Geomex Surveys

AMOCO AUSTRALIA PETROLEUM COMPANY

REPORT

ON

POSITIONING OF RIG

DIAMOND M. EPOCH

ON

LOCATION

'KOORKAH NO. 1'

IN

BLOCK T-18-P

BASS STRAIT

AUSTRALIA

Date: December 1985

Report No. K104/85/AM

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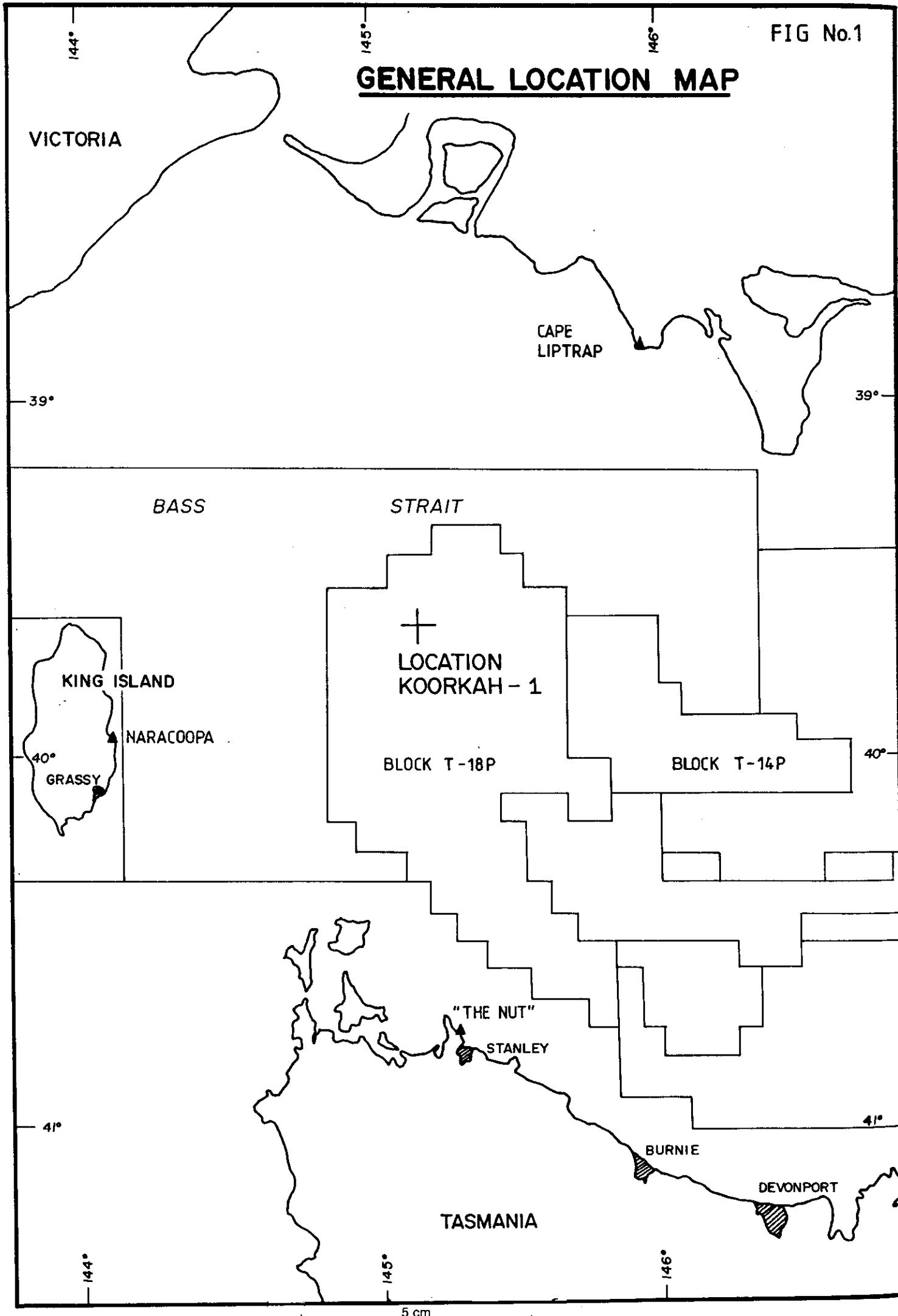
FIG No.1

GENERAL LOCATION MAP



1. INTRODUCTION

GEOMEX SURVEYS (AUSTRALIA) PTY. LTD. were contracted by AMOCO AUSTRALIA PETROLEUM COMPANY to position the semi-submersible drilling rig 'Diamond M. Epoch' on location 'Koorkah No. 1' in permit area T-18P, in the Bass Strait Australia.

Positioning was conducted using an Argo chain previously established in the area and an integrated acoustic-satellite system.

The rig was positioned over location on the 27th November 1985 with the final co-ordinates for the drill-stem being:

Latitude	:	39° 37' 57.24" South
Longitude	:	145° 09' 05.13" East

This position is 41 metres at 263° from the proposed location.

The rig heading was 231.5° true.

2. PERSONNEL, EQUIPMENT AND LOGISTICS SUPPORT

2.1 Personnel

The following personnel were engaged on this project:

M. Gale	:	Party Chief/Hydrographic Surveyor
M. Monk	:	Surveyor/Acoustic Technician
J. Cram	:	Logistics Supervisor
W. Gray	:	Base Station Operator (Naracoopa)
B. Hassett	:	Base Station Operator (Cape Liptrap)
T. Moore	:	Base Station Operator (North Point)
R. Harris	:	Base Station Operator (Point Sorrell)
N. McGowan	:	Client Representative

2. PERSONNEL, EQUIPMENT AND LOGISTICS SUPPORT (Cont'd)

2.2 Equipment

The following survey equipment was employed on this project:

Argo Positioning System comprising:

Mobile - Two - Range Processing Units (R.P.U.)
- Two - Control and Display Units (C.D.U.)
- Two - Antenna Loading Units (A.L.U.)
- One - Shakespeare Antenna
- Two - Sets of cables and connectors
- One - S.S.B. Radio
- Two - HP 9836 Computers
- Two - Scope III Interfacing Units
- Two - HP 2671G Printers

Beacons - Five - Range Processing Units
- Five - Antenna Loading Units
- Five - Antennae
- Five - S.S.B. Radios
- Five - Sets of cables and connectors
- Tower Sections, Generators, etc.

Acoustic Positioning System comprising:

Two - HP 9836 Computers
One - HP 2671G Printer
One - Oceano RM201 Range Meter plus back-up
One - Oceano TT101 Telecommand Module plus back-up
One - Oceano IM100 Interface Module plus back-up
One - Oceano PS100 Power Supply plus back-up
One - Oceano Spares kit
One - AM121 Acoustic Module and dunking cable
One - AM121 Acoustic Module, housed in a streamlined towfish
One - Hand winch with towfish cable
Seven - Oceano Acoustic Transponders
- Deck cables, velocimeter, etc.

2. PERSONNEL, EQUIPMENT AND LOGISTICS SUPPORT (Cont'd)

2.2 Equipment (Cont'd)

Satellite Positioning System comprising:

One - Magnavox MX1107 Satellite Receiver

One - Marine Antenna

- Spares kit, cables, etc.

2. PERSONNEL, EQUIPMENT AND LOGISTICS SUPPORT (Cont'd)

2.3 Logistics Support

The equipment was stored in Devonport, Tasmania, following recent site surveys in the area, and mobilised onto the 'Diamond M. Epoch' on 23rd November 1985. On completion of the rig move, the equipment was re-stored in Devonport.

Onshore support was provided by the GEOMEX shore-station personnel, with back-up support being provided by the GEOMEX base in Perth.

3. CHRONOLOGICAL RECORD OF EVENTS

Saturday 23rd November 1985

1100 Personnel depart Devonport for rig

1145 Personnel arrive onboard rig

1730 Argo Mobile equipment arrives at rig, onboard M/V Lady Kirry

1745 Commenced installation of equipment onboard rig

1930 Installation and checking of Argo Mobile equipment completed

Sunday 24th November 1985

Acoustic system installed and checked

Monday 25th November 1985

9099 Rig under tow from Tilana to Koorkah

1600 Rig on approach to location, acoustic Fish deployed

1620 No. 6 anchor dropped

1915 4 anchors now dropped

2045 Tow vessels on rest period. Satellite confirmation of Acoustic/Argo positioning

Tuesday 26th November 1985

0600 Re-commenced positioning over location with the re-running of anchors

Wednesday 27th November 1985

0200 Anchor positioning completed, commenced ballasting down

0745 Completed ballasting down, commenced Final Fixes

Thursday 28th November 1985

Continue collecting data for Final Fix

Friday 29th November 1985

0300 Completed Final Fix data collection

0315 Commenced demobolization of equipment

0615 Personnel and equipment transferred from rig to 'M/V Lombardina Creek'

3. CHRONOLOGICAL RECORD OF EVENTS (Cont'd)

Friday 29th November 1985 (Cont'd)

0745 Commenced transit Fix of rig

1000 Completed transit Fix, vessel steaming for Tilana location

1415 Arrive at Tilana, commenced recovery of transponders

1900 Completed recovery of transponders, one transponder not recovered. Vessel steaming for Pelican location

2200 Commenced satellite calibration of Pelican acoustic array

Saturday 30th November 1985

Continue calibration data collection

Sunday 1st December 1985

2200 Completed calibration data collection

2345 Vessel steaming to cut Argo baselines

Monday 2nd December 1985

0215 Crossed Cape Liptrap - North Point baseline

0845 Crossed Cape Liptrap - Point Sorell baseline

1030 Crossed Naracoopa - Point Sorell baseline

1215 Vessel arrives Devonport, commenced demobolization of equipment.

Tuesday 3rd December 1985

Demobolizing Argo base station equipment and storage on site

Wednesday 4th December 1985

Completed demobolization of Argo equipment

4. SURVEY METHODS AND PROCEDURES

4.1 ARGO Positioning System and Calibration

4.1.1 Mode of Operation

Argo DM-54 is a long range radio positioning system operating between the frequencies of 1600 and 2000 KHz. The system determines the range (in lanes) of the mobile station from each of the coordinated base stations by measurement of fractional land distances and accumulation of whole lane counts. The fractional lane distances are determined by measuring the phase difference between RF signals transmitted by the mobile station and received from the base station. The mobile station initiates the basic ranging process by transmitting a pulse of RF energy (Interrogation Burst). The fixed stations receive this signal, correct the phase to that of the original transmission, and, in sequence broadcast pulse of RF energy (Reply Burst). These pulses are received by the mobile station, and the phases of these signals are compared to the phase of that originally broadcast. This phase difference (delay) is used in the computations to determine the whole lane count. A weighted average of fractional values is used to determine when a whole lane value should be changed.

The ground wave component of the high frequency (HF) transmission utilized by the Argo system enables measurements beyond the optical horizon. Operational ranges up to 400 nm. can be expected during daytime hours. Maximum usable range decreases during night time hours due

4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.1 ARGO Positioning System and Calibration (Cont'd)

4.1.1 Mode of Operation (Cont'd)

primarily to changing atmospheric conditions and increased skywave interference to the gound wave signals. Range accuracy is quoted by the manufacturer at 0.05 lanes, achievable field accuracy. The lane width typically varies from 75 to 94 m. depending on frequencies used and propagation velocity. For this rig move it was 88.0347 m.

4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.1 ARGO Positioning System and Calibration (Cont'd)

4.1.2 ARGO Calibration and Coordinate Data

The ARGO system which was to be installed on the rig DIAMOND M. EPOCH on 23rd November 1985, was established on 8th October oboard the vessel M.V. EUGENE McDERMOTT, and calibrated against a previously established SYLEDIS chain in the area. The four shore stations in the ARGO chain were situated at the following sites:

1. POINT SORELL
   - Latitude : 41° 07' 23.63" S
   - Longitude : 146° 31' 42.35" E
   - Eastings : 460 414 m
   - Northings : 5 447 440 m
   - Height : 30 m

2. NORTH POINT
   - Latitude : 40° 42' 52.15" S
   - Longitude : 145° 15' 30.28" E
   - Eastings : 352 895.49 m
   - Northings : 5 491 462.76 m
   - Height : 5 m

3. NARACOOPA
   - Latitude : 39° 55' 29.05" S
   - Longitude : 144° 07' 39.04" E
   - Eastings : 254 517 m
   - Northings : 5 576 630 m
   - Height : 56 m

4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.1 ARGO Positioning System and Calibration (Cont'd)

4.1.2 ARGO Calibration and Coordinate Data (Cont'd)

4. CAPE LIPTRAP

Latitude	:	38° 53' 35.54" S
Longitude	:	145° 56' 53.40" E
Eastings	:	408 781.82 m
Northings	:	5 694 533.67 m
Height	:	114 m

All coordinates refer to:

Spheroid	:	Australian National
Datum	:	Australian Geodetic
Projection	:	U.T.M. (Zone 55)
Central Meridian	:	147° East

The ARGO system has a signal velocity of propagation of 299 670 km/sec, and an operating frequency of 1.702 MHz, with a lane width of 88.0347 metres. At the time of calibration and comparison with the Syledis system set-up in the area, the following partial lane counts were recorded:

POINT SORELL	0.75 lane
NORTH POINT	0.69 lane
NARACOOPA	0.41 lane
CAPE LIPTRAP	0.49 lane

When this system was mobolized onboard the DIAMOND M. EPOCH at TILANA-1 location, the position of the rig was checked against its previously established position and the partial lane counts confirmed.

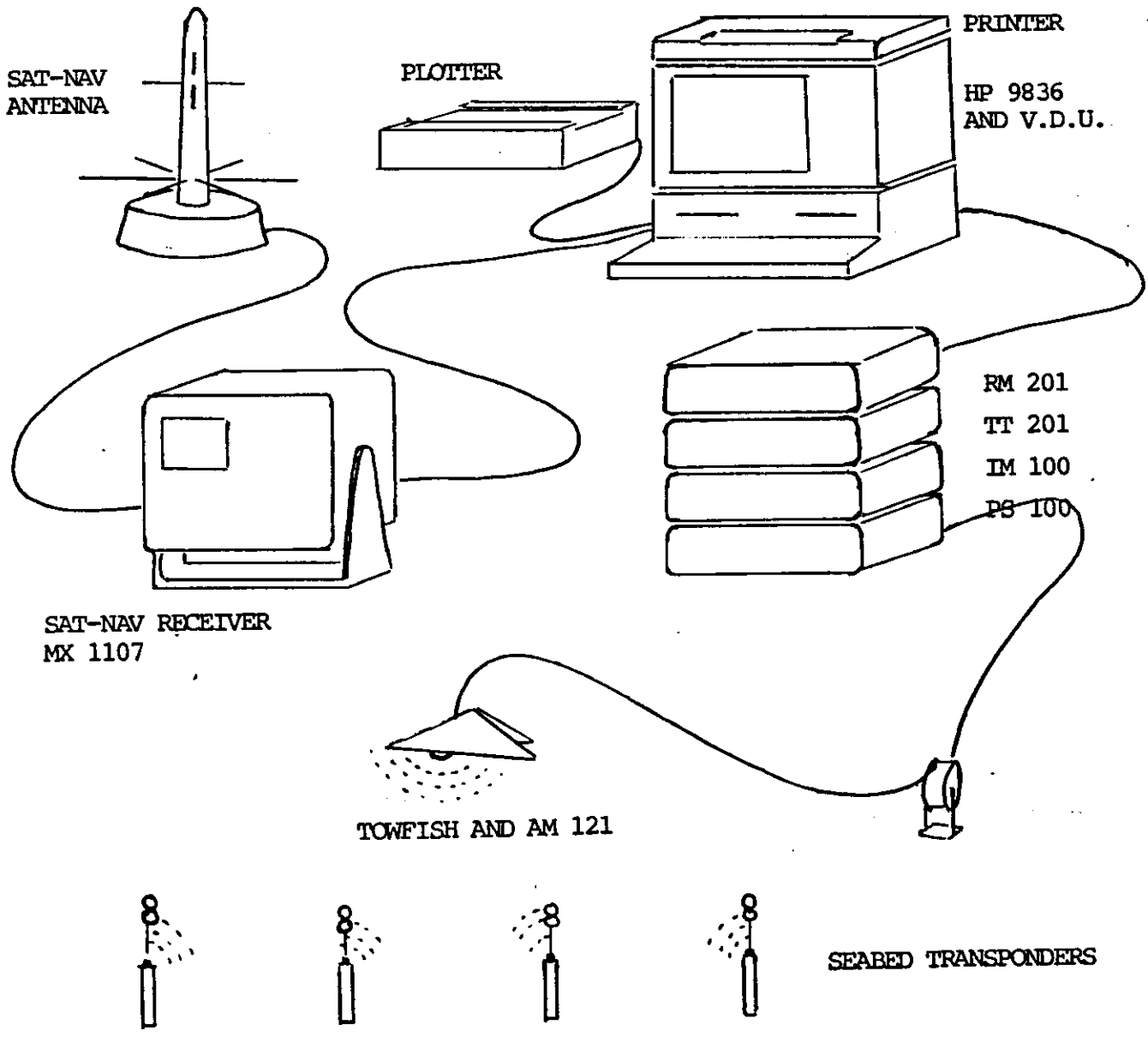
4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.2 Satellite-Acoustic Positioning System

4.2.1 Mode of Operation

The integrated satellite-acoustic positioning system employed on this project is manufactured by "OCEANO INSTRUMENTS" and comprises a low frequency long baseline acoustic system linked to a "MAGNAVOX" transit-satellite receiver, and integrated through a "HEWLETT PACKARD" desktop computer with V.D.U. displays for navigation.

The configuration of equipment is illustrated below:-



4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.2 Satellite-Acoustic Positioning System (Cont'd)

4.2.1 Mode of Operation (Cont'd)

The acoustic system itself is made up of four (4) basic onboard units, a range meter, a telecommand unit, an interface module and a dedicated 24V D.C. power supply which controls the type and coding of interrogation signals emitted from an acoustic module mounted in a streamlined towfish and suspended over-the-side of the survey vessel. The transponder units laid in an array on the seabed receive the common interrogation frequency and reply on their own individual frequencies. These are received by the acoustic module and passed back to the onboard units where the time between signal transmission and reception is recorded, and processed to display the range in metres to each transponder.

The satellite navigation receiver is a MX1107 R.S. dual-channel survey receiver and with its marine antenna is a stand-alone system. The reason for its choice is its dead-reckoning facility through the entering of vessels course and speed, and its ability to display position in real-time. These facilities are enabled through a data-com interface and allow direct hand-shaking with the desk-top computer to assist with the positioning, and calibration of the acoustic transponder array on the seabed.

4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.2 Satellite-Acoustic Positioning System (Cont'd)

4.2.1 Mode of Operation (Cont'd)

The desk-top computer is a HP 9836 with inbuilt V.D.U. display and sufficient memory and interface modules to communicate with the satellite receiver and acoustics range meter, for the software to perform the relative and absolute calibrations of the acoustic transponder array, the navigation and tracking of a vessel, the display and recording of position data, and all other functions that are required of a real-time Navigation Computer system.

4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.2 Satellite-Acoustic Positioning System (Cont'd)

4.2.2 Calibration and Coordinate Data

An array of acoustic transponders was laid around the KOORKAH-1 location by the vessel R.V. SPRIGHTLY at the time of the site investigation survey on 24th July 1985, and calibrated using both a MAXIRAN radio positioning system and a satellite system. See GEOMEX Report K088/85/AM.

These transponders were used together with the onboard Acoustic system to position the rig DIAMOND M. EPOCH over location on 26th November.

The final adjusted coordinates of the transponders as determined by satellite positioning are as follows:

TRANSPONDER POSITIONS (IN AMG)

NO.	CODE	EASTINGS	NORTHINGS
1	6	338 225.57	5 611 750.51
2	14	342 346.83	5 610 216.70
3	7	340 512.98	5 612 583.66
4	1	341 852.95	5 614 665.19
5	5	344 703.21	5 610 983.45
6	10	340 985.31	5 608 114.12

The final adjusted coordinates for the transponders as determined by the MAXIRAN positioning system are as follows:

4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.2 Satellite-Acoustic Positioning System (Cont'd)

4.2.2 Calibration and Coordinate Data (Cont'd)

TRANSPONDER POSITIONS (IN AMG)

NO.	CODE	EASTINGS	NORTHINGS
1	6	338 191.18	5 611 784.86
2	14	342 286.24	5 610 182.43
3	7	340 492.18	5 612 579.69
4	1	341 866.73	5 614 638.54
5	5	344 655.10	5 610 909.71

Transponder 6 on Code 10 and a seventh transponder on Code 3 were deployed on the site, but were not properly calibrated into the array due to acoustic interference in their local area, and were not used for the rig positioning.

The Acoustics Towfish was set through the moonpool when moving the rig onto location, to minimise any errors in offsetting to the rigs drilling position.

4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.3 Satellite Positioning System

4.3.1 Mode of Operation

The Marine Satellite receiver used with the integrated Acoustic positioning system is a MAGNAVOX MX 1107 R.S. complete with antenna and cable.

This operates by monitoring the change in frequency, or doppler effect, of the 400 MHz and 150 MHz frequencies transmitted by each of the five transit satellites circling the earth in polar orbits.

Orbital data and time are received from each satellite with an up-dated message every two minutes. Interpolation of the satellite's position monitored with the change of received frequencies will provide a line of position on which the receiver lies. The recording of data from a number of satellites will therefore provide the position of the receiver. The greater the number of good satellite passes recorded, the greater the accuracy of the results.

4. SURVEY METHODS AND PROCEDURES (Cont'd)

4.3 Satellite Positioning System (Cont'd)

4.3.2 Satellite Recording

The MAGNAVOX MX 1107 receiver was used to provide a confirmation of the rig's final position after it had been ballasted down over location.

The antenna was set-up on the edge of the rig's heli-deck and a total of twenty six (26) 3D satellite passes recorded during the period 27th to 29th November, before position results had diverged sufficiently to confirm final position coordinates.

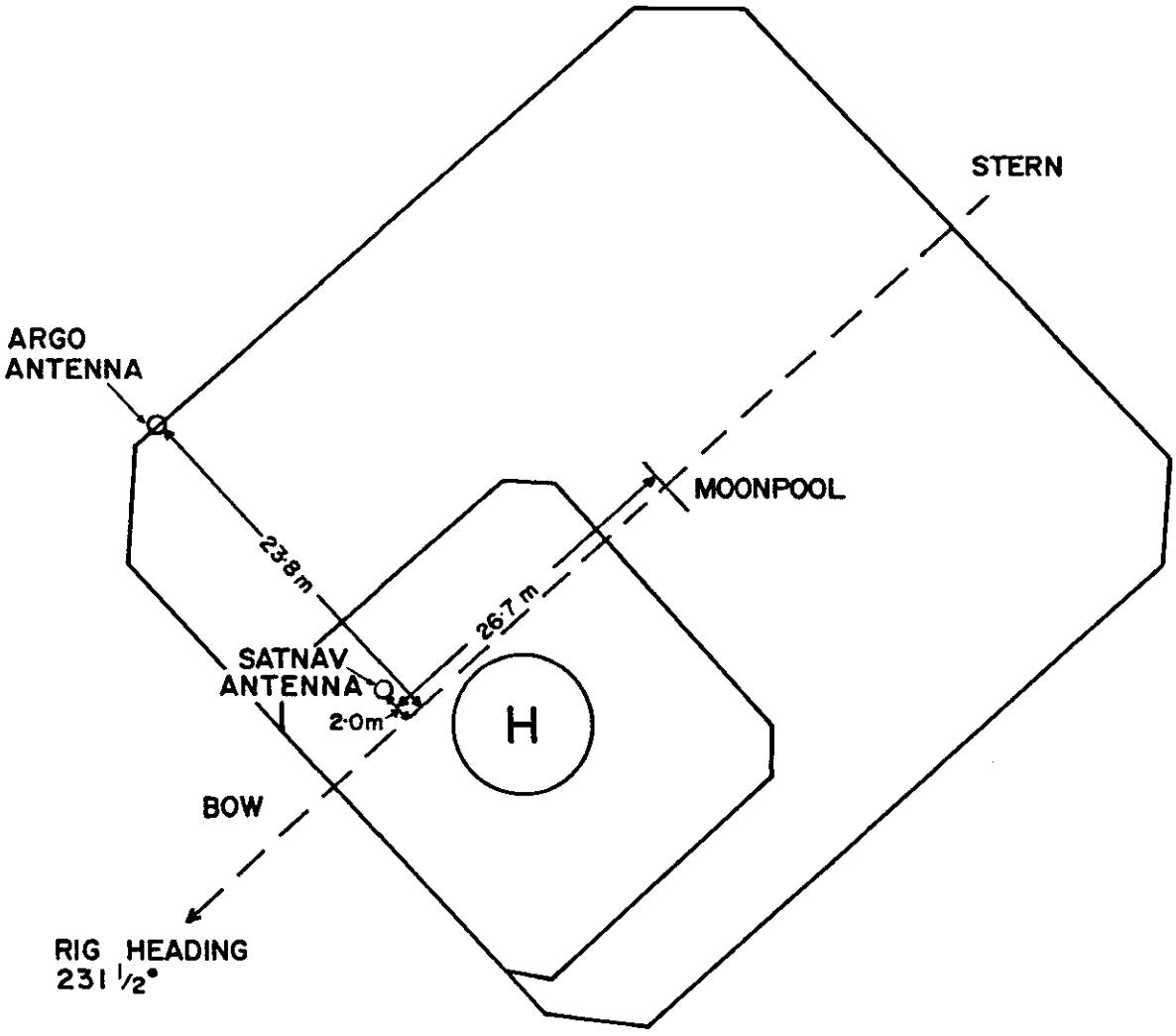
The offset from the satellite antenna to the rig's drillstem position was applied according to distances shown in FIG. 2.

All satellite data was recorded in WGS 72 Spheroid and converted to Geographical and UTM coordinates in the Australian National Spheroid, using the following datum shifts:

X	- 124.2 metres
Y	- 28.8 metres
Z	+ 137.2 metres

FIG. No. 2.

OFFSET DIAGRAM OF RIG DIAMOND M. EPOCH



Not to scale.

5. RESULTS

5.1 ARGO Position Results

The ARGO radio positioning system was installed onboard the rig on 23rd November with the antenna mounted on the starboard bow. It was used to navigate the rig from the TILANA location to KOORKAH, but due to crane movements onboard the rig interference to the ARGO signals occured with the result that whole lane determination was lost on occasions and had to be resurrected by dead-reconing.

This caused uncertainty in the rig's position and some of the rig's anchors to be laid incorrectly on first arriving at location, but after cross-referencing with the acoustic positioning system, the correct whole lane numbers were able to be re-established and a final position determined for the rig after ballasting down.

The final position was determined by taking a mean of ten (10) fixes, using ranges from Naracoopa, North Point and Port Sorell only, as the ranges from Liptrap were being interferred with by the rig's superstructure.

The final position for the ARGO antenna on the rig was recorded as follows:

Latitude	:	39° 37' 58.06" South
Longitude	:	145° 09' 03.39" East
Easting	:	341 317 metres
Northing	:	5 611 349 metres

5. RESULTS

5.1 ARGO Position Results (Cont'd)

After applying the offset from the Argo Antenna to the drillstem, see FIG. 2, the drilling position for the rig was provided as follows:

Latitude	:	39° 37' 58.15" South
Longitude	:	145° 09' 04.90" East
Easting	:	341 353 metres
Northing	:	5 611 347 metres

A comparison with the rig's satellite position is given below:

Satellite Fix	:	E 341 358 m	N 5 611 375 m
Argo Fix	:	E 341 353 m	N 5 611 347 m
		+5 m	+28 m

5. RESULTS (Cont'd)

5.2 Acoustic Positioning

The Acoustic positioning system was installed onboard the rig with the towfish lowered through the moonpool on 24th November, whilst on location to KOORKAH-1 location.

After switching on the acoustic transponders, a discrepancy in position with comparison to the Argo system was detected, for the reasons described in Section 5.1. This was resolved after taking five 3D satellite passes on the night of 25th November, while the work vessels were shut down, and the acoustic system found to be correct.

The final fix using acoustics was taken after the rig had ballasted down at 0745 hrs. on 27th November, using a velocity of propagation of 1504 metres per second for the acoustic signals the mean of fifty (50) fixes were recorded to determine the rig's drilling position. This result using the better Maxiran calibrated transponder position is given below:

Latitude	:	39° 37' 57.568" S
Longitude	:	145° 09' 05.376" E
Easting	:	341 364 metres
Northing	:	5 611 365 metres

A comparison with the rig's satellite position is given below:

Satellite Fix	:	E 341 358 m	N 5 611 375 m
Acoustic Fix	:	E 341 364 m	N 5 611 365 m
		-4 m	+10 m

5. RESULTS (Cont'd)

5.3 Satellite Positioning

On completion of the rig ballasting down, at 0745 on 27th November 1985, a final position check was commenced using the MAGNAVOX MX 1107 Receiver. By 0300 on 29th November, twenty six (26) passes had been accepted for 3D processing, giving a final antenna position of:

Latitude	:	39° 37' 57.71" South
Longitude	:	145° 09' 04.20" East
Eastings	:	341 336 metres
Northings	:	5 611 360 metres

The antenna to moonpool offset was then applied, (see FIG. 2.) and the final drill-stem position for the rig given as follows:

Latutide	:	39° 37' 57.24" South
Longitude	:	145° 09' 05.13" East
Eastings	:	341 358 metres
Northings	:	5 611 375 metres

6. CONCLUSIONS

The semi submersible drilling rig DIAMOND M. EPOCH was positioned over location KOORKAH No.1 on the 27th November 1985, with the final coordinates recorded by satellite, for the drilling position, accepted as follows:

Latitude	:	39° 37' 57.24" South
Longitude	:	145° 09' 05.13" East
Eastings	:	341 358 metres
Northings	:	5 611 375 metres

This position is 41 metres on a bearing of 263° from the intended location.

The final rig heading was 231.5° true.

G.H. MOUNTENEY
HYDROGRAPHIC SURVEYOR

APPENDIX A

STATION DESCRIPTIONS

STATION: NORTH POINT

LOCATION: The station is located near the township of Stanley, Circular Head, Tasmania, Southern Australia.

ACCESS: From Devonport head west along the Bass Highway for approximately two hours. Turn right towards Stanley and head towards the very obvious hill (The Nut). On reaching the township of Stanley turn left 50 m. before the B.P. Garage, then left again at the Union Hotel. Follow this road along the coast, towards the lighthouse. There is only one access track to the station. Use the diagram from here. From the Union Hotel the distance to the station is 8.6 km.

MARKERS: There are three (3) markers on the site:

(1) GEOMEX 10/85 - 320 mm. block of concrete inscribed "GEOMEX 10/85" with a star picket protruding 1" above the concrete.

(2) SYLED GEOMEX 10/85 - 240 mm block of concrete inscribed "GEOMEX 10/85"

(3) ARGO 10/85 - 270 mm. block of concrete inscribed "ARGO 10/85".

GENERAL: A caravan is recommended for this site. Access can be made by 2 wheel-drive vehicle for most of the year except after heavy rains.

Food, fuel, water, etc. may be obtained from Stanley.

Permission to occupy the site must be obtained from Mr. David Bruce (tel: 004-581321). The local Ranger, Mr. Brian Carson (tel: 004-581320) has proved very useful in obtaining local labour and for general assistance.

STATION: NORTH POINT (Cont'd)

CO-ORDINATES: GEOMEX 10/85

Latitude:	40° 42' 50.472" South
Longitude:	145° 15' 31.329" East
Easting:	352 919.11 m.
Northing:	5 491 514.85 m.
Height:	5.5 m.

SYLED GEOMEX 10/85

Latitude:	40° 42' 51.396" South
Longitude:	145° 15' 31.313" East
Easting:	352 919.30 m.
Northing:	5 491 486.36 m.

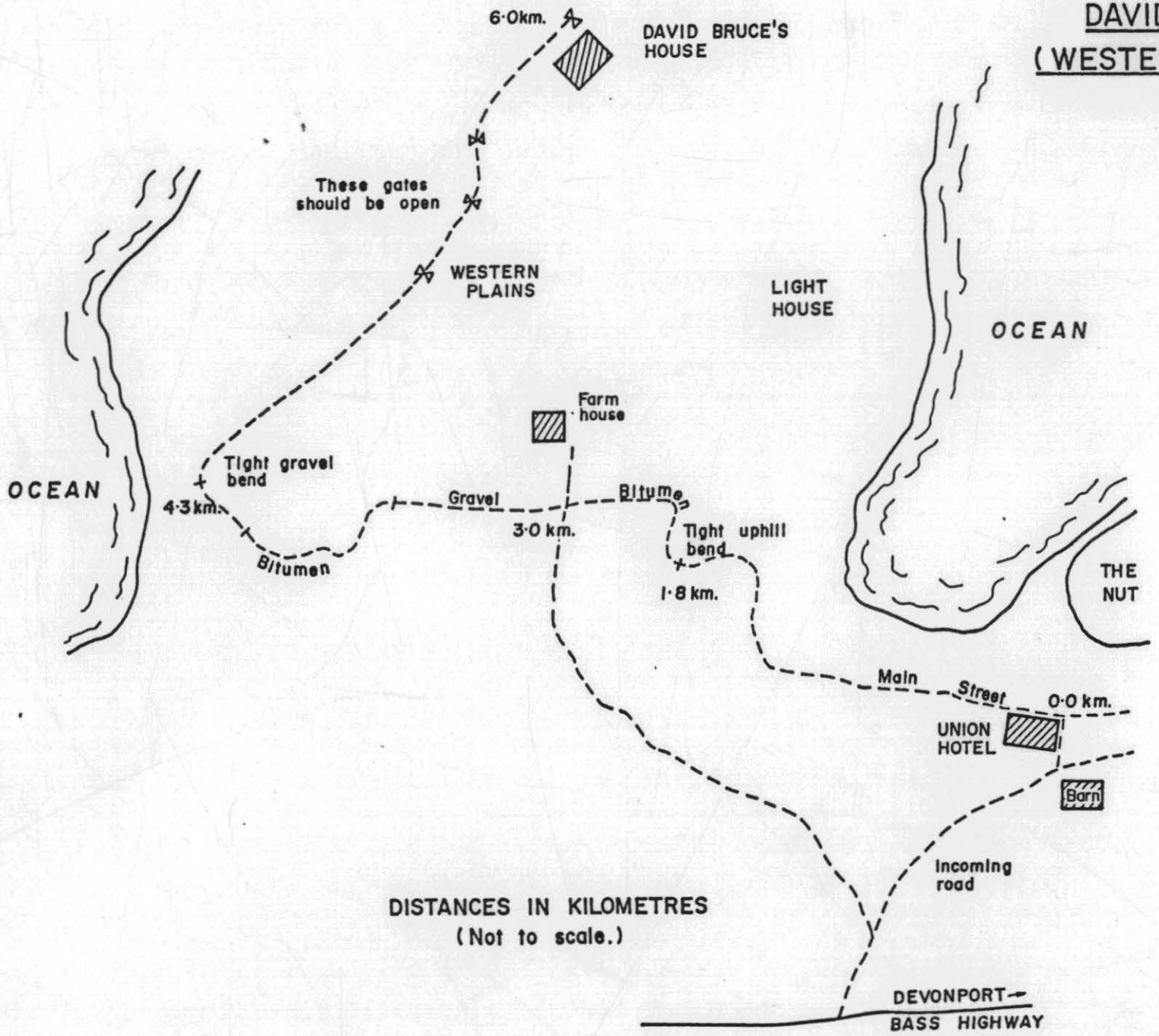
ARGO 10/85

Latitude:	40° 42' 52.146" South
Longitude:	145° 15' 30.279" East
Easting:	352 895.49 m.
Northing:	5 491 462.76 m.

All co-ordinates refer to:

Spheroid	:	Australian National
Datum	:	Australian Geodetic
UTM Projection	:	Zone 55
Central Meridian	:	147° East
Rectangular Co-ordinates	:	Australian Map Grid (in m.)
Heights	:	In metres above the Australian Height Datum.

ACCESS DIAGRAM TO DAVID BRUCE'S PROPERTY (WESTERN PLAINS) VIA STANLEY



DISTANCES IN KILOMETRES
(Not to scale.)

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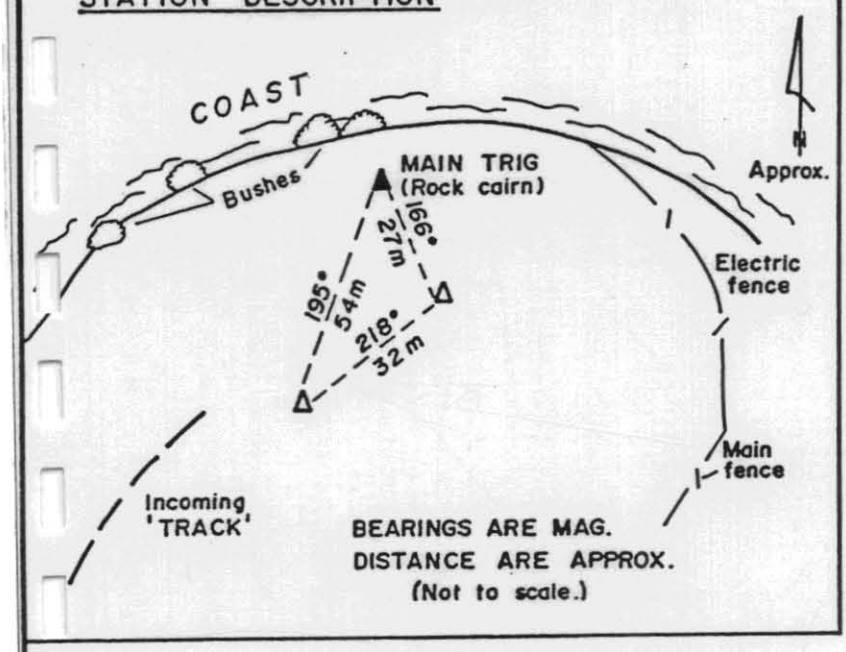
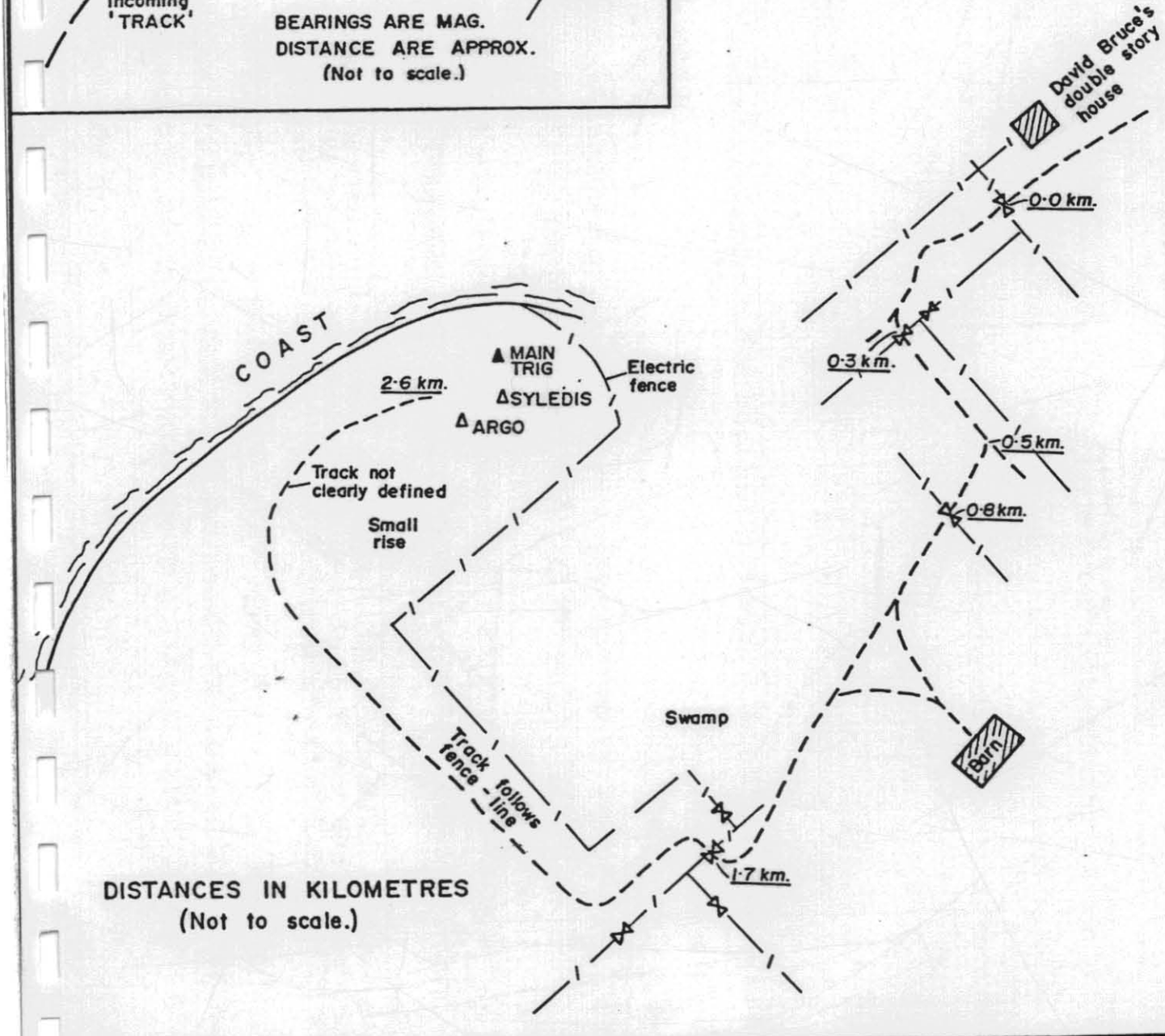
NORTH POINT STATION
ACCESS DIAGRAM

STATION DESCRIPTION





STATION: GEOMEX NO. 1 and GEOMEX NO. 2

LOCATED: Cape Liptrap.
The stations are located approximately 2 kilometres east of the Cape Liptrap Lighthouse which is situated 45 kilometres from the township of Tarwin Lower, Victoria, Australia.

The station's site is 110 metres above sea level and surrounded on three sides by the sea. The only vegetation on the site is low grass which is used for the grazing of stock animals.

The most direct route to the site is to travel southeast from Tarwin Lower on the Tarwin Lower - Walkerville Road. After about 40 kilometres there is a turn off to the right which is unsealed and signposted to Cape Liptrap Lighthouse. Follow this road for about 5 kilometres whence there is a property access road to the left. The station site is located about 1 kilometre along this access road on the headland overlooking the sea.

The site is accessable by any type of vehicle by following this route. Permission to enter must be obtained from the property owner, Mr. Bill Bray (telephone number 056-632265).

MARKER: The station markers consist of driven starpickets set in concrete. The concrete is inscribed "Geomex No. 1 and Geomex No. 2" respectively.

GENERAL: Local labour, food, fuel, oil and drinking water can be obtained from the nearest township of Tarwin Lower. As the site is very much exposed, rain and wind mainly from the west and east will be the main source of discomfort experienced on the site.

TATION: GEOMEX NO. 1 and GEOMEX No. 2 (Cont'd)

O-ORDINATES: The stations were surveyed in from the Australian Triangulation Station No. 00146 located near the intersection of the Cape Liptrap - Tarwin Lower Roads.

Geomex No. 1

Latitude	:	38° 53' 36.024" South
Longitude	:	145° 56' 53.272" East
Easting	:	408 778.815 m.
Northing	:	5 694 518.719 m.
Height	:	113.865 m.

Geomex No. 2 (Syledis Station)

Latitude	:	38° 53' 35.433" South
Longitude	:	145° 56' 51.541" East
Easting	:	408 736.896 m.
Northing	:	5 694 536.482 m.
Height	:	113.638 m.

Argo Station

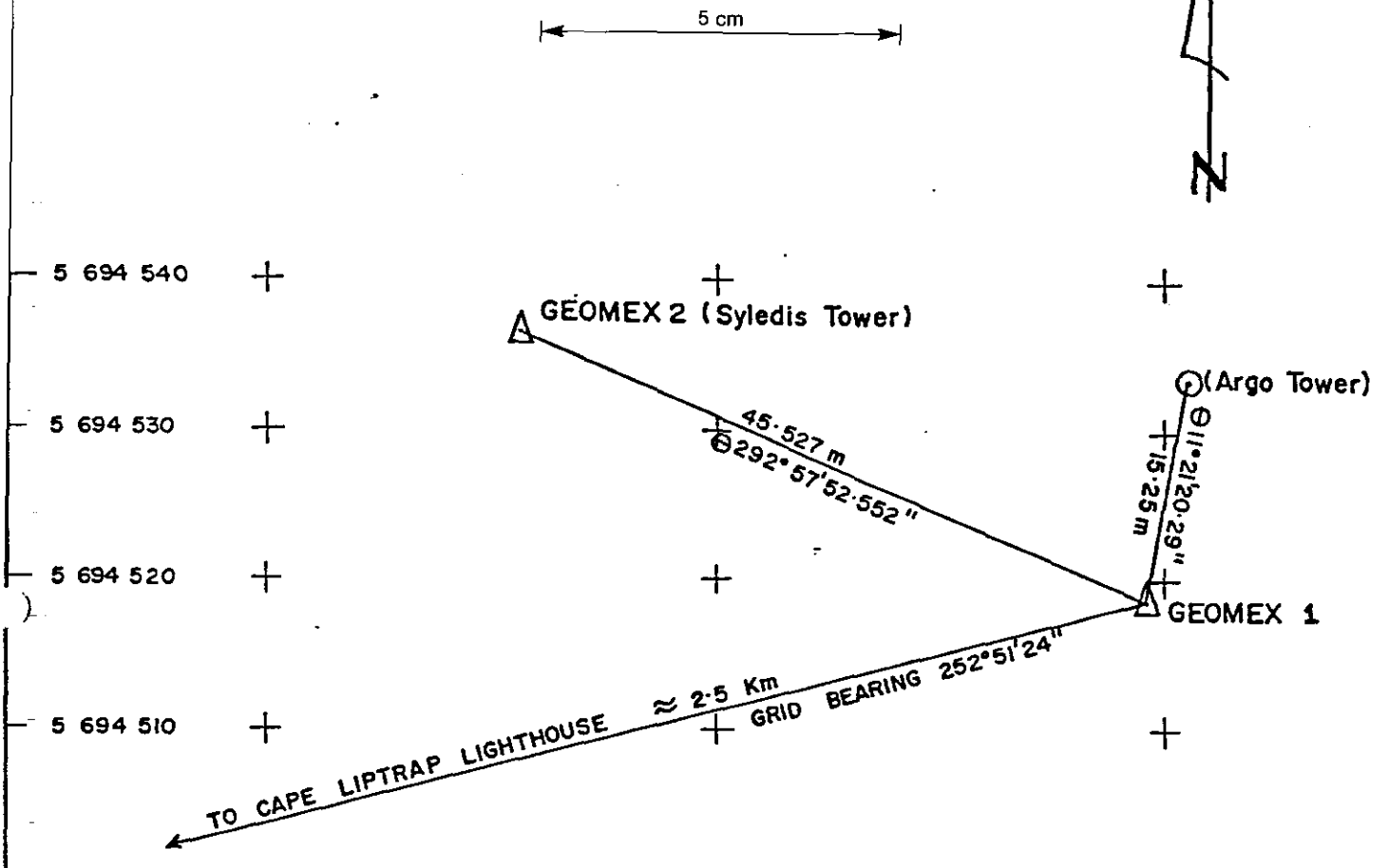
Latitude	:	38° 53' 35.541" South
Longitude	:	145° 56' 53.404" East
Easting	:	408 781.818 m.
Northing	:	5 694 533.670 m.
Height	:	114.705 m.

NOTE: All co-ordinates refer to:-

Spheroid	:	Australian National
Datum	:	Australian Geodetic
UTM Projection	:	Zone 55
Central Meridian	:	147° East
Rectangular Co-ordinates	:	Australian Map Grid (in metres)
Height	:	In metres above the Australian Height Datum

279636

STATION DETAILS



	GEOMEX 1	GEOMEX 2	ARGO TOWER
EASTING	408778·815 m	408736·896 m	408781·818 m
NORTHING	5694518·719 m	5694536·482 m	5694533·670 m
LATITUDE	38° 53' 36·024" South	38° 53' 35·433" South	38° 53' 35·541" South
LONGITUDE	145° 56' 53·272" East	145° 56' 51·541" East	145° 56' 53·404" East
HEIGHT	113·865 m	113·638 m	114·705 m

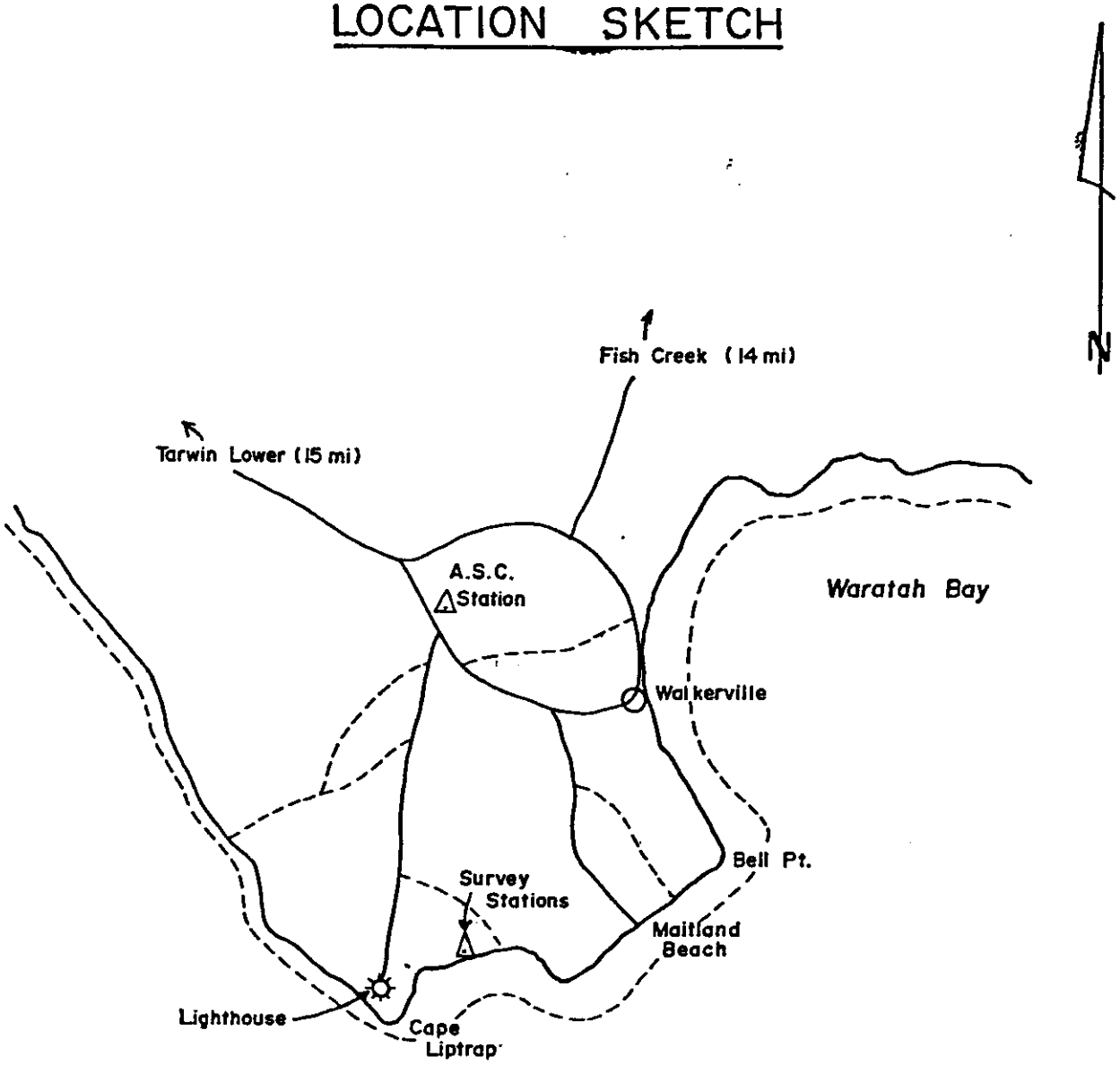
U.T.M. PROJECTION

ZONE 55. C.M. 147° E

AUSTRALIAN GEODETIC DATUM.

279037

LOCATION SKETCH



STATION: NARACOOPA

LOCATED: Station NARACOOPA is located in the village of Naracoopa, approximately 20 km. from the town of Curry on King Island, in the Bass Strait, Southern Australia.

ACCESS: Follow the road from Curry towards Naracoopa, just before reaching Naracoopa, there is a turn-off to the right, signposted "Millbrook". Follow this road for 0.8 km. whence there is a property access to the left which is gated. Proceed through the gate and drive to the right around a small dam. The station is located in a small grass paddock on a ridge which is easily seen.

For most of the year a 4WD vehicle is required to reach the site. A tractor may be obtained to provide transport from Mr. D. Spittle (tel: 004-611206).

MARKERS: Two markers exist on the site, both consisting of brass plaques set in concrete. One plaque is inscribed "ONI Argo 1984" and the other "GSI Syledis 1984". The points are also marked with star pickets.

GENERAL: The property the stations are located on is owned by Mrs. Gail Henderson who should be contacted prior to occupying the site. She lives in Curry and as Curry is a small community, locating her is not a problem.

Assistance in establishing the station (e.g. employing local labour, etc.) may be obtained from Mr. Ian Whitehouse who also lives in Curry.

STATION: NARACOOPA (Cont'd)

GENERAL: (Cont'd) Food, fuel, and small hardware items may be obtained from Curry. At present, a caravan is located on the property, however, if not available there is a deserted house 175 m. from the station which may be used as accomodation. Contact Mrs. Henderson for details.

CO-ORDINATES:

Marker "(281/150)"

Latitude:	39° 55' 27.64" South
Longitude:	144° 07' 26.23" East
Easting:	254 211 m.
Northing:	5 576 663 m.

Marker "ONI ARGO 1984"

Latitude:	39° 55' 29.05" South
Longitude:	144° 07' 39.03" East
Easting:	254 517 m.
Northing:	5 576 630 m.
Height:	55.9 m.

Marker "GSI Syledis 1984"

Latitude:	39° 55' 29.95" South
Longitude:	144° 07' 39.47" East
Easting:	254 528 m.
Northing:	5 576 603 m.
Height:	56 m.

All co-ordinates refer to:

Spheroid	:	Australian National
Datum	:	Australian Geodetic
UTM Projection	:	Zone 55
Central Meridian	:	147° East
Rectangular Co-ordinates	:	Australian Map Grid (in m.)
Heights	:	In metres above the Australian Height Datum.

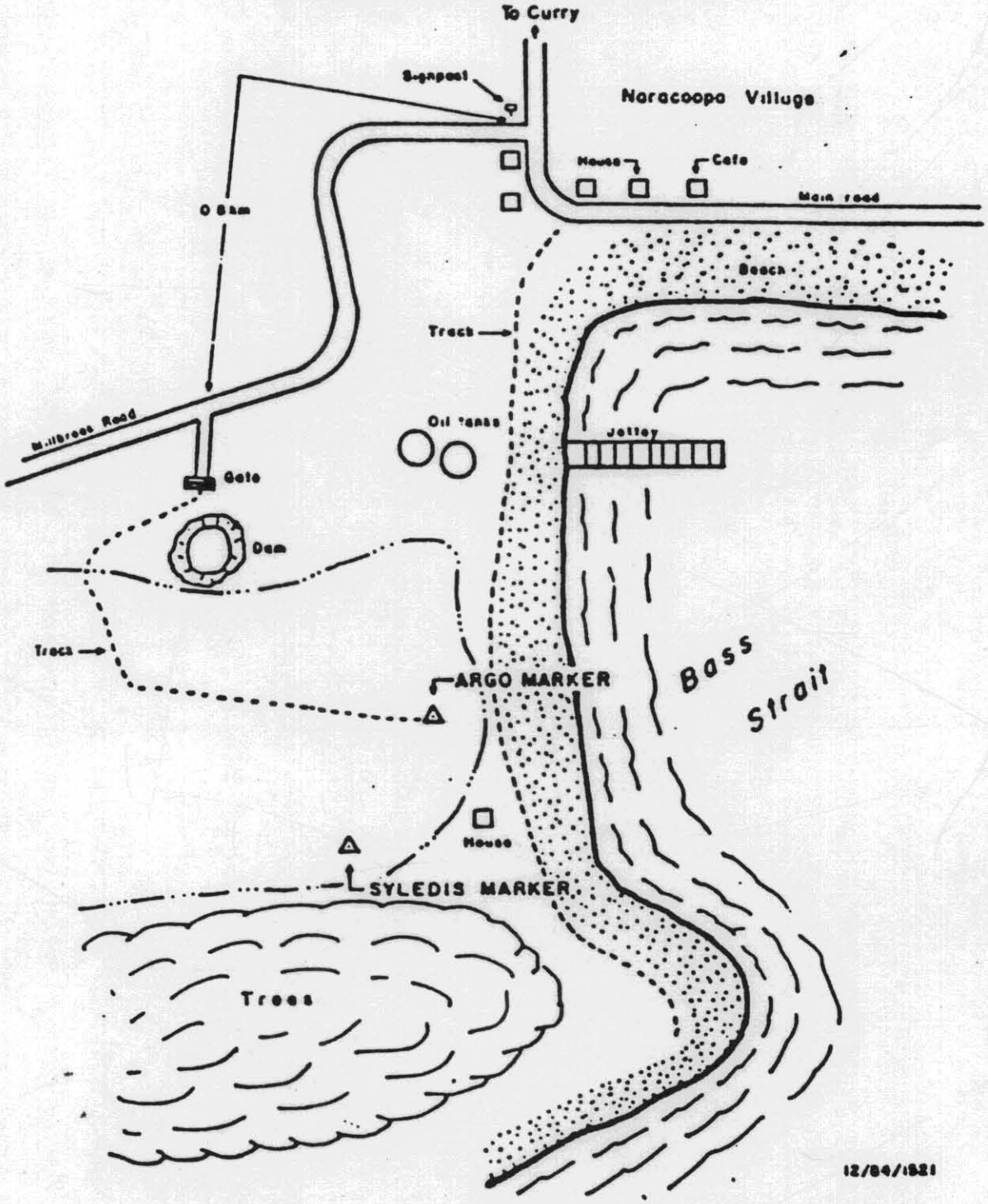
279040

STA. NARACOOPA ——— AUSTRALIA

MARKER (281/150) COORDINATES

LAT. 38°55'27".64 S — N 5,576,663 meters
LONG. 144°07'26".23 E — E 254,211 meters
ELEV. Not reported

UTM PROJ. ——— AUST. NAT. SPHEROID
ZONE 55, C.M. 147° E ——— A.G.D.



5 cm

STATION: POINT SORELL (ST. 517)

LOCATED: The station is located on the highest point of Point Sorell, which is 4.8 km. from Hawley Beach or 26 km. from the city of Devonport, Tasmania.

The station marker is located on a point, 150 m. from the water's edge. Vegetation around the site is made up of grass, with patches of 0.5m. high tussocks.

ACCESS: Access may be by two-wheel drive type vehicle unless there has been recent rain when a four-wheel drive vehicle will be needed.

From Devonport follow the Bass Highway towards Launceston for 2 km. past the East Devonport turn-off, then turn left at the Exeter/Port Sorell turn-off. Follow this road towards Port Sorell for approximately 12 km. to an intersection located approximately 2 km. before Port Sorell. Turn left at this intersection which is signposted "Hawley Caravan Park". Follow this road to Hawley Beach until a 'T' junction is reached. Turn left at this junction, just after making this turn, turn right onto a sealed road marked "Heavy Vehicles Only". Follow this road until another 'T' junction. Turn left and follow this road for approximately 700 metres to a white wooden gate. Immediately in front of the gate the road veers to the right. Follow this road until a road leads to left which is signposed "LHC Private Road". Turn left here and follow the road for approximately 100 m., then turn to the right. Directly ahead of you should be the residence of Mr. Roger Moncrieff. Continue on this road for a further 300 m. until a locked gate is reached. Obtain a key for this gate from the property owner, or if open follow

STATION: POINT SORELL (ST 517) (Cont'd)

ACCESS: (Cont'd) the road to a set of double gates, near the council sewage pond. The station marker can be seen about 2 km. from these gates. Mr. Roger Moncrieff, the station owner (tel: 004-286193), should be contacted before attempting to occupy the site.

MARKER: The station marker located on a hill consists of a brass mushroom S.P.M., which is not numbered, is set in concrete at ground level, with stones surrounding the marker.

The Maxiran station was erected approximately 1 metre at about 270° from the station marker. A 3 metre quadrapod is erected over the station.

GENERAL: Mr. Roger Moncrieff may be able to assist with the provision of labour. Labour, food, fuel, supplies etc. may be obtained in Devonport.

A caravan with heater is essential at this site which may be obtained from "Devon Coastavans" in Devonport. Although a 40 ft. tower has been used on this station, a 20 ft. tower should suffice.

STATION: POINT SORELL (ST 517) (Cont'd)

CO-ORDINATES: Maxiran Tower

Latitude	:	41° 07' 24.75" South
Longitude	:	146° 31' 41.91" East
Easting	:	460 404 m.
Northing	:	5 447 405 m.
Height	:	42 m.

Argo Tower

Latitude	:	41° 07' 23.63" South
Longitude	:	146° 31' 42.34" East
Easting	:	460 414 m.
Northing	:	5 447 440 m.
Height	:	30 m.

Note all co-ordinates refer to:

Spheroid	:	Australian National
Datum	:	Australian Geodetic
UTM Projection	:	Zone 55
Central Meridian	:	147° East
Rectangular Co-ords	:	Australian Map Grid (in m.)
Heights	:	In metres above the Australian Height Datum

279044

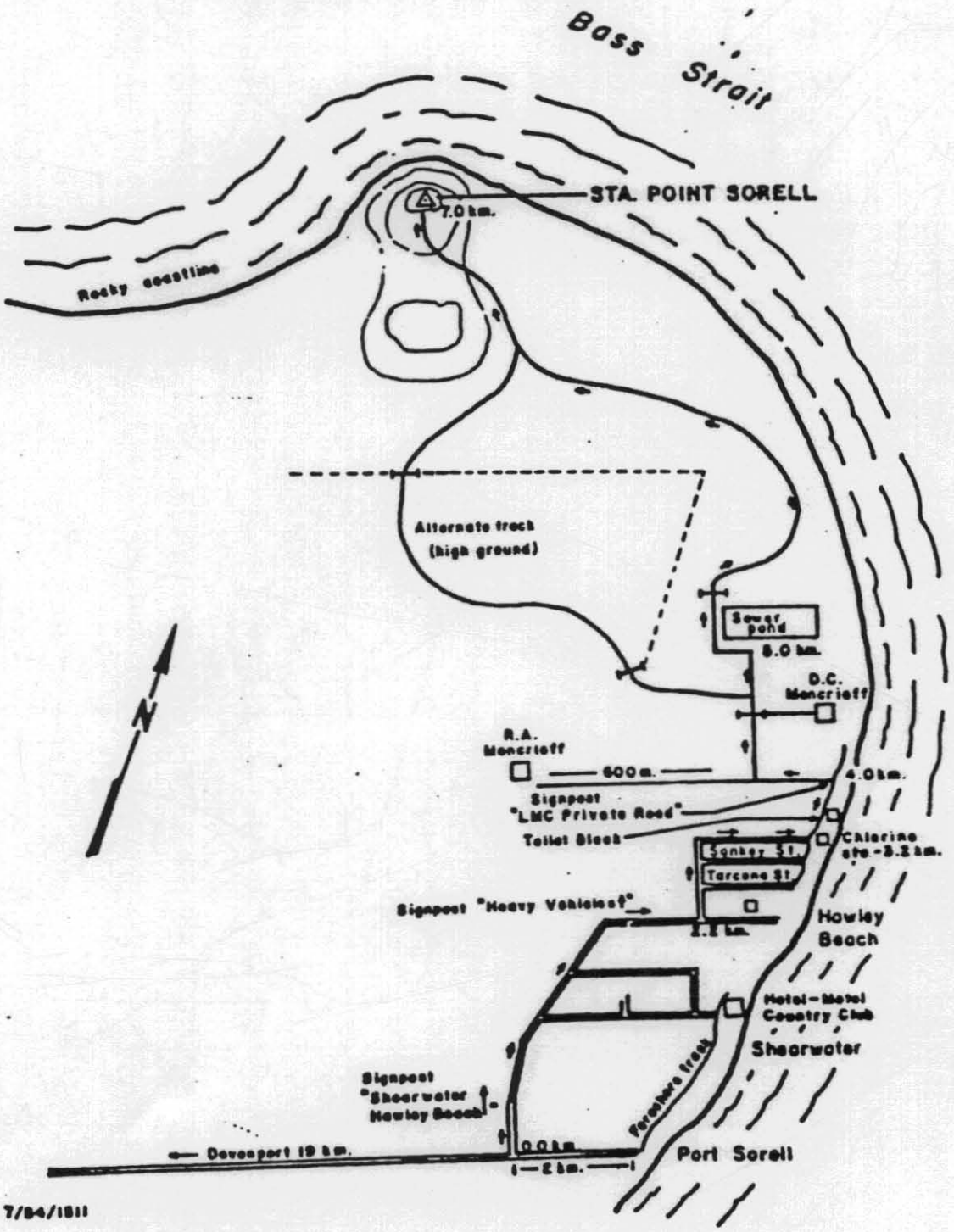
STA. POINT SORELL (ST 517)——AUSTRALIA

LAT. 41° 07' 24".69 S
LONG. 146° 31' 41".88 E
ELEV. 30 meters

(MARKER COORDS.)

N 5,447,407 meters
E 460,403 meters

UTM PROJ. ——— AUST. NAT. SPHEROID
ZONE 55, C.M. 147° E ——— A.G.D.



7/84/1811

5 cm

APPENDIX B

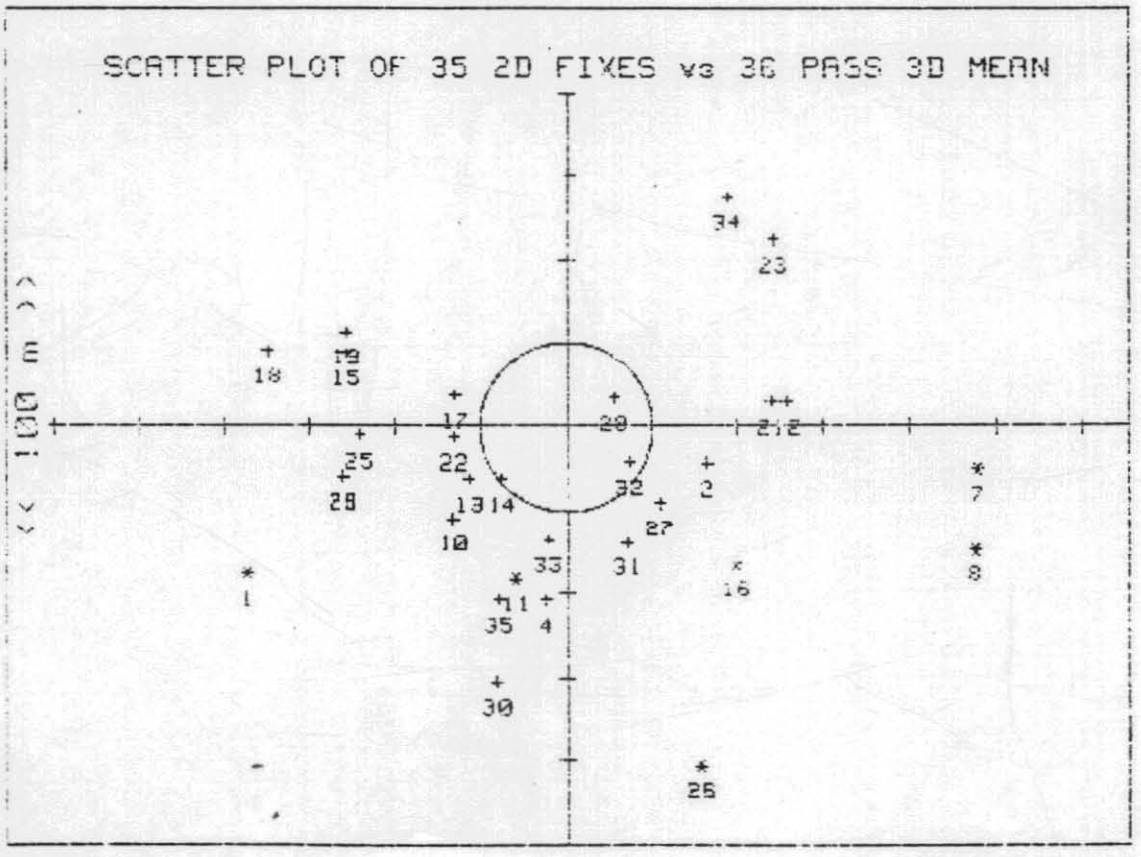
SATELLITE VERIFICATION DATA

279046

SATELLITE VERIFICATION DATA

***** 3D PARAMETERS *****

Pass #	36	
Latitude 3D	39.631248	
Longitude 3D	145.152268	
Easting	341427.94	
Northing	5611539.36	
Height	:	20.9
Sigma latitude	:	4
Sigma longitude	:	6
Sigma height	:	4
No. rejected passes	:	9
Quadrant rise totals	9	6
	6	6



5 cm

			lexit

3D SCATTER PLOT COMPONENTS RELATIVE TO MEAN

Pass #	dEast	DNorth
1	-549.9	138.2
2	5.6	4.7
3	7.4	2.3
4	11.0	-5.1
5	12.8	-5.1
6	11.0	-5.1
7	11.0	-5.1
8	7.3	-5.0
9	7.3	-2.6
10	1.8	-2.5
11	0.0	0.0
12	-5.5	.1
13	-1.8	0.0
14	-1.8	0.0
15	0.0	2.4
16	0.0	0.0
17	0.0	0.0
18	0.0	0.0

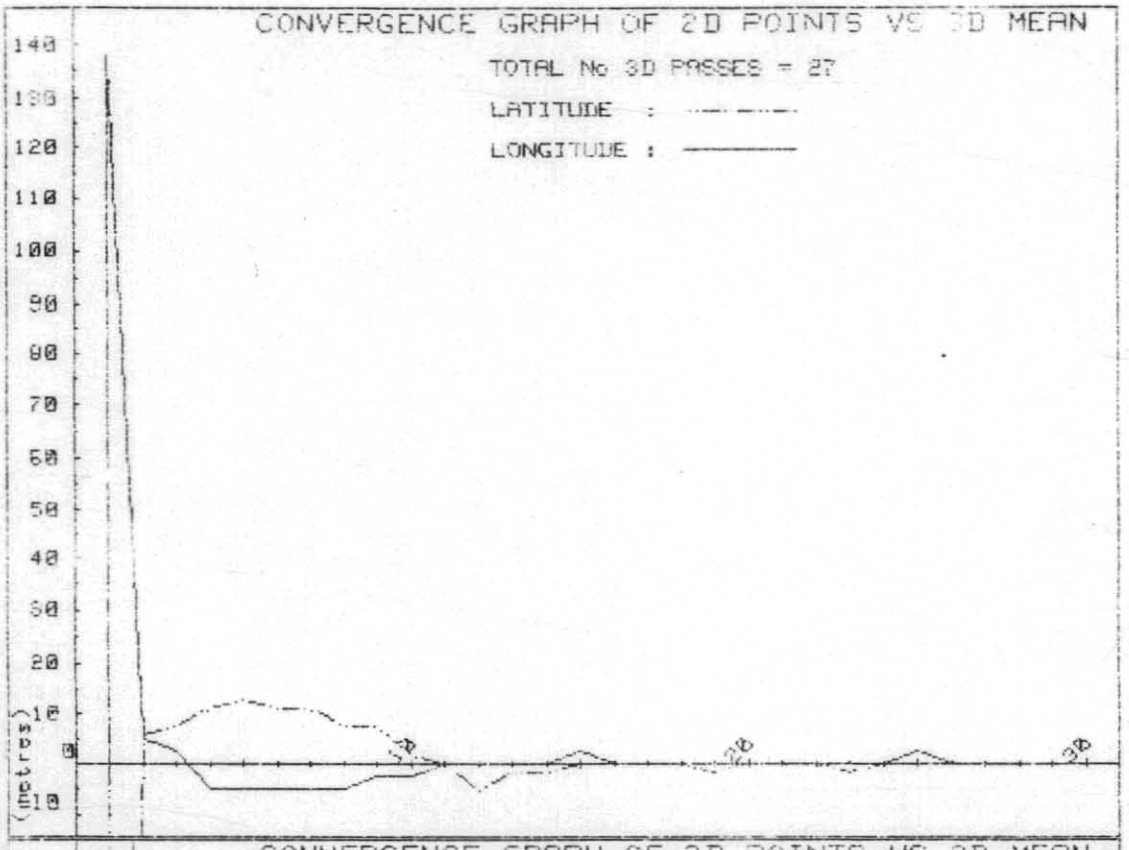
			lexit

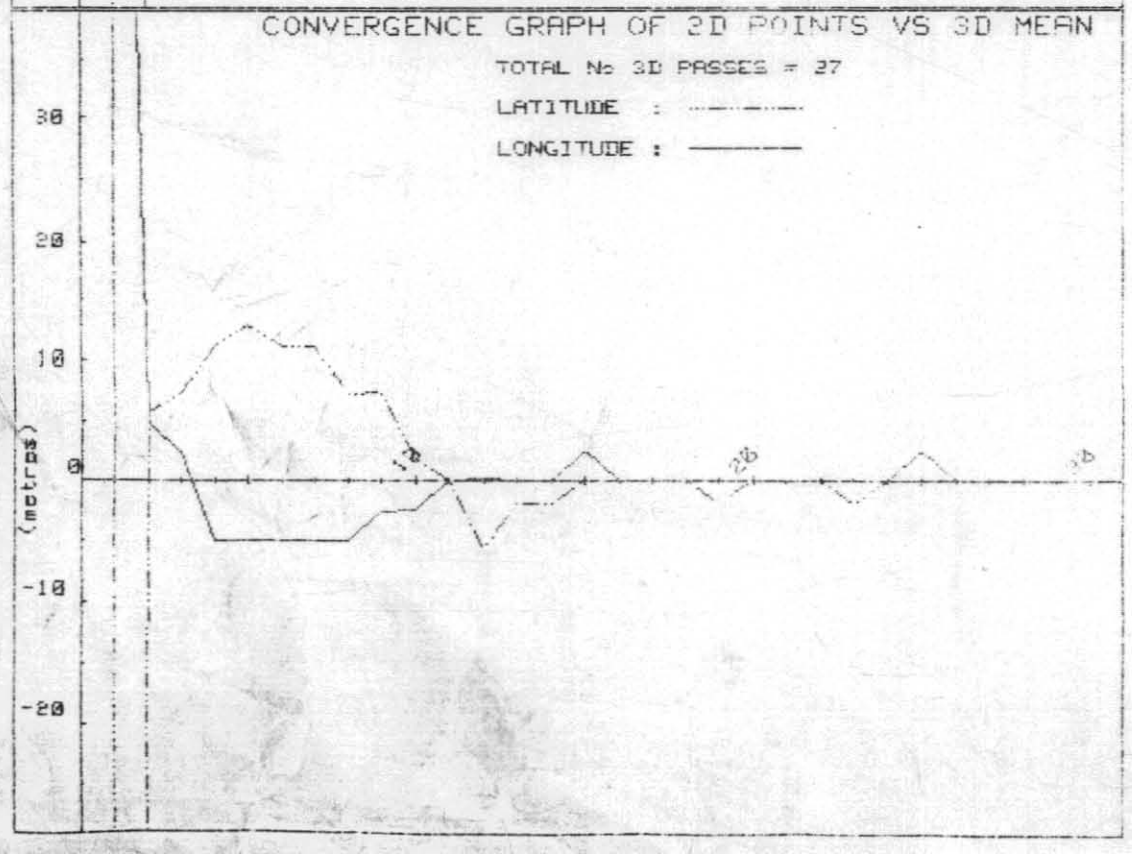
18	0.0	0.0
19	-1.8	0.0
20	0.0	0.0
21	0.0	0.0
22	0.0	0.0
23	-1.8	0.0
24	0.0	0.0
25	0.0	2.4
26	0.0	0.0

			lexit

279048

exit



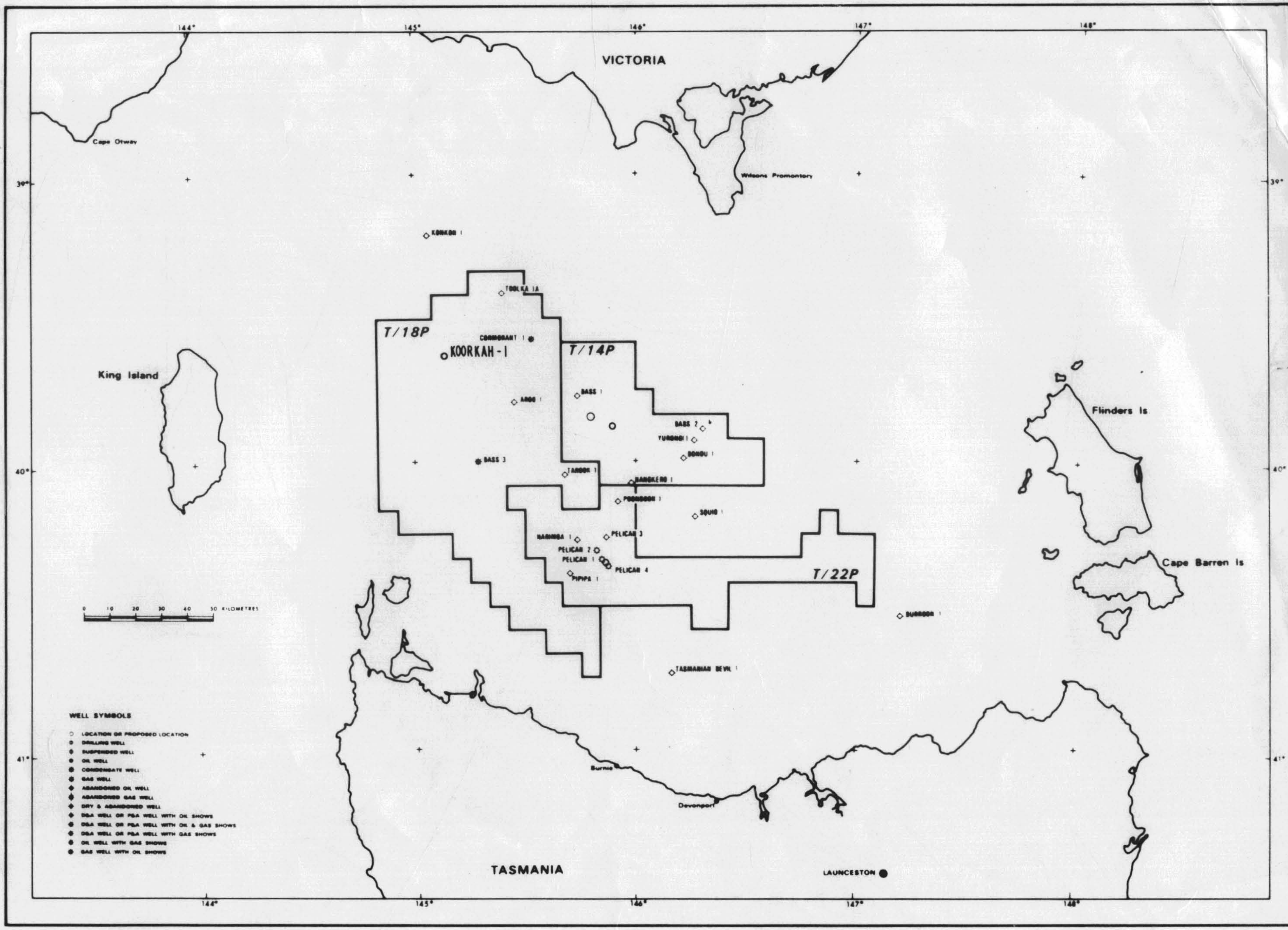


5 cm

5 cm

279049

MAP. I.



OR-0087A

N 5 635 060 m
E 327 829 m

N 5 636 121 m
E 385 222 m

145°00' 330 340 10' 350 20' 360 370 30' 380 145°40'

-39°25'

-40°00'

-40°05'

5630 5620 5610 5600 5590 5580 5570

30' 40' 50'

TP05-01 TP05-02 TP05-03 TP05-04 TP05-05 TP05-06 TP05-07 TP05-08 TP05-09 TP05-10 TP05-11 TP05-13 TP05-15 TP05-17A TP05-51C TNK4-15A

N 5 561 061 m
E 329 482 m

N 5 562 126 m
E 386 323 m

279050

SPHEROID : A.N.S.
A RADIUS : 6378160m
FLATTENING : 1/298.25
PROJECTION : U.T.M.
CENTRAL MERIDIAN : 147°
DATUM : A.G.D.

AUSTRALIAN MAP GRID

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SUBIACO, WESTERN AUSTRALIA 6008
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Amoco Australia Petroleum Company

CONFIDENTIAL
CLASS

KOPRKAH - 1

SITE SURVEY PROGRAM

SCALE: 1:100,000
24 MAY., 1985
MAP 2.

5 cm

XU 859 (-3

OR-0287A