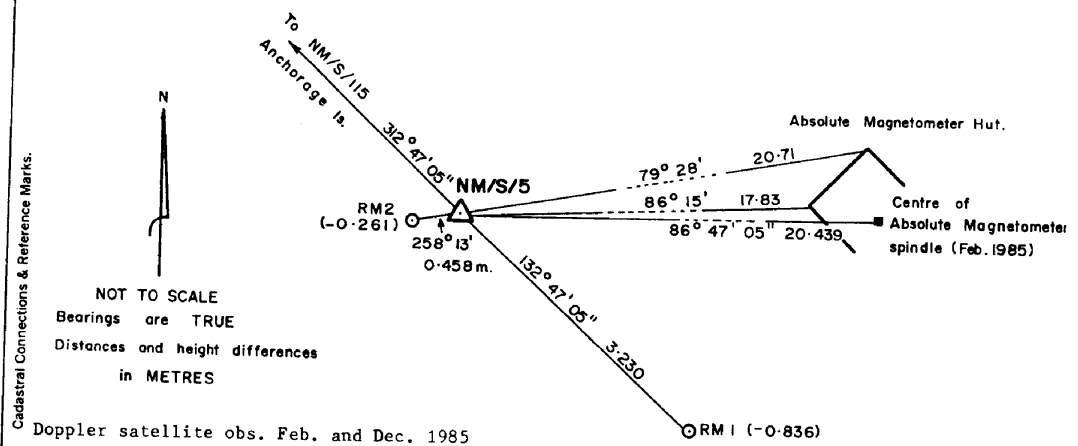
REFERENCE MARKS: RM 1- Brass pin 25 mm in diameter set in rock. A brass plate stamped NM/S/5E is grouted to rock nearby.

RM 2- BMR gravity station which is a circular brass plaque 65 mm in diameter set in rock and inscribed BUREAU OF MINERAL RESOURCES CANBERRA ACT GRAVITY STATION 8007.0000.

WITNESS MARK: Nil



To ADJ AZIMUTH ADJ LENGTH



Cadastral Connections & Reference Marks.

NOT TO SCALE
Bearings are TRUE
Distances and height differences
in METRES

Doppler satellite obs. Feb. and Dec. 1985

- Film No CAS/C 8909, Run 20 Exposure Nos 1,2 and 3 (Hasselblad 70 mm Spot Photo.)
- Film No CAS/C 8910, Exposure Nos 50, 50A and 50B
- Film No CAS/C 8442, Exposure Nos 16, 17 and 18 (35 mm spot photography)
- Film No CAS/C 8916, Exposure Nos 22-31 inclusive (Hasselblad 70 mm Spot Photo.)

Photo Identification

Certified free of transcription errors:

[Signature]

Date: 26 May 1987



DIVISION OF NATIONAL MAPPING
TRIGONOMETRICAL STATION SUMMARY
ANTARCTICA

Station No.	Station Name
	PAGEOS B052 CASEY

Station established by U.S.G.S. 1969
 Station re-established by
 Station re-visited by A.N.A.R.E. 1973
 References to previous work

1:250,000 SERIES MAP REFERENCE

Sheet Number **SQ 49-50/9** Sheet Name **WILKES LAND**

Latitude **S66° 16' 46.8495"** Longitude **E110° 32' 07.7098"** Height (metres) **20.0"**

STATION MARK : LOCALITY : ACCESS

A 9 cm diameter brass plaque stamped International Satellite Triangulation Station B052 1967" set in the centre of a 2.4 metre square concrete pad. Two vertical scaffold pipes project 1.52 m above the pad. It stands approximately 12 m west of the Casey ham radio shack and has 3 white panels painted on the surrounding rock for photo identification.

No special access.

RECTANGULAR CO-ORDINATES

Universal Transverse Mercator System : International Spheroid : Metres

Zone 49		Zone	
Eastings	Northings	Eastings	Northings
479147.034	2648651.160		
Convergence -0° 25' 31.02"		Convergence	
Origin of Survey PAGEOS B052 CASEY		Lat.	
Datum for Height WILKES DATUM - MSL		Long.	

AIR PHOTOGRAPH IDENTIFICATION

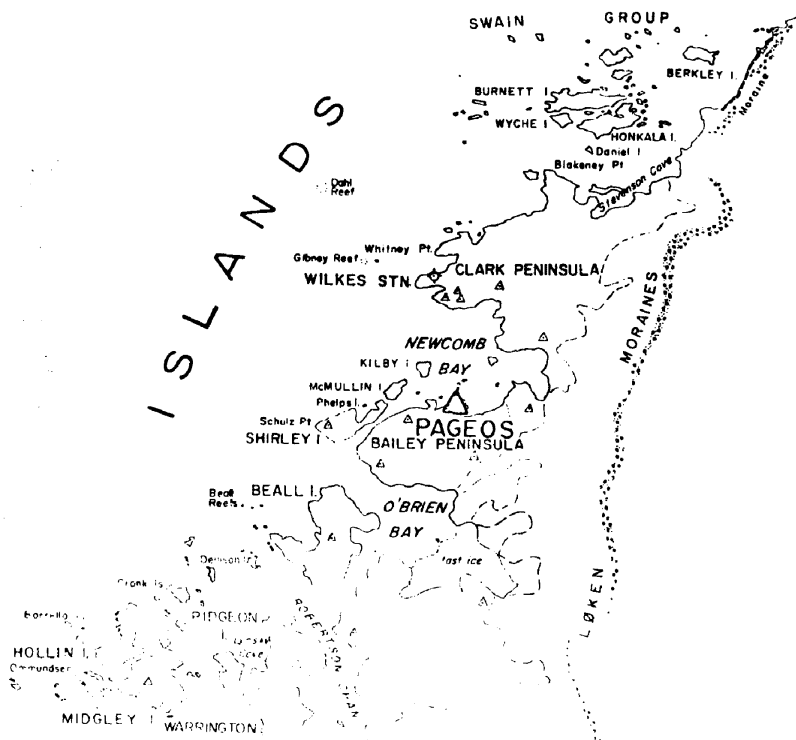
Title DONOVAN IS - WILKES	Film No. ANT 124	Run No. 22	Photo No. 806
Film held by	Quadrant X	Y	Diagonal

Tell. **12119** REFERENCE BOOKS
 Trig. **11839, 12326, 12334, 6020** AZ. F.B. **12052, 12053, 12061, 10481**
~~Ground~~ NM **11978, 11842** Spot Photography F.B. NM **12349, 16138, CAS 8463/1 16118**

Stations Observed	Observed (i) Directions	Adjusted True Bearings	Distance (ii) in metres	Distanc in feet
-------------------	-------------------------	------------------------	-------------------------	-----------------

16 46.8495	110 32 07.7098	49	479147.034	2648651.160	-0 25 31.02	2
-------------------	-----------------------	-----------	-------------------	--------------------	--------------------	----------

SERIAL	ADJ AZIMUTH	OBS LAPLACE	ADJ LENGTH	OBS
39	WILKES 2 351 38 25.09	- .95 0.00	2563.026	0.000
	BAILEY PENINSULA 5 90 47 58.09	.95	1572.658	
	BAILEY PENINSULA 14 251 55 55.54	0.00	800.707	0.000



NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No

Authority DIVISION OF NATIONAL MAPPING

INTERNATIONAL SATELLITE TRIANGULATION STATION NO 051
Station Number and Name: MAWSON PAGEOS CAMERA SITE

Order: DOPPLER 1

Original Station Established by: COAST AND GEODETIC SURVEY, US DEPARTMENT OF COMMERCE Date: 1969
Existing Station Marked by: COAST AND GEODETIC SURVEY, US DEPARTMENT OF COMMERCE Date: 1969
Reference Books: JMR Doppler Satellite Observations Work Files (3).
NM 10576, NM 10712, NM 10713, NM10714, 11232, 19010, 19522
Spot Photography 14512.

Map Name: FRANNES MOUNTAINS Map Number: Scale 1:100 000
DATUM World Geodetic System 1972
RECTANGULAR COORDINATES: Universal Transverse Mercator Grid. In Metres
GRID BEARING: ADJ AZIMUTH + CONVERGENCE HEIGHTS: In Metres Above Mean Sea Level (Mawson)

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
67°36'04.9523"	62°52'23.6648"	41	494609.804	2501574.296	-00°07'01.91"	9.792 (spirit levelling)

Cadastral Location: State County/District
Parish/Hundred Allotment/Section/Portion

To ADJ AZIMUTH ADJ LENGTH
Coordinates derived from Doppler satellite observations at JSTS051 and NMS 192 1975, 1976 and 1978

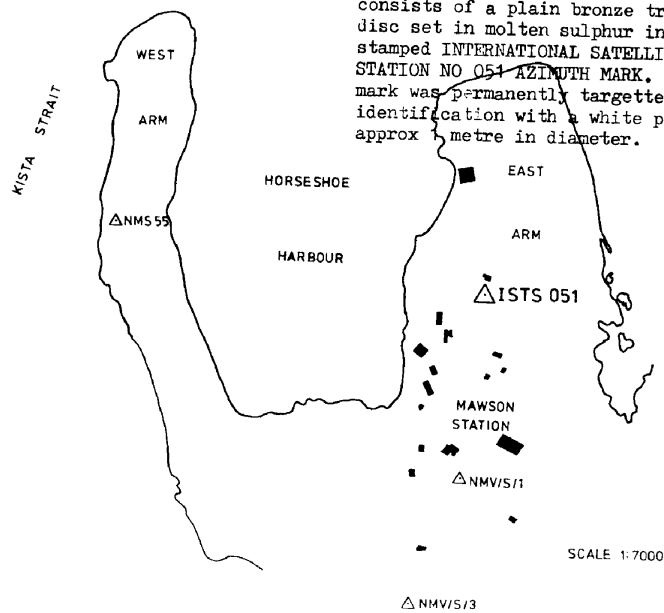
Access and Locality Sketch:
ACCESS: The station mark is located on the East Arm of Horseshoe Harbour and lies approximately 40 metres north-west of the meteorological radome. It is but an easy five minute walk from the Mawson Station recreation room.
LOCALITY SKETCH: See diagram below.

Particulars of station marking and beacon:
STATION MARK: Consists of a plain bronze triangulation station disc set in a drilled hole in bedrock. Stainless steel inserts are set in the bedrock 0.178 metre from the disc for the purpose of securing the Wild BC4 ballistic camera pedestal. The disc and inserts are fixed in place with molten sulphur. The disc is stamped INTERNATIONAL SATELLITE TRIANGULATION STATION No 051 1969

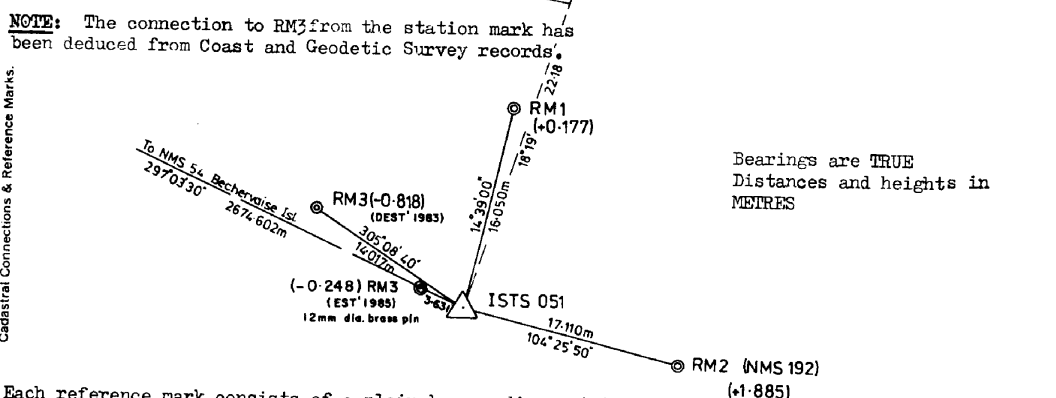
BEACON: Nil. In 1979 this mark was permanently targetted for air photo identification with a white painted circle approx 1 metre in diameter.

REFERENCE MARKS: See diagram and description below right.

AZIMUTH MARK: The azimuth mark is located approx. 21 metres north of NMS55 WEST ARM (see diagram below). The azimuth mark consists of a plain bronze triangulation disc set in molten sulphur in bedrock and is stamped INTERNATIONAL SATELLITE TRIANGULATION STATION NO 051 AZIMUTH MARK. In 1979 this mark was permanently targetted for air photo identification with a white painted circle approx 1 metre in diameter.



Cadastral Connections & Reference Marks.



Each reference mark consists of a plain bronze disc set in sulphur in bedrock and is stamped INTERNATIONAL SATELLITE TRIANGULATION STATION NO 051 No 1 (etc) 1969. In 1979 RMs 1 & 3 were permanently targetted for air photo identification with white painted circles approx. 1 metre in diameter. RM2 was permanently targetted with 3 white painted arms approx. 1.5 metres long by 0.5 metres wide. CAS/C 8914 Exposure Nos 1-18 inclusive and 59-63 inclusive Hasselblad 70mm spot photography).

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: NMS 273 TARBUCK CRAG

Order: Doppler 1

Original Station Established by: AUSTRALIAN NATIONAL ANTARCTIC RESEARCH EXPEDITION Date: February 1969

Existing Station Marked by: DIVISION OF NATIONAL MAPPING Date: January 1979

Reference Books: Tellurometer 9899, 19001
Trigonometrical 5860, 9876, 11722, 14963, 14966, 14967, 19631, 13330
JMR Doppler Satellite Observations Work File
Spot Photography 14512

Cadastral Location: State County/District
Parish/Hundred Allotment/Section/Portion

Map Name: VESTFOLD HILLS Map Number: Scale 1: 50 000

DATUM: World Geodetic System 1972

RECTANGULAR COORDINATES: Universal Transverse Mercator Grid: In Metres

GRID BEARING: ADJ AZIMUTH + CONVERGENCE

TARBUCK CRAG NMS 273 SECTION VES FIX SERIAL 3

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
68 34 38.5612	78 11 54.1700	44	385836.711	2390164.118	-2 36 30.02	140.933
		43	630319.365	2389375.911	+2 58 40.16	

Access and Locality Sketch:

ACCESS: By helicopter in 1979

LOCALITY: See diagram below:

WITNESS MARKS: Nil

Particulars of station marking and beacon:

STATION MARK: Brass pin (0.015 metre in diam) set in sulphur in bedrock. A small brass plate (0.075 x 0.025 m approx.) stamped with the station number is affixed to nearby rock.

BEACON: A rock cairn approx 1.5 metres high.

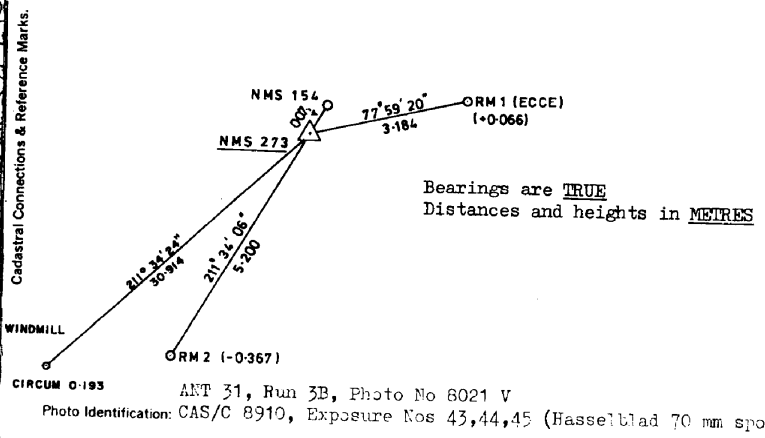
REFERENCE MARKS: 1. A circular brass plaque (0.08 m in diam.) set in sulphur in bedrock inscribed DOPPLER SATELLITE STATION, DIVISION OF NATIONAL MAPPING AUSTRALIA and stamped NMS 273 ecce.

2. A rock piton (found) driven into a crack in rock.

PO	SERIAL	ADJ AZIMUTH	ADJ LENGTH
LONG PENINSULA	NMS 265 12	5 36 09.72	11098.859
LIED BLUFF	NMS 257 9	21 37 28.99	7343.173
MURPHY ROCKS	NMS 268 17	29 53 02.15	44336.289
	NMS 270 18	30 03 46.09	44468.577
STALKER HILL	NMS 260 8	61 34 23.67	12248.655
BORSDAL KNOLL	NMS 262 6	174 45 42.18	8094.731
FILEA ISLAND	NMS 153 20	211 34 05.99	30520.089
ANCHORAGE ISLAND	NMS 115 1	277 57 14.91	10985.420
ROOKERY LAKE	NMS 264 10	334 31 52.28	9789.737
TARBUCK CRAG	NMS 154 19	31 34 17.73	.070
LITCHEN VALLEY	NMS 258 11	34 53 28.22	15058.924
Boulder Hill	NMS 261 7	104 15 28.03	12696.354
ABLE PENINSULA	NMS 263 5	224 37 36.99	11420.471
HAWKER ISLAND	NMS 269 4	245 55 52.76	15625.118
DAVIS	NMS 5 2	269 55 39.15	9212.405



Doppler satellite observations January-February, 1979.
Visited by Australian Survey Office January, 1984.
Visited by National Mapping January, 1986.
FOURTH ORDER LEVEL CONNECTION 1986



NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No. _____

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: NMS 257 LIED BLUFF

Order: 3

Original Station Established by: DIVISION OF NATIONAL MAPPING Date: January 1979
Existing Station Marked by: DIVISION OF NATIONAL MAPPING Date: January 1979
Reference Books: Tellurometer 15511, 15515, 19001, 19002
Trigonometrical 14965, 14967, 19598, 19599
Spot Photography 14512
Cadastral Location: State _____ County/District _____
Parish/Hundred _____ Allotment/Section/Portion _____

Map Name: VESTFOLD HILLS Map Number: _____ Scale 1: 50 000
DATUM: World Geodetic System 1972
RECTANGULAR COORDINATES: Universal Transverse Mercator Grid: In Metres
GRID BEARING = ADJ AZIMUTH + CONVERGENCE HEIGHTS: In Metres Above Mean Sea Level

LIED BLUFF		NMS 257		SECTION		VES FIX		SERIAL		9	
SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT					
68 30 58.1972	78 15 52.4328	44	388228.882	2397104.825	-2 32 44.30	127.5					
		43	633375.839	2396051.235	+3 02 17.48						

Access and Locality Sketch:
ACCESS: By helicopter in 1979, 1985
LOCALITY: See diagram below
Particulars of station marking and beacon:
STATION MARK: Brass pin (0.015 metre diam) set in sulphur in bedrock. A small brass plate (0.075 x 0.025 m approx) stamped with the station number is affixed to rock nearby.
BEACON: NIL
REFERENCE MARKS: NIL
WITNESS MARK: NIL

TO	SERIAL	ADJ AZIMUTH	ADJ LENGTH
FRYNE ISLAND	NMS 259 13	22 35 32.60	17109.800
MURPHY ROCKS	NMS 268 17	31 27 08.29	37084.283
LICHEN VALLEY	NMS 258 11	46 51 11.79	8089.180
STALKER HILL	NMS 260 8	96 58 29.58	8126.850
TARBUCK CRAG	NMS 273 3	201 33 47.24	7343.173
ROOKERY LAKE	NMS 264 10	286 09 34.23	7202.657
LONG PENINSULA	NMS 265 12	338 54 16.65	4520.714
	NMS 270 18	31 39 36.49	37220.495
WYATT EARP IS	NMS 272 14	33 03 39.14	21255.958
	NMS 271 16	34 11 46.80	27872.780
MCCALLIE ROCKS	NMS 267 15	34 19 49.98	27712.633
DAVIS	NMS 5 2	240 05 39.70	13740.809
ANCHORAGE ISLAND	NMS 115 1	248 36 16.31	14585.319



Cadastral Connections & Reference Marks

Visited by Australian Survey Office January, 1984

Photo Identification: Film No CAS/C 8910, Exposure Nos 9, 9A, 10, 11 (Hasselblad 70 mm Spot Photography)

Certified free of transcription errors: _____ Date: 1 Mar 81
Approved by: [Signature]

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No. _____

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: **NMS 263 MULE PENINSULA**

Order: **3**

Original Station Established by: **DIVISION OF NATIONAL MAPPING** Date: **January 1979**
Existing Station Marked by: **DIVISION OF NATIONAL MAPPING** Date: **January 1979**

Map Name: **VESTFOLD HILLS** Map Number: _____ Scale: **1:50 000**

Reference Books: **Tellurometer 19001, 19002**
Trigonometrical 14965, 14967
Spot Photography 14512

DATUM: **World Geodetic System 1972**

RECTANGULAR COORDINATES: **Universal Transverse Mercator Grid: In Metres**

Cadastral Location: State _____ County/District _____
Parish/Hundred _____ Allotment/Section/Portion _____

GRID BEARING = **ADJ AZIMUTH + CONVERGENCE** HEIGHTS: **In Metres Above Mean Sea Level**
MULE PENINSULA NMS 263 SECTION VES FIX SERIAL 5

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
68 39 00.4680	78 00 03.5870	44	378194.027	2381681.392	-2 47 36.73	72.27
						43 621886.856 2381677.444 +2 47 43.41

Access and Locality Sketch:

ACCESS: **By helicopter in 1979**
LOCALITY: **See diagram below**

Particulars of station marking and beacon:

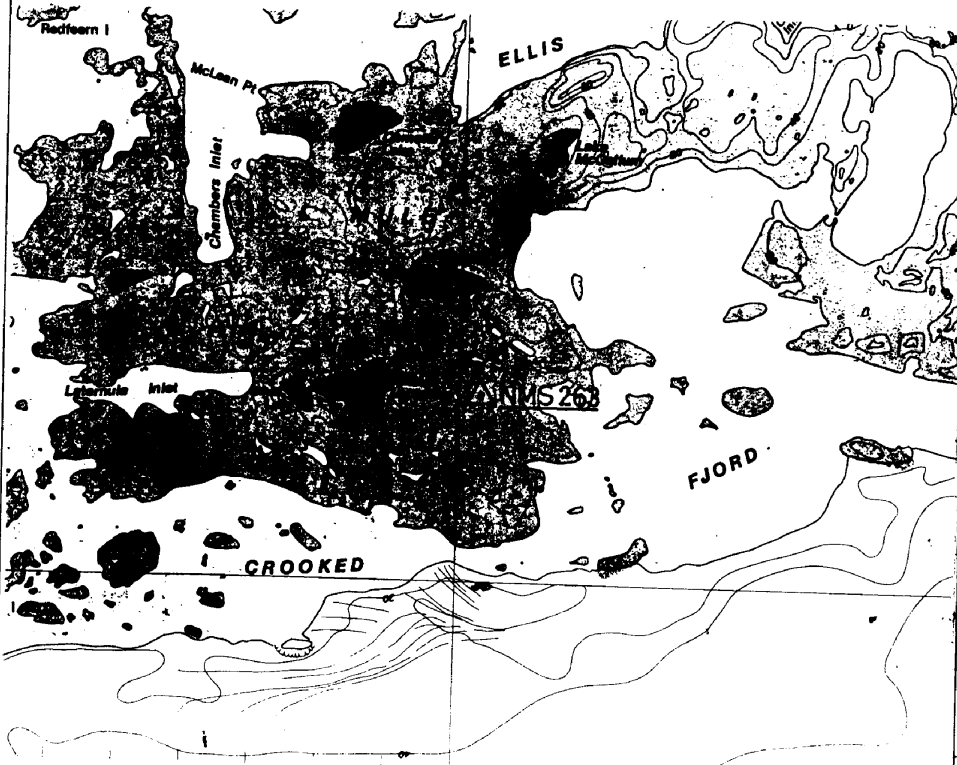
STATION-MARK: **Brass pin (0.015 metre diam) set in sulphur in bedrock. A small brass plate (0.075 x 0.025 m approx) stamped with the station number is affixed to rock nearby**

BEACON: **NIL**

REFERENCE-MARKS: **NIL**

WITNESS-MARK: **NIL**

(1)	SERIAL	ADJ AZIMUTH	ADJ LENGTH
HAWKER ISLAND	NMS 269 4	285 53 14.07	6485.970
TARBUCK CRAG	NMS 273 3	44 48 38.64	11420.471
SPIRSDAL KNOLL	NMS 262 6	89 44 45.02	8762.028
BOULDER HILL	NMS 261 7	76 21 45.84	20934.132



Cadastral Connections & Reference Marks.

Visited by Australian Survey Office January, 1984

Photo Identification: **Film No CAS/C 8910, Exposure Nos 27, 27A, 28, 29 (Hasselblad 70 mm Spot Photography)**

Certified free of transcription errors:

[Signature]

Date: **7 Mar 84**

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No _____

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: **NMS 236 TURNER ISLAND**

Order: _____

Original Station Established by: Division of National Mapping	Date: February 1985	Map Name: VESTFOLD HILLS	Map Number: _____	Scale 1: _____
Existing Station Marked by: Division of National Mapping	Date: February 1985	DATUM: Australian Geodetic Datum 1966		
Reference Books: TRIG No. 19599		RECTANGULAR COORDINATES: Australian Map Grid. In Metres		
		GRID BEARING = ADJ AZIMUTH + CONVERGENCE		
		HEIGHTS: In Metres on the Australian Height Datum		

Cadastral Location	State Antarctic	County/District							
Parish/Hundred		Allotment/Section/Portion							

Access and Locality Sketch:
ACCESS: by Helicopter 1985.
By LARC in 1985

LOCALITY: See diagram below.

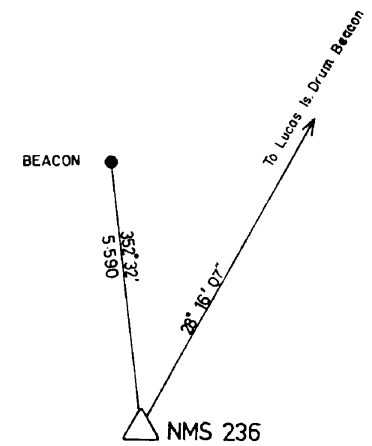
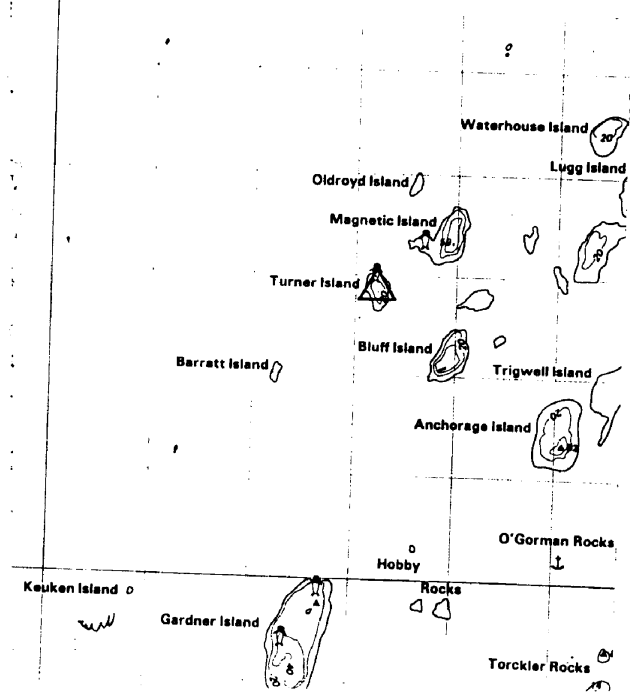
Particulars of station marking and beacon:
STATION MARK: Brass rod grouted into bedrock.
A small brass plate stamped with the station number is grouted to the rock.

BEACON: 3X44 gallon drums welded end-to-end and wire guyed. The top of the beacon is 2.64 metres above the ground.

REFERENCE MARKS: Nil

WITNESS MARK: Nil

SITUPHER ISLAND	NMS2303	S68 32 53.21170E	77 53 27.30860	43.5	HEIGHT
		617953.161	2393255.628		
		373151.737	2392921.749		



Not to Scale
Bearings are TRUE
Distances and heights in METRES.

Cadastral Connections & Reference Marks.

Photo Identification: _____

Certified free of transcription errors.

Date: _____

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No. _____

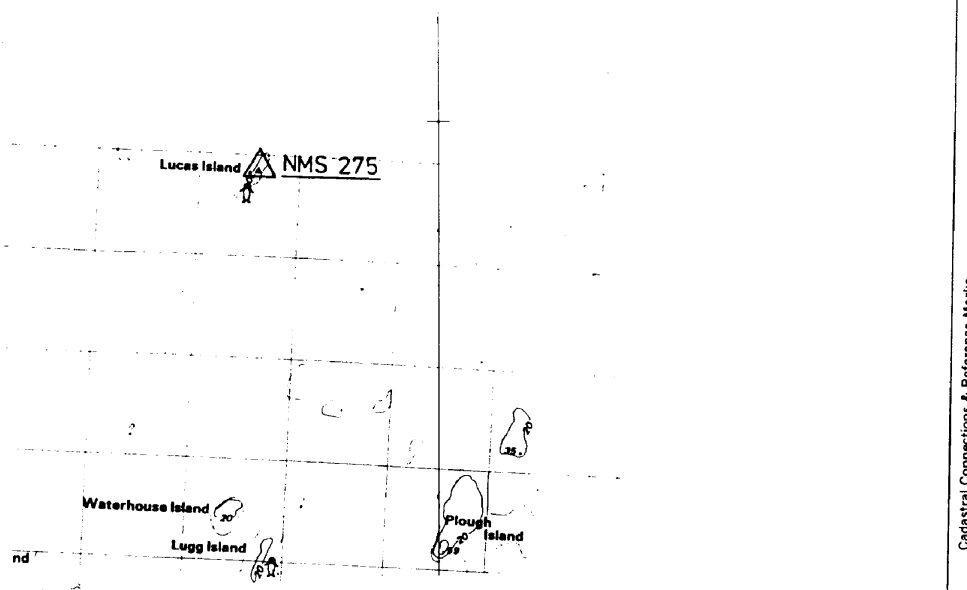
Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: **NMS 275 LUCAS ISLAND** Order: _____

Original Station Established by: Australian Survey Office Date: January 1984
Existing Station Marked by: Australian Survey Office Date: January 1984
Reference Books: A.S.O. Field Sheets Project No V8331/10179, SF 3276.
Trigonometrical 19599

Cadastral Location: State Antarctic County/District _____
Parish/Hundred _____ Allotment/Section/Portion _____

Access and Locality Sketch: Particulars of station marking and beacon.
ACCESS: By Helicopter 1984
LOCALITY: See diagram below.
STATION MARK: Brass rod grouted into bedrock. A small brass plate stamped with the station number is grouted to the rock.
BEACON: 4x44 gallon drums welded end-to-end and wire guyed. The top of the beacon is 3.52 metres above the ground.
REFERENCE MARKS: Nil
WITNESS MARK: _____

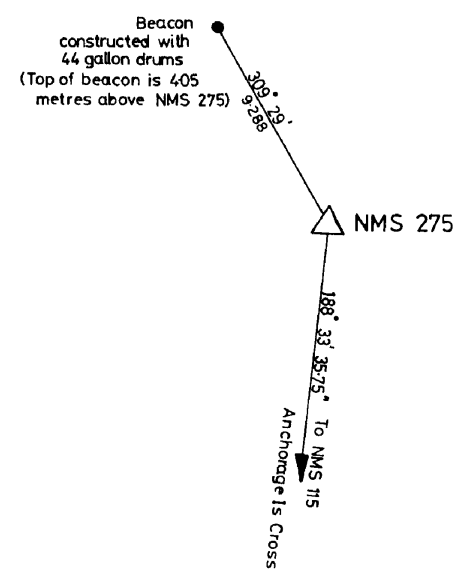


Map Name: VESTFOLD HILLS Map Number: _____ Scale 1: 50,000
DATUM: World Geodetic System 1972
RECTANGULAR COORDINATES: Universal Transverse Mercator Grid: In Metres
GRID BEARING = ADJ AZIMUTH + CONVERGENCE HEIGHTS: In Metres Above Mean Sea Level

LUCAS ISLAND	NMS2753	S68 30 13.01410E	77 57 23.02220	35.4
		620861.166	2398085.481	
		375576.003	2397911.749	

To _____ ADJ AZIMUTH _____ ADJ LENGTH _____

Cadastral Connections & Reference Marks.



N
↑
Not to Scale
Bearings are TRUE
Distances and heights in
METRES.

Photo Identification: Film Ant 55 Run 3 Photo 8069.

Certified free of transcription errors: _____ Date: _____

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No _____

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: **NMS 274 GARDNER ISLAND**

Order: _____

Original Station Established by: Australian Survey Office Date: January 1984

Map Name: **VESTFOLD HILLS**

Map Number: _____

Scale 1: 50,000

Existing Station Marked by: Australian Survey Office Date: January 1984

DATUM: World Geodetic System 1972

Reference Books: A.S.O. Field Sheets Project No V8331/10179,SF 3276.
Trigonometrical 19598

RECTANGULAR COORDINATES: Universal Transverse Mercator Grid: In Metres

GRID BEARING = ADJ AZIMUTH + CONVERGENCE

HEIGHTS: In Metres Above Mean Sea Level

Cadastral Location: State Antarctic County/District _____
Parish/Hundred _____ Allotment/Section/Portion _____

27 GARDNER ISLAND	NMS2743	S68 34 29.36090E	77 52 25.25060	35.2
		617111.236	2390313.393	
		372600.167	2389811.452	

Access and Locality Sketch:

ACCESS: By Helicopter in 1984.
By LARC in 1985

LOCALITY: See diagram below

Particulars of station marking and beacon:

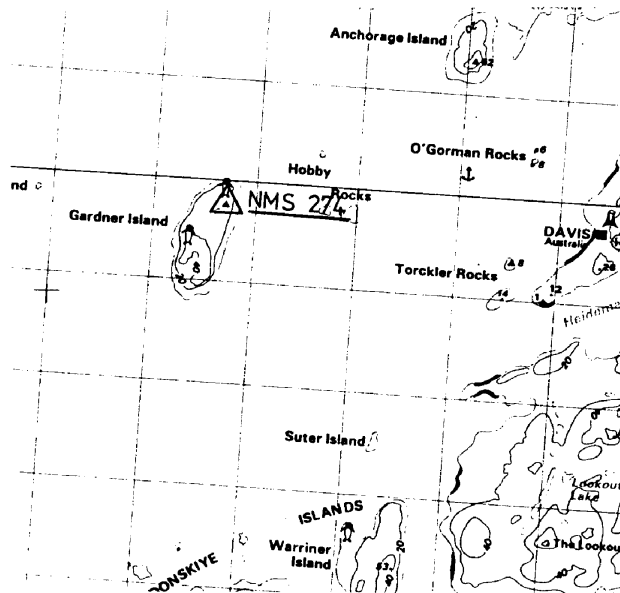
STATION MARK: Brass rod grouted into bedrock.
A small brass plate stamped with the station number is grouted to the rock.

BEACON: 4x44 gallon drums welded end-to-end and wire guyed. The top of the beacon is 3.60 metres above the ground.

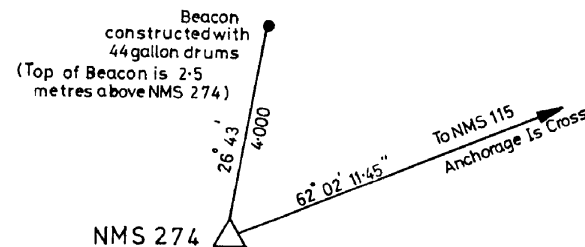
REFERENCE MARKS: Nil.

WITNESS MARK: Nil

To _____ ADJ AZIMUTH _____ ADJ LENGTH _____



Cadastral Connections & Reference Marks.



Not to Scale
Bearings are TRUE
Distances and heights in METRES.

Photo Identification: Film Ant 31 Run 3H Photo No 8103.
CAS/C 8915, Exposure nos 1-14 inclusive (Hasselblad 70mm Spot Photography)
Aust. Survey Office Book 88 Film 1 Exposure nos 17,18 (35mm Spot Photography)

Certified free of transcription errors:

Date: _____

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No. _____

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: **NMS 319 PLOUGH ISLAND**

Order: _____

Original Station Established by: **Australian Survey Office** Date: **January 1984**
 Existing Station Marked by: **Australian Survey Office** Date: **January 1984**
 Reference Books: **A.S.O. Field Sheets Project No V8331/10179, SF 3276.**
 Cadastral Location: **State Antarctic** County/District _____
 Parish/Hundred _____ Allotment/Section/Portion _____

Map Name: **VESTFOLD HILLS** Map Number: _____ Scale 1: **50,000**

DATUM: **World Geodetic System 1972**

RECTANGULAR COORDINATES: **Universal Transverse Mercator Grid: In Metres**

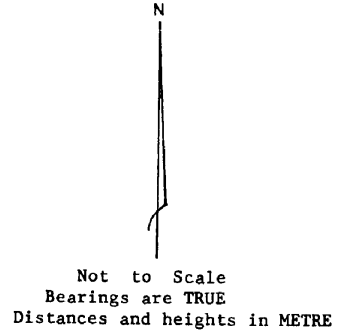
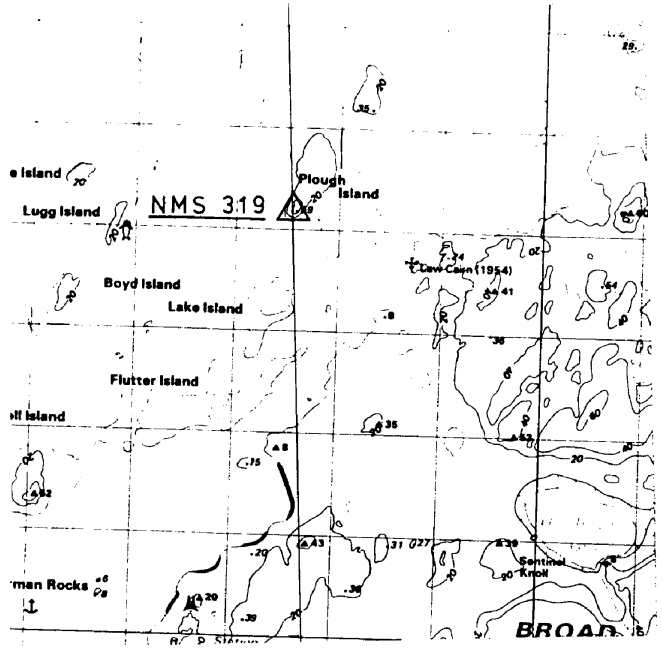
GRID BEARING = **ADJ AZIMUTH + CONVERGENCE**

HEIGHTS: **In Metres Above Mean Sea Level**

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
10 PLOUGH ISLAND	NMS3193	508	32 15.42390E	77 59 58.09970		52.8
			622436.369	2394212.862		
			377520.566	2394210.761		

Access and Locality Sketch: _____ Particulars of station marking and beacon:
ACCESS: By Helicopter in 1984. **STATION MARK:** Australian Survey Office plaque grouted into bedrock. A small brass plate with the station number grouted to the rock.
LOCALITY: See diagram below. **BEACON:** Nil.
REFERENCE MARKS: A 1.5 metre long steel post is grouted into the rock beside the Station Mark.
WITNESS MARK: Nil.

To _____ ADJ AZIMUTH _____ ADJ LENGTH _____



Cadastral Connections & Reference Marks.

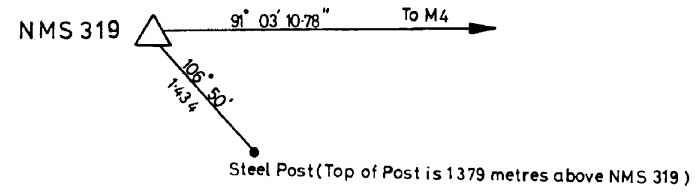


Photo Identification: **Film Ant 31 Run 3H Photo No. 8099.**
Aust. Survey Office Book 88 Film 1 Exposure nos,10,11,(35mm Spot Photography)

Certified free of transcription errors. Date: _____

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Authority AUSTRALIAN NATIONAL ANTARCTIC RESEARCH EXPEDITION

Serial No

Station Number and Name: NM/S/153 FILLA ISLAND

Order: Doppler 2

Original Station Established by: ANARE Date: February 1969

Existing Station Marked by: ANARE Date: February 1969

Reference Books: JMR Doppler Satellite Observations Work File
Tellurometer 6987
Trigonometrical 6685, 5975 (spot photography)
Spot Photography 14512 General 19523 Comps AMB 46, 48

Cadastral Location: State _____ County/District _____
Parish/Hundred _____ Allotment/Section/Portion _____

Map Name: _____ Map Number: SR 43-44 Scale 1: 1 000 000

DATUM: World Geodetic System 1972

RECTANGULAR COORDINATES: Universal Transverse Mercator Grid. In Metres

GRID BEARING = ADJ AZIMUTH + CONVERGENCE HEIGHTS: In Metres Above Mean Sea Level

FILLA ISLAND		NMS 153		SECTION		VES FIX		SERIAL 20	
SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT	ADJ AZIMUTH	ADJ LENGTH	
68 48 36.1414	77 48 08.8260	43	613015.161	2364243.597	+2 36 47.68	88.2T	31 56 13.91	30520.159	
		44	371063.197	2363465.595	-2 58 54.33		5 21 0.95	30520.089	
							10 51 44.22	19705.619	
								27991.918	

Access and Locality Sketch:

ACCESS: By helicopter in 1979
By LARC in 1985

LOCALITY: See diagram below

REMARKS: Rounds of black and white and colour photography taken at the station

Particulars of station marking and beacon:

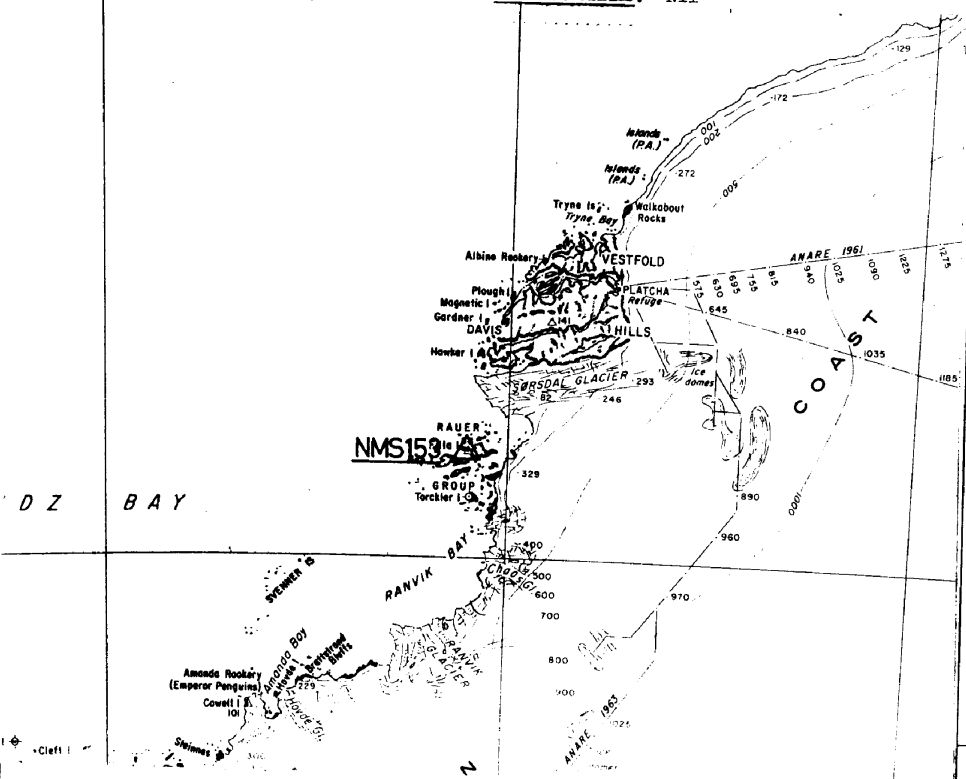
STATION MARK: A rock piton approximately 0.15 metre long set in a loose rock cairn approximately 0.5 metre high.

BEACON: 3 X 44 gallon drums welded end-to-end and wire guyed.

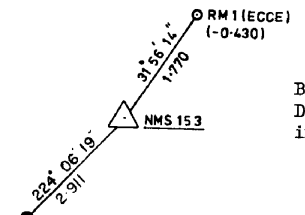
REFERENCE MARKS: A circular brass plaque (0.08 metre in diam) set in sulphur in bed-rock inscribed DOPPLER SATELLITE STATION DIVISION OF NATIONAL MAPPING AUSTRALIA and stamped NMS 153 ECCE.

WITNESS MARKS: Nil

Doppler satellite observations February, 1979.



Cadastral Connections & Reference Marks.



Bearing is TRUE
Distance and height in METRES

BEACON (top of beacon is approx. 2.8 metres above Station mark.)

Film ANT 97, Run No 3E, Photo No 8033V
Film No CAS/C 8910, Exposure Nos 51, 52, 53, 53A (Hasselblad 70 mm Spot Photogr.)

Certified free of transcription errors: _____
Approved by: [Signature] Date: 4 Mar 81
Date: 4 Mar 81

NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Serial No. _____

Authority DIVISION OF NATIONAL MAPPING

Station Number and Name: **NMS 333 SUTER POINT**

Order: _____

Original Station Established by: **Australian Survey Office** Date: **January 1984**
 Existing Station Marked by: **Australian Survey Office** Date: **January 1984**
 Reference Books/ **A.S.O. Field Sheets Project No V8331/10179, SF 3276.**
Level 13324

Cadastral Location: **State Antarctic** County/District _____
 Parish/Hundred _____ Allotment/Section/Portion _____

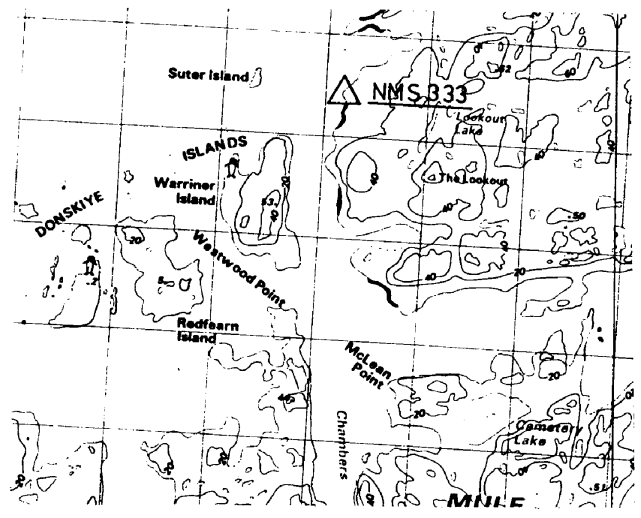
Map Name: **VESTFOLD HILLS** Map Number: _____ Scale 1: **50,000**
 DATUM: **World Geodetic System 1972**
 RECTANGULAR COORDINATES: **Universal Transverse Mercator Grid: In Metres**
 GRID BEARING = **ADJ AZIMUTH + CONVERGENCE** HEIGHTS: **In Metres Above Mean Sea Level**

25 SUTER POINT	NMS333	S68 35 49.95700E	77 56 6.20240	9.158
		619491.952	2387701.524	
		375223.798	2387443.681	

Access and Locality Sketch: **ACCESS: By Helicopter in 1984.**
LOCALITY: See diagram below.

Particulars of station marking and beacon:
STATION MARK: A 0.13 diameter brass rod grouted into bedrock. A small brass plate stamped with the station number is grouted to the rock.
BEACON: Nil
REFERENCE MARKS: Nil
WITNESS MARK: Nil

To _____ ADJ AZIMUTH _____ ADJ LENGTH _____
fourth order level connection 1984/85



Cadastral Connections & Reference Marks.

Photo Identification: **Film Ant 31 Run 3H Photo No. 8103.**
Aust. Survey Office Book 88 Film 1 Exposure nos 20,25,26, (35mm Spot Photography)

Certified free of transcription errors: _____ Date: _____

Approved by: _____

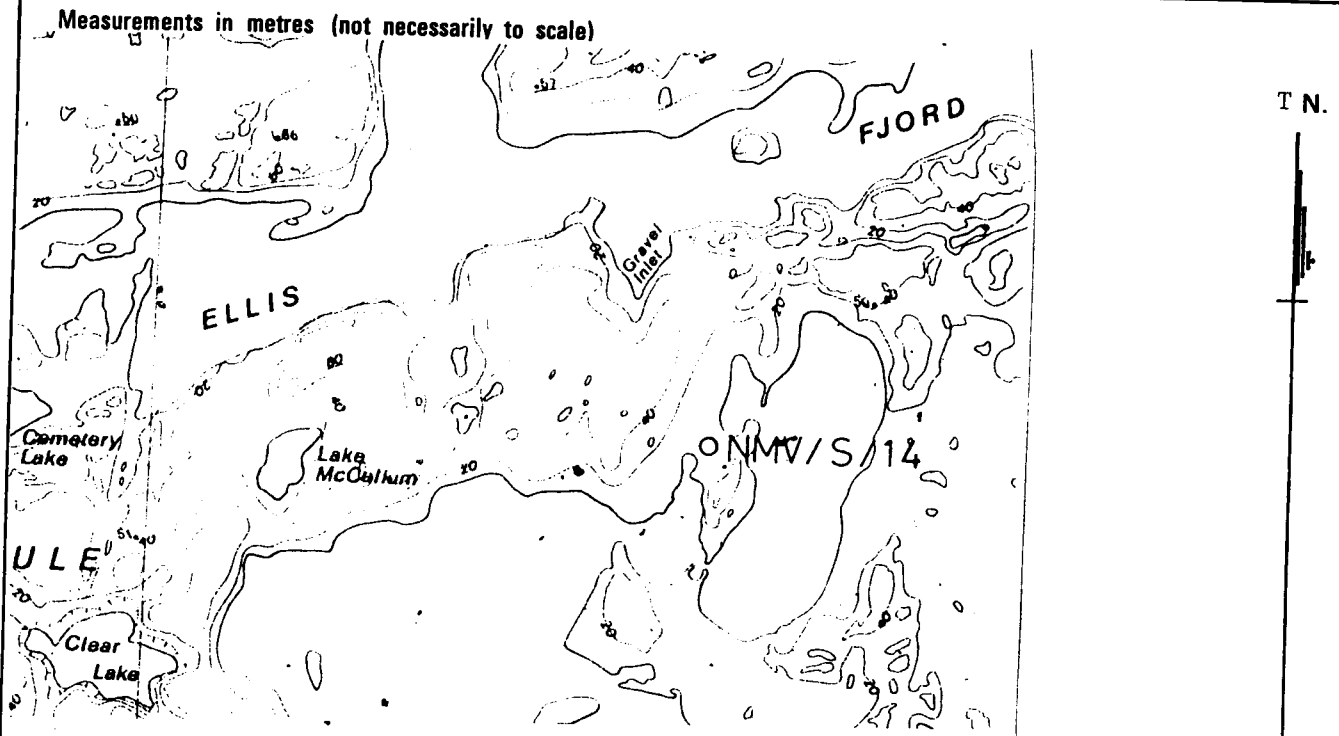


PBM No. NMV/S/14

DEPARTMENT OF MINERALS AND ENERGY

DIVISION OF NATIONAL MAPPING

PERMANENT BENCH MARK RECORD



The bench mark consists of a brass pin 25 mm in diameter set in sulphur in solid rock. A brass plate approximately 25 mm x 75 mm stamped NMV/S/14 is affixed to rock nearby with epoxy resin.

The rock bears large white markings radiating out in three directions.

Provisional Reduced Level: 6.178 ✓ metres Datum: Davis M. S.L. 1983

Established by: P. Naughton Date: January 1982

Under field supervision of: B. Murphy Surveyor, Class 2

Sketch shown in Field Level Book No.:

1:250,000 Map Sheet: SR 43-44/3 Vestfold Hills

Scaled Latitude: 68°37'31" (WGS72) Scaled Longitude: 78°05'12" (WGS72)

PHOTO IDENTIFICATION.

AERIAL, Area: Film No: Run No: Photo No:

TERRESTRIAL, Film No: Photo No:

Certified free of transcription errors: Date:

Approved by: Date: