APPENDIX 27
SOLE-2

Re-entry Rig Positioning Report

-Thales-

Back to Contents

Return to Sole-2 Positioning Report of the Ocean Bounty

Prepared for OMV Australia Pty Ltd

Report No: 3432A3

Thales GeoSolutions (Australasia) Limited
ABN 82 000 601 909
Hydrographic House
4 Ledgar Road
BALCATTA WA 6021
Tel: +61 (0) 8 9344 7166
Fax: +61 (0) 8 9344 8783

THALES

Thales GeoSolutions (Australasia) Limited
ABN 82 000 601 909

Hydrographic House
4 Ledgar Road
Balcatta WA 6021
Tel: + 61 (0) 8 9344 7166
Fax: + 61 (0) 8 9344 8783

Prepared for

OMV

OMV AUSTRALIA PTY LTD

DOCUMENT TITLE	:	**RETURN TO SOLE-2 POSITIONING REPORT OF THE OCEAN BOUNTY**
CLIENT	:	**OMV AUSTRALIA PTY LTD**
LOCATION	:	**GIPPSLAND BASIN, BASS STRAIT**
PERMIT	:	**VIC/RL3**
REPORT REF.	:	**3432A3**
REPORT REV NO.	:	**0**
REPORT ISSUE DATE	:	**20 AUGUST 2002**
SURVEY DATE	:	**7 – 11 AUGUST 2002**

CONTENTS

APPENDICES

A - FINAL DIFFERENTIAL GPS DRILLSTEM POSITION AT SOLE-2

B - GNS2 STATIC DIFFERENTIAL GPS FIX GRAPHS

C - RUN LINE GRAPHICS OF ANCHOR HANDLING VESSELS

D - OCEAN BOUNTY ANCHOR PATTERN DETAILS AT SOLE-2

E - OCEAN BOUNTY ANCHOR CATENARY CALCULATIONS

F - GYROCOMPASS CALIBRATION REPORT

G - DIFFERENTIAL GPS CHECK

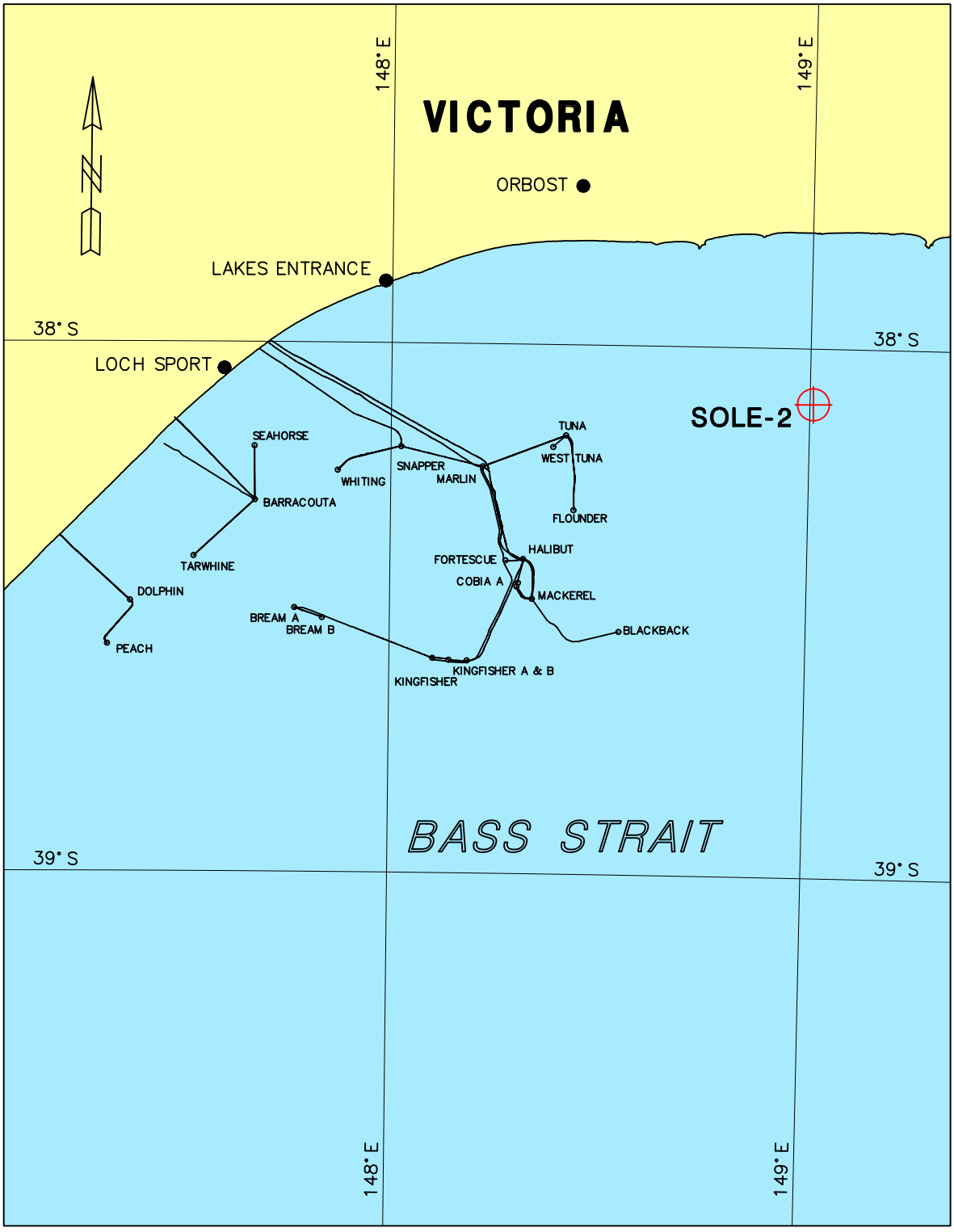
H - OCEAN BOUNTY OFFSET DIAGRAM

I - PACIFIC SENTINEL AND PACIFIC CONQUEROR OFFSET DIAGRAMS

J - GNS2 CONFIGURATION FILE PRINTOUT

K - DAILY REPORT SHEETS

LOCATION DIAGRAM



ABSTRACT

This report details the positioning services provided by Thales GeoSolutions (Australasia) Limited (Thales), prior to and during the positioning of the semi-submersible drilling rig Ocean Bounty at the Sole-2 location for OMV Australia Pty Ltd (OMV). The Ocean Bounty returned to Sole-2 for H_2S testing, following original drilling operations conducted in July 2002.

Positioning of the Ocean Bounty during the approach to and at the Sole-2 location was provided by Thales' SkyFix/SkyFix Spot Differential GPS (Differential GPS) interfaced to Thales' Multifix 3 multiple reference station positioning software and Thales' GNS2 rig move software. The two anchor handling vessels (AHVs), Pacific Sentinel and Pacific Conqueror were positioned using Thales' Tracs/Tug Display Vessel Tracking System (VTS). The Ocean Bounty was positioned at the Sole-2 location at 2130 on 10 August 2002.

Published Sole-2 Location

The co-ordinates of the intended Sole-2 location were provided by OMV as follows:

Datum: AGD66

Latitude : 38° 06' 18.665" South
Longitude : 149° 00' 28.997" East

Projection: AMG Zone 55, CM 147° East

Easting : 676 059.05m
Northing : 5 780 595.42m

Rig Positioning Tolerance : ± *20m*

Intended Rig Heading : 257.0° (T)

Final Differential GPS Drillstem Position at the Sole-2 Location

The final Differential GPS Position of the Ocean Bounty drillstem at the Sole-2 location was computed from data observed between 0824 and 0832 on 11 August 2002. The final position is as follows:

Datum: AGD66

Latitude : 38° 06' 18.532" South
Longitude : 149° 00' 28.960" East

Projection: AMG Zone 55, CM 147° East

Easting : 676 058.23m
Northing : 5 780 599.53m

The final Differential GPS drillstem position is 4.20m on a bearing of 347.5° (T) from the published Sole-2 location.

Final Rig Heading : 260.2° (T)
All times quoted in this report are Eastern Standard Time (UTC + 10.0 hours).

1. RESULTS

1.1 FINAL DIFFERENTIAL GPS POSITION OF THE OCEAN BOUNTY DRILLSTEM AT THE SOLE-2 LOCATION

The Ocean Bounty was positioned at the Sole-2 location at 2130 on 10 August 2002.

The final Differential GPS position of the Ocean Bounty drillstem at the Sole-2 location, was determined using Thales' MultiFix 3 positioning software interfaced to a Trimble 4000 DS GPS receiver, with differential corrections being provided by Thales' SkyFix Spot Differential GPS services.

The final fix routine, within Thales' GNS2 rig move software version 2.35, was used to compute the final Differential GPS position of the drillstem at the Sole-2 location. A total of 100 position fixes were recorded at 5 second intervals between 0824 and 0832 on 11 August 2002.

Refer to Appendix A for the GNS2 final Differential GPS position printouts at the Sole-2 location. Associated graphs are located in Appendix B.

Differential corrections from the SkyFix reference stations in Melbourne, Sydney and Adelaide were used in the MultiFix 3 software computations to derive the Differential GPS position.

The final surface co-ordinates for the Sole-2 Ocean Bounty drillstem location, determined from Differential GPS observations are as follows:

Total number of samples used = 100.

The computed antenna position is as follows:

GPS Antenna Position

Datum: WGS84

Latitude	:	38° 06' 13.165" South	(S.D. 0.30m)
Longitude	:	149° 00' 32.077" East	(S.D. 0.25m)
Ellipsoidal Height	:	42.77m	(S.D. 0.41m)

Transforming the above WGS84 co-ordinates to AGD66 co-ordinates using the parameters in section 6, gives the following antenna co-ordinates:

GPS Antenna Position

Datum: AGD66

Latitude	:	38° 06' 18.710" South
Longitude	:	149° 00' 27.587" East
Ellipsoidal Height	:	49.10m

By applying a distance of 33.90m on a bearing of 77.8° (T) from the antenna position, the following drillstem co-ordinates are calculated:

Final Differential GPS Position of the Drillstem at the Sole-2 Location

Datum: AGD66

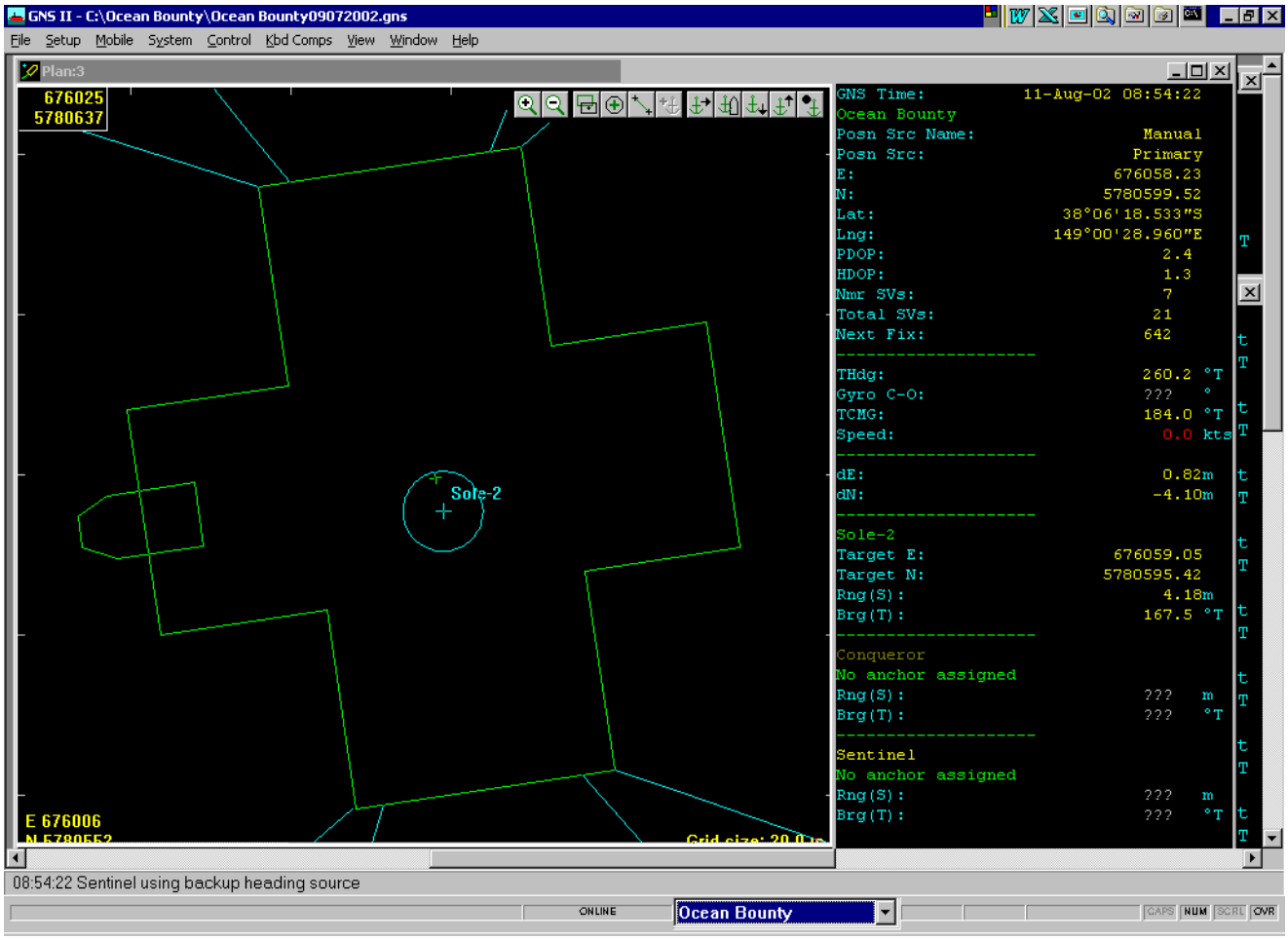
Latitude : 38° 06' 18.532" South
Longitude : 149° 00' 28.960" East

Projection: AMG Zone 55, CM 147° East

Easting : 676 058.23m
Northing : 5 780 599.53m

This final Differential GPS position of the drillstem is 4.20m on a bearing of 347.5° (T) from the published Sole-2 location.

Final Rig Heading : 260.2° (T)



Skyfix Spot Differential GPS Position and Published Position at the Sole-2 Location

1.2 OCEAN BOUNTY ANCHOR POSITIONS

Deployed anchor positions were derived from the computed anchor function within the GNS2 software. The function takes into account the length of anchor chain out, water depth, anchor tension and the wet weight of anchor chain to compute the deployed anchor positions. The final anchor positions are tabulated below:

Datum: AGD66 Projection: AMG Zone 55, CM 147° East

Anchor	Intended Anchor Position		Final Anchor Position	
	Easting (m)	Northing (m)	Easting (m)	Northing (m)
Anchor 1	675 672.88	5 779 395.70	675 720.19	5 779 459.12
Anchor 2	675 140.79	5 779 741.04	675 187.83	5 779 824.37
Anchor 3	674 876.11	5 781 012.35	674 950.74	5 780 978.50
Anchor 4	675 226.17	5 781 541.35	675 339.43	5 781 497.74
Anchor 5	676 445.21	5 781 795.15	676 473.20	5 781 663.06
Anchor 6	676 977.32	5 781 449.81	676 997.58	5 781 428.70
Anchor 7	677 241.99	5 780 178.48	677 047.61	5 780 232.59
Anchor 8	676 891.92	5 779 649.48	676 803.72	5 779 733.10

Difference of final anchor positions from the intended anchor positions.

Anchor	Dropped by	Eastings (m)	Northings (m)
Anchor 1	P.Sentinel	+47.31	+63.42
Anchor 2	P.Conqueror	+47.04	+83.33
Anchor 3	P.Conqueror	+74.63	-33.85
Anchor 4	P.Sentinel	+113.26	-43.61
Anchor 5	P.Sentinel	+27.99	-132.09
Anchor 6	Ocean Bounty	+20.26	-21.11
Anchor 7	P.Conqueror	-194.38	+54.11
Anchor 8	P.Sentinel	-88.20	+83.62

Horizontal distance and bearing from the Ocean Bounty fairleads to the final anchor positions.

Anchor	Bearing (T)	Horizontal Distance (ft)
Anchor 1	195.5°	3877
Anchor 2	228.3°	3985
Anchor 3	286.3°	3885
Anchor 4	319.6°	3762
Anchor 5	20.5°	3731
Anchor 6	48.5°	4147
Anchor 7	107.6°	3328
Anchor 8	137.5°	3790

Ocean Bounty anchor details are located in Appendices C, D and E of this report.

2. SAFETY

A pre-rig move meeting was held at Thales' Perth offices on 6 August 2002. Thales personnel B. O'Brien and P. Wells were present. During the meeting safety procedures were discussed including correct operation and handling of equipment. It was also confirmed that personnel had been issued with the appropriate safety equipment.

All Thales personnel attended DOGC's daily pre-tour meetings. No weekly safety meetings were held during operations.

Should an incident occur, Thales' procedures require the incident to be recorded on the appropriate forms and Thales' QA & Safety Manager to be notified immediately. The QA & Safety Manager will initiate a full and thorough investigation with corrective action being introduced to prevent further incidents.

There were no incidents involving Thales personnel during this project. Thales personnel carried out their duties at all times in accordance with Company and Statutory Regulations and Guidelines.

When demobilising the Ocean Bounty, all equipment was packed securely in the designated area where it would not cause obstructions. All heavy or fragile boxes were clearly labelled to avoid accidents during handling.

A project debrief was also held at Thales' Perth offices on 12 August 2002. During the meeting the safety procedures that had been undertaken were discussed and reviewed. It was noted that all personnel had taken due care and as a result there had been no incidents.

3. SUMMARY

3.1 REQUIREMENTS

Thales GeoSolutions (Australasia) Limited were contracted by OMV Australia Pty Ltd (OMV) to provide personnel and positioning equipment consisting of Thales' SkyFix/SkyFix Spot Differential GPS for the rig move of the Ocean Bounty to the Sole-2 location.

The project requirements were as follows:

(a) Provide real-time positioning of the semi-submersible drilling rig Ocean Bounty and the anchor handling vessels Pacific Sentinel and Pacific Conqueror during the anchor recovery at the Beardie-1 location.

(b) Provide real-time positioning of the semi-submersible drilling rig Ocean Bounty and the anchor handling vessels Pacific Sentinel and Pacific Conqueror, during transit to the Sole-2 location.

(c) Differential GPS Positioning of the Ocean Bounty at the Sole-2 location.

(d) Real-time positioning (including GNS2 fixing/logging/streaming) of the Ocean Bounty, Pacific Sentinel and Pacific Conqueror during anchor deployment operations at the Sole-2 location.

(e) Determine the final Differential GPS position of the Ocean Bounty drillstem at the Sole-2 location using a Multiple Reference Station Differential GPS solution.

(f) The provision of a comprehensive positioning report containing the final Differential GPS position of the Ocean Bounty drillstem and anchors at the Sole-2 location.

The positioning requirements were as follows:

(a) Published Sole-2 location:

Datum: AGD66

Latitude	:	38° 06' 18.665" South
Longitude	:	149° 00' 28.997" East

Projection: AMG Zone 55, CM 147° East

Easting	:	676 059.05m
Northing	:	5 780 595.42m

(b) Positioning tolerance : ± 20m

(c) Intended rig heading : 257.0° (T)

3.2 SUMMARY OF EVENTS

All times quoted are in Eastern Standard Time (UTC + 10.0 hours).

7 August 2002

1105 Thales personnel PW, SB & NG depart Perth and transit to Sale (Victoria) via Melbourne.

8 August 2002

1130 Thales personnel PW, SB & NG check-in at Esso helicopter base Longford, standby and transfer to Ocean Bounty.
1345 Arrive Ocean Bounty. NG participate in Ocean Bounty safety induction.
1545 Commence mobilisation of equipment.
1650 Confirm with OIM (Steve Andrews) intended Sole-2 location and heading as per final fix position from previous Sole-2 rig move. 3nm run in required on 227°.
1700 PW attend pre-rig move meeting. Barge Master (Graham Galyer) advised proposed tow route.
1830 Ocean Bounty and Pacific Sentinel navigation equipment operational. Pacific Conqueror Tracs not operational. Suspected 240V-24V power supply faulty. Anchor recovery operations commenced with Pacific Conqueror recovering anchor No. 1 and Pacific Sentinel recovering anchor No. 5.
2000 Anchor recovery operations suspended as problems cutting off casing.
2145 Conduct Gyrocompass calibration to Baracoutta Platform. C-O confirmed as +1.4°.
2240 Conduct Check Fix at Beardie-1. Datum 2.06m on bearing of 3.7°(T) from published Beardie-1 position.
2325 Ballast Control advise anchor recovery to remain suspended until approximately 0500 on 9 August 2002. No anchors recovered as yet. PCC's passed back to Ocean Bounty.
2335 Tracs power supply on Pacific Conqueror changed out and Tracs operating correctly.

9 August 2002

0645 Anchor recovery operations re-commencing. Anchor No.1 assigned to Pacific Conqueror and anchor No. 5 assigned Pacific Sentinel. AHV's chasing out anchors.
0756 #1 PCC returned to the rig
0805 #8 PCC passed to Conqueror
0835 #8 winch tension excessive. Conqueror preparing to re-chase chain.
0840 #5 PCC returned to the rig
0850 #4 PCC passed to Sentinel
0855 #8 winch tension eased. Re-commence winching in.
0945 #8 PCC returned to the rig. Conqueror preparing deck for Esso backload
1050 #4 PCC returned to rig. Drill floor, riser deck and ballast operations commencing prior to further anchor recovery.
1200 Sentinel connected to tow bridle
1630 Critical phase of ballast operations complete.
1659 #3 PCC passed to Conqueror.

9 August 2002 (continued)

1906 #3 PCC returned to rig
1915 #7 PCC passed to Conqueror.
2130 #7 PCC returned to rig
2140 #2 PCC passed to Conqueror
2257 #2 PCC returned to rig

10 August 2002

0018 Last Anchor (#6) off the bottom, commencing tow.
0026 Anchor #6 racked.
0800 Continue en-route to Sole 2 at 4.8 knots
1345 Rig on 3 mile run in, vessels shortening tow
1436 #6 Anchor deployed by the rig at 676 998mE 5 781 429mS
1500 Rig 500ft past Sole-2 location and standing by for helo due 1515.
1610 #2 PCC to Conqueror. Tracs data to Sentinel corrupted, data from Sentinal ok.
1628 #2 run out.
1645 #2 Anchor deployed at 675 188mE, 5 779 834mS
1721 Tracs reset on vessels ok
1734 #2 PCC returned to rig
1744 #7 PCC passed to Conqueror.
1834 #7 run out, vessel clear of well head (25m tolerance provided)
1843 #7 deployed at 677 048mE, 5 780 233mS
1915 #7 PCC returned to the rig
1933 #3 PCC passed to Conqueror
1950 #3 run out
2001 #3 deployed at 674 950mE, 5 780 978mN
2006 Heaving in on #7 and paying out on #3 to move rig closer to Sole-2
2040 #3 PCC returned to rig
Heaving in on #6 andpaying out on # 2 to move rig closer to Sole-2
Heaving in on #7 and paying out on #3 to move rig closer to Sole-2
Ocean Bounty positioned within 5m of published Sole-2 location. ROV instructed to inspect wellhead
2055 Conqueror departed location, Tracs equipment turned off.
2110 Sentinel released from the tow bridle
2130 OMV Company Man (Ron King) advises ROV inspection confirms wellhead below centre of rig
#8 PCC passed to Sentinal

11 August 2002

0001 Anchor #1 deployed at 675720mN, 577949mE
0027 #1 PCC returned to rig
0042 #5 PCC passed to Sentinel
0102 Anchor #5 deployed at 676473mN, 5781663mE
0133 #5 PCC returned to rig
0139 #4 PCC passed to Sentinel
0157 Anchor #4 deployed at 675339mN, 5781498mE
0238 #4 PCC returned to rig
0300 Ballast down operations commenced
0620 Ballast operations complete
0825 Conduct final fix. Ocean Bounty drillstem 676 058.23mE, 5 780 599.53mN. Drillstem is 4.02m on a bearing of 347.5° (T) from the published Sole-2 location.
0900 Confirm with OMV Company Man (Ron King) rig positioning acceptable. Back-up data as required. Commence demobilisation of equipment.
1030 Provide Ocean Bounty positioning details to OIM, Barge Master and OMV Company Man.
1100 Demobilisation complete and all equipment secured in container.
1335 Thales personnel depart Ocean Bounty and transit to Perth via Melbourne.
2300 Thales personnel arrive Perth.

4. EQUIPMENT ANALYSIS

4.1 EQUIPMENT PERFORMANCE

During the positioning of the semi-submersible drilling rig Ocean Bounty from the Beardie-1 location to the Sole-2 location, no significant problems were encountered with Thales' equipment or software.

However, a damaged Tracs Geopod Interface power supply was replaced on board the Pacific Conqueror.

Some positional updates did not occur onboard anchor handling vessels during anchor transfer from rig to vessel. This occurrence was due to the close proximity of the vessels to the rig, therefore interfering with the Tracs signal transfer. GNS2 was shut down for 30 seconds on all three vessels and restarted rectifying the fault.

It should be noted that these minor issues caused no delays to the Sole-2 rig move.

5. EQUIPMENT CHECKS AND CALIBRATIONS

5.1 DIFFERENTIAL GPS CHECK FIX

A Differential GPS check fix of the drillstem position of the Ocean Bounty at the Beardie-1 location was computed using SkyFix Spot Differential GPS. 100 fixes were taken. Appendix G contains the results of the check fix of the Ocean Bounty drillstem position at the Beardie-1 location.

The published Differential GPS co-ordinates of the Ocean Bounty drillstem position at the Beardie-1 location are as follows:

Datum : AGD66

Latitude	:	38° 15' 16.214" South
Longitude	:	147° 48' 24.643" East

Projection : AMG Zone 55, CM 147° East

Easting	:	570 594.15m
Northing	:	5 765 624.16m

The computed Differential GPS check fix co-ordinates of the Ocean Bounty drillstem position is as follows:

Datum : AGD66

Latitude	:	38° 15' 16.147" South
Longitude	:	147° 48' 24.648" East

Projection : AMG Zone 55, CM 147° East

Easting	:	570 594.30m
Northing	:	5 765 626.21m

The Differential GPS check fix of the Ocean Bounty drillstem position is 2.06m on a bearing of 3.7°(T) from the published Beardie-1 location.

The client representative reviewed all geodetic parameters and antenna offsets at which time Thales' equipment was accepted as operating correctly.

5.2 GYROCOMPASS CALIBRATION

The S.G. Brown 1000S gyrocompass installed onboard the Ocean Bounty was calibrated on 8 August 2002 using a marine sextant. A series of measurements of the horizontal angle between the centreline of the rig and the Barracouta platform were observed while accurately recording local time at the instant of each observation. The gyrocompass heading was simultaneously recorded within GNS2 data files.

The C-O value in GNS2 was set to +1.4° prior to conducting the gyrocompass calibration (value used in previous move).

This entered value provided a 0.0° calibration result, confirming +1.4° as the correct C-O required.

Observation Date : 25 July 2002

Barracouta Platform

Time	Observed Angle	Observed Easting (m)	Observed Northing (m)	Calculated Heading	Observed Heading	C-O
21:45:00	5.7°	570 600	5 765 644	241.5°	241.5°	+0.0°
21:46:00	5.8°	570 602	5 765 645	241.4°	241.5°	-0.1°
21:47:00	5.6°	570 603	5 765 644	241.6°	241.6°	+0.0°
21:48:00	5.8°	570 603	5 765 643	241.4°	241.6°	-0.2°
21:49:00	5.6°	570 605	5 765 646	241.6°	241.5°	+0.1°
					Mean	**+0.0°**

Mean Calibration C-O = 0.0°

Mean C-O = +1.4°

The mean C-O of +1.4° was input into the GNS2 navigation software. See Appendix F for the gyrocompass calibration results.

Due to a small shift of the gyrocompass en-route to Sole-2 a check gyrocompass calibration was conducted on 10 August 2002. The results of the gyrocompass check were consistent with the mean C-O of +1.4° already input into the GNS2 navigation software and this value was used for the remainder of the rig move.

6. GEODETIC PARAMETERS

Co-ordinates listed in this report are referenced to the Australian Geodetic Datum 1966 (AGD66). The Global Positioning System (GPS) is referenced to the World Geodetic System 1984 (WGS84).

6.1 DATUMS

Datum	:	**AGD66**
Spheroid	:	Australian National Spheroid
Semi-major Axis (a)	:	6 378 160.000m
Semi-minor Axis (b)	:	6 356 774.719m
Eccentricity Squared (e^2)	:	0.006 694 542
Flattening ($^1/_f$)	:	298.25
Datum	:	**ITRF 92 (Epoch 1994.0) WGS84 G730**
Spheroid	:	WGS84
Semi-major Axis (a)	:	6 378 137.000m
Semi-minor Axis (b)	:	6 356 752.314m
Eccentricity Squared (e^2)	:	0.006 694 380
Flattening ($^1/_f$)	:	298.257 223 563

6.2 PROJECTION

Projection Name	:	**Australian Map Grid 1966 (AMG66)**
Projection Type	:	Universal Transverse Mercator
AMG Zone	:	55
Central Meridian (CM)	:	147° East
Scale factor on the CM	:	0.9996
False Easting	:	500 000m
False Northing	:	10 000 000m
Latitude of Origin	:	0° (Equator)
Unit of Measure	:	International Metre

6.3 DATUM TRANSFORMATION

The following 7-parameter datum transformation was used by the GNS2 software to convert WGS84 co-ordinates to AGD66 co-ordinates:

Dx	=	+123.314m
Dy	=	+47.223m
Dz	=	– 136.594m
Rx	=	+0.264"
Ry	=	+0.322"
Rz	=	+0.270"
Scale	=	+1.384 p.p.m.

The sign convention in Thales' GNS survey software used is that used by the US Department of Defense and by Higgins, where a positive rotation about the Z axis is an anti-clockwise movement of the X and Y axes (when viewed from the North Pole looking towards the center of the Earth).

7. EQUIPMENT DESCRIPTIONS

7.1 GNS2

GNS2 (General Navigation System) is Thales' third generation of On-line Navigation Survey Control software. It has been written by Thales' Software Support Group in C++ for operation under Windows® 95 or Windows® 98 or Windows® NT. GNS2 adheres to the operation and dialogue conventions of the Microsoft Windows® environment. Attention has been paid to preserving a consistent operator interface, while at the same time modifying individual dialogue boxes to reflect specific logical circumstances. It has been designed for operation with a pointing device such as a mouse or a tracker ball but control can still be effected in case of the absence or failure of such a device.

The program has the ability to accommodate a large number and variety of mobiles, including surface vessels/ships, anchor handling vessels, tugs, barges, ROVs, towfish, aircraft, vehicles and submersibles etc. The only limiting factors on the number of mobiles that can be tracked in GNS2 are the number of input/output serial communication ports available on the computer and the computer's memory.

For the input/output (I/O) of navigation and sensor data, GNS2 employs intelligent multi-channel serial communications boards to expand a computer's serial input/output facility. Currently GNS2 can support up to 26 communication (Comm) ports, which would consist of the computer's two internal Comm ports and three 8 channel serial communications boards fitted in the computer's internal expansion slots.

If Least Squares Computations (LSCs) are employed for positional calculations, whether two-dimensional (2D), three-dimensional (3D) or altitude aided, GNS2 uses standard iteration routines for the minimisation of residuals using 'variation of co-ordinate' algorithms. The number of positioning systems/computations that GNS2 can handle, is only limited by the number of I/O serial communication ports available on the computer and the computer's memory.

All input observables are accepted on interrupt. Screen updates and other internal triggers are paced to once per second but time critical activities occur at discrete moments as required.

The GNS2 application workspace can extend beyond the display area, which is normally restricted to a single monitor connected to the computer. By using one or more multiple VGA cards, an enlarged display area can spread across multiple monitors.

Currently GNS2 can display 14 different types of view windows. Several copies of the same type of view window can be invoked at any one time. This may be required when several mobiles are being tracked and a Plan, Helmsman's or Bullseye display are required for each one or when the data on several Comm ports are to be viewed simultaneously. Each window can be individually sized to optimise use of the available display area.

GNS2 can be operated in 2 modes; GNS2 Master or GNS2 Remote. GNS2 Master has the full functionality of GNS2. GNS2 Remote is run on a separate computer and allows independent configuration of the graphics display and its associated numeric information. GNS2 Remote is operated on Anchor Handling Vessels or anywhere where positional information is required. (eg. Vessel Masters, ROV Pilots, Winch Control Stations). The link between GNS2 Master and GNS2 Remote can be via a telemetry link or hard wired cable.

7.2 GLOBAL POSITIONING SYSTEM (GPS)

System Description

The NAVSTAR GPS (Navigational Satellite Timing and Ranging Global Positioning System) is a USA Military all-weather, space-based positioning system that transmits signals from a constellation of satellites orbiting the Earth. It is capable of providing suitably equipped users worldwide with accurate three-dimensional positions on, or near, the Earth's surface. The accuracy of these determined positions can vary from a few millimetres to several 10's of metres depending on the GPS receiver and on the method of data acquisition and processing. System design consists of three integrated parts: the Ground Control Segment, the Space Segment and the User Segment.

The operational space segment consists of 24 production satellites and 3 active spares; the term Space Vehicle (SV) is used as a synonym for satellite. The satellites are in high orbits, at approximately 20,200km, having an orbit period of 12 hours. They are arranged in 6 orbital planes, inclined at 55 degrees with near circular orbits. The configuration provides complete 4-satellite (3D) coverage worldwide.

GPS Observations

There are two important types of GPS observations (observables): Pseudo-range and Carrier Phase. Carrier phase is sometimes also referred to as carrier beat phase. Pseudo-range techniques are generally used for navigation. In high-precision baseline surveying the carrier phase is used. Although the (undifferenced) phase can be used directly, it has become common practice, at least in surveying applications, to process certain linear combinations of the original carrier phase observations (double differences and triple differences).

Pseudo-ranges

The pseudo-range is a measure of the distance between the satellite and the receiver at the epochs of transmission and reception of the signals. The transit time of the signals is measured by comparing (correlating) identical pseudo-random noise (PRN) codes generated by the satellite and by the receiver. A code-tracking loop within the receiver shifts the internal replica of the PRN code in time until maximum correlation occurs. The codes generated at the receiver are derived from the receiver's own clock, and the codes of the satellite transmissions are generated by the satellite system of clocks. It follows that unavoidable timing errors in both the satellite and the receiver clock will cause the measured quantity (pseudo-range) to differ from the geometric distance.

Where instantaneous positions are required, pseudo-range is the preferred observable. Given the satellite ephemeris (i.e. the position of the satellite at the epoch of transmission), there are seven unknowns: two clock errors, three receiver co-ordinates and the ionospheric and tropospheric delays. The effect of the satellite clock error is negligible for the typical navigation solution, particularly considering that the time errors are indistinguishable from the ionospheric and tropospheric delays. The satellite clocks are constantly monitored and synchronised with GPS time as maintained by the control centre. Actual offsets of the satellite clocks are approximated by polynomials in time and transmitted as part of the navigation message to the user for the correction of the measured pseudo-ranges. The ionospheric and tropospheric delays can be computed on the basis of ionospheric and tropospheric models, thus there are four unknowns left X, Y, Z and receiver clock error. These can be determined from four pseudo-ranges measured simultaneously to four GPS satellites.

Carrier Phase

The phase observable is the difference between the phase of the carrier signal of the satellite, measured at the receiver, and the phase of the local oscillator within the receiver at the epoch of measurement. This can be regarded as a biased range measurement of the satellite-receiver distance with the integer number of carrier waves being unknown. The wavelength of the L1 carrier is about 19cm. Because of the fraction of the carrier phase is measured, the term "interferometry" is often used to describe carrier phase techniques.

7.3 SKYFIX/SKYFIX SPOT DIFFERENTIAL GPS (DGPS)

Differential GPS (DGPS)

GPS is primarily a USA Defence space-based positioning system capable of operating worldwide and in all weather conditions. The USA Military can degrade the accuracy of GPS with the use of Selective Availability (SA) to control the accuracy of Pseudo-range measurements. Essentially, the user is given a false Pseudo-range for each satellite so that the resulting measurement is in error by a controlled amount. On the 1 May 2000 SA was discontinued conditionally and coincided with the successful demonstration of the ability to selectively deny GPS signals on a regional basis. SA has been set to zero and can be reinstated during periods of heightened global tension.

GPS signals are affected by several sources of positional bias, the largest of which was SA. The remaining biases of the ionosphere, the troposphere, time, satellite ephemeris and inherent reciever noise also give rise to substantial bias of position.

Differential GPS is a means by which the civil user can improve the accuracy and quality of GPS to the 1-3 metre level. It requires a receiver be located at a precisely known point from which pseudo-range corrections for each satellite can be determined and monitored. These pseudo-range corrections are then communicated by means of a telecommunications link to users at unknown locations. In the relative mode, most of the important systematic errors common to the known station and at the unknown location cancel out to improve the accuracy of the computed position.

SkyFix/SkyFix Spot Differential

SkyFix

Thales GeoSolutions (Australasia) Limited introduced its SkyFix Differential GPS System in Australia in February 1991, using the Inmarsat Pacific and Indian Ocean marine communications satellites as the differential data broadcast link. Extensive performance trials and projects undertaken to date have shown SkyFix to meet the best industry expectations in terms of quality of service and accuracy.

Satellite communications systems, particularly at the Inmarsat L-band frequencies of 1.5 GHz are reliable and free of the interference associated with the crowded MF/HF bands. This high data integrity gives users confidence that the corrections will be continuously received without interference.

The SkyFix Australian network comprises of reference stations at Dampier, Broome, Perth, Adelaide, Melbourne, Sydney, Cairns and Darwin.

SkyFix Spot

The SkyFix Spot Differential GPS System was launched in Australia in December 1994, using the OPTUS high powered focused communications satellite as the differential data broadcast link. Projects undertaken to date have shown SkyFix Spot to meet the industry expectations in terms of quality of service and accuracy.

The SkyFix Spot system has a link capacity of 1200 bits per second, similar to the SkyFix system but because it is only transmitting corrections from the Australian network an update rate of better than five seconds is achieved.

The OPTUS satellite uses the L-band frequencies of 1.5586 GHz and are very reliable and free of interference avoiding data loss associated with the crowded MF/HF bands.

The SkyFix Spot network comprises of reference stations at Dampier, Broome, Perth, Adelaide, Melbourne, Sydney, Cairns, Darwin, Alice Springs and also Ujung Pandang and Jakarta in Indonesia and Wellington, New Zealand.

The differential corrections generated at each reference station are brought via landline links to the data hub and control centre in Singapore, where the system is monitored for performance and quality. From there, a composite message containing full RTCM 104 version 2 formatted data from all reference stations are sent via dual redundant links to Satellite Earth Stations at Sentosa Island, Singapore, O.T.C. Perth, Western Australia and OPTUS, Perth, Western Australia, for uplink and broadcast over the Inmarsat Pacific and Indian Ocean Region satellites and the OPTUS Satellite.

The SkyFix/SkyFix Spot system includes a 24 hour monitoring facility to ensure the validity of data received at the control centre from the Differential GPS reference stations, and that the same data are received over the SkyFix/SkyFix Spot satellite data link.

7.4 TRIMBLE SERIES 4000 GPS RECEIVER

The Trimble Series 4000 GPS receiver is designed for moderate precision static and dynamic positioning applications. The GPS receiver provides time and three-dimensional station co-ordinates at a once-per-second update rate.

The receiver receives the civilian coded signal (C/A) from the GPS NAVSTAR satellites. The receiver automatically acquires and simultaneously tracks GPS satellites and precisely measures code phase and computes position and velocity.

Latitude, longitude and height values are output on the World Geodetic System (WGS84) Earth-centred, Earth-fixed co-ordinate system.

The receiver is designed to measure the following observables:

- Coarse/Acquisition (C/A) code Pseudo-ranges
- Rate of change of Pseudo-range
- Integrated Carrier

C/A code correlation techniques measure the propagation time of the signal from the satellite to the antenna. Latitude, longitude, height and time can be determined from measurements made from at least 4 satellites, by a process similar to triangulation.

To determine speed and heading, the receiver calculates the rate of change of Range (the range-rate) by measuring the Doppler shift of the carrier.

It is capable of receiving and processing differential corrections from other reference sources using the standard format of the Radio Technical Commission for Maritime Services, Special Committee 104 (RTCM SC-104), Version 1.0 or 2.0 protocols.

The Trimble Series 4000 GPS receiver has several options available, including internal data logging memory, event marker logging etc. and therefore may be used alone or as part of a more extensive navigation system.

7.5 MULTIFIX 3

7.5.1 System Overview

MultiFix 3 is Thales GeoSolutions third generation *multiple reference station* differential GPS (DGPS) real time position computation and quality control program. It is an integral part of the Thales SkyFix Premier service but can also be used with the standard SkyFix service. MultiFix 3 has more advanced features than its predecessor, MultiFix 2, including being able to use dual frequency receivers and form real time 'Iono-Free DGPS position solutions'.

MultiFix 3 is one of a series of programs available under the group name Zero, which includes other tools and utilities with a similar user interface and layout structure, like static and dynamic position comparison programs, a correction monitor program, a terminal program and a replay utility.

MultiFix 3 takes in Almanac, Ephemeris and Raw Code and Carrier measurements from a single or dual frequency GPS receiver (or, for replay, from logged files). It takes in RTCM SC104 Version 2 differential correction messages from one or more RTCM correction delivery systems. It also takes in RTCM Type 15 or Thales Proprietary RTCM Type 55 Ionospheric range corrections generated at selected SkyFix Premier reference stations and broadcast via the Thales global network of high (SkyFix Spot-Optus) and low (SkyFix-Inmarsat) power satellite based L-Band beams.

Key features of the program are:

- No limit on the number of RTCM correction delivery systems (data links)
- No limit on the number of RTCM differential reference stations
- No limit on the number of computations (solutions)
- Each computation can employ corrections from any combination of reference stations available
- Computations are weighted least squares with statistical evaluation based upon the UKOOA recommendations
- No limit on the number of outputs
- No limit on the number of view windows
- View windows can be customised
- Extra NMEA outputs can be defined
- TCP/IP communication via sockets for GPS, RTCM and position data transfer between networked computers

MultiFix 3 has been designed in a modular fashion such that data is passed between modules as if over a computer network. The core module MultiFix 3 performs the computation of position. Additional modules are available and more will be made available in the future. While a single computer can be used, the various modules will equally be able to be run on different computers, provided there is a network interconnection.

MultiFix 3 uses the EGM96 geoid/spheroid separation model.

The RTCM corrections that are generated at reference stations are contaminated by a variety of error components, one of which is Ionospheric delay. The Ionospheric delay is currently more variable because of greater sun spot activity. MultiFix 2 and MultiFix 3's standard computation uses the Klobuchar Ionospheric delay model. This model is updated periodically but is not responsive to the current short-term variability. MultiFix 3 has an additional calculation option when working with dual frequency receivers and in receipt of Type 15 or 55 RTCM messages. With dual frequency receivers, estimates can be made of the Ionospheric delay by examining the differences between the measurements from the two frequencies. If the same procedure for estimation of Ionospheric delay is performed at the reference stations and on the mobile, both the RTCM corrections and the pseudo-ranges can have the Ionospheric delay removed, effectively providing an Iono-Free DGPS position solution.

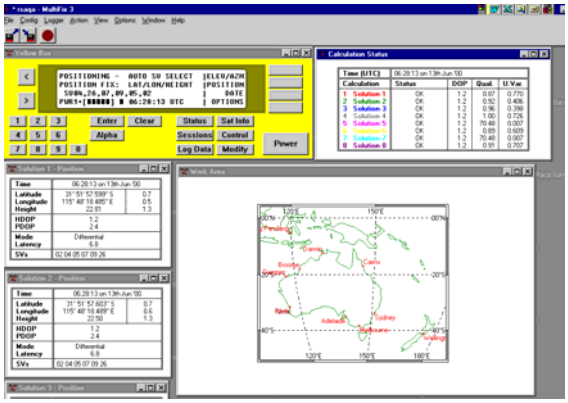
7.5.2 Hardware Requirements

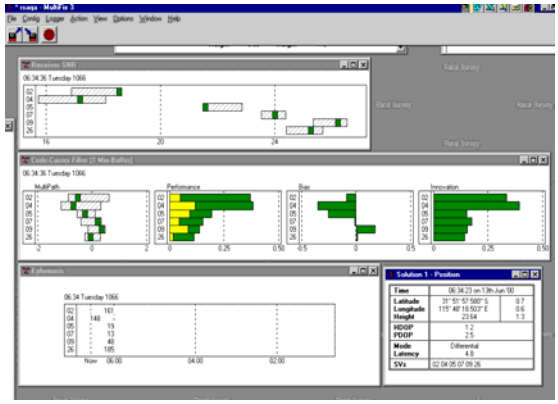
Optimum requirements for MultiFix 3 are:

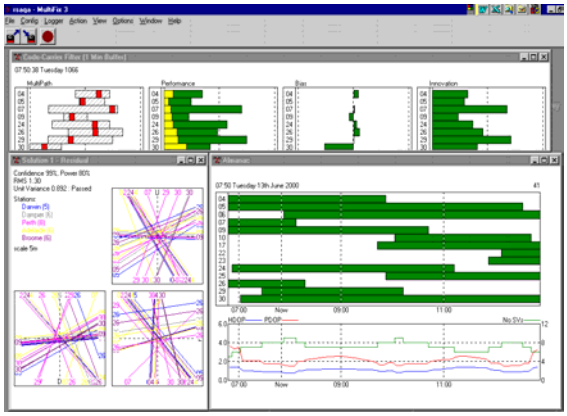
- 350 MHz Pentium II computer
- 32 Mb RAM
- Windows 95, 98 or NT operating system
- Graphics resolution of at least 800 x 600 pixels
- Intelligent multi-port serial I/O board

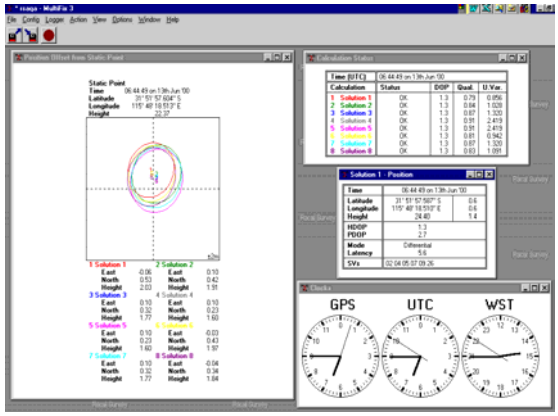
7.5.3 Positioning and Quality Control Displays

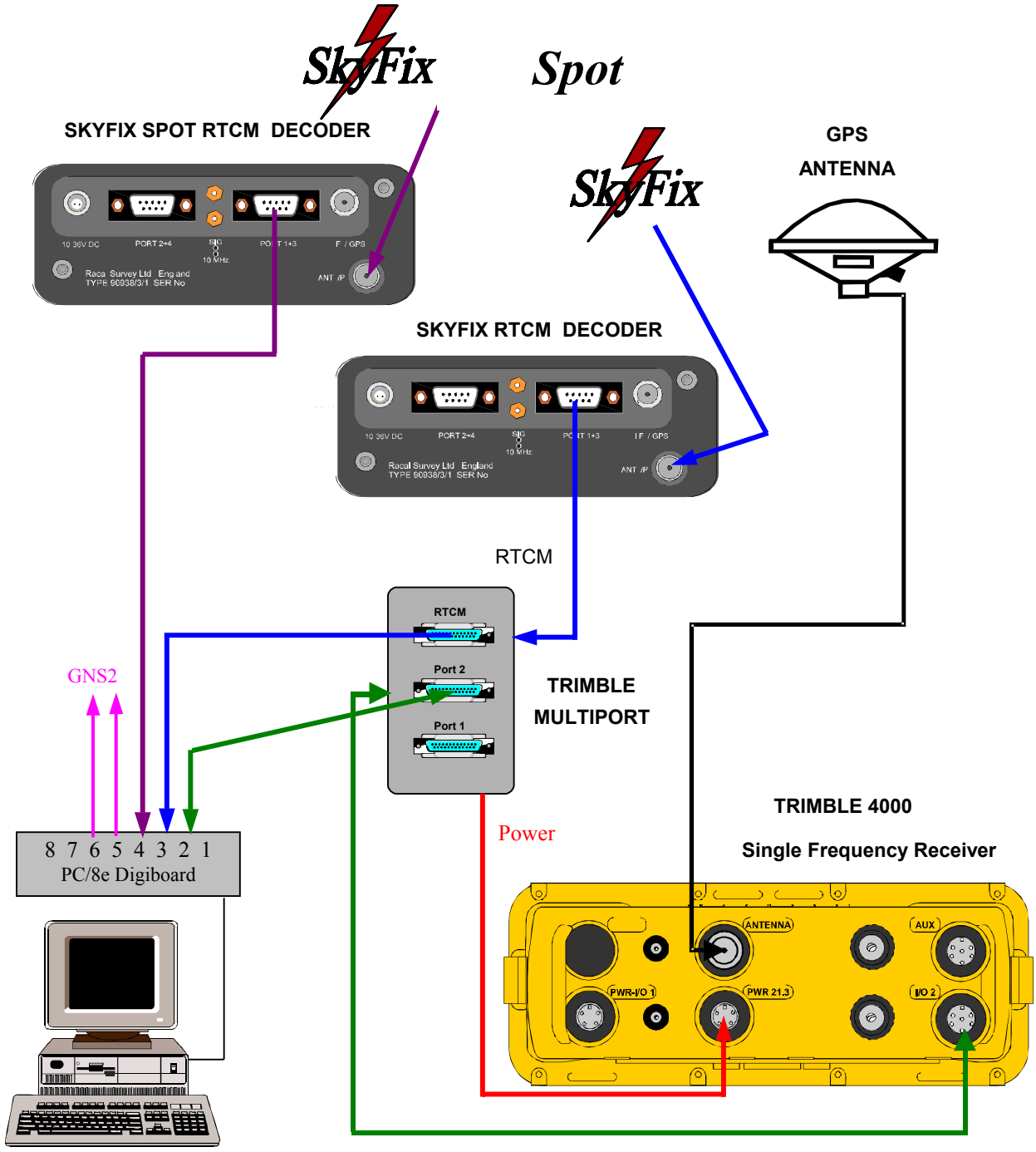
MultiFix 3 has a large number of features to accomodate the user requirements of highly accurate positions with quality control (QC) information and outputs in different formats. MultiFix 3 runs in a Windows environment, which allows the user to design a preferred screen layout by opening, sizing and placing the numerous displays that are available. Examples of the various displays can be found below.











Typical MultiFix 3 Interconnection With Trimble 4000 GPS Receiver

7.6 TRACS TDMA

Tracs TDMA (Time Division Multiple Access) is a high speed, intelligent network radio datalink which can operate in the VHF or UHF bands to provide an addressable network with integrated position reporting from an integrated/internal GPS receiver. The standard Tracs units are fitted with a Trimble SK8 GPS receiver, or a Trimble DSM GPS receiver.

Each unit in the network is assigned a unique address (1 to 255) enabling messages can be specifically addressed to that unit. A broadcast address (0) is provided to allow multiple units to receive a message, for example RTCM corrections. The system manages the data bandwidth by dividing it into timeslots synchronised by means of GPS 1PPS (pulse per second) timing pulse from an internal GPS receiver.

The standard Tracs system has a frequency band of 455.0MHz to 465.0MHz (frequency module 53R). The channel frequencies can be selected in 25kHz steps and the units are equipped with the facility to pre-store 10 selected frequencies within the 10MHz band. Units for use in Australia are fitted with 471MHz radios.

There are four types of messages that can be transmitted in a Tracs network.

- Position Reports automatically generated from the SK8 or DSM GPS receiver as a NMEA type or Raw Pseudo Range information.
- Transparent messages used to send unformatted data across the network eg. RTCM corrections.
- Open messages used to provide a general-purpose data link between units. This format is used by GNS to transfer information.
- Configuration messages used for remote configuration of units using the Destination ID to identify which unit is being configured.

7.7 S.G. BROWN 1000S GYROCOMPASS

The S.G. Brown 1000S Gyrocompass is a compact, simple-to-operate master heading reference instrument employing the effect of gravity and the earth's rotation to produce a True North reference. This reference may be read off the compass card or from a digital display and can be interfaced to the GNS2 navigation system.

The normal starting cycle of the instrument is fully automatic and is initiated when the system power supply is switched on. A fail safe control circuit is incorporated which ensures that the compass is not damaged after a power failure when power is restored; the compass will restart automatically and carry out its normal settling program.

8. PERSONNEL AND EQUIPMENT

8.1 PERSONNEL

The following personnel were employed on this project:

For : Thales GeoSolutions (Australasia) Limited

P. Wells	:	Surveyor/Team Leader
S. Bradley	:	Senior Engineer
N. Gregory	:	Engineer

For : OMV Australia Pty Ltd

R. King	:	Client Representative

8.2 EQUIPMENT

The following equipment was provided for this project:

Ocean Bounty

2 x Compaq Computer, inc monitor, keyboard (for GNS2 / MultiFix 3)

1 x Thales SkyFix Mini Rig Portable

3 x SkyFix/SkyFix Spot MK II Receivers

1 x Compaq Computer, inc. monitor, keyboard (for GNS2 Remote)

1 x S.G. Brown 1000S gyrocompass

1 x Uninteruptable Power Supply (UPS)

2 x Epson LX300 Printers

2 x SkyFix Spot Whip Antennae

1 x SkyFix Spot Antenna 90962/3/1

2 x Trimble 4000DS GPS Receivers

2 x SkyFix Spot Antennae

2 x Tracs Bricks

2 x Tracs Multiplexer

2 x UHF Antennae

1 x Marine Sextant

Pacific Sentinel and Pacific Conqueror (Each)

1 x Tracs Geopod

1 x Fluxgate compasses

1 x Tracs Box and Interface Box

1 x Compaq computer, inc. monitor, keyboard (GNS2 Tug Display)

1 x Uninteruptable Power Supply (UPS)

plus all associated software (GNS 2 version 2.35, MultiFix 3 version 1.24) c/w cables, consumables, software dongles etc.

9. DISTRIBUTION

Copies of this report have been distributed as follows:

OMV Australia Pty Ltd	: 3 copies
Attn: Mr Ron King	: 1 electronic copy
Thales GeoSolutions (Australasia) Limited	: 1 copy

Phil Wells
Surveyor

Anthony Kerr
Survey Manager

APPENDIX A

FINAL DIFFERENTIAL GPS DRILLSTEM POSITION AT SOLE-2

THALES **Thales GeoSolutions Aust Ltd**

FINAL POSITION FIX – DIFFERENTIAL GPS
Ocean Bounty return to Sole-2

Job Description: Ocean Bounty return to Sole-2
Job Number: 3432A3
Thales Surveyor: P. Wells
Client: OMV Australia Pty Ltd
Client Representative: Ron King

Sampling started: 11 Aug 2002 08:24:12
Sampling end: 11 Aug 2002 08:32:25

Ocean Bounty

Intended datum location

Datum: AGD 1966
Latitude: 38°06'18.665"S Longitude: 149°00'28.997"E
Projection: AMG Zone 55
Easting: 676059.05 m Northing: 5780595.42 m

Final Antenna Position (T1 Thales UKOOA):

Sample size: 100 fixes used out of a total of 100.

Antenna offset

X: 0.28m Y: 33.90m Z: 0.00m
Range: 33.90m Rel Brg from datum to antenna: 0.5°

Datum: WGS 84
Latitude: 38°06'13.165"S Longitude: 149°00'32.077"E Spheroidal Ht: 42.77m
Datum: AGD 1966
Latitude: 38°06'18.710"S Longitude: 149°00'27.587"E Spheroidal Ht: 49.10m
Projection: AMG Zone 55
Easting: 676024.66 Northing: 5780594.77 Spheroidal Ht: 49.10m

Standard deviations

Long or E: 0.25m
Lat or N: 0.30m
Height: 0.41m
Position: 0.39m

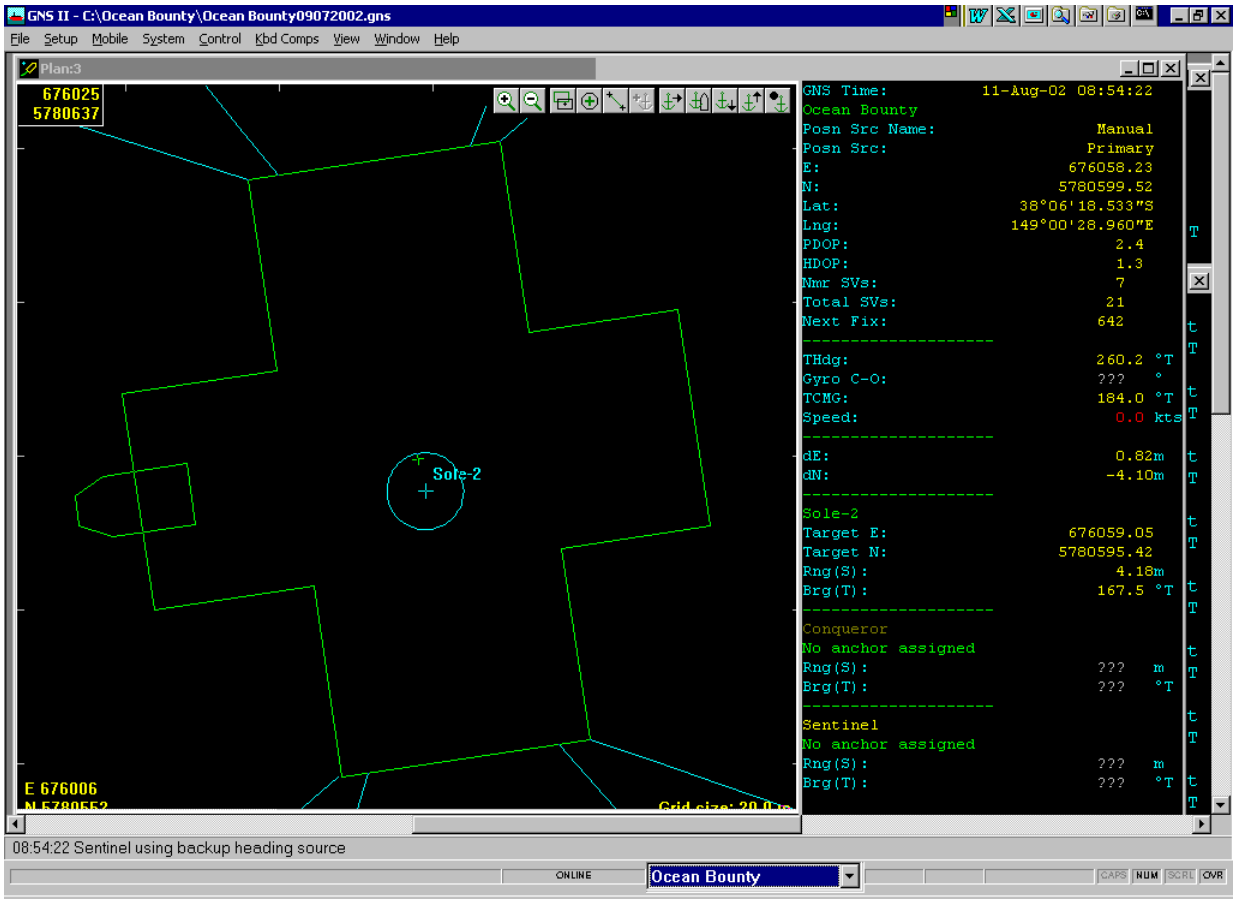
Final Datum Position

Datum: AGD 1966
Latitude: 38°06'18.532"S Longitude: 149°00'28.960"E

Projection: AMG Zone 55
Easting: 676058.23 m Northing: 5780599.53 m

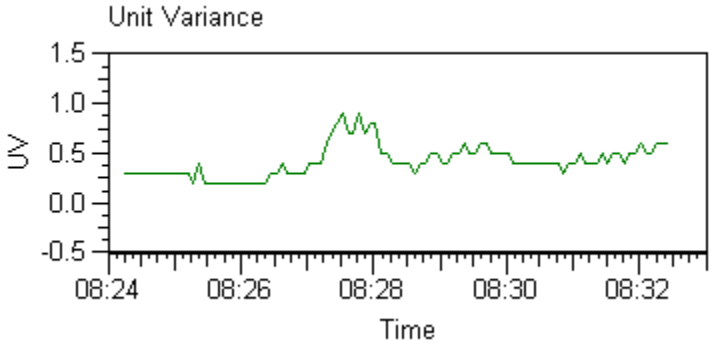
Mean corrected heading: 260.2°T (Rig gyro reading 257.9°T)
SD heading: 0.1°T
Intended heading: 257.0°T
Difference from intended: 3.2°
Gyro C-O: 0.0°
Convergence: -1.24°

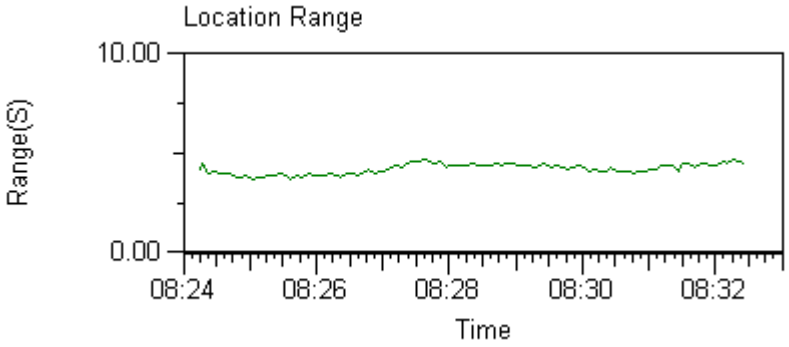
Final Datum Position is 4.20m on a bearing of 347.5°T (348.7°G) from the intended location.

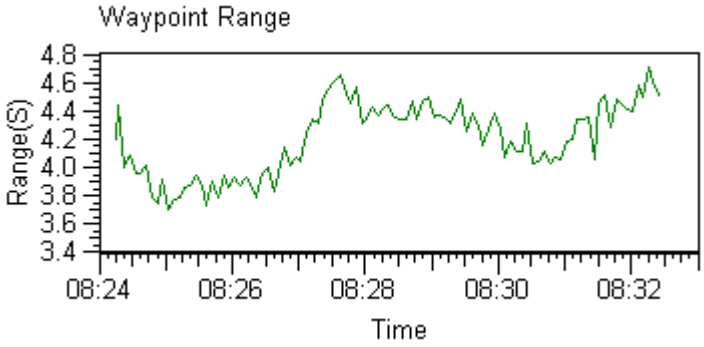

GNS II - C:\Ocean Bounty\Ocean Bounty09072002.gns
File Setup Mobile System Control Kbd Comps View Window Help
Plan:3
676025
5780637
Sole-2
E 676006
GNS Time: 11-Aug-02 08:54:22
Ocean Bounty
Posn Src Name: Manual
Posn Src: Primary
E: 676058.23
N: 5780599.52
Lat: 38°06'18.533"S
Lng: 149°00'28.960"E
PDOP: 2.4
HDOP: 1.3
Nmr SVs: 7
Total SVs: 21
Next Fix: 642
THdg: 260.2 °T
Gyro C-O: ??? °
TCMG: 184.0 °T
Speed: 0.0 kts
dE: 0.82m
dN: -4.10m
Sole-2
Target E: 676059.05
Target N: 5780595.42
Rng(S): 4.18m
Brg(T): 167.5 °T
Conqueror
No anchor assigned
Rng(S): ??? m
Brg(T): ??? °T
Sentinel
No anchor assigned
Rng(S): ??? m
Brg(T): ??? °T
08:54:22 Sentinel using backup heading source
ONLINE
Ocean Bounty
CAPS NUM SCRL OVR

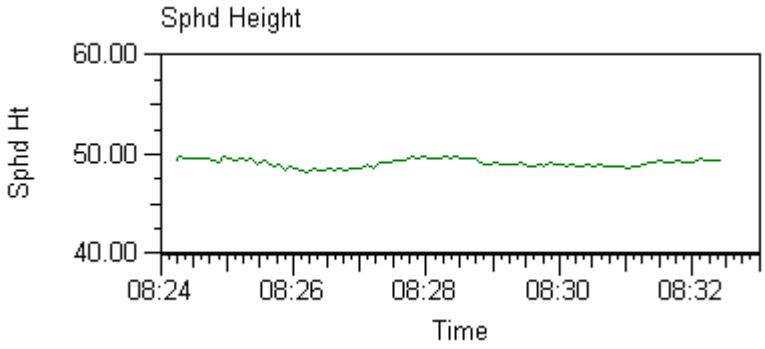
APPENDIX B

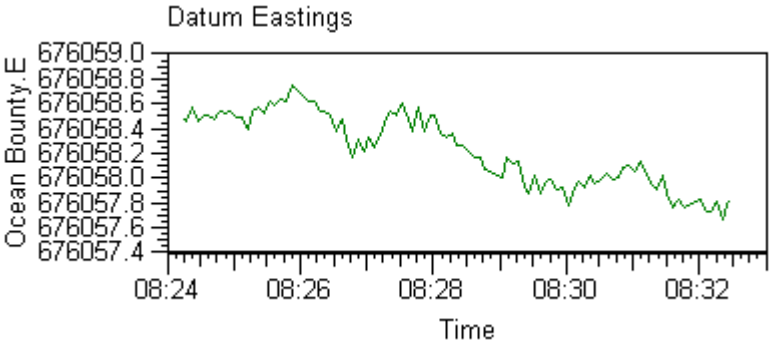
GNS2 STATIC DIFFERENTIAL GPS FIX GRAPHS

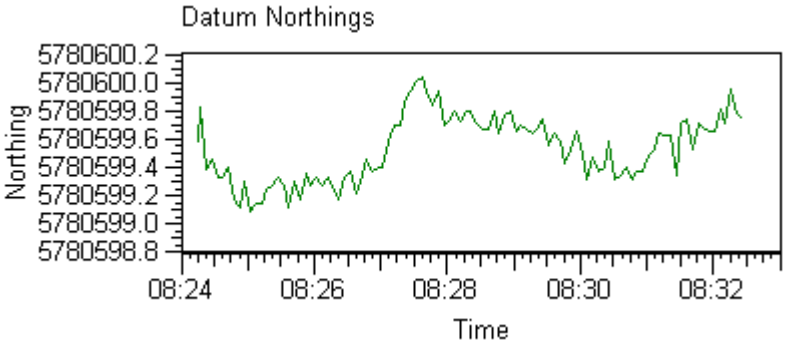

Unit Variance
UV
1.5
1.0
0.5
0.0
-0.5
08:24
08:26
08:28
08:30
08:32
Time

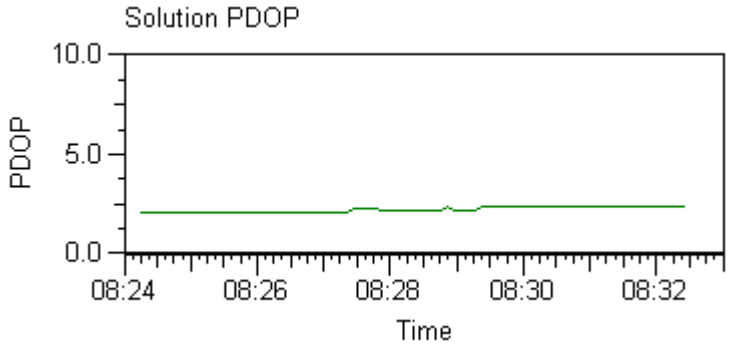

Location Range
Range(S)
10.00
0.00
08:24
08:26
08:28
08:30
08:32
Time

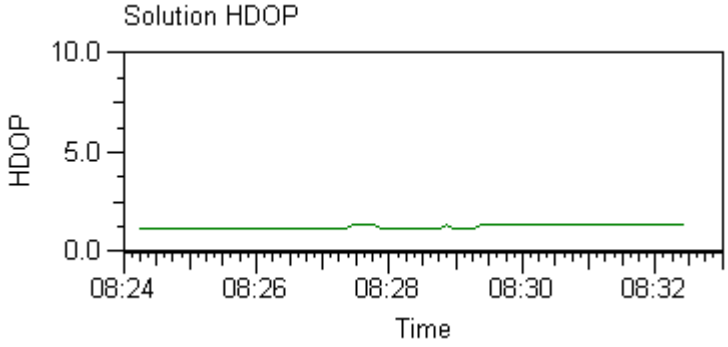

Waypoint Range
Range(S)
4.8
4.6
4.4
4.2
4.0
3.8
3.6
3.4
08:24
08:26
08:28
08:30
08:32
Time

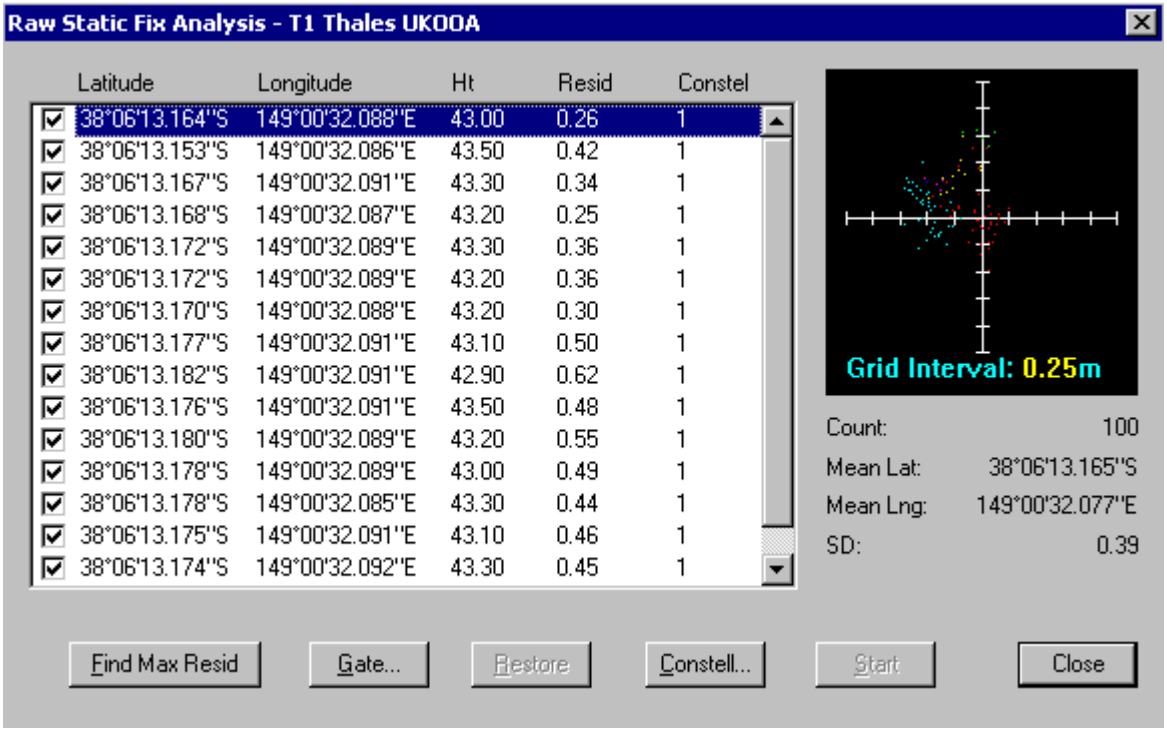

Sphd Height
Sphd Ht
60.00
50.00
40.00
08:24
08:26
08:28
08:30
08:32
Time


Datum Eastings
Ocean Bounty.E
676059.0
676058.8
676058.6
676058.4
676058.2
676058.0
676057.8
676057.6
676057.4
08:24
08:26
08:28
08:30
08:32
Time


Datum Northings
Northing
5780600.2
5780600.0
5780599.8
5780599.6
5780599.4
5780599.2
5780599.0
5780598.8
08:24
08:26
08:28
08:30
08:32
Time


Solution PDOP
PDOP
10.0
5.0
0.0
08:24
08:26
08:28
08:30
08:32
Time

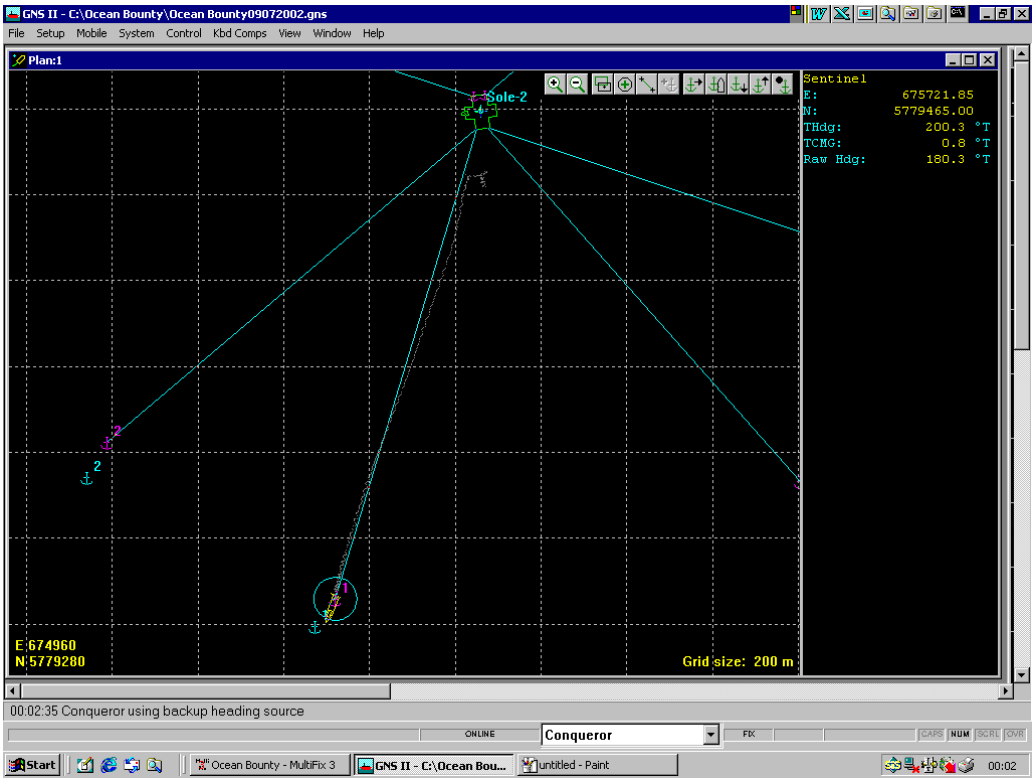

Solution HDOP
HDOP
10.0
5.0
0.0
08:24
08:26
08:28
08:30
08:32
Time


Raw Static Fix Analysis - T1 Thales UKOOA
Latitude Longitude Ht Resid Constel
38°06'13.164"S 149°00'32.088"E 43.00 0.26 1
38°06'13.153"S 149°00'32.086"E 43.50 0.42 1
38°06'13.167"S 149°00'32.091"E 43.30 0.34 1
38°06'13.168"S 149°00'32.087"E 43.20 0.25 1
38°06'13.172"S 149°00'32.089"E 43.30 0.36 1
38°06'13.172"S 149°00'32.089"E 43.20 0.36 1
38°06'13.170"S 149°00'32.088"E 43.20 0.30 1
38°06'13.177"S 149°00'32.091"E 43.10 0.50 1
38°06'13.182"S 149°00'32.091"E 42.90 0.62 1
38°06'13.176"S 149°00'32.091"E 43.50 0.48 1
38°06'13.180"S 149°00'32.089"E 43.20 0.55 1
38°06'13.178"S 149°00'32.089"E 43.00 0.49 1
38°06'13.178"S 149°00'32.085"E 43.30 0.44 1
38°06'13.175"S 149°00'32.091"E 43.10 0.46 1
38°06'13.174"S 149°00'32.092"E 43.30 0.45 1
Grid Interval: 0.25m
Count: 100
Mean Lat: 38°06'13.165"S
Mean Lng: 149°00'32.077"E
SD: 0.39
Find Max Resid
Gate...
Restore
Constell...
Start
Close

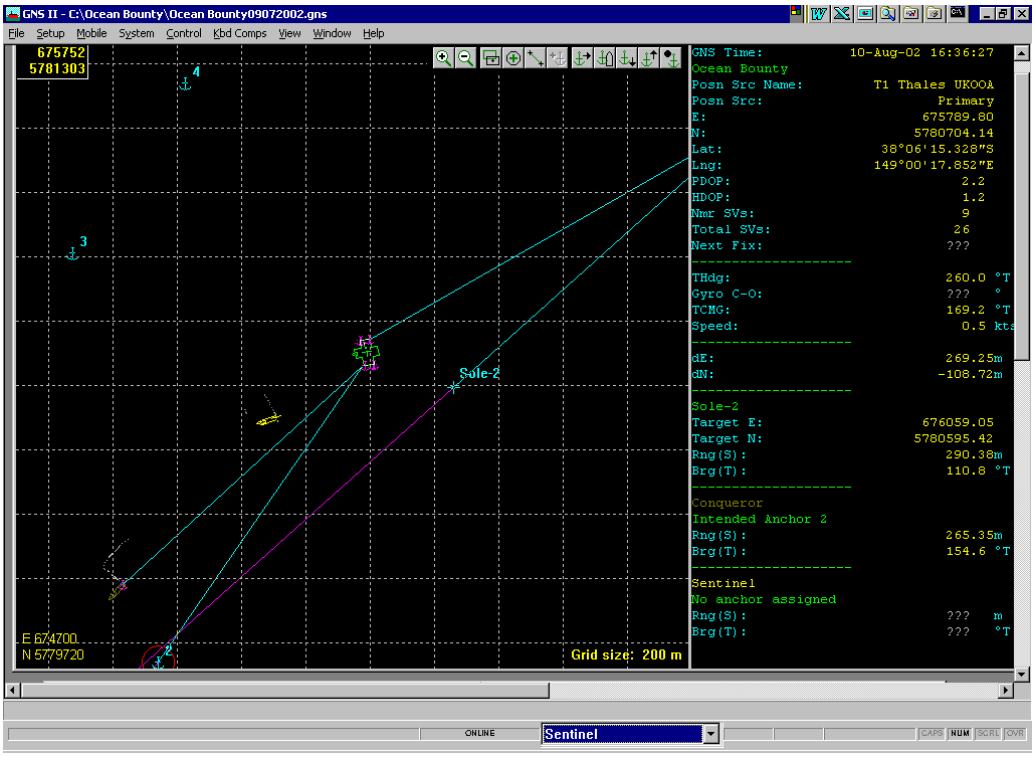
APPENDIX C

RUN LINE GRAPHICS OF ANCHOR HANDLING VESSELS

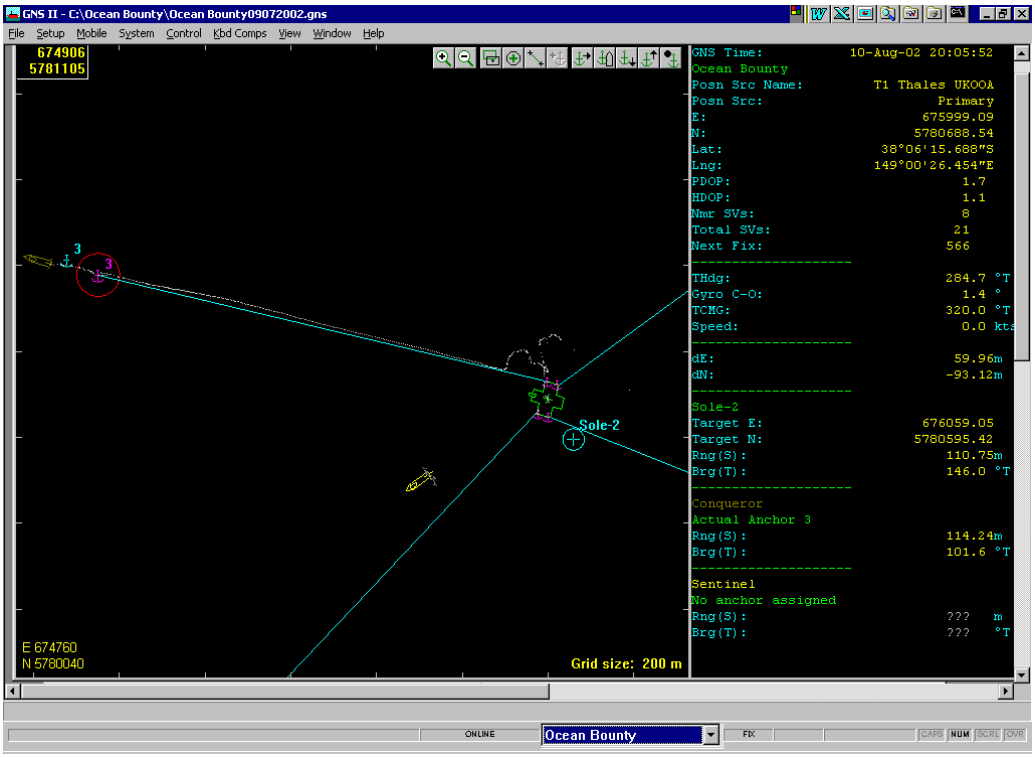
Anchor 1 – Pacific Sentinel



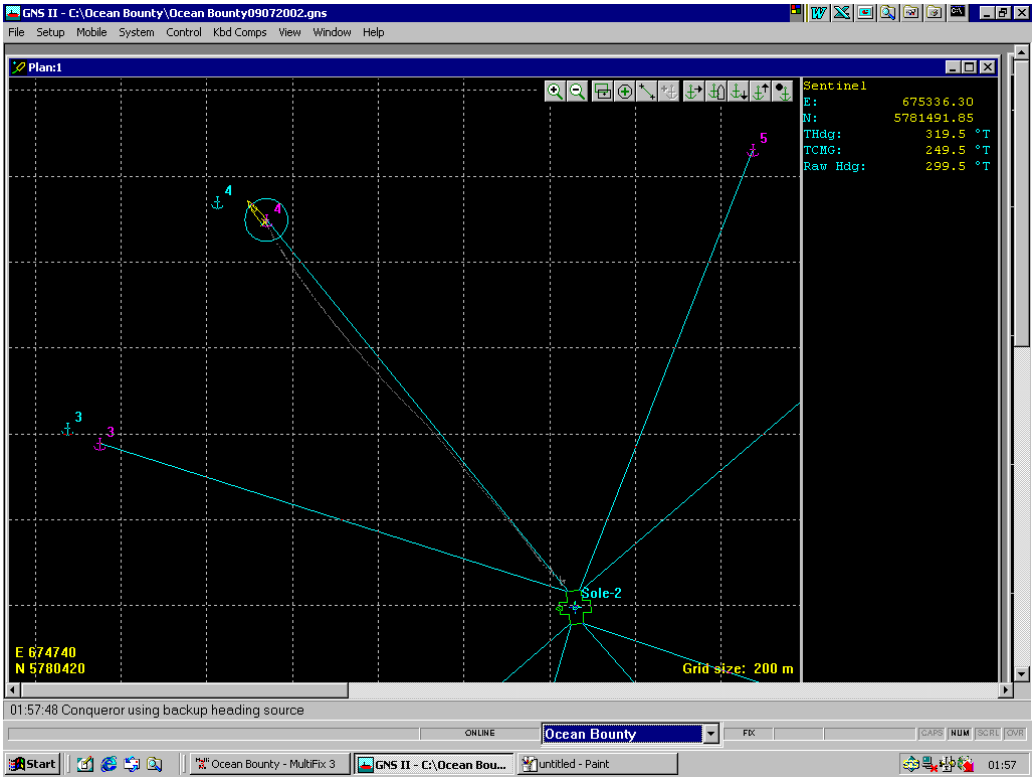
Anchor 2 – Pacific Conquerer



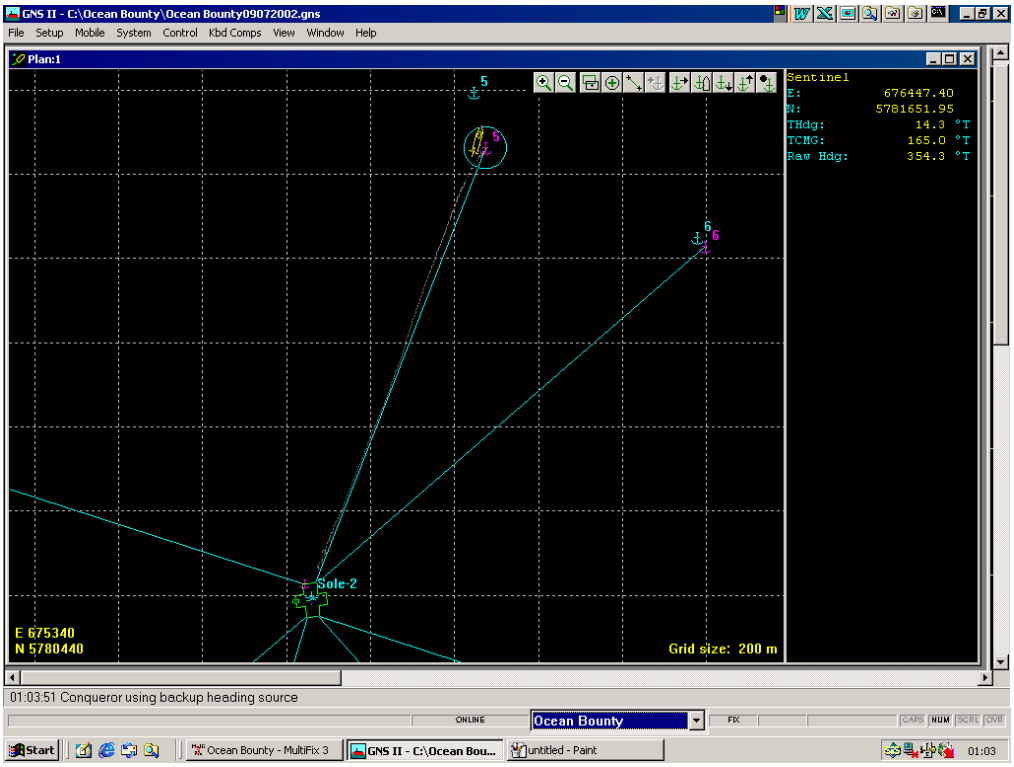
Anchor 3 – Pacific Conquerer



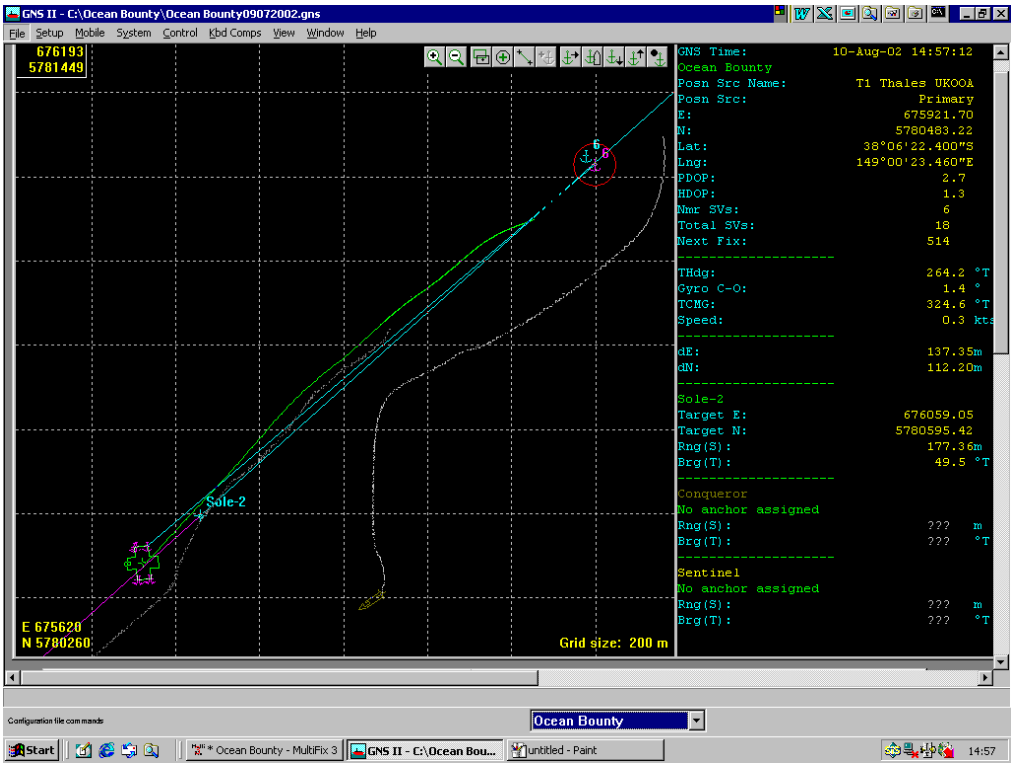
Anchor 4 – Pacific Sentinel



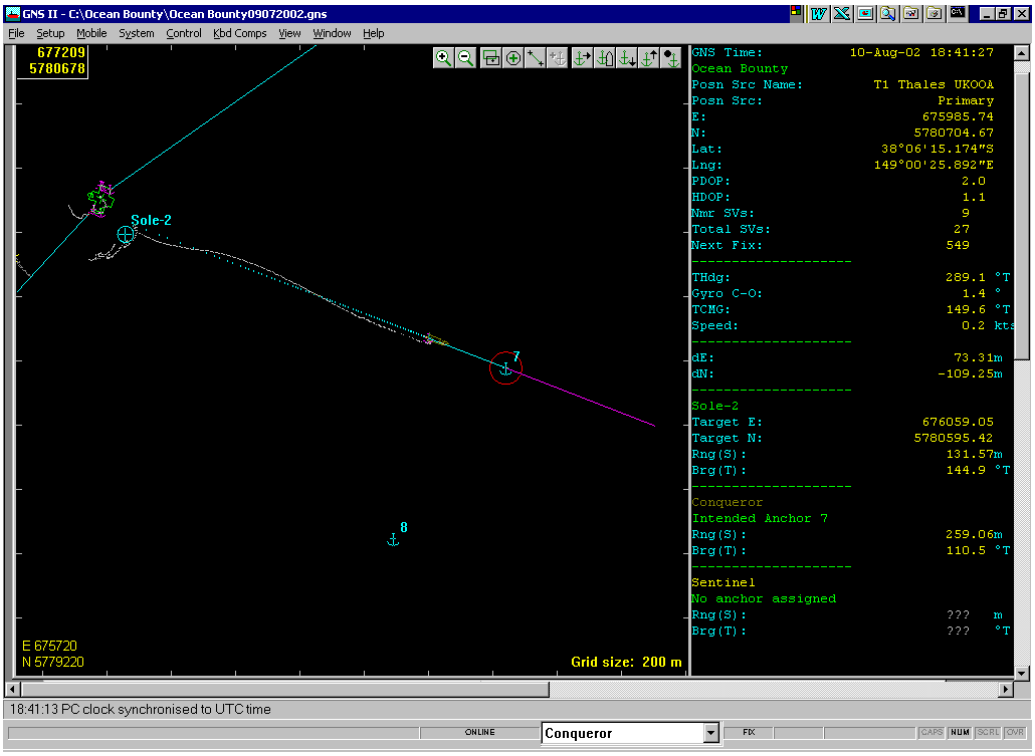
Anchor 5 – Pacific Sentinel



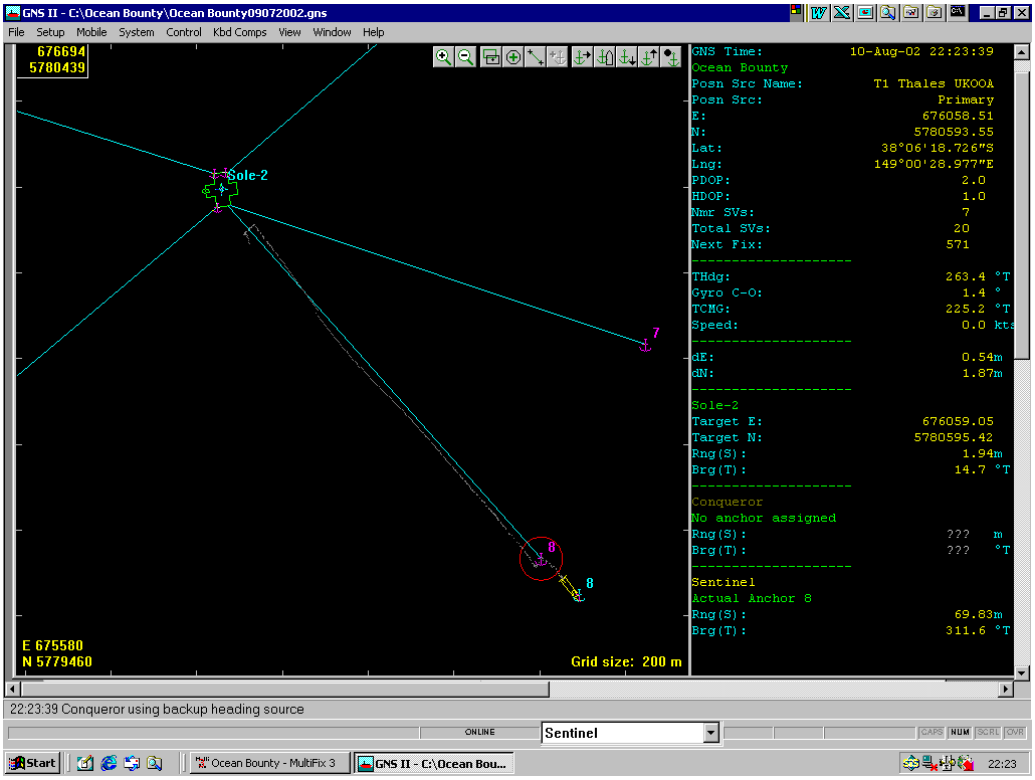
Anchor 6 – Ocean Bounty



Anchor 7 – Pacific Conquerer

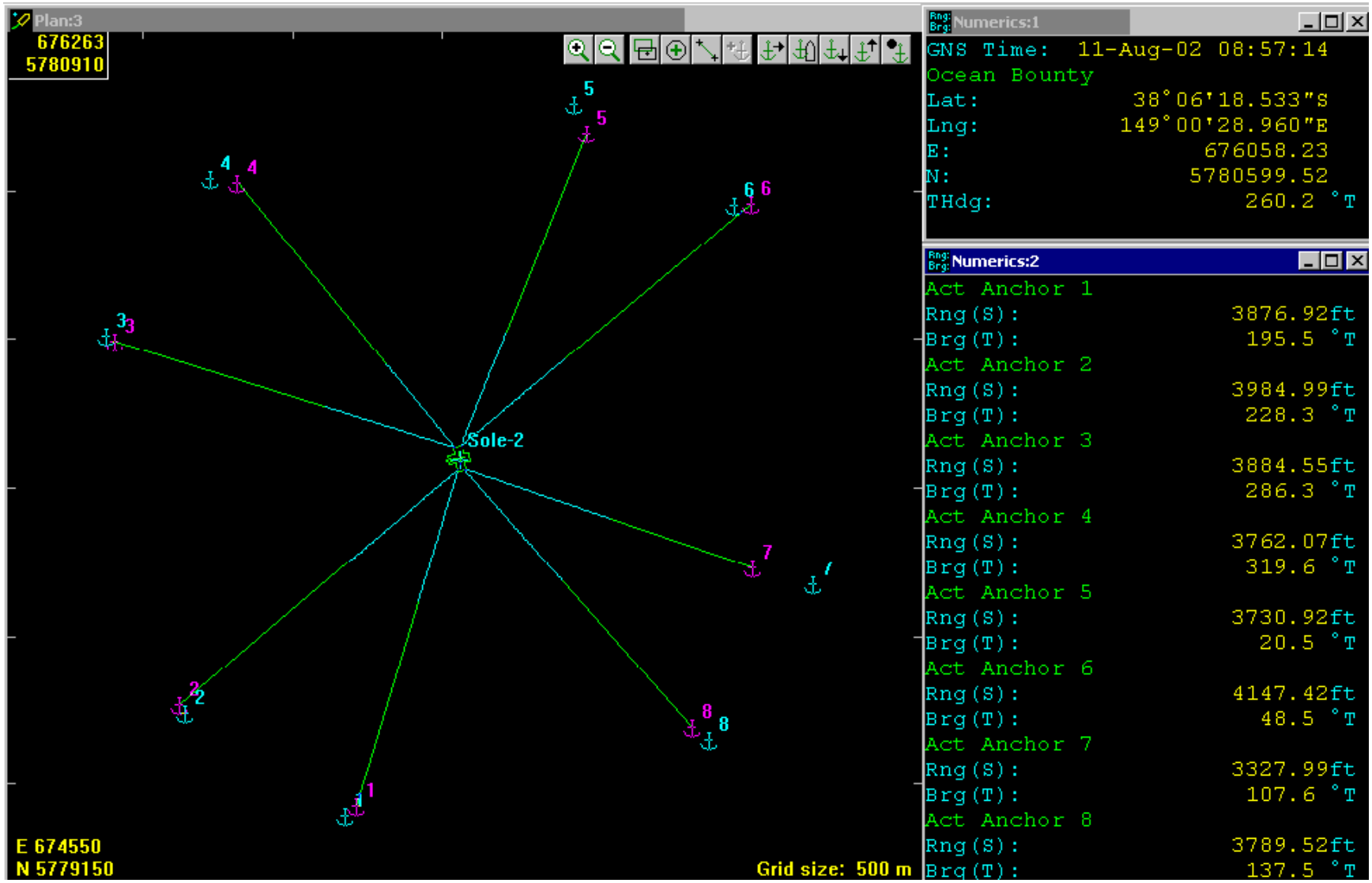


Anchor 8 – Pacific Sentinel



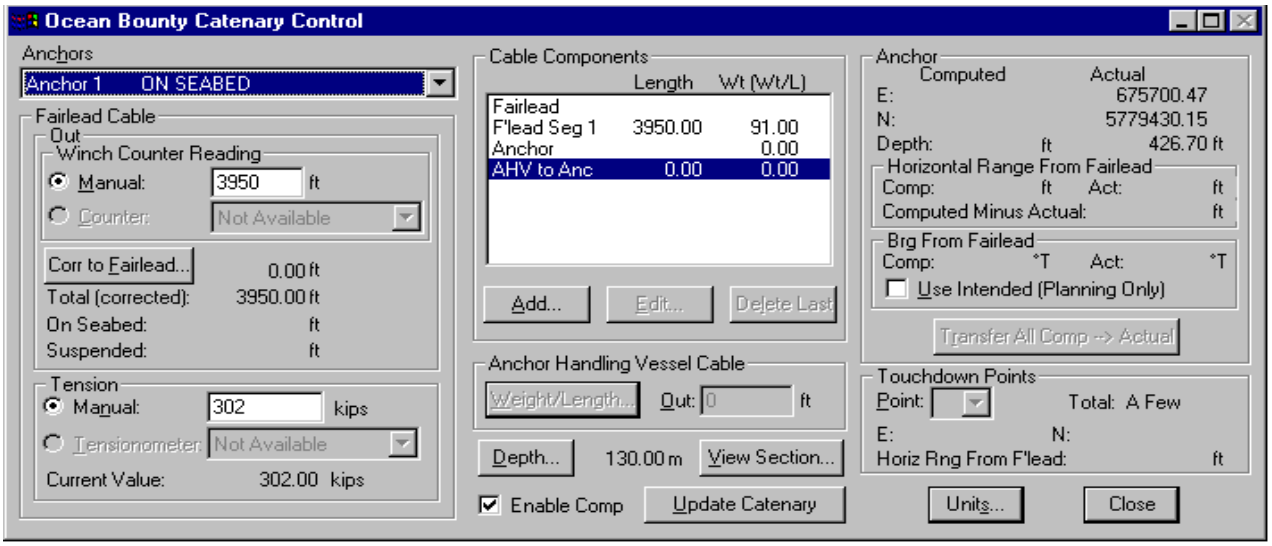
APPENDIX D

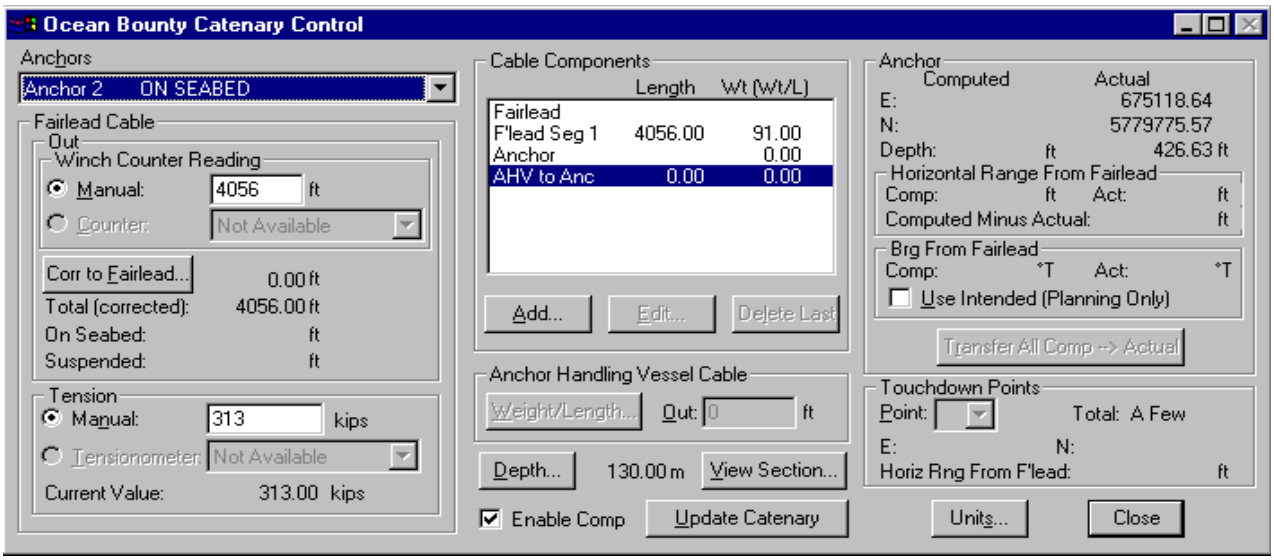
OCEAN BOUNTY ANCHOR PATTERN DETAILS AT SOLE-2

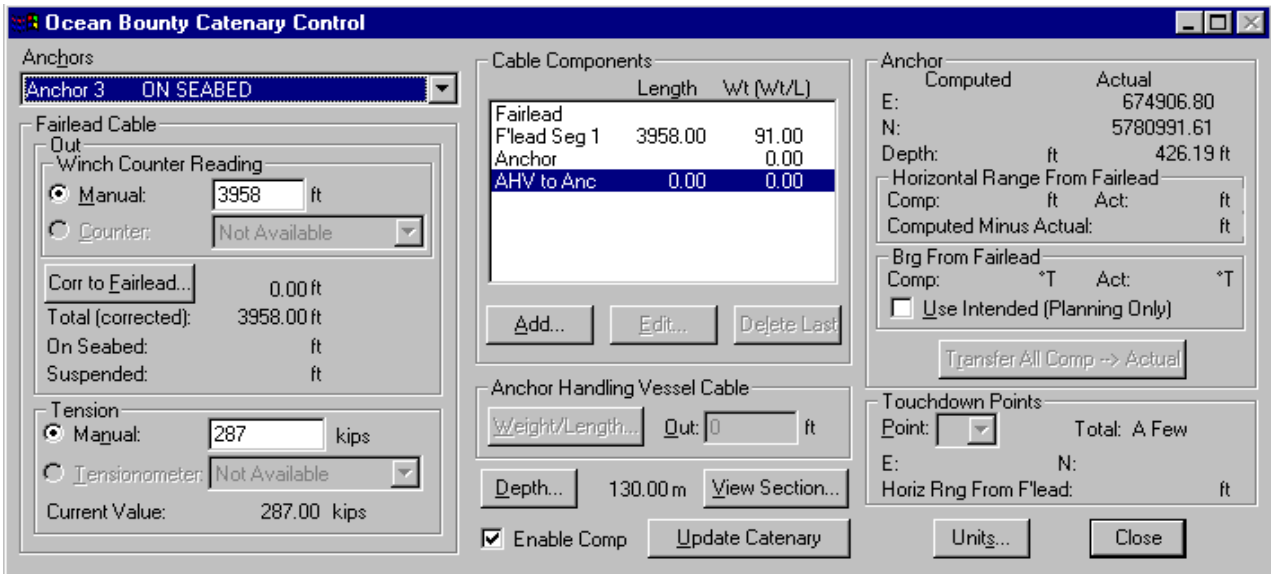

Plan:3
676263
5780910
Sole-2
E 674550
N 5779150
Grid size: 500 m
Numerics:1
GNS Time: 11-Aug-02 08:57:14
Ocean Bounty
Lat: 38°06'18.533"S
Lng: 149°00'28.960"E
E: 676058.23
N: 5780599.52
THdg: 260.2 °T
Numerics:2
Act Anchor 1
Rng(S): 3876.92ft
Brg(T): 195.5 °T
Act Anchor 2
Rng(S): 3984.99ft
Brg(T): 228.3 °T
Act Anchor 3
Rng(S): 3884.55ft
Brg(T): 286.3 °T
Act Anchor 4
Rng(S): 3762.07ft
Brg(T): 319.6 °T
Act Anchor 5
Rng(S): 3730.92ft
Brg(T): 20.5 °T
Act Anchor 6
Rng(S): 4147.42ft
Brg(T): 48.5 °T
Act Anchor 7
Rng(S): 3327.99ft
Brg(T): 107.6 °T
Act Anchor 8
Rng(S): 3789.52ft
Brg(T): 137.5 °T

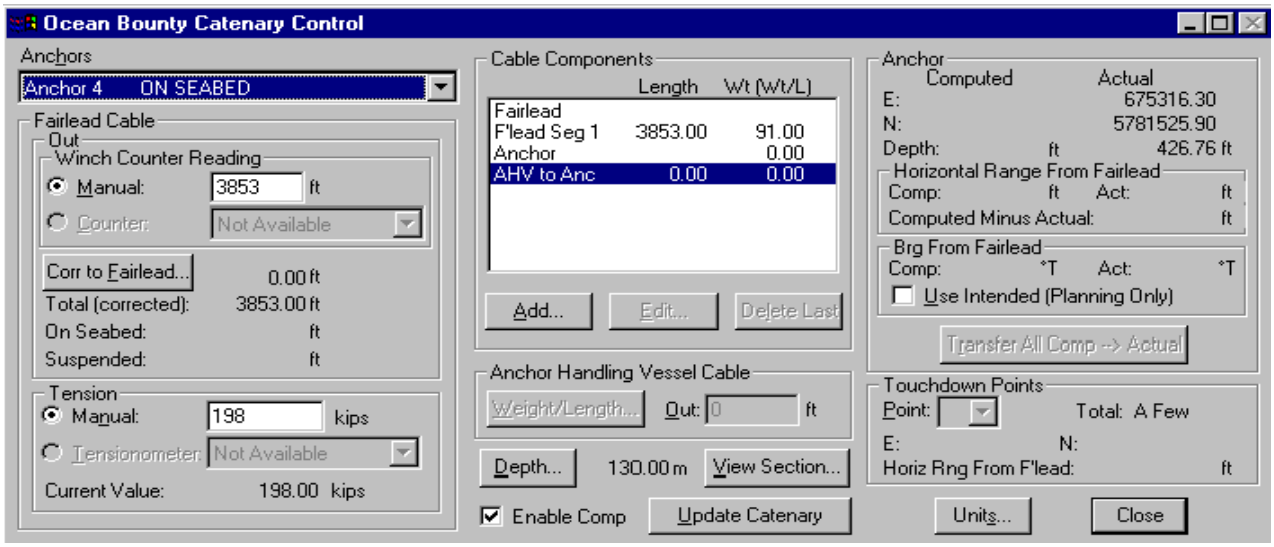
APPENDIX E

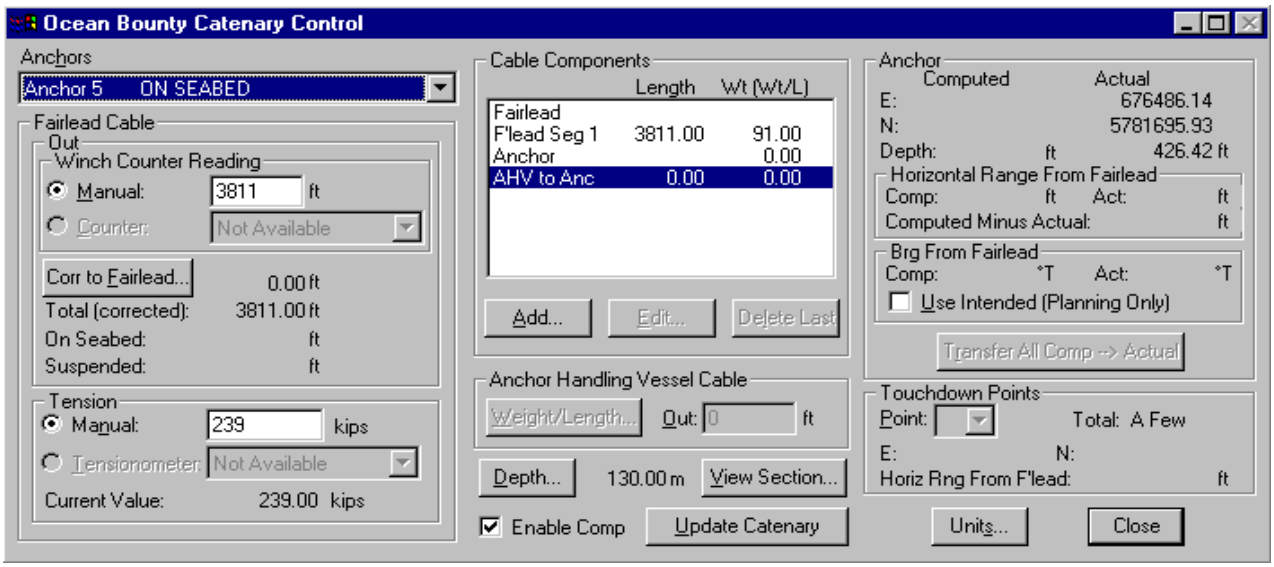
OCEAN BOUNTY ANCHOR CATENARY CALCULATIONS

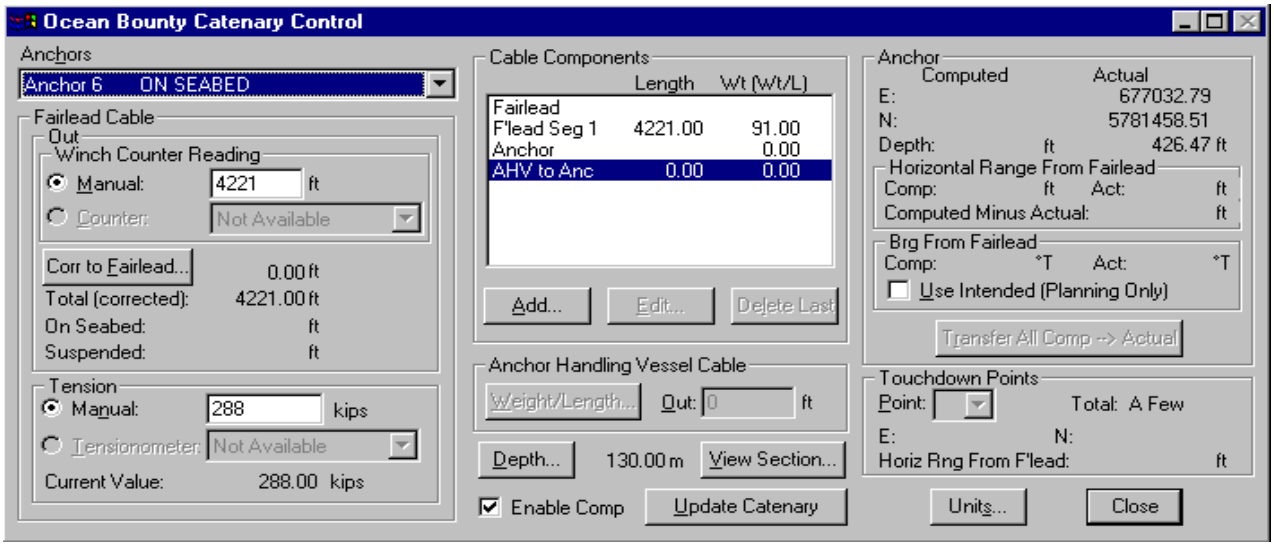

Ocean Bounty Catenary Control
Anchors
Anchor 1 ON SEABED
Fairlead Cable
Out
Winch Counter Reading
Manual: 3950 ft
Counter: Not Available
Corr to Fairlead... 0.00 ft
Total (corrected): 3950.00 ft
On Seabed: ft
Suspended: ft
Tension
Manual: 302 kips
Tensionometer: Not Available
Current Value: 302.00 kips
Cable Components
Length Wt (Wt/L)
Fairlead
F'lead Seg 1 3950.00 91.00
Anchor 0.00
AHV to Anc 0.00 0.00
Add... Edit... Delete Last
Anchor Handling Vessel Cable
Weight/Length... Out: 0 ft
Depth... 130.00 m View Section...
Enable Comp Update Catenary
Anchor
Computed Actual
E: 675700.47
N: 5779430.15
Depth: ft 426.70 ft
Horizontal Range From Fairlead
Comp: ft Act: ft
Computed Minus Actual: ft
Brg From Fairlead
Comp: °T Act: °T
Use Intended (Planning Only)
Transfer All Comp -> Actual
Touchdown Points
Point: Total: A Few
E: N:
Horiz Rng From F'lead: ft
Units... Close

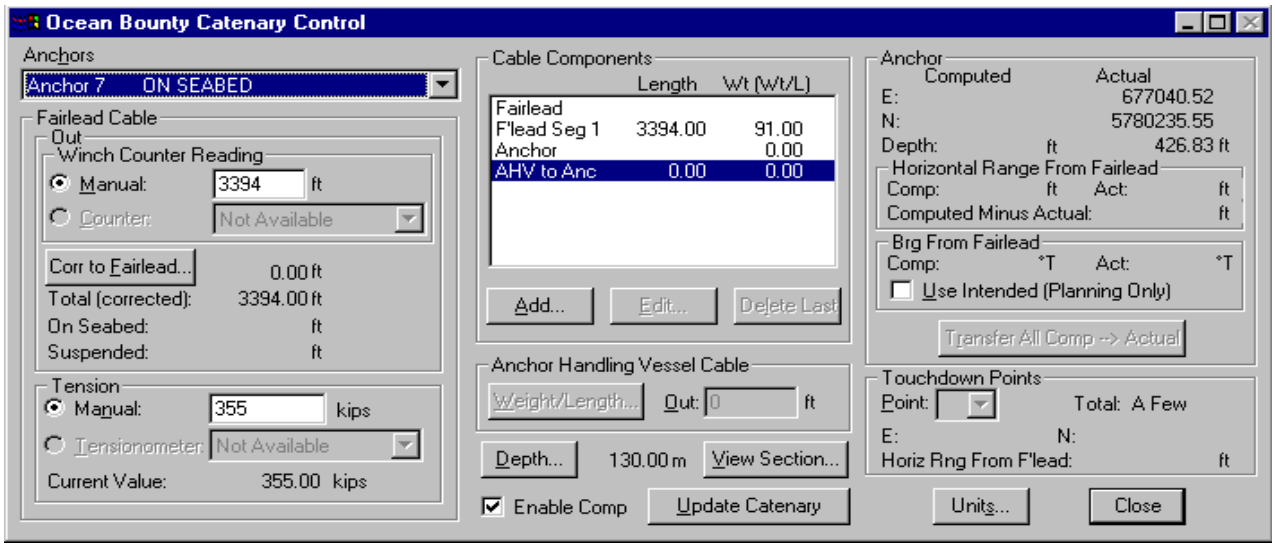

Ocean Bounty Catenary Control
Anchors
Anchor 2 ON SEABED
Fairlead Cable
Out
Winch Counter Reading
Manual: 4056 ft
Counter: Not Available
Corr to Fairlead... 0.00 ft
Total (corrected): 4056.00 ft
On Seabed: ft
Suspended: ft
Tension
Manual: 313 kips
Tensionometer: Not Available
Current Value: 313.00 kips
Cable Components
Length Wt (Wt/L)
Fairlead
F'lead Seg 1 4056.00 91.00
Anchor 0.00
AHV to Anc 0.00 0.00
Add... Edit... Delete Last
Anchor Handling Vessel Cable
Weight/Length... Out: 0 ft
Depth... 130.00 m View Section...
Enable Comp Update Catenary
Anchor
Computed Actual
E: 675118.64
N: 5779775.57
Depth: ft 426.63 ft
Horizontal Range From Fairlead
Comp: ft Act: ft
Computed Minus Actual: ft
Brg From Fairlead
Comp: °T Act: °T
Use Intended (Planning Only)
Transfer All Comp -> Actual
Touchdown Points
Point: Total: A Few
E: N:
Horiz Rng From F'lead: ft
Units... Close

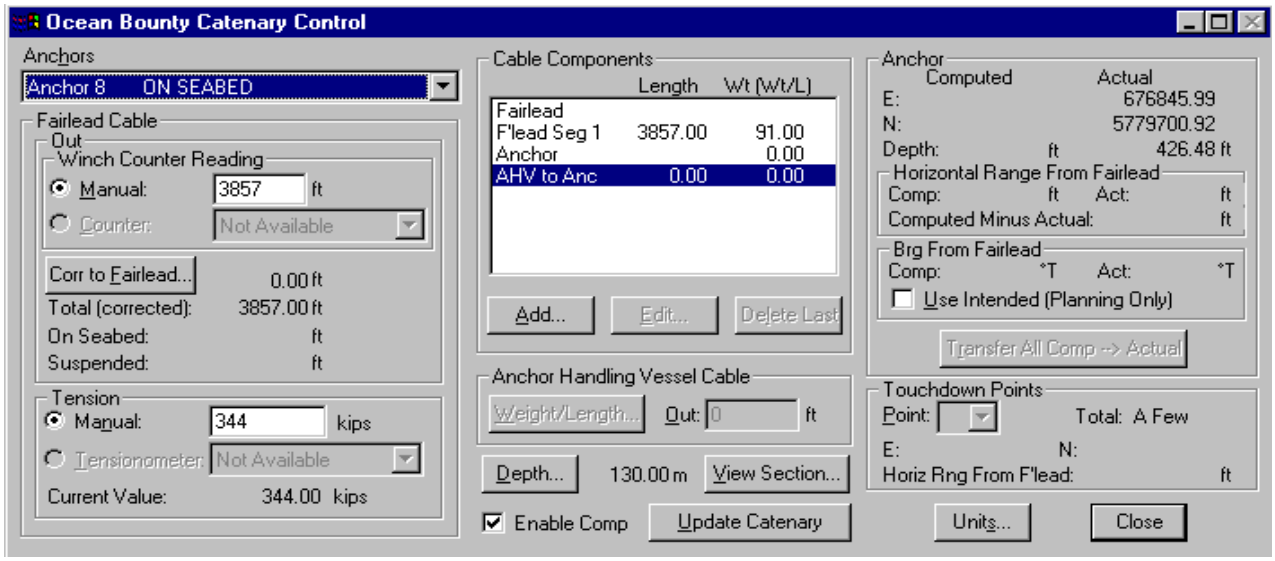

Ocean Bounty Catenary Control
Anchors
Anchor 3 ON SEABED
Fairlead Cable
Out
Winch Counter Reading
Manual: 3958 ft
Counter: Not Available
Corr to Fairlead... 0.00 ft
Total (corrected): 3958.00 ft
On Seabed: ft
Suspended: ft
Tension
Manual: 287 kips
Tensionometer: Not Available
Current Value: 287.00 kips
Cable Components
Length Wt (Wt/L)
Fairlead
F'lead Seg 1 3958.00 91.00
Anchor 0.00
AHV to Anc 0.00 0.00
Add... Edit... Delete Last
Anchor Handling Vessel Cable
Weight/Length... Out: 0 ft
Depth... 130.00 m View Section...
Enable Comp Update Catenary
Anchor
Computed Actual
E: 674906.80
N: 5780991.61
Depth: ft 426.19 ft
Horizontal Range From Fairlead
Comp: ft Act: ft
Computed Minus Actual: ft
Brg From Fairlead
Comp: °T Act: °T
Use Intended (Planning Only)
Transfer All Comp -> Actual
Touchdown Points
Point: Total: A Few
E: N:
Horiz Rng From F'lead: ft
Units... Close


Ocean Bounty Catenary Control
Anchors
Anchor 4 ON SEABED
Fairlead Cable
Out
Winch Counter Reading
Manual: 3853 ft
Counter: Not Available
Corr to Fairlead... 0.00 ft
Total (corrected): 3853.00 ft
On Seabed: ft
Suspended: ft
Tension
Manual: 198 kips
Tensionometer: Not Available
Current Value: 198.00 kips
Cable Components
Length Wt (Wt/L)
Fairlead
F'lead Seg 1 3853.00 91.00
Anchor 0.00
AHV to Anc 0.00 0.00
Add... Edit... Delete Last
Anchor Handling Vessel Cable
Weight/Length... Out: 0 ft
Depth... 130.00 m View Section...
Enable Comp Update Catenary
Anchor
Computed Actual
E: 675316.30
N: 5781525.90
Depth: ft 426.76 ft
Horizontal Range From Fairlead
Comp: ft Act: ft
Computed Minus Actual: ft
Brg From Fairlead
Comp: °T Act: °T
Use Intended (Planning Only)
Transfer All Comp -> Actual
Touchdown Points
Point: Total: A Few
E: N:
Horiz Rng From F'lead: ft
Units... Close


Ocean Bounty Catenary Control
Anchors
Anchor 5 ON SEABED
Fairlead Cable
Out
Winch Counter Reading
Manual: 3811 ft
Counter: Not Available
Corr to Fairlead... 0.00 ft
Total (corrected): 3811.00 ft
On Seabed: ft
Suspended: ft
Tension
Manual: 239 kips
Tensionometer: Not Available
Current Value: 239.00 kips
Cable Components
Length Wt (Wt/L)
Fairlead
F'lead Seg 1 3811.00 91.00
Anchor 0.00
AHV to Anc 0.00 0.00
Add... Edit... Delete Last
Anchor Handling Vessel Cable
Weight/Length... Out: 0 ft
Depth... 130.00 m View Section...
Enable Comp Update Catenary
Anchor
Computed Actual
E: 676486.14
N: 5781695.93
Depth: ft 426.42 ft
Horizontal Range From Fairlead
Comp: ft Act: ft
Computed Minus Actual: ft
Brg From Fairlead
Comp: °T Act: °T
Use Intended (Planning Only)
Transfer All Comp -> Actual
Touchdown Points
Point: Total: A Few
E: N:
Horiz Rng From F'lead: ft
Units... Close


Ocean Bounty Catenary Control
Anchors
Anchor 6 ON SEABED
Fairlead Cable
Out
Winch Counter Reading
Manual: 4221 ft
Counter: Not Available
Corr to Fairlead... 0.00 ft
Total (corrected): 4221.00 ft
On Seabed: ft
Suspended: ft
Tension
Manual: 288 kips
Tensionometer: Not Available
Current Value: 288.00 kips
Cable Components
Length Wt (Wt/L)
Fairlead
F'lead Seg 1 4221.00 91.00
Anchor 0.00
AHV to Anc 0.00 0.00
Add... Edit... Delete Last
Anchor Handling Vessel Cable
Weight/Length... Out: 0 ft
Depth... 130.00 m View Section...
Enable Comp Update Catenary
Anchor
Computed Actual
E: 677032.79
N: 5781458.51
Depth: ft 426.47 ft
Horizontal Range From Fairlead
Comp: ft Act: ft
Computed Minus Actual: ft
Brg From Fairlead
Comp: °T Act: °T
Use Intended (Planning Only)
Transfer All Comp -> Actual
Touchdown Points
Point: Total: A Few
E: N:
Horiz Rng From F'lead: ft
Units... Close


Ocean Bounty Catenary Control
Anchors
Anchor 7 ON SEABED
Fairlead Cable
Out
Winch Counter Reading
Manual: 3394 ft
Counter: Not Available
Corr to Fairlead... 0.00 ft
Total (corrected): 3394.00 ft
On Seabed: ft
Suspended: ft
Tension
Manual: 355 kips
Tensionometer: Not Available
Current Value: 355.00 kips
Cable Components
Length Wt (Wt/L)
Fairlead
F'lead Seg 1 3394.00 91.00
Anchor 0.00
AHV to Anc 0.00 0.00
Add... Edit... Delete Last
Anchor Handling Vessel Cable
Weight/Length... Out: 0 ft
Depth... 130.00 m View Section...
Enable Comp Update Catenary
Anchor
Computed Actual
E: 677040.52
N: 5780235.55
Depth: ft 426.83 ft
Horizontal Range From Fairlead
Comp: ft Act: ft
Computed Minus Actual: ft
Brg From Fairlead
Comp: °T Act: °T
Use Intended (Planning Only)
Transfer All Comp -> Actual
Touchdown Points
Point: Total: A Few
E: N:
Horiz Rng From F'lead: ft
Units... Close


Ocean Bounty Catenary Control
Anchors
Anchor 8 ON SEABED
Fairlead Cable
Out
Winch Counter Reading
Manual: 3857 ft
Counter: Not Available
Corr to Fairlead... 0.00 ft
Total (corrected): 3857.00 ft
On Seabed: ft
Suspended: ft
Tension
Manual: 344 kips
Tensionometer: Not Available
Current Value: 344.00 kips
Cable Components
Length Wt (Wt/L)
Fairlead
F'lead Seg 1 3857.00 91.00
Anchor 0.00
AHV to Anc 0.00 0.00
Add... Edit... Delete Last
Anchor Handling Vessel Cable
Weight/Length... Out: 0 ft
Depth... 130.00 m View Section...
Enable Comp Update Catenary
Anchor
Computed Actual
E: 676845.99
N: 5779700.92
Depth: ft 426.48 ft
Horizontal Range From Fairlead
Comp: ft Act: ft
Computed Minus Actual: ft
Brg From Fairlead
Comp: °T Act: °T
Use Intended (Planning Only)
Transfer All Comp -> Actual
Touchdown Points
Point: Total: A Few
E: N:
Horiz Rng From F'lead: ft
Units... Close

APPENDIX F

GYROCOMPASS CALIBRATION REPORT

Gyrocompass Calibration Ocean Bounty

Thales Job No. 3432A3
Job Description: Ocean Bounty Rig Move (Return to Sole-2)
Client: OMV
Party Chief: Phil Wells
Surveyor / Observer: Phil Wells
Rig Name: Ocean Bounty
Date: 8 August 2002
Observation Station: Ocean Bounty Heli-deck

Reference Object: Barracouta Platform
R.O. Position (m)
Easting: 558 998
Northing: 5 760 887

Note: C-O Left at +1.4° From Previous Rig Move for Calibration

Barracouta Platform

Time (EST)	Observed Angle	Observed Easting(m)	Observed Northing (m)	Calculated Heading	Observed Heading	C-O
21:45:00	5.7°	570 600	5 765 644	241.5°	241.5°	0.0°
21:46:00	5.8°	570 602	5 765 645	241.4°	241.5°	-0.1°
21:47:00	5.6°	570 603	5 765 644	241.6°	241.6°	0.0°
21:48:00	5.8°	570 603	5 765 643	241.4°	241.6°	-0.2°
21:49:00	5.6°	570 605	5 765 646	241.6°	241.5°	0.1°
					Mean:	**0.0°**

Sign:_____

Surveyor/Party Chief

THALES

Thales GeoSolutions (Australasia) Limited

ABN 82 000 601 909

Solar Observation for Azimuth (Hour Angle) 2002

Thales Job Number: 3234A3
Job Description: Return to Sole-2
Client: OMV Australia Pty Ltd
Party Chief: Phil Wells
Surveyor: Phil Wells
Rig Name: Ocean Bounty
Date: 10 August 2002

Control Point Co-ordinates

Datum: WGS84 Projection: UTM Zone 55S CM 147° East

Latitude (DMS):	-038	06	19
Longitude (DMS):	149	00	29
UTC Correction (HMS):	10.00		

Total Station Observations:

Face	Local Time (HMS)			Observed Direction to R.O. (DMS)			Observed Direction to Sun (DMS)			Observed (O) True Heading (D.D)
Left	07	30	00	000	00	00	164	54	00	260.20
Right	07	30	00	180	00	00	344	54	00	
Left	07	32	00	000	00	00	164	48	00	260.20
Right	07	32	00	180	00	00	344	48	00	
Left	07	33	00	000	00	00	164	24	00	260.30
Right	07	33	00	180	00	00	344	24	00	
Left	07	34	00	000	00	00	164	06	00	260.30
Right	07	34	00	180	00	00	344	06	00	
Left	07	36	00	000	00	00	164	00	00	260.20
Right	07	36	00	180	00	00	344	00	00	
Left	07	37	00	000	00	00	163	48	00	260.20
Right	07	37	00	180	00	00	343	48	00	
Left										
Right										
Left										
Right										
Left										
Right										
Left										
Right										
Left										
Right										
Left										
Right										

Signature

SURVEYOR/PARTY CHIEF

CLIENT SURVEY REPRESENTATIVE

THALES

Thales GeoSolutions (Australasia) Limited

ABN 82 000 601 909

Solar Observation for Azimuth (Hour Angle) 2002

Thales Job Number: 3234A3
Job Description: Return to Sole-2
Client: OMV Australia Pty Ltd
Party Chief: Phil Wells
Surveyor: Phil Wells
Rig Name: Ocean Bounty
Date: 10 August 2002

Datum: WGS84 Projection: UTM Zone 55S CM 147° East

Average Local Time (HMS)			Average Horizontal Angle (DMS)			Azimuth Sun (DMS)			Azimuth RO (DMS)			Calculated (C) True Heading (D.D)	Observed (O) True Heading (D.D)	C-O (D.D)
07	30	00.0	164	54	00	065	11	59	260	17	59	260.30	260.20	0.10
07	32	00.0	164	48	00	064	52	31	260	04	31	260.08	260.20	-0.12
07	33	00.0	164	24	00	064	42	45	260	18	45	260.31	260.30	0.01
07	34	00.0	164	06	00	064	32	58	260	26	58	260.45	260.30	0.15
07	36	00.0	164	00	00	064	13	21	260	13	21	260.22	260.20	0.02
07	37	00.0	163	48	00	064	03	31	260	15	31	260.26	260.20	0.06

Mean C-O **0.04**

Signature

SURVEYOR/PARTY CHIEF

CLIENT SURVEY REPRESENTATIVE

APPENDIX G

DIFFERENTIAL GPS CHECK

THALES **Thales GeoSolutions Aust Ltd**

FINAL POSITION FIX – DIFFERENTIAL GPS

Job Description: Ocean Bounty to Beardie-1
Job Number: 3410A3
Thales Surveyor: P. Wells
Client: OMVAustralia Pty Ltd
Client Representative: R. King

Sampling started: 8 Aug 2002 22:37:51
Sampling end: 8 Aug 2002 22:46:05

Ocean Bounty

Intended datum location

Datum: AGD 1966
Latitude: 38°15'16.214"S Longitude: 147°48'24.643"E
Projection: AMG Zone 55
Easting: 570594.15 m Northing: 5765624.16 m

Final Antenna Position (T1 Thales UKOOA):

Sample size: 100 fixes used out of a total of 100.

Antenna offset

X: 0.28m Y: 33.90m Z: 0.00m
Range: 33.90m Rel Brg from datum to antenna: 0.5°

Datum: WGS 84
Latitude: 38°15'11.163"S Longitude: 147°48'27.992"E Spheroidal Ht: 42.09m
Datum: AGD 1966
Latitude: 38°15'16.664"S Longitude: 147°48'23.417"E Spheroidal Ht: 50.56m
Projection: AMG Zone 55
Easting: 570564.24 Northing: 5765610.54 Spheroidal Ht: 50.56m

Standard deviations

Long or E: 0.37m
Lat or N: 0.20m
Height: 0.72m
Position: 0.42m

Final Datum Position

Datum: AGD 1966
Latitude: 38°15'16.147"S Longitude: 147°48'24.648"E

Projection: AMG Zone 55
Easting: 570594.30 m Northing: 5765626.21 m

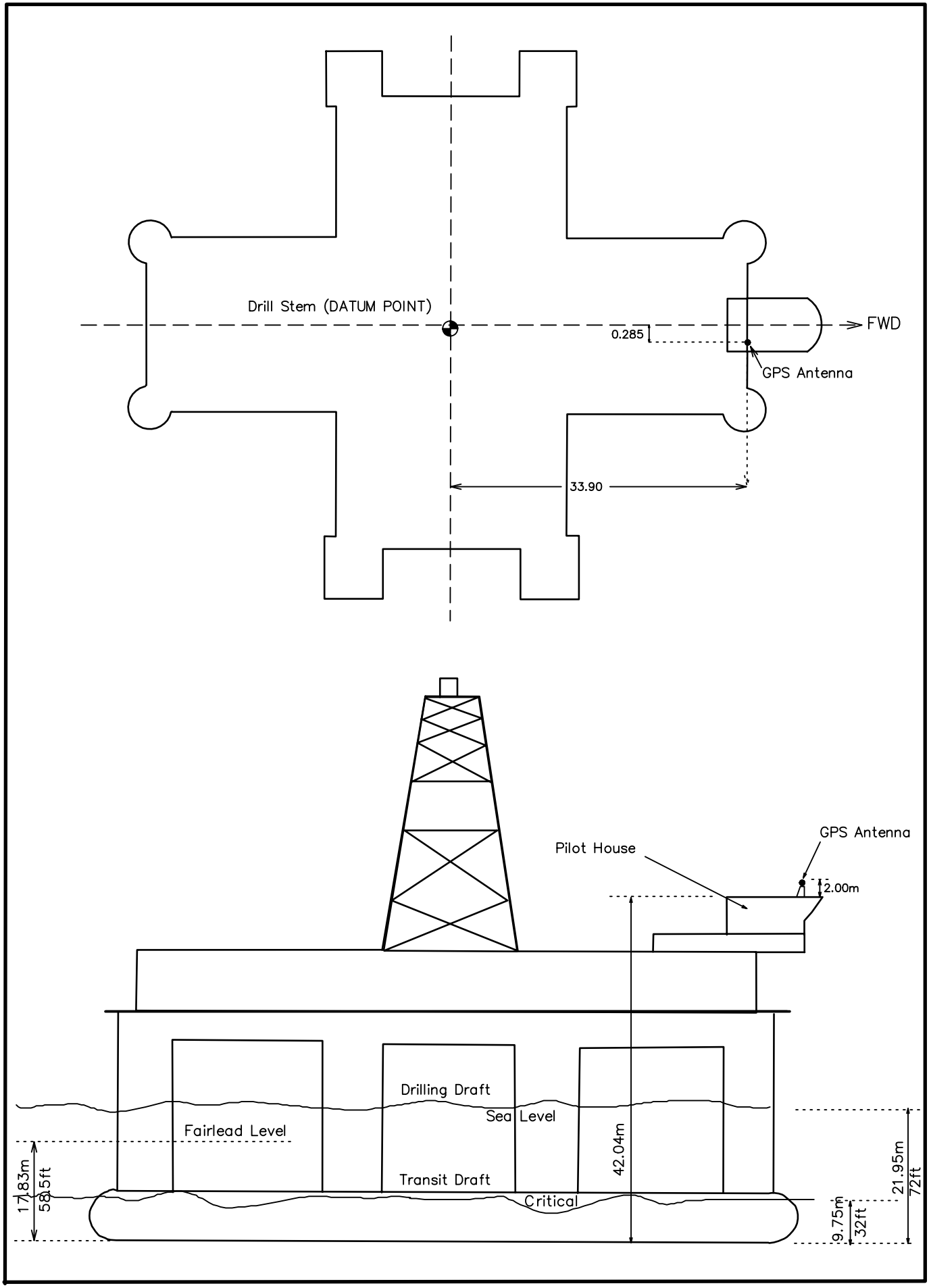
Mean corrected heading: 241.5°T
SD heading: 0.1°T
Intended heading: 240.7°T
Difference from intended: 0.8°
Gyro C-O: 1.4°
Convergence: -0.50°

Final Datum Position is 2.06m on a bearing of 3.7°T (4.2°G) from the intended location.

APPENDIX H

OCEAN BOUNTY OFFSET DIAGRAM

OCEAN BOUNTY OFFSET DIAGRAM

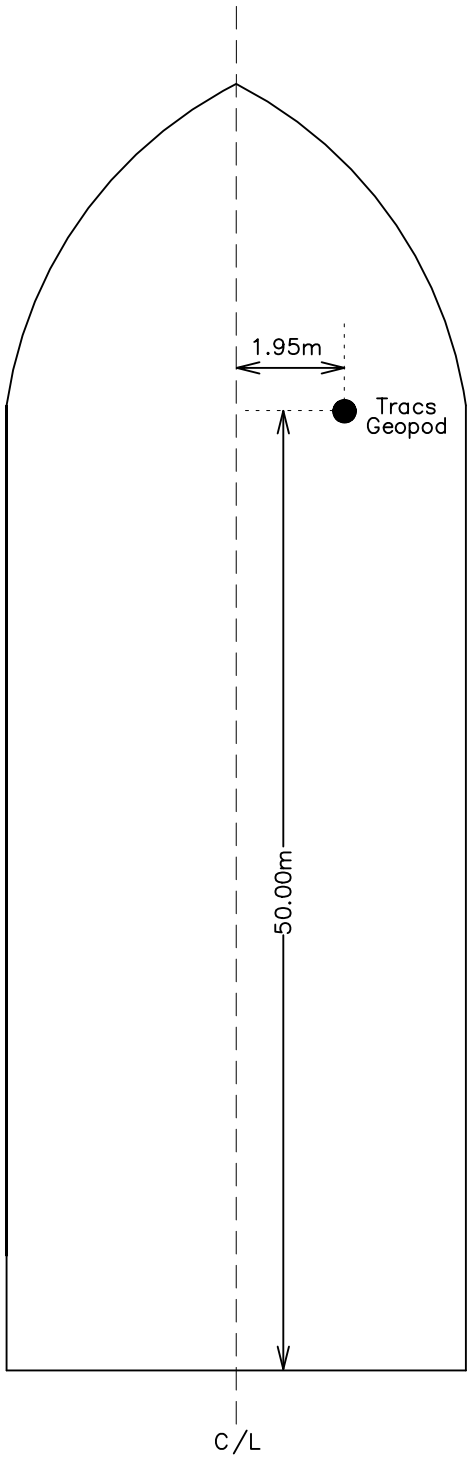


NOT TO SCALE

APPENDIX I

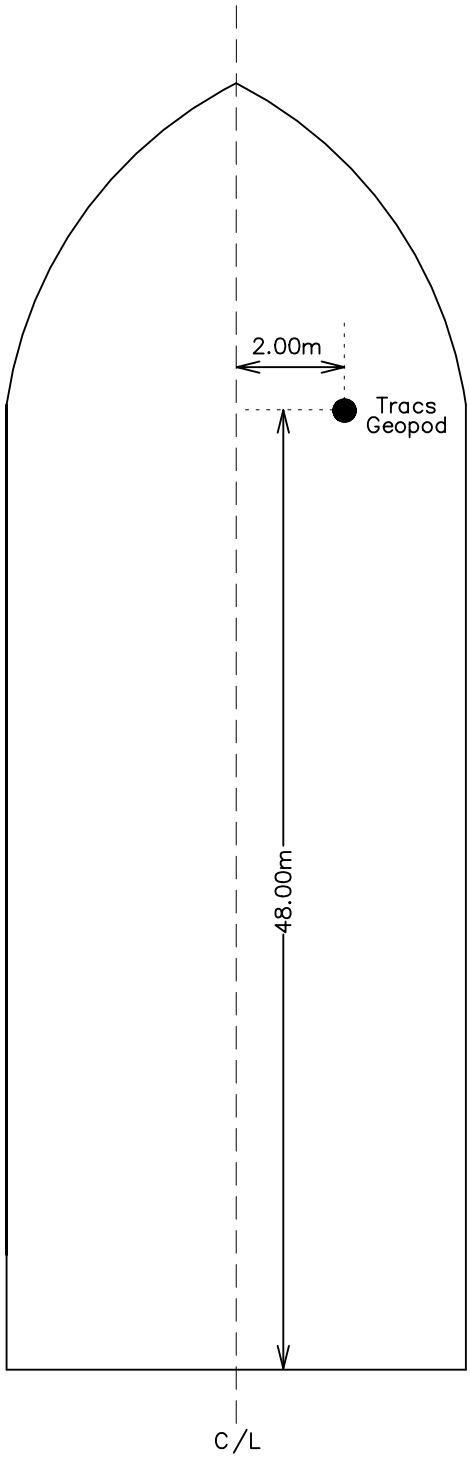
PACIFIC SENTINEL AND PACIFIC CONQUEROR OFFSET DIAGRAMS

PACIFIC SENTINEL



(NOT TO SCALE)

PACIFIC CONQUEROR



(NOT TO SCALE)

APPENDIX J

GNS2 CONFIGURATION FILE PRINTOUT

GNS II CONFIGURATION FILE W:\Project Data\3432A3 OMV Return to Sole-2 Ocean

JOB DETAILS
Job Number : 3424A3A3
Job Description : Ocean Bounty to Beardie-1
Company : Thales GeoSolutions Aust Ltd
Client : OMV Australia Pty Ltd
Time Zone : GMT ~~+8:00~~ 10.00

WORKING SPHEROID
AGD 1966
Semi-major : 6378160.000 m
e Squared : 0.006694541855

WORKING PROJECTION
AMG Zone 55
Lat of Origin : 00°00'00.000"N
Long of Origin : 147°00'00.000"E
False Easting : 500000.00
False Northing : 10000000.00
Scale Factor : 0.999600
Units : Metres

GPS TRANSFORMATION
From : WGS 84
Semi-major : 6378137.000 m
e Squared : 0.006694380067
To : AGD 1966
Dx : 123.314 m
Dy : 47.223 m
Dz : -136.594 m
Rot x : 0.2640 secs
Rot y : 0.3220 secs
Rot z : 0.2700 secs
Scale : 1.3840 ppm

WAYPOINTS

Beardie-1	E:	570593.80	N:	5765622.40	Ht:	0.00 m
Patricia-1	E:	626945.00	N:	5789700.30	Ht:	0.00 m
Patricia-2	E:	627207.69	N:	5790098.71	Ht:	0.00 m
West Tuna	E:	621503.10	N:	5771736.08	Ht:	0.00 m
Baleen-3	E:	626675.86	N:	5792541.30	Ht:	0.00 m
Sole-2	E:	676059.05	N:	5780595.42	Ht:	0.00 m
Sole-1	E:	678342.70	N:	5779272.10	Ht:	0.00 m

TRACK GUIDANCE
None defined

MOBILES
Ocean Bounty (semi-sub rig)
Shape Definition: Ocean Bounty
Line:-
X: 14.20 m Y: 37.00 m
X: 14.20 m Y: 16.60 m
X: 39.30 m Y: 16.60 m
X: 39.30 m Y: -16.60 m
X: 14.20 m Y: -16.60 m
X: 14.20 m Y: -36.20 m
X: -14.20 m Y: -36.20 m
X: -14.20 m Y: -16.60 m

Verified by: (sign)_____ (print)_____

```
    X: -39.30 m  Y: -16.60 m
    X: -39.30 m  Y:  16.00 m
    X: -14.20 m  Y:  16.00 m
    X: -14.20 m  Y:  37.00 m
    X:  14.20 m  Y:  37.00 m
   Line:-
    X:  -4.00 m  Y:  30.00 m
    X:   4.00 m  Y:  30.00 m
    X:   4.00 m  Y:  41.00 m
    X:   2.00 m  Y:  45.00 m
    X:  -2.00 m  Y:  45.00 m
    X:  -4.00 m  Y:  41.00 m
    X:  -4.00 m  Y:  30.00 m

  Tracking Point       : Datum
  Pitch and Roll Centre: Datum

  Selected Sources:-
   Primary Position : T1 Thales UKOOA (Using Antenna Offset : GPS Ae)
   Backup Position  : T2 Thales UKOOA (Using Antenna Offset : GPS Ae)
   Primary Heading  : S1 SGB 1000S
   Primary Height   : Datum Displacement
   Pitch and Roll   : Manual
   Soundings        : Manual
   Speed            : Position Filter
   Course Made Good : Posn Filter CMG

  Equipment:-
   T1 Thales UKOOA
    Status:  OFF  Interface: Sock1
    Antenna Offset Selected: GPS Ae
     X:    0.28 m Y:   33.90 m Z:    0.00 m Rng:   33.90 m Brg:  0.5°
    Apply Pitch Roll: Off  Stale Time: 5.0 s  Posn SD: 3.0 m  Ht SD: 1.0 m
    Update posn only when diff corrected
    Filter: Off  Time Constant:60.0 s  Sample Dwell: 0.5 s
    Gate: Off  Gate Width: 9.0 xSD  Minimum Gate: 0.0 m

   T2 Thales UKOOA
    Status:  OFF  Interface: Sock2
    Antenna Offset Selected: GPS Ae
     X:    0.28 m Y:   33.90 m Z:    0.00 m Rng:   33.90 m Brg:  0.5°
    Apply Pitch Roll: Off  Stale Time: 5.0 s  Posn SD: 3.0 m  Ht SD: 1.0 m
    Update posn regardless of whether diff corrected
    Filter: Off  Time Constant:60.0 s  Sample Dwell: 0.5 s
    Gate: Off  Gate Width: 9.0 xSD  Minimum Gate: 0.0 m

   S1 SGB 1000S
    Status:  OFF  Interface: COM6
    C-O:   0.0 degs  Stale Time: 5.0 s  SD: 0.1 degs
     Filter: Off  Gate: Off  Time Constant: 5.0 s  Sample Dwell: 0.5 s

   T3 Tracs TDMA Master
    Status:  OFF  Interface: COM10
    Antenna Offset Selected: GPS Ae
     X:    0.28 m Y:   33.90 m Z:    0.00 m Rng:   33.90 m Brg:  0.5°

  Defined Offsets:-
   Datum
    X:    0.00 m Y:    0.00 m Z:    0.00 m Rng:    0.00 m Brg:  0.0°
   GPS Ae
```

Verified by: (sign)_____ (print)_____

```
    X:    0.28 m Y:   33.90 m Z:    0.00 m Rng:   33.90 m Brg:  0.5°
   Fairlead 1
    X:  -39.30 m Y:   12.60 m Z:   -4.11 m Rng:   41.27 m Brg:287.8°
   Fairlead 2
    X:  -39.30 m Y:   16.60 m Z:   -4.11 m Rng:   42.66 m Brg:292.9°
   Fairlead 3
    X:   39.30 m Y:   16.60 m Z:   -4.11 m Rng:   42.66 m Brg: 67.1°
   Fairlead 4
    X:   39.30 m Y:   12.60 m Z:   -4.11 m Rng:   41.27 m Brg: 72.2°
   Fairlead 5
    X:   39.30 m Y:  -12.60 m Z:   -4.11 m Rng:   41.27 m Brg:107.8°
   Fairlead 6
    X:   39.30 m Y:  -16.60 m Z:   -4.11 m Rng:   42.66 m Brg:112.9°
   Fairlead 7
    X:  -39.30 m Y:  -16.60 m Z:   -4.11 m Rng:   42.66 m Brg:247.1°
   Fairlead 8
    X:  -39.30 m Y:  -12.60 m Z:   -4.11 m Rng:   41.27 m Brg:252.2°

Conqueror (ship)
  Shape Definition: ship
   Line:-
    X: -10.00 m  Y: -30.00 m
    X: -10.00 m  Y:  10.00 m
    X:   0.00 m  Y:  30.00 m
    X:  10.00 m  Y:  10.00 m
    X:  10.00 m  Y: -30.00 m
    X: -10.00 m  Y: -30.00 m

  Tracking Point       : Datum
  Pitch and Roll Centre: Datum

  Selected Sources:-
   Primary Position : T4 Tracs TDMA Remote (Using Antenna Offset : Pod)
   Primary Heading  : T4 Tracs TDMA Remote
   Primary Height   : Datum Displacement
   Pitch and Roll   : Manual
   Soundings        : Manual
   Speed            : T4 Tracs TDMA Remote
   Course Made Good : Posn Filter CMG

  Equipment:-
   T4 Tracs TDMA Remote
    Status:  ON   Interface: Not defined
    Antenna Offset Selected: Pod
     X:    2.00 m Y:   48.00 m Z:    0.00 m Rng:   48.04 m Brg:  2.4°

  Defined Offsets:-
   Datum
    X:    0.00 m Y:    0.00 m Z:    0.00 m Rng:    0.00 m Brg:  0.0°
   Pod
    X:    2.00 m Y:   48.00 m Z:    0.00 m Rng:   48.04 m Brg:  2.4°

Sentinel (ship)
  Shape Definition: ship
   Line:-
    X: -10.00 m  Y: -30.00 m
    X: -10.00 m  Y:  10.00 m
    X:   0.00 m  Y:  30.00 m
    X:  10.00 m  Y:  10.00 m
    X:  10.00 m  Y: -30.00 m

Verified by: (sign)_____ (print)_____
```

X: -10.00 m Y: -30.00 m

Tracking Point : Datum
Pitch and Roll Centre: Datum

Selected Sources:-
Primary Position : Manual
Primary Heading : Manual
Primary Height : Datum Displacement
Pitch and Roll : Manual
Soundings : Manual
Speed : Position Filter
Course Made Good : Posn Filter CMG

Equipment:-
T5 Tracs TDMA Remote
Status: ON Interface: Not defined
Antenna Offset Selected: Pod
X: 1.95 m Y: 50.00 m Z: 0.00 m Rng: 50.04 m Brg: 2.2°

Defined Offsets:-
Datum
X: 0.00 m Y: 0.00 m Z: 0.00 m Rng: 0.00 m Brg: 0.0°
Pod
X: 1.95 m Y: 50.00 m Z: 0.00 m Rng: 50.04 m Brg: 2.2°

ANCHORS
Ocean Bounty
Fairleads:-

Name	X	Y	Z	Rng	Brg
Fairlead 1	-39.30 m	12.60 m	-4.11 m	41.27 m	287.8°
Fairlead 2	-39.30 m	16.60 m	-4.11 m	42.66 m	292.9°
Fairlead 3	39.30 m	16.60 m	-4.11 m	42.66 m	67.1°
Fairlead 4	39.30 m	12.60 m	-4.11 m	41.27 m	72.2°
Fairlead 5	39.30 m	-12.60 m	-4.11 m	41.27 m	107.8°
Fairlead 6	39.30 m	-16.60 m	-4.11 m	42.66 m	112.9°
Fairlead 7	-39.30 m	-16.60 m	-4.11 m	42.66 m	247.1°
Fairlead 8	-39.30 m	-12.60 m	-4.11 m	41.27 m	252.2°

Main Intended Positions:-

Name	Easting	Northing	Depth	Tolerance
Anchor 1	675672.80	5779395.92	130.00 m	0.00 m
Anchor 2	675140.79	5779741.04	130.00 m	0.00 m
Anchor 3	674876.11	5781012.35	130.00 m	0.00 m
Anchor 4	675226.17	5781541.35	130.00 m	0.00 m
Anchor 5	676445.21	5781795.15	130.00 m	0.00 m
Anchor 6	676977.32	5781449.81	130.00 m	0.00 m
Anchor 7	677241.99	5780178.48	130.00 m	0.00 m
Anchor 8	676891.92	5779649.48	130.00 m	0.00 m

Main Actual Positions:-

Name	Easting	Northing	Depth	Tolerance
Anchor 1	675700.47	5779430.15	130.06 m	0.00 m
Anchor 2	675118.64	5779775.57	130.04 m	0.00 m
Anchor 3	674906.80	5780991.61	129.90 m	0.00 m
Anchor 4	675316.30	5781525.90	130.08 m	0.00 m
Anchor 5	676486.14	5781695.93	129.97 m	0.00 m
Anchor 6	677032.79	5781458.51	129.99 m	0.00 m

Verified by: (sign)_____ (print)_____

Anchor 7	677040.52	5780235.55	130.10 m	0.00 m
Anchor 8	676845.99	5779700.92	129.99 m	0.00 m

Verified by: (sign)_____ (print)_____

APPENDIX K

DAILY REPORT SHEETS

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date: 7-Aug-2002 Client: OMV Job No.: 3432A3 Vessel: Ocean BountyLocation: Bass Strait

Equipment	Op	

Equipment	Op	

Racal Personnel
P. Wells (PW)
S. Bradley (SB)
N. Gregory (NG)
Client Personnel

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone=UTC+10.00
1105	Thales personnel PW, SB & NG depart Perth and transit to Sale (Victoria) via Melbourne.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____
SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____
CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date: 8-Aug-2002 Client: OMV Job No.: 3432A3 Vessel: Ocean BountyLocation: Bass Strait

Equipment	Op	
Ocean Bounty		
SkyFix	1	
SkyFix Spot	2	
Gyro	1	
GNS 2	1	1
MultiFix 3	1	1
Remote Disp	1	1
Tracs	1	1

Equipment	Op	
AHV's		
Tug Display	2	
Tracs	2	
Fluxgate gyro	2	

Racal Personnel
P. Wells (PW)
S. Bradley (SB)
N. Gregory (NG)
Client Personnel

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS PAGE 2 OF 6

TIME	Time Zone=UTC+10.00
1130	Thales personnel PW, SB & NG check-in at Esso helicopter base Longford, standby and transfer to Ocean Bounty.
1345	Arrive Ocean Bounty. NG participate in Ocean Bounty safety induction.
1545	Commence mobilisation of equipment.
1650	Confirm with OIM (Steve Andrews) intended Sole-2 location and heading as per final fix position from previous Sole-2 rig move. 3nm run in required on 227°.
1700	PW attend pre-rig move meeting. Barge Master (Graham Galyer) advised proposed tow route.
1830	Ocean Bounty and Pacific Sentinel navigation equipment operational. Pacific Conqueror Tracs not operational. Suspected 240V-24V power supply faulty. Anchor recovery operations commenced with Pacific Conqueror recovering anchor No. 1 and Pacific Sentinel recovering anchor No. 5.
2000	Anchor recovery operations suspended as problems cutting off casing.
2145	Conduct Gyrocompass calibration to Baracoutta Platform. C-O confirmed as +1.4°.
2240	Conduct Check Fix at Beardie-1. Datum 2.06m on bearing of 3.7°(T) from published Beardie-1 position.
2325	Ballast Control advise anchor recovery to remain suspended until approximately 0500 9 August. No anchors recovered as yet. PCC's passed back to Ocean Bounty.
2335	Tracs power supply on Pacific Conqueror changed out and Tracs operating correctly.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE :Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date: 9-Aug-2002 Client: OMV Job No.: 3432A3 Vessel: Ocean BountyLocation: Bass Strait

Equipment	Op	
Ocean Bounty		
SkyFix	1	
SkyFix Spot	2	
Gyro	1	
GNS 2	1	1
MultiFix 3	1	1
Remote Disp	1	1
Tracs	1	1

Equipment	Op	
AHV's		
Tug Display	2	
Tracs	2	
Fluxgate gyro	2	

Racal Personnel
P. Wells (PW)
S. Bradley (SB)
N. Gregory (NG)
Client Personnel

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS PAGE 3 OF 6

TIME	Time Zone=UTC+10.00 **Friday, 09 August 2002**
0645	Anchor recovery operations re-commencing. Anchor No.1 assigned to Pacific Conqueror and anchor No. 5 assigned Pacific Sentinel. AHV's chasing out anchors.
0756	#1 PCC returned to the rig
0805	#8 PCC passed to Conqueror
0835	#8 winch tension excessive. Conqueror preparing to re-chase chain.
0840	#5 PCC returned to the rig
0850	#4 PCC passed to Sentinel
0855	#8 winch tension eased. Re-commence winching in.
0945	#8 PCC returned to the rig. Conqueror preparing deck for Esso backload
1050	#4 PCC returned to rig. Drill floor, riser deck and ballast operations commencing prior to further anchor recovery.
1200	Sentinel connected to tow bridle
1630	Critical phase of ballast operations complete.
1659	#3 PCC passed to Conqueror.
1906	#3 PCC returned to rig
1915	#7 PCC passed to Conqueror.
2130	#7 PCC returned to rig
2140	#2 PCC passed to Conqueror
2257	#2 PCC returned to rig

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____ CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date: 10-Aug-2002 Client: OMV Job No.: 3432A3 Vessel: Ocean Bounty Location: Bass Strait

Equipment	Op	
Ocean Bounty		
SkyFix	1	
SkyFix Spot	2	
Gyro	1	
GNS 2	1	1
MultiFix 3	1	1
Remote Disp	1	1
Tracs	1	1

Equipment	Op	
AHV's		
Tug Display	2	
Tracs	2	
Fluxgate gyro	2	

Racal Personnel
P. Wells (PW)
S. Bradley (SB)
N. Gregory (NG)
Client Personnel

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS PAGE 4 OF 6

TIME	Time Zone=UTC+10.00 **Saturday, 10 August 2002**
0018	Last Anchor (#6) off the bottom, commencing tow.
0026	Anchor #6 racked.
0800	Continue enroute to Sole 2 at 4.8 knots
1345	Rig on 3 mile run in, vessels shortening tow
1436	#6 Anchor deployed by the rig at 676 998mE 5 781 429mS
1500	Rig 500ft past Sole-2 location and standing by for helo due 1515.
1610	#2 PCC to Conqueror. Tracs data to Sentinel corrupted, data from Sentinal ok.
1628	#2 run out.
1645	#2 Anchor deployed at 675 188mE 5 779 834mS
1721	Tracs reset on vessels ok
1734	#2 PCC returned to rig
1744	#7 PCC passed to Conqueror.
1834	#7 run out, vessel clear of well head (25m tolerance provided)
1843	#7 deployed at 677 048mE 5 780 233mS
1915	#7 PCC returned to the rig
1933	#3 PCC passed to Conqueror
1950	#3 run out
2001	#3 deployed at 674 950mE 5 780 978mN
2006	Heaving in on #7 and paying out on #3 to move rig closer to Sole-2
2040	#3 PCC returned to rig
	Heaving in on #6 andpaying out on # 2 to move rig closer to Sole-2
	Heaving in on #7 and paying out on #3 to move rig closer to Sole-2
	Ocean Bounty positioned within 5m of published Sole-2 location. ROV instructed to inspect wellhead

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE : Accounts Department
BLUE :Operations Department
YELLOW : Clients Representative

Signature _____ CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date: 10-Aug-2002 Client: OMV Job No.: 3432A3 Vessel: Ocean Bounty Location: Bass Strait

Equipment	Op	
Ocean Bounty		
SkyFix	1	
SkyFix Spot	2	
Gyro	1	
GNS 2	1	1
MultiFix 3	1	1
Remote Disp	1	1
Tracs	1	1

Equipment	Op	
AHV's		
Tug Display	2	
Tracs	2	
Fluxgate gyro	2	

Racal Personnel
P. Wells (PW)
S. Bradley (SB)
N. Gregory (NG)
Client Personnel

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS PAGE 5 OF 6

TIME	Time Zone=UTC+10.00 **Saturday, 10 August 2002**
2055	Conqueror departed location, Tracs equipment turned off.
2110	Sentinel released from the tow bridle
2130	OMV Company Man (Ron King) advises ROV inspection confirms wellhead below centre of rig
	#8 PCC passed to Sentinal

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____ CLIENT REPRESENTATIVE

THALES GEOSOLUTIONS (AUSTRALASIA) LIMITED
DAILY RECORD SHEET

Date: 11-Aug-2002 Client: OMV Job No.: 3432A3 Vessel: Ocean Bounty Location: Bass Strait

Equipment	Op	
Ocean Bounty		
SkyFix	1	
SkyFix Spot	2	
Gyro	1	
GNS 2	1	1
MultiFix 3	1	1
Remote Disp	1	1
Tracs	1	1

Equipment	Op	
AHV's		
Tug Display	2	
Tracs	2	
Fluxgate gyro	2	

Racal Personnel
P. Wells (PW)
S. Bradley (SB)
N. Gregory (NG)
Client Personnel
Ron King

WX	Sea State	Swell	Wind Dir.
0000			
0600			
1200			
1800			

DIARY OF OPERATIONS

TIME	Time Zone=UTC+10.00 **Sunday, 11 August 2002**
0001	Anchor #1 deployed at 675720mN 577949mE
0027	#1 PCC returned to rig
0042	#5 PCC passed to Sentinel
0102	Anchor #5 deployed at 676473mN 5781663mE
0133	#5 PCC returned to rig
0139	#4 PCC passed to Sentinel
0157	Anchor #4 deployed at 675339mN 5781498mE
0238	#4 PCC returned to rig
0300	Ballast down operations commenced
0620	Ballast operations complete
0825	Conduct final fix. Ocean Bounty drillstem 676 058.23mE, 5 780 599.53mN. Drillstem is 4.02m on a bearing of 347.5° (T) from the published Sole-2 location.
0900	Confirm with OMV Company Man (Ron King) rig positioning acceptable. Back-up data as required. Commence demobilisation of equipment.
1030	Provide Ocean Bounty positioning details to OIM, Barge Master and OMV Company Man.
1100	Demobilisation complete and all equipment secured in container.
1335	Thales personnel depart Ocean Bounty and transit to Perth via Melbourne.
2300	Thales personnel arrive Perth.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Signature _____ SURVEYOR/ENGINEER

WHITE	: Accounts Department
BLUE	:Operations Department
YELLOW	: Clients Representative

Signature _____ CLIENT REPRESENTATIVE