

GLOBEX FAR EAST

SITE SURVEY REPORT



LOCATION : BARRAMUNDI-1
PERMIT : T/27-P
DATE : 29 NOVEMBER - 9 DECEMBER 1998
REPORT REF. : 2830C1

OR-0455

CONTENTS**1. INTRODUCTION****2. SURVEY RESULTS**

- 2.1 Bathymetry
- 2.2 Seabed Features
- 2.3 Shallow Geology
- 2.4 Seabed Sampling
- 2.5 Conclusions

3. GEODETIC PARAMETERS

- 3.1 Datums
- 3.2 Projection
- 3.3 Datum Transformation

4. SAFETY**5. OPERATIONAL SUMMARY**

- 5.1 On-line Procedures
- 5.2 Skyfix/Skyfix Spot Differential Link
- 5.3 Echo Sounder
- 5.4 Electrical & Environmental
- 5.5 Side Scan Sonar
- 5.6 Boomer
- 5.7 Ensin Digital Acquisition, Processing and Interpretation System
- 5.8 Acoustic Velocity Probe

6. SUMMARY OF EVENTS**7. PERSONNEL AND EQUIPMENT**

- 7.1 Personnel
- 7.2 Equipment

8. DISTRIBUTION

APPENDICES

- A - OFFSET DIAGRAM - BLUEFIN
- B - GNS SYSTEM DATA PRINTOUT
- C - GYRO CALIBRATION
- D - STATIC DIFFERENTIAL GPS CHECK
- E - BAR CHECK
- F - SEAWATER VELOCITY OF SOUND PROFILE
- G - SIDE SCAN SONAR RUB TEST
- H - BOOMER PULSE TEST
- I - SAFETY
- J - SURVEY LINE LOGS
- K - DROP CORE DESCRIPTIONS
- L - TIDAL PREDICTIONS
- M - DATA EXAMPLES
- N - DAILY FIELD PROGRESS REPORT SHEETS

DRAWINGS

DRAWING 2830C1-1	TRACK AND SEABED FEATURES	Scale 1:5000
DRAWING 2830C1-2	BATHYMETRY	Scale 1:5000
DRAWING 2830C1-3	ISOPACH	Scale 1:5000
DRAWING 2830C1-4	GEOLOGICAL CROSS SECTIONS	Scale 1:5000/1:400

GENERAL LOCATION DIAGRAM



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5 cm

1. INTRODUCTION

Positioning, bathymetric and geophysical services were provided by Racal Survey Australia Limited, (Racal) for a survey of the proposed Barramundi-1 well location for Globex Far East in the Bass Strait, offshore Victoria, Australia. All survey requirements and operating procedures were undertaken in accordance with the agreement between Racal and Kelly Down Consultants Pty Ltd (agents for Globex Far East). The survey was undertaken to investigate the suitability of the area for the positioning of the Sedco 702 semi-submersible drilling rig.

The Fisheries Research Vessel 'Bluefin' was used to conduct the survey, with all necessary survey positioning and geophysical equipment installed and tested onboard prior to the commencement of survey. A Trimble Series 4000 Global Positioning System (GPS) receiver was used in conjunction with Racal's SkyFix/SkyFix Spot Differential GPS and associated equipment to provide on-line positioning. An Atlas Deso 20 echo sounder, side scan sonar and a boomer sub-bottom profiling system, with ENSIN data logging, were used for geophysical data acquisition.

The survey site consisted of a 3.0 km x 3.0 km area.

Proposed Barramundi-1 Location

Datum: AGD 84

Latitude : 39° 39' 42.01" South
Longitude : 145° 44' 02.87" East

Projection: AMG Zone 55 CM 147° East

Easting : 391 412.3m
Northing : 5 609 012.1m

The survey consisted of 31 primary lines on an orientation of 090/270° with a 100m line spacing. Seven cross lines were orientated 360/180° and spaced at 500m. The full suite of geophysical equipment, echo sounder, side scan sonar and boomer were operated simultaneously on all lines. The survey was carried out between 1 and 7 December 1998.

All times quoted are in Eastern Standard Time (GMT + 11 hours).

2. SURVEY RESULTS

2.1 BATHYMETRY

Analogue and digital soundings of the seafloor were obtained using an Atlas Deso 20 single beam echo sounder with dual frequency 210 and 33 kHz transducers. The data were corrected for heave using a TSS 335B motion sensor. The transducers were mounted onto the starboard side of the vessel and bar checks were carried out as sea conditions allowed before survey commencement. Draft settings of 2.05m and 2.03m were obtained on 1 December and 7 December 1998 respectively (see Appendix E).

All soundings have been reduced to Lowest Astronomical Tide (LAT) using a bathymetric crossing analysis, and the application of a co-tidal Z_0 value (1.65 metres) from the standard Ports of Stanley, Rabbit Island and Port Phillip Heads (refer to Drawing Nos. 2830C1-2 and 2830C1-4). Velocity of sound in seawater was determined by the deployment of a Valeport 600 MkII Direct Reading CTD probe (see Appendix G). A mean velocity of sound of 1506m/s was obtained and entered into the echo sounder.

Bathymetric soundings are plotted on Drawing No. 2830C1-2 (Scale 1:5000) enclosed herein, and contoured at 1 metre intervals. Due to the fact that the site is of a flat, featureless nature, meaningful contours cannot be accurately plotted, therefore contours shown on Drawing No. 2830C1-2 exhibit broad trends of depth change.

Bathymetric data quality was good with gross crossing misties generally being absent. Maximum misties observed were up to 0.4 metres.

Water depths across the 3.0 km x 3.0 km site vary from 73.8 metres in the central north to a maximum of 77.8 metres in the extreme south-east. The entire site slopes very gently up to the central north and west.

No steep slopes or bathymetric anomalies are present within the site.

The nearest observed water depth to the proposed Barramundi-1 location is 74.8 metres.

An example of the single beam echo sounder data over the proposed location is held in Appendix M.

2.2 SEABED FEATURES

The textural characteristics and reflective strengths of the seafloor around the survey area were investigated by the deployment of a dual frequency Klein side scan sonar system. The system consists of a Klein 595 thermal recorder and Klein 422 towfish, operated at 100kHz. The side scan sonar was set at 100 metres slant range with 10m interval scale lines providing 100% overlap on a 100m primary line spacing.

Changes in reflective strengths and textural characteristics of the seabed within the survey area have been plotted and interpreted as the seabed lithology and sediment types detailed below. Five drop cores were performed during the survey, the results of which have been correlated with, and used as an aid to sonar textural and surficial geological interpretation. (See Drawing Nos. 2830C1-3 and 2830C1-4.)

The entire site appears to be composed of patchy medium reflectivity muddy sand interspersed with localised patches of higher reflectivity sediment representing possible accumulations of broken shells.

No broad sedimentary textural boundaries are evident from the sonar records, the entire site represented by the above description.

No items of debris were encountered that could pose a hazard to the positioning of anchors for a semi-submersible rig.

2.3 SHALLOW GEOLOGY

The shallow geology of the site survey area was defined from data acquired by the deployment of an EG&G 230 boomer source. The boomer firing interval was set at 400ms with a pulse energy of 300 Joules. Analogue data were recorded on an ENSIN Seismic Acquisition and Processing System. The data were recorded to DAT. A sweep of 130ms was recorded and was displayed on a hard copy printout using a Gulton plotter. The printed data was increasingly amplified with depth to compensate for signal loss and a band-pass filter (400Hz-2000Hz) was applied. The hard copy was used for interpretation.

Good quality boomer data were acquired, with a maximum useful penetration of 60m noted. A series of well defined horizontal reflectors delineate the various sedimentary units described below, which are interpreted according to the seismic character displayed. Unit thicknesses have been calculated assuming a seismic velocity of 1600m/s.

Unit A

The uppermost unit, designated Unit A, lies between the seabed and Reflector R1. Unit A varies between 34-38 metres and has been divided into the following sub-units.

Unit A1

Unit A1 is typically 10-12 metres thick, and displays a laterally variable acoustic character. Regions of well defined horizontal reflectors (interpreted as comprising interbedded sands, silts, clays and shelly gravels) grade laterally into regions displaying a semi-transparent acoustic character (interpreted as comprising more homogenous silts and clays). By correlation with coring results, the consistency of Unit A1 sediments beneath the uppermost 1 metre is expected to be firm to stiff. The base of Unit A1 is defined by Reflector R1a, a virtually continuous horizontal reflector.

Unit A2

Unit A2 is typically 7 metres thick, and comprises moderately, well defined horizontal reflectors. Unit A2 is expected to comprise stiff interbedded silts and clays interbedded with sands. The base of Unit A2 is defined by Reflector R1b, a virtually continuous horizontal reflector.

Unit A3

Unit A3 is typically 16-18 metres thick, and has a semi-transparent seismic character with occasional weak horizontal reflectors. Unit A3 is expected to comprise stiff to hard silts and clays.

The base of Unit A3, and Unit A, is defined by Reflector R1, a strong, continuous, horizontal reflector. Overall thickness of Unit A, presented in Drawing No. 2830C1-4, is seen to increase from 34 metres in the east to a maximum of just over 37 metres in the west-southwest of the site.

Unit B

Unit B comprises well defined, virtually continuous, horizontal reflectors and is typically 9-10 metres thick. Unit B is interpreted as comprising interbedded stiff to hard clays and silts, and dense sands.

The base of Unit B is defined by Reflector R2, a continuous strong horizontal reflector.

Unit C

Seismic penetration within Unit C is limited, but this unit appears to have a semi-transparent acoustic character with occasional horizontal reflectors. Unit C is expected to mark the onset of extensive cementation and/or compaction, and may comprise well cemented sands or hard silts and clays.

Interpreted geological profiles through the proposed location are presented in Drawing No. 2830C1-4.

No evidence of shallow gas (acoustic masking, bright spots or phase reversals) or additional drilling hazards (such as faulting or excessively hard units) are seen on the boomer records to the limit of useful signal penetration (60 metres).

2.4 SEABED SAMPLING

Five drop cores were recovered within the surveyed area using a Sergeant Gravity Corer rigged with a 2 metre barrel. Core-1 was located at the proposed location, with the remaining four cores targeted at the expected anchor radius (3500 feet) from the proposed location.

Field descriptions were taken and are presented in Appendix K.

Datum: AGD 84 Projection: AMG Zone 55, C.M. 147° East

Core Designation	Position		Recovery (m)	Description
	Easting (m)	Northing (m)		
Core 1	391 415	5 609 011	1.08	Top: Very muddy SAND, fine, brown, well sorted, occasional shell fragment to 10mm. Base: CLAY, firm, olive green, well sorted.
Core 2	391 416	5 610 079	0.63	Top: Very muddy SAND, fine, brown, well sorted, occasional shell fragment to 10mm. Base: Muddy, sandy, shelly GRAVEL, poorly sorted, angular, shell fragments to 15mm.
Core 3	392 480	5 609 003	1.06	Top: Very muddy SAND, fine, brown, well sorted, occasional shell fragment to 10mm. Base: Shelly very muddy SAND, olive green, loose, poorly sorted. Occasional very weakly cemented nodules to 2mm.
Core 4	391 401	5 607 942	1.23	Top: Very muddy SAND, fine, brown, well sorted. Base: CLAY, firm, olive green, well sorted.
Core 5	390 345	5 609 012	0.89	Top: Very muddy SAND, fine, brown, well sorted, occasional shell fragment to 10mm. Base: CLAY, firm, olive green, well sorted.

2.5 CONCLUSIONS

The observed water depth at the proposed Barramundi-1 drilling location is 74.8 metres LAT. At the proposed location and over the entire site, the seafloor sediments consist of muddy sand overlying mainly firm clay.

The uppermost geological unit, Unit A1 is interpreted as interbedded sands, silts, clays and occasional shelly gravels, becoming increasingly compact with depth, and is 13 metres thick at the proposed location, providing what should be a suitable substrate for anchor holding.

No evidence of shallow gas was noted to the limit of seismic penetration across the proposed site and no other obstructions were evident that could pose a hazard to the emplacement of a semi-submersible drilling rig.

However, it should be noted that during past drilling campaigns some shallow gas has been encountered in the Bass Strait area.

3. GEODETIC PARAMETERS

Co-ordinates shown in this report are referred to the Australian Geodetic Datum 1984 (AGD 84).

The Global Positioning System (GPS) is referenced to the World Geodetic System 1984 (WGS 84).

3.1 DATUMS

Datum	:	Australian Geodetic Datum 1984
Spheroid	:	Australian National
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 ($1/\rho$)	:	298.25

Datum	:	World Geodetic System 1984
Spheroid	:	WGS 84
Semi-major Axis (a)	:	6 378 137.000m
Semi-minor Axis (b)	:	6 356 752.3142m
Eccentricity Squared (e^2)	:	0.006 694 380
Flattening ($1/\rho$)	:	298.257 223 563

3.2 PROJECTION

Projection	:	Universal Transverse Mercator
AMG Zone	:	55
Central Meridian (C.M.)	:	147° East
Scale factor on the C.M.	:	0.9996
False Easting	:	500 000m
False Northing	:	10 000 000m
Latitude of Origin	:	0° (Equator)
Unit of Measure	:	International Metre

3.3 DATUM TRANSFORMATION

The following 7-parameter datum transformation was used to convert WGS 84 co-ordinates to AGD 84 co-ordinates:

Dx	=	+116.00m
Dy	=	+50.47m
Dz	=	-141.69m
Rx	=	+0.230"
Ry	=	+0.390"
Rz	=	+0.344"
Scale (K)	=	-0.0983

Note: The sign conventions used in Racal software in the datum transformations were derived as follows:

GNS Survey Software:

The convention used is that used by the US Department of Defence and by Higgins (Transformation from WGS 84 to AGD 84 - An Interim Solution), 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 centre of the Earth).

These values were adopted by the Inter-Governmental Advisory committee on Surveying and Mapping Standards for Control Surveys in May 1990.

4. SAFETY

A pre-mobilisation and safety meeting was chaired by Matthew Tuck (Racal Party Chief).

The following personnel attended the meeting outlined below:-

R. Walker	Vessel Master	AMC
A. Faulkner	Mate	AMC
F. Penkar	Chief Engineer	AMC
B. Jones	Seaman	AMC
C. Hansen	Seaman	AMC
J. Cowans	Geophysicist	Racal
D. Evans	Client Representative	Globex
L. Etheridge	Underwater Engineer	Racal
D. Bell	Underwater Engineer	Racal
B. Teh	Navigation Engineer	Racal

The Safety Induction Meeting commenced at 0800 on 30 November 1998.

The following items were discussed:-

1. Scope of works and brief personnel introduction.
2. Mobilisation procedures, lifting of heavy items, precautions taken for high U.V. index.
3. General awareness of newly installed cables, winches, moving side scan wire, high voltage cables for boomer.
4. Permits for welding, cutting, going aloft to install various antennae.
5. All safety equipment to be worn, care on back deck to be taken, nobody to venture out onto back deck near the stern on their own, life vests to be worn when anywhere near stern.
6. A further safety induction and muster points etc to be held before sailing. Location of life vests and fire extinguishers discussed.

A pre-sailing safety meeting was chaired by M. Tuck and R. Walker at 1300 on 2 December 1998.

All survey and ship's crew attended the pre-sailing safety meeting.

The following items were discussed:-

1. Boomer deployment and recovery.
2. Side scan deployment and recovery.
3. Coring/grab sample operations.
4. Location of muster points, lifeboat, fire extinguishers and life rings.
5. Smoking not permitted inside vessel.
6. General safety awareness on board, provision of *U-see U-act* forms and *Step back, 5 by 5*.
7. Toolbox meetings to be held before each 'back-deck' operation is carried out.

The above-mentioned toolbox meetings were informal meetings held on the back deck including personnel directly involved with coring/grab sample operations and recovery/deployment of the underwater equipment. These meetings were normally 'chaired' by D. Bell, (Racal Underwater Engineer).

No further safety incidents or near misses were reported throughout the survey (see Appendix I).

5. OPERATIONAL SUMMARY

5.1 ON-LINE PROCEDURES

The Racal's General Navigation System (GNS) Survey software package was used to provide the on-line navigation of the survey vessel. A Trimble Series 4000 GPS receiver was used in conjunction with Racal's SkyFix Spot Differential GPS and other ancillary equipment which were interfaced to a personal computer operating the navigation software.

A fix at 30 second intervals was supplied to the geophysical equipment. This allowed information including date, time and fix number to be output onto the hard copy analogue paper records.

Offsets were applied in the GNS survey software from the datum point (echo sounder) to the antenna position and the various instrument tow points around the vessel. (Refer to Appendix B.)

The survey consisted of 31 primary lines on an orientation of 90/270° with a 100m line spacing. Seven cross lines were orientated 360/180° and spaced at 500m. The full suite of geophysical equipment, echo sounder, side scan sonar and boomer were operated simultaneously on all lines. The survey was carried out between 1 and 7 December 1998.

5.2 SKYFIX/SKYFIX SPOT DIFFERENTIAL LINK

Racal Survey Australia 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.

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. Extensive performance trials and 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 four seconds is achieved.

The OPTUS satellite used the L-band frequencies of 1.5586 GHz and are very reliable and free of interference avoiding data loss associated with the crowded HF/MF 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 Auckland, 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 is sent via dual redundant links to Satellite Earth Stations at Sentosa Island, Singapore, O.T.C. Perth, and the earth station at Lockridge, Perth, Western Australia, for uplink and broadcast over the Inmarsat Pacific and Indian Ocean Region satellites and OPTUS Satellites.

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.

Stations used for survey were Adelaide, Melbourne and Sydney.

5.3 ECHO SOUNDER

The Deso 20 echo sounder used on this project is a dual frequency system operating at 33kHz and 200kHz. Digital technology is employed so that the equipment comprises one unit incorporating an analogue/digital thermal recorder, transceiver electronics and digitiser. The transducers may be hull or over-the-side mounted, as was the case with the Bluefin (refer to Appendix A).

To measure water depth the Deso 20 uses ultrasonic sound-waves. A short burst of acoustic energy is transmitted vertically downwards into the water by a transducer which converts electrical energy into mechanical energy. A proportion of the sound energy is reflected by the bottom or by other solid media such as fish, and returns as an echo to the transducer. The time which elapses between the transmission of the signal and the return of its echo is proportional to the depth. The accuracy of the depth measurement depends on such factors such as the print speed and index errors, although the primary influence on depth accuracy is the measurement (and concomitant accuracy) of the water velocity. This value is set in the recorder unit after temperature, salinity, and pressure measurements are obtained through the water column. Bar checks are also carried out to calibrate the system for index errors. Print speed checks are carried out as part of the mobilisation procedures. The recording unit controls the generation, timing and length of outgoing pulses that are transmitted from the transducer.

The 33kHz and 210kHz frequency transducers produce different waveforms, with wavelengths dependant on the velocity of sound in water. 33kHz and 210kHz frequencies have typical accuracies of 10cm and 1cm respectively, the Deso 20 compensates for this by offsetting the transmission line so that each frequency records the same depth.

Bar checks were completed alongside the AMC wharf on 2 December 1998 and prior to survey operations on 3 and 7 December while on location. The measured draughts were 2.03 and 2.05 metres respectively.

A TSS 335B Motion Sensor was used on this project to correct bathymetric data. The heave data were interfaced to the GNS Navigation System correcting depths for the ship's motion. Heave corrected digital data for the 210kHz frequency were input to the GNS system for logging every 2 seconds.

High frequency transmissions will tend to be reflected by the seafloor whilst lower frequency signals penetrate soft mud and sediment to produce shaded echoes of the various layers on the analogue recorder. The echo sounder contains two digitisers, one for each transmitted frequency. Returns from several transmissions are stored, weighted and summed so that faint returns from the seabed will be recognised from the background noise. Digital information is indicated in the display window of the analogue recorder and is also available for external use. The digitised data between on-line fixes is recorded by the GNS as intermediate depths.

The mean velocity of sound in seawater was measured by deploying the Valeport CTD probe while alongside the AMC wharf and then on location prior to each bar check. A mean velocity of 1506.3m/s was observed on site.

Bathymetric data quality was good with strong digitisation of returned signals.

The Deso 20 system specifications are as follows :

Operational Voltage:	< 20-32 V DC
Power Consumption:	80 W
Transducer Frequencies:	33 kHz 210 kHz
Beam Width:	33 kHz - 16° 210 kHz - 9°
Depth Capability:	0.5-5000 (1500m)
Power Output:	300-1000 W
Measuring Accuracy:	33kHz ± 9.5cm 210kHz ± 1.5cm
Water Sound Velocity:	1400m/s to 1599m/s in 1m/s steps.

Electrical

Power requirement		20-30V d.d. 20W
Analogue outputs (3 channels) :		
Range		±10V
Resolution		12 bit
Minimum load		10kΩ//1500pF (Scale, linear/sine, offset, polarity - all operation selectable)
Digital Interface (data output plus command input)		To EIA Standard RS232C (Tx, Rx, Gnd only. No hardware handshake.)
Output data rate	Digital (free-running)	21.333Hz
	Digital (interrogated)	0-100 Hz
	Analogue	2.73kHz

Environmental

Temperature range	(operating)	-5 to +40°C
	(storage)	-20 to +70°C
Shock (survival)		30g peak
		40ms half-sine
Vibration (operating)		30mm/s ² or
		0.2mm, 7-300 Hz
Transverse acceleration		500mg peak
		0.1s sine
Enclosure ingress protection		IP68
		400m water depth
Tilt	Operating	±30° any; plane
	Transit/Storage	No limit
Yaw immunity		10° per second with 30° roll and pitch

5.5 SIDE SCAN SONAR

The Klein side scan sonar system was used to provide mapping of the seafloor. The system consisted of a dual frequency Klein 422 towfish, a Klein 595 digital graphic recorder and tow cable. The 100kHz frequency and 100m slant range was used throughout the survey.

The towfish contains transducers which transmit short pulses of high frequency acoustic energy in fan shaped beams at right angles to the fish's track. The beams are narrow in the horizontal plane and wide in the vertical plane. In the nose of the towfish are the transmitting and receiving circuitry and on receipt of a trigger pulse from the ship-borne recorder the transducers are energised. The receiving circuitry amplifies the returned echoes and sends them up the tow cable to the recorder for display.

The Klein 595 recorder has 4 channels to record continuous side scan sonar as well as sub-bottom topography. The recorder generates a trigger pulse which is sent down the tow cable to energise the side scan sonar and/or sub-bottom profiler transducers. When the sonar echoes are received, they are sent up the tow cable to the recorder. The signals are electronically processed and printed line by line to produce the sonar image. The Klein 595 is controlled by a microprocessor and includes a wide variety of capabilities including image correction, record expansion, annotation and menu-driven operation. The Klein 595 features a fixed head, high resolution, high speed dry thermal printer with 4-bit resolution (16 distinct grey shades/pixel).

System specifications are as follows:

Towfish

Horizontal Beamwidth	:	1°
Frequency	:	100kHz / 500kHz
Pulse Length	:	0.1 µs
Beam Width	:	40° tilted down 10° from horizontal
Maximum Coverage	:	400 - 1000 metres
Maximum Coverage per Channel	:	200 - 500 metres
Acoustic Output	:	228 dB (peak) reference one micropascal at one metre. 128 dB (peak) reference one microbar at one metre.
Cable Length	:	100 - 170 metres

Klein 595 Recorder

Dot Density	:	8 dots/mm (203 dots/in)
Recording Paper Type	:	direct thermal, dry, odourless, archival
Colour	:	black and white
Width	:	43.2 cm (17 in)
Length of Roll	:	46 metres (150 feet)
Grey Scale	:	16 shades, each pixel digitally controlled.

Sonar data quality was good throughout the survey.

5.6 BOOMER

The nature of the sub-seafloor geology was identified using a EG&G boomer source. The boomer sled and the 10-element hydrophone were each towed 16m astern respectively on opposite quarters of the vessel (refer to Appendix A).

During this project the raw analogue signal was filtered first using a Krohn-Hite 3700 filter before it was digitally displayed and recorded on ENSIN.

The system was operated at a power of 300 Joules and fired every 400ms by an Applied Acoustics CSP 1000 Triggered Capacitor Bank and Power Supply. The fiducial fix mark and annotations were supplied by the positioning system every 30 seconds. The data were processed by an ENSIN system which included a band pass filter of 400Hz to 2000Hz. The raw data was stored on DAT.

The boomer system comprises the following components:

Boomer Seismic Source EG&G Model 230

The boomer (or Uniboom) is an electromechanical source fixed to a surface towed catamaran. The boomer source consists of an induction coil against which an aluminium plate is applied by a system of springs. With each discharge, from the ship-borne capacitor banks, the eddy currents induced in the conductive plate cause it to move violently away from the coil. The initial movement of the plate triggers the acoustic pulse, the duration of the boomer signal is limited to about 0.2ms.

Power Supply Applied Acoustics CSP1000

The CSP1000 Power Supply provides a source of high-voltage direct current for charging the capacitor banks used in sub-bottom profiling systems. The CSP1000 will charge at 1100 Joules per second. This allows the operator to select sound-pulse repetition rates as fast as six pulses per second at an energy level of 1000 Joules:

System specifications are as follows:

Size	19" rack mounted 7U high 550mm deep
Weight	55 kg
Operating Temperature	0-37°C at maximum output
Mains input	207-206 VAC 45-65 Hz @ 2.5kVA 3 pin connector
Voltage Output	3550 or 3800 volts DC 4 pin interlocked connector
Output Energy	100 to 1000J in 100J increments
Charging Rate	1100J per second
Capacitance	144µF. 1 x 10 ⁸ shot life
Trigger	+ive key opto isolated or closure set by front panel switch. BNC connector on front panel and remote
Repetition Rate	To 6pps
Earth	M8 stainless steel stud on front panel

Hydrophone EG&G Type Model 265

The 265 Hydrophone uses 10 elements connected in series and incorporates a current summing amplifier. The hydrophone elements and preamplifier are enclosed in a one-inch, oil filled tube designed to minimise turbulent noise from towing, this part of the hydrophone is called the active section. In addition to the active section, the hydrophone includes a tail for stabilisation, a tow cable that incorporates the conductors for transmitting the electric signals and a battery box attached to the shipboard end of the cable which supplies the DC voltage for operating the pre-amplifier.

System specifications are as follows:

Input Power	9v DC Battery
Sensitivity	-61 dB/volt/microbar
Bandwidth	400 Hz - 5kHz
Hydrophone Element	
Sensitivity	-103 dB/volt/microbar (single element)
Gain (Preamplifier)	42 dB (including gain of 10 elements in series)
Output	2 kohms

5.7 ENSIN DIGITAL ACQUISITION, PROCESSING AND INTERPRETATION SYSTEM

ENSIN (ENgineering Seismic INterpretation) is a single-channel, high-resolution, digital seismic acquisition, processing, and interpretation package manufactured by the Perth-based exploration and mining software company Micromine Pty Ltd. ENSIN is designed and developed for IBM PC and compatible computers, and operates on a variety of processors, screens, and interfaces to most printers, plotters, and digitisers.

A basic system consists of the following:

- 80486 processor running at 33 Mhz or better on a DOS-based PC.
- Super VGA card and compatible monitor. Supported Super VGA cards include:
 - Trident (640 x 480 x 256 colour)
 - Oak
 - Paradise
 - Tseng Labs
- Extended memory (> 4 MB) for disk cache.
- HPGL compatible plotter (if interpretation routines employed).
- LynxDAT 2 GB external tape drive.
- Hard disk with at least 100 MB of free storage space.
- Microsoft compatible mouse or trackball.
- Versatec compatible thermal printer.
- ENSIN data acquisition and processing card.

The ENSIN acquisition and processing card is responsible for converting the analogue signal received from the single-channel streamer to a digital format based on a user-specified sampling frequency. The digitised data can be stored on hard disk or directly on DAT in a specialised ENSIN binary format, which in turn can be converted to the industry standard SEG-Y format.

5.8 ACOUSTIC VELOCITY PROBE

The speed of sound in seawater (acoustic velocity) was determined by the use of a Valeport Direct Recording CTD probe (Model 600 MkIII).

The Valeport is a multi-parameter, self-contained intelligent instrument designed for the measurement of conductivity, temperature and pressure. From those parameters, salinity, density and speed of sound are calculated, displayed and recorded.

Sampling mode, rate and averaging periods are user-controlled, via a PC or the Control Display Unit. Calibration for all sensors is held within the instrument and the data is provided in engineering units. The unit has 128 Kbyte memory and can store up to 20,000 records.

Deployment of the Valeport is either by hand or winch. As the instrument is lowered to and raised from the seabed, data are stored in memory.

When recovered, the Valeport is re-connected to a PC which can be used to set up and extract the data to disk.

System specifications are as follows:

Temperature:	Type: PRT and Thermistor Range: -5 to 35° C Accuracy: ± 0.02° C for PRT and ± 0.1° C for Thermistor Resolution: 0.002° C
Conductivity:	Type: Inductive coils Range: 0.1 to 60ms/cm Accuracy: ± 0.05 ms/cm Range: 0.003 ms/cm
Pressure:	Type: Strain gauge Range: 50,100,500,1000 or 2000 dBar Accuracy: ± 0.5% FS and ± 0.1% FS Range: 0.005% FS
Salinity:	Type: Derived [SAL78] Accuracy: ± 0.07 PSU for PRT and ± 0.15 PSU for Thermistor Range: 0.003 PSU
Speed of Sound:	Type: Derived [Chen & Millero 1977] Accuracy: ± 0.25 m/sec for PRT and ± 0.75 m/sec for Themistor Range: 0.02 m/sec
Density Anomaly Gamma:	Type: Derived [EOS-80] Accuracy: ± 0.06kg/m ² for PRT and ± 0.12kg/m ² for Thermistor Range: 0.01kg/m ²
Physical Specifications:	Depth Rating: 1500 metres Body diameter: 76mm Overall Length: 1050mm SR version and 860mm DR version Weight in air: SR 10 kgf, DR 6 kgf Weight in water: SR 8 kgf, DR 4 kgf

6. SUMMARY OF EVENTS

Racal personnel arrived at the AMC Wharf, Beauty Point, Tasmania on 29 November 1998. All personnel were onboard the Bluefin at 0800 on 30 November 1998 and a pre-mobilisation induction/safety meeting was held, attended by all personnel.

At 0900, a brief job overview, personnel introduction and vessel familiarisation were conducted by the Racal Party Chief and the Vessel Master.

Mobilisation of survey equipment commenced at 1600 once the transporter arrived. All gear, pallets and container were onboard the vessel by 1800.

Mobilisation continued on 1 December 1998 at 0600 with the navigation system on line by 1000. A side scan sonar rub test was performed at 1300 and a boomer pulse test carried out at 1440. At 1550 the vessel changed berth to the inspection dock for the gyro calibration and Differential GPS check. Both checks were completed by 1930 that evening.

Mobilisation continued the following morning and a new Gulton Plotter was ordered to replace a faulty unit. A bar check and TS dip were performed at 1130, prior to the vessel moving back to the Maritime College dock.

A project safety meeting and muster drill was held at 1300.

Mobilisation continued, securing/tying down equipment and checking/verifying systems data. At 2015 the replacement Gulton Plotter arrived at Launceston for immediate collection by L. Etheridge. The plotter was onboard, tested and working by 2130. At 2205, the vessel departed Beauty Point for the Barramundi-1 site.

The vessel arrived at the site at 0908 on 3 December 1998 where a bar check and seawater velocity profile was carried out. A scouting line was run prior to the deployment of underwater survey gear and the side scan sonar was found to be non-operational, requiring a re-termination which was completed by 2030.

The first survey line commenced at 2211. Weather conditions deteriorated and all equipment was recovered at 2330.

The vessel stood by, waiting on weather until 0730 on 5 December 1998. The first survey line commenced at 0822. The side scan sonar was found to be faulty, again requiring a re-termination. The weather conditions were deemed unsuitable for survey but the sonar fish was wet tested to test the integrity of the re-termination at 1300. At 1330 the echo sounder bracket was badly damaged by heavy wave action. All equipment was recovered at 1340 and at 1400 the vessel headed for Launceston in view of the weather forecasts, and to re-weld the echo sounder bracket.

The vessel arrived alongside the AMC wharf at Beauty Point at 0200 on 6 December 1998 on standby, waiting on weather until 0600, 7 December 1998, when the vessel departed again for the site. On arrival at the Barramundi-1 site a bar check and TS dip were carried out. All equipment was deployed and the first survey line commenced at 1734. Survey lines continued to be run until 1530 on 8 December 1998. All equipment was then recovered and a toolbox safety meeting was held on deck prior to coring operations. Five drop cores were recovered between 1623 and 1736. All equipment was then stowed and secured and the vessel departed the site at 1745.

The vessel arrived alongside Beauty Point at 0500 on 9 December 1998, all equipment and personnel having left the vessel by 1800.

7. PERSONNEL AND EQUIPMENT

7.1 PERSONNEL

The following personnel were employed on this project:

For : RACAL SURVEY AUSTRALIA LIMITED

M. Tuck	-	Party Chief/Senior Surveyor
J. Cowans	-	Geophysicist
B. Teh	-	Navigation Engineer
L. Etheridge	-	Underwater Engineer
D. Bell	-	Underwater Engineer
J. Cowans/A. Ali	-	Interpretation Geophysicists

For : GLOBEX FAR EAST

Derek Evans	-	Client Representative
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7.2 EQUIPMENT

NAVIGATION

- 2 x Trimble 4000 Series GPS Receivers
- 2 x SkyFix/LandStar Demodulators
- 2 x LandStar Whip Antennae
- 3 x Compaq 486/66 MHz Lunch Box GNS computers
- 1 x Compaq 486/66 MHz Laptop computer
- 2 x HP Thinkjet Printers
- 1 x SG Brown 1000 Gyro Compass plus all associated software, cables, manuals, etc
- 1 x Helmsman's GRREP system

GEOPHYSICAL

ECHO SOUNDER

- 2 x Atlas-Deso 20 Recorder
- 2 x Atlas-Deso Overboard Transducer Shoes c/w 33KHz and 210KHz transducers
- 1 x Model XR-666 230vac to 24vdc Power Converter
- 1 x Applied Microsystems SVP-16, Direct-Reading Seawater Velocity Profiler
- 1 x E/S Bar Check
- 1 x TSS 335B Motion Sensor
- 1 x Valeport Velocity Profiler

SIDE SCAN SONAR

- 1 x Klein 595 Recorders with spares
- 2 x Klein 422 Side Scan Sonar Dual Frequency Towfish Assemblies
- 2 x Side Scan Sonar Deck Cables
- 1 x Electric Winch
- 1 x Armoured Tow cables

BOOMER SYSTEM

- 2 x ENSIN Computer Systems
- 1 x ENSIN System Printer/Plotter/DAT Drive
- 2 x EG&G Surface Tow Source
- 2 x CSP 1000 Cap/Disch. Power supplies
- 1 x EG&G Sub tow source
- 1 x Hunttec Subtow source
- 2 x EG&G Type Hydrophones
- 2 x TSS 307 TVG amplifiers
- Auto transformer
- 2x Krohne-Hite Filters

MISCELLANEOUS

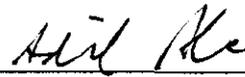
- 1 x Total Station with prisms and tripods
 - 1 x Racal 500 V Megger
 - 1 x HV Probe
 - 1 x Total Power Systems IS-1000 Power Line Conditioner
 - 1 x Astro RS-12A Regulated Power Supply 230 VAC to 12 VDC
 - 1 x Deskjet Printer
 - 1 x Optus Satellite Phone/Modem
 - 2 x VHF hand held radios
 - 1 x Sharp Facsimile Machine
 - 1 x HP Oscilloscope
- plus all associated software, cables, manuals, etc. and 100% back-up of spare units.

8. DISTRIBUTION

Copies of this report have been distributed as follows:

Kelly Down Consultants Pty Ltd (agents for Globex Far East) : 3 copies
Attn: Geoff Rowlands

Racal Survey Australia Limited : 1 copy



Adil Ali
Geophysicist



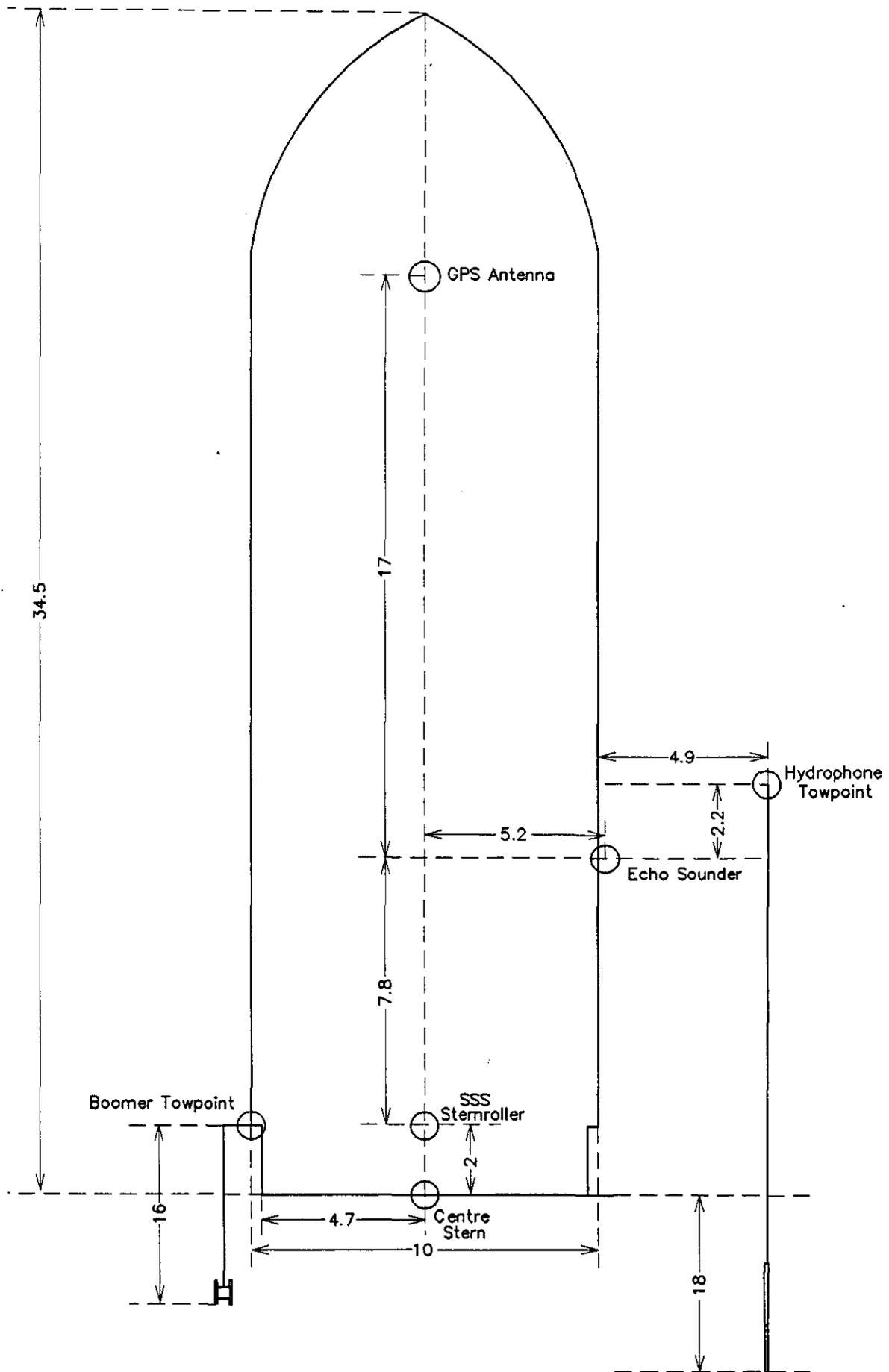
Anthony Kerr
Area Surveyor

APPENDIX A

OFFSET DIAGRAM - BLUEFIN

FTV BLUEFIN

(NOT TO SCALE)



UNITS IN METRES

APPENDIX B

GNS SYSTEM DATA PRINTOUT

GNSSGS System Data 2 Dec 1996 19:10:41

Job Number : 2830C1
 Description : BASS STRAIT BARRAMUNDI-1 PERMIT 1/27-P SITE SURVEY
 Client : GLOBEX FAR EAST
 Surveyor : MATTHEW TUCK

Spheroid : AGD 84

Eccentricity $\wedge 2$ = 0.006694542
 Semi-major axis = 6378160.000 Metres

Projection : UTM/TM

Grid Scale Const = 0.9996000
 Unit Conv. Factor = 1.0000000
 False Easting = 500000.00 Metres
 False Northing = 1000000.00 Metres
 Central Meridian = 147 DEG 00 MIN 00.000 SEC E
 Lat of Origin = 00 DEG 00 MIN 00.000 SEC

System Type Definition

A RACAL UK00A
 B Not Defined
 C Not Defined
 D Not Defined

Station Data for System Type A : RACAL UK00A

GPS Spheroid : WGS 84

Eccentricity $\wedge 2$ = .00669438
 Semi-major axis = 6378137.00 metres

Transformation Parameters to : AGD 84 Spheroid

DX = +116.000 Metres
 DY = +50.470 Metres
 DZ = -141.690 Metres
 Rotation (X) = +.2300 seconds
 Rotation (Y) = +.3900 seconds
 Rotation (Z) = +.3440 seconds
 Scaling (ppm) = -.0903

Station Data for System Type B : Not Defined

No Station Data

Station Data for System Type C : Not Defined

No Station Data

Station Data for System Type D : Not Defined

No Station Data

Pattern Corrections and Standard Deviations

System A RACAL UK00A	System B Not Defined	System C Not Defined
C-0 Corrections :-	No Data	No Data
Latit. +0.000 Secs		
Long. +0.000 Secs		
Height +0.000 M		

Pattern Corrections and Standard Deviations

System D Not Defined
 No Data

Mobile System Assignments

Sys Mobile	System Type	Status
1 BLUE FIN	RACAL UK00A	ON

Receiver Pattern Codes

Sys 1 BLUE FIN
 RACAL UK00A
 Receiver1 Receiver2
 NN NFF

Addr	Baud	Data Bits	Parity	Stop Bits	Term Char	Term Count
3201	9600	8	NONE	1	10	0
3202	9600	8	NONE	1	10	0
3203	9600	8	NONE	1	10	0
3204	9600	8	NONE	1	10	0
3205	9600	8	NONE	1	10	0
3206	9600	8	NONE	1	10	0
3207	4800	8	NONE	1	10	0
3208	9600	8	NONE	1	10	0

Digiboard 2: Addresses 3301 - 3308

Not Interfaced

Digiboard 3: Addresses 3401 - 3408

Not Interfaced

Digiboard 4: Addresses 3501 - 3508

Not Interfaced

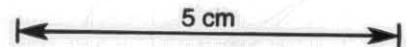
Comms Ports 1 and 2 : Addresses 9 and 11

Addr	Baud	Data Bits	Parity	Stop Bits	Term Char	Term Count
9	9600	8	NONE	1	10	0
11	Not Present					

1=8x1,Revert



Scale:  = 10 grid units



CURRENT OFFSET Posn : DATUM
+0.00 X, +0.00 Y

Waypoint Co-ordinates:

1	BARRAMUNDI-1	E	391412.00	N	5609012.00
2	INS	E	485206.00	N	5444144.61
3	IHN AG066	E	485127.27	N	5444162.34

391 412.2752 5609 012.050N.

Track Guidance Line Data:

Line	Description	KP SQL	SQL East	SQL North	EOL East	EOL North
1	1	0.000	389912.00	5607512.00	392912.00	5607512.00
2	2	3.001	389912.00	5607612.00	392912.00	5607612.00
3	3	0.000	389912.00	5607712.00	392912.00	5607712.00
4	4	0.000	389912.00	5607812.00	392912.00	5607812.00
5	5	0.000	389912.00	5607912.00	392912.00	5607912.00
6	6	0.000	389912.00	5608012.00	392912.00	5608012.00
7	7	0.000	389912.00	5608112.00	392912.00	5608112.00
8	8	0.000	389912.00	5608212.00	392912.00	5608212.00
9	9	0.000	389912.00	5608312.00	392912.00	5608312.00
10	10	0.000	389912.00	5608412.00	392912.00	5608412.00
11	11	0.000	389912.00	5608512.00	392912.00	5608512.00
12	12	0.000	389912.00	5608612.00	392912.00	5608612.00
13	13	0.000	389912.00	5608712.00	392912.00	5608712.00
14	14	0.000	389912.00	5608812.00	392912.00	5608812.00
15	15	0.000	389912.00	5608912.00	392912.00	5608912.00
16	16	0.000	389912.00	5609012.00	392912.00	5609012.00
17	17	0.000	389912.00	5609112.00	392912.00	5609112.00
18	18	0.000	389912.00	5609212.00	392912.00	5609212.00
19	19	0.000	389912.00	5609312.00	392912.00	5609312.00
20	20	0.000	389912.00	5609412.00	392912.00	5609412.00
21	21	0.000	389912.00	5609512.00	392912.00	5609512.00
22	22	0.000	389912.00	5609612.00	392912.00	5609612.00
23	23	0.000	389912.00	5609712.00	392912.00	5609712.00
24	24	0.000	389912.00	5609812.00	392912.00	5609812.00
25	25	0.000	389912.00	5609912.00	392912.00	5609912.00

547036

27	27	0.000	389912.00,	5610112.00	392912.00,	5610112.00
28	28	0.000	389912.00,	5610212.00	392912.00,	5610212.00
29	29	0.000	389912.00,	5610312.00	392912.00,	5610312.00
30	30	0.000	389912.00,	5610412.00	392912.00,	5610412.00
31	31	0.000	389912.00,	5610512.00	392912.00,	5610512.00
32	32	1.101	389912.00,	5607512.00	389912.00,	5610512.00
33	33	0.000	390412.00,	5607512.00	390412.00,	5610512.00
34	34	0.000	390912.00,	5607512.00	390912.00,	5610512.00
35	35	0.000	391412.00,	5607512.00	391412.00,	5610512.00
36	36	0.000	391912.00,	5607512.00	391912.00,	5610512.00
37	37	0.000	392412.00,	5607512.00	392412.00,	5610512.00
38	38	0.000	392912.00,	5607512.00	392912.00,	5610512.00

Offsets for BLUE FIN

No	Name	X Coord	Y Coord	Dir
1	DATUM	+0.00	+0.00	On Hdg
2	HYDRO TOWPOINT	+1.90	+2.20	On Hdg
3	SSS STERN	-5.20	-7.90	On Hdg
4	CENTRE STERN	-5.20	-9.80	On Hdg
5	BOOMER TOWPOINT	-9.90	-7.80	On Hdg

Verified by:


(sign)

DEREK EVANS
(print)

2 Dec 1998 19:21:10

Online Computations : Spheroid/Datum TransformationSeven Parameter Shift Values

DX (metres) :	+116.000	Rot X (secs) :	+ .2300
DY (metres) :	+50.470	Rot Y (secs) :	+ .3900
DZ (metres) :	-141.690	Rot Z (secs) :	+ .3410
Scale (ppm) :	-.0983		

Source Spheroid : WGS 84

Semi-major :	+6378137.000
Eccentr ² :	+.0066943800

Destination Spheroid : AGD 84

Semi-major :	+6378160.000
Eccentr ² :	+.0066945420

Latitude :	20 DEG 51 MIN 18.642 SEC S
Longitude :	116 DEG 47 MIN 52.599 SEC E
Spher. Ht :	+0.000
Cart X :	-2688298.185
Cart Y :	+5322400.364
Cart Z :	-2256418.662

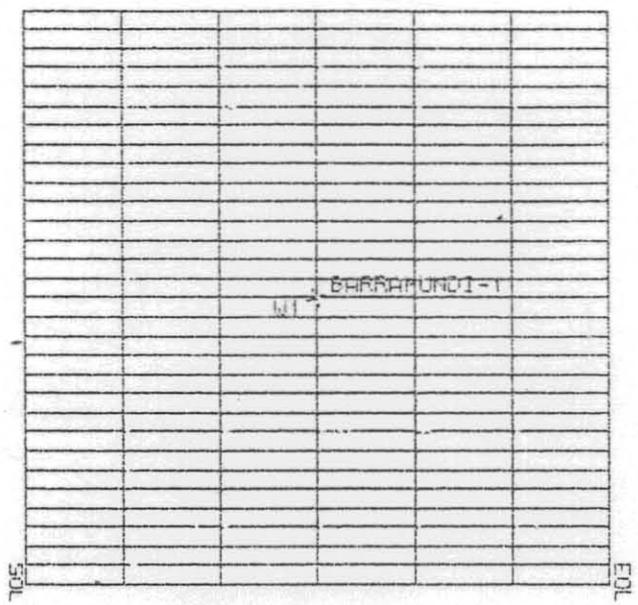
Latitude :	20 DEG 51 MIN 23.427 SEC S
Longitude :	116 DEG 47 MIN 47.794 SEC E
Spher. Ht :	+20.147
Cart X :	-2688168.778
Cart Y :	+5322452.279
Cart Z :	-2256571.148

Track Guidance Line Data:

Line	Description	KP SOL	SOL East	North	EOL East	North
1	1	0.000	389912.00	5607512.00	392912.00	5607512.00
2	2	3.001	389912.00	5607612.00	392912.00	5607612.00
3	3	0.000	389912.00	5607712.00	392912.00	5607712.00
4	4	0.000	389912.00	5607812.00	392912.00	5607812.00
5	5	0.000	389912.00	5607912.00	392912.00	5607912.00
6	6	0.000	389912.00	5608012.00	392912.00	5608012.00
7	7	0.000	389912.00	5608112.00	392912.00	5608112.00
8	8	0.000	389912.00	5608212.00	392912.00	5608212.00
9	9	0.000	389912.00	5608312.00	392912.00	5608312.00
10	10	0.000	389912.00	5608412.00	392912.00	5608412.00
11	11	0.000	389912.00	5608512.00	392912.00	5608512.00
12	12	0.000	389912.00	5608612.00	392912.00	5608612.00
13	13	0.000	389912.00	5608712.00	392912.00	5608712.00
14	14	0.000	389912.00	5608812.00	392912.00	5608812.00
15	15	0.000	389912.00	5608912.00	392912.00	5608912.00
16	16	0.000	389912.00	5609012.00	392912.00	5609012.00
17	17	0.000	389912.00	5609112.00	392912.00	5609112.00
18	18	0.000	389912.00	5609212.00	392912.00	5609212.00
19	19	0.000	389912.00	5609312.00	392912.00	5609312.00
20	20	0.000	389912.00	5609412.00	392912.00	5609412.00
21	21	0.000	389912.00	5609512.00	392912.00	5609512.00
22	22	0.000	389912.00	5609612.00	392912.00	5609612.00
23	23	0.000	389912.00	5609712.00	392912.00	5609712.00
24	24	0.000	389912.00	5609812.00	392912.00	5609812.00
25	25	0.000	389912.00	5609912.00	392912.00	5609912.00
26	26	0.000	389912.00	5610012.00	392912.00	5610012.00
27	27	0.000	389912.00	5610112.00	392912.00	5610112.00
28	28	0.000	389912.00	5610212.00	392912.00	5610212.00
29	29	0.000	389912.00	5610312.00	392912.00	5610312.00
30	30	0.000	389912.00	5610412.00	392912.00	5610412.00
31	31	0.000	389912.00	5610512.00	392912.00	5610512.00
32	32	1.101	389912.00	5607512.00	389912.00	5610512.00
33	33	0.000	390412.00	5607512.00	390412.00	5610512.00
34	34	0.000	390912.00	5607512.00	390912.00	5610512.00
35	35	0.000	391412.00	5607512.00	391412.00	5610512.00
36	36	0.000	391912.00	5607512.00	391912.00	5610512.00
37	37	0.000	392412.00	5607512.00	392412.00	5610512.00
38	38	0.000	392912.00	5607512.00	392912.00	5610512.00

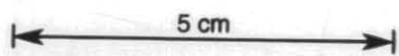
RACAL
 Racal Survey Ltd

19:23:54 2 Dec 98
 BLUE FIN
 DATUM
 E 391412.00
 N 5609012.00
 Hdg 340.5 T
 Speed 0.0 Kt
 Line Nmr 1
 DTog 1500.0 M
 DOFL -1500.0 M
 DSOL -1500.0 M
 DEOL 1500.0 M
 Line Dir 90.8 T
 Wp: BARRAMUNDI-1 #1
 Wp R 0.0 M
 Wp B 8 T
 N Fix 58
 Sounding 0.0 M



560900E
 5606500N

SCALE 1:25000
 TICK INT 100M



547040

APPENDIX C

GYRO CALIBRATION

The survey gyro compass was calibrated while the FRV Bluffing was alongside the Inspection Wharf at Beauty Point on 1st. December 1998.

Two co-ordinated survey control points had been previously installed for the Port of Launceston PTY Ltd. on the Inspection Wharf. The control points were located at the North and South ends of the wharf. Both points were offset equally from the edge of the wharf thus defining the azimuth of the dock. A sunshot was observed prior to the calibration to verify the calculated azimuth between the two control points. The results from the sunshot agreed to within 4' of the calculated azimuth between the two stations and therefore proves the integrity of the baseline. Sunshot observation results have been included in Appendix C.

Following a two hour period allowing the vessel gyro to settle. Simultaneous taped measurements were made to the centreline of the vessel at the bow and stern while also logging the vessel gyro readings. A computed azimuth for the vessel was then computed for each set of observations and compared to the observed gyro readings. A mean C-O was then computed to show the gyro was reading high by 1.99 °.

Raw observations and layout diagrams have been included in Appendix C.

Control Point Co-ordinates

Co-ordinates were provided in AGD 66.

Station	Eastings(m)	Northings(m)
IHN	485127.266	5444462.344
IHS	485206.796	5444144.606

Grid Azimuth IHS to IHN 345° 56' 51.179" g
 True Azimuth IHS to IHN 346° 03' 48.892" t

Gyro Calibration Observations and Results

	Time	Obs.1	Obs.2	x	α	Calculated heading	Observed gyro	C-O°
1	19:35:00	5.57	6.30	0.73	1.28	347.35	349.3	-1.95
2	19:35:15	5.42	6.60	1.18	2.08	348.14	350.2	-2.06
3	19:35:30	5.31	6.95	1.64	2.89	348.95	350.8	-1.85
4	19:35:45	5.43	6.80	1.37	2.41	348.48	350.5	-2.02
5	19:36:00	5.42	6.67	1.25	2.20	348.27	350.3	-2.03
6	19:36:15	5.41	6.70	1.29	2.27	348.34	350.3	-1.96
7	19:36:30	5.34	6.80	1.46	2.57	348.63	350.7	-2.07
8	19:36:45	5.35	6.88	1.53	2.69	348.76	350.7	-1.94
9	19:37:00	5.40	6.87	1.47	2.59	348.65	350.7	-2.05
10	19:37:15	5.50	6.80	1.30	2.29	348.35	350.3	-1.95

Mean C-O = -1.99°

SD = 0.066

Job No. 2830C1

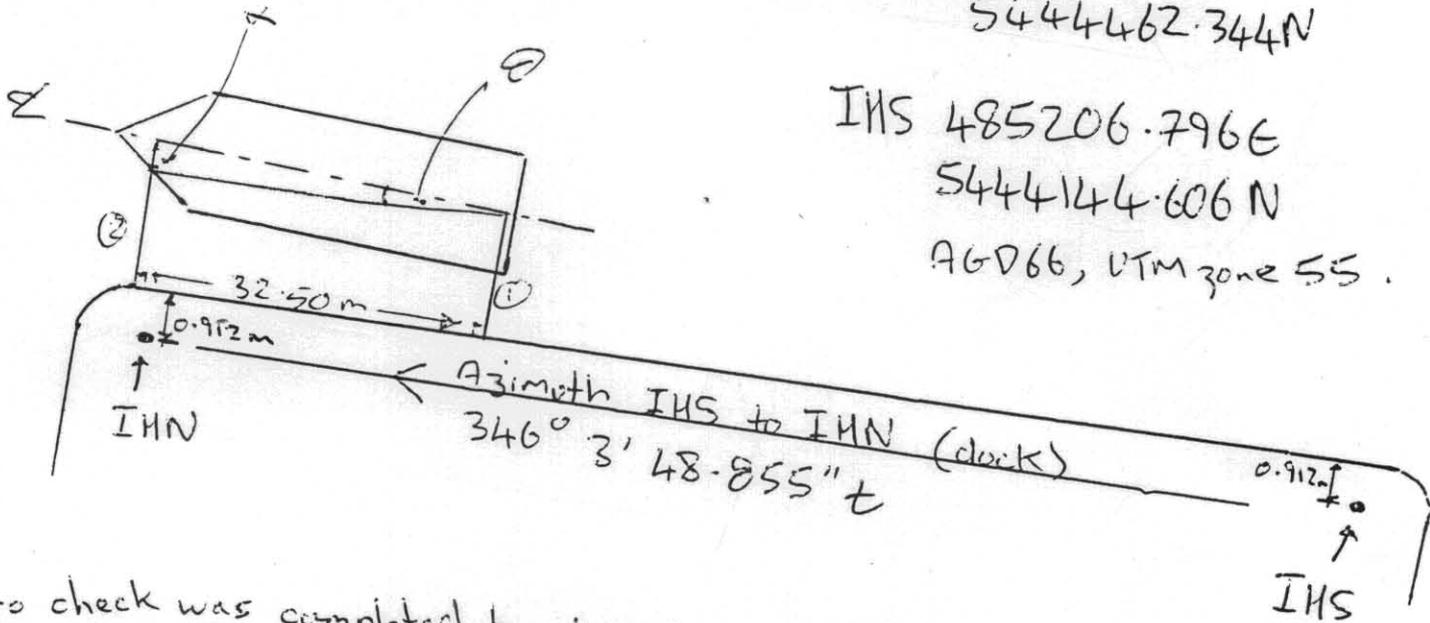
547043 1st. Dec 1998

FRV 'Bluefin' Gyro Check, alongside Inspection Dock, Beauty Pt., Tasmania.

Control: IHN 485127.266 E
5444462.344 N

IHS 485206.796 E
5444144.606 N

AGD66, UTM zone 55.



Gyro check was completed by taped measurements to vessel centreline from points ① and ② above. Taped measurements and gyro were recorded simultaneously. The computed vessel heading was then compared to the observed gyro readings to give a mean C-O of -1.99° .

Observation #	time	taped measurement ①	taped measurement ②	x	θ	calculated hdg.	observed gyro	C-O $^\circ$
1	19:35:00	5.57	6.30	0.73	1.287	347.35 $^\circ$	349.3	-1.95
2	:15	5.42	6.60	1.18	2.079	348.14 $^\circ$	350.2	-2.06
3	:30	5.31	6.95	1.64	2.889	348.95 $^\circ$	350.8	-1.85
4	:45	5.43	6.80	1.37	2.414	348.48 $^\circ$	350.5	-2.02
5	36:00	5.42	6.67	1.25	2.203	348.27 $^\circ$	350.3	-2.03
6	:15	5.41	6.70	1.29	2.273	348.34 $^\circ$	350.3	-1.96
7	:30	5.34	6.80	1.46	2.572	348.63 $^\circ$	350.7	-2.07
8	:45	5.35	6.88	1.53	2.695	348.76 $^\circ$	350.7	-1.94
	37:00	5.40	6.82	1.47	2.589	348.65 $^\circ$	350.7	-2.05
9	19:37:15	5.50	6.80	1.30	2.291	348.35	350.3	-1.95

5 cm

Mean C-O -1.99°

SD 0.111

SPADE (v4.2) Copyright (c) 1991 Michael R. Craymer
2830c1

Date : 1 Dec 1998
Method : Solar Hour Angle
Latitude (D.MMSSs) : -41.0913
Longitude West (D.MMSSs) : -146.4925
Watch Corr: UT-Watch (H.MMSSs) : 0.00000
Error in Latitude (arcsec) : 0.0
Error in Timing (sec of time) : 0.0
Output Filename : beautypoint

Set No.	Average Watch Time (HH.MMSSs)	Average Horz.Ang (DD.MMSSs)	Azimuth Star (DD.MMSSs)	Azimuth RO (HH.MMSSs)	Error in Azimuth (HH.MMSSs)
1	7.1230	94.3422	260.3855	166.0433	0.0000
2	7.1245	94.3422	260.3639	166.0217	0.0000
3	7.1430	94.1021	260.2045	166.1024	0.0000
4	7.1630	93.5509	260.0236	166.0727	0.0000
5	7.1830	93.3909	259.4428	166.0519	0.0000
6	7.1930	93.2511	259.3525	166.1014	0.0000
7	7.2130	93.1001	259.1718	166.0717	0.0000

Average Azimuth

Set No.	Azimuth RO (DD.MMSSs)	Error (DD.MMSSs)
1	166.0433	0.0000
2	166.0217	0.0000
3	166.1024	0.0000
4	166.0727	0.0000
5	166.0519	0.0000
6	166.1014	0.0000
7	166.0717	0.0000

omitted

Average Azimuth RO : 166.0733

547045

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485135.23 N 5444450.83 Ht +25.21 Lat 41 9 3.5015 Long 146 49 22.252E

FRV 'Bluefin' Guro Line

1/12/98 Job # 28306

Offset 1 DATUM : E 485135.23 N 5444450.83
Offset 2 HYDRO TOWPOINT (Hdg) : E 485138.70 N 5444458.57
Offset 3 SSS STERN (Hdg) : E 485131.50 N 5444442.22
Offset 4 CENTRE STERN (Hdg) : E 485131.86 N 5444440.26
Offset 5 BOOMER TOWPOINT (Hdg) : E 485126.88 N 5444441.39
Speed MG(K) : 0.0 Corrected Gyro(T) : 349.8 Corr. : +0.0 Cng(T) : 135.5
Line: 16INCH DTtoG(M):2059063.3 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 14.9 Brg(T): 321.6

Observed gyro

FIX # 18 19:33:44 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:33:44) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485135.31 N 5444450.90 Ht +25.19 Lat 41 9 3.5405 Long 146 49 22.256E
Offset 1 DATUM : E 485135.31 N 5444450.90
Offset 2 HYDRO TOWPOINT (Hdg) : E 485138.76 N 5444458.65
Offset 3 SSS STERN (Hdg) : E 485131.61 N 5444442.29
Offset 4 CENTRE STERN (Hdg) : E 485131.98 N 5444440.32
Offset 5 BOOMER TOWPOINT (Hdg) : E 485126.99 N 5444441.43
Speed MG(K) : 0.0 Corrected Gyro(T) : 349.7 Corr. : +0.0 Cng(T) : 135.5
Line: 16INCH DTtoG(M):2059063.3 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 14.9 Brg(T): 321.2

FIX # 19 19:34:00 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:34:00) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485135.16 N 5444450.87 Ht +25.14 Lat 41 9 3.5495 Long 146 49 22.249E
Offset 1 DATUM : E 485135.16 N 5444450.87
Offset 2 HYDRO TOWPOINT (Hdg) : E 485138.56 N 5444458.65
Offset 3 SSS STERN (Hdg) : E 485131.51 N 5444442.24
Offset 4 CENTRE STERN (Hdg) : E 485131.88 N 5444440.27
Offset 5 BOOMER TOWPOINT (Hdg) : E 485126.89 N 5444441.36
Speed MG(K) : 0.0 Corrected Gyro(T) : 349.3 Corr. : +0.0 Cng(T) : 135.5
Line: 16INCH DTtoG(M):2059063.3 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 14.8 Brg(T): 321.7

FIX # 20 19:34:15 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:34:15) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485135.19 N 5444450.65 Ht +25.02 Lat 41 9 3.5565 Long 146 49 22.250E
Offset 1 DATUM : E 485135.19 N 5444450.65
Offset 2 HYDRO TOWPOINT (Hdg) : E 485138.51 N 5444458.41
Offset 3 SSS STERN (Hdg) : E 485131.51 N 5444442.05
Offset 4 CENTRE STERN (Hdg) : E 485131.88 N 5444440.05
Offset 5 BOOMER TOWPOINT (Hdg) : E 485126.89 N 5444441.16
Speed MG(K) : 0.0 Corrected Gyro(T) : 349.5 Corr. : +0.0 Cng(T) : 135.5
Line: 16INCH DTtoG(M):2059063.5 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 15.0 Brg(T): 322.2

FIX # 21 19:34:30 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:34:30) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485135.27 N 5444450.79 Ht +25.06 Lat 41 9 3.5525 Long 146 49 22.254E
Offset 1 DATUM : E 485135.27 N 5444450.79
Offset 2 HYDRO TOWPOINT (Hdg) : E 485138.74 N 5444458.53
Offset 3 SSS STERN (Hdg) : E 485131.54 N 5444442.19
Offset 4 CENTRE STERN (Hdg) : E 485131.90 N 5444440.22
Offset 5 BOOMER TOWPOINT (Hdg) : E 485126.92 N 5444441.35
Speed MG(K) : 0.0 Corrected Gyro(T) : 349.8 Corr. : +0.0 Cng(T) : 135.5
Line: 16INCH DTtoG(M):2059063.4 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 14.9 Brg(T): 321.6

FIX # 22 19:34:45 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:34:45) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485135.25 N 5444450.63 Ht +25.11 Lat 41 9 3.5575 Long 146 49 22.253E
Offset 1 DATUM : E 485135.25 N 5444450.63
Offset 2 HYDRO TOWPOINT (Hdg) : E 485138.65 N 5444458.41
Offset 3 SSS STERN (Hdg) : E 485131.50 N 5444442.00
Offset 4 CENTRE STERN (Hdg) : E 485131.97 N 5444440.03
Offset 5 BOOMER TOWPOINT (Hdg) : E 485126.98 N 5444441.12
Speed MG(K) : 0.0 Corrected Gyro(T) : 349.3 Corr. : +0.0 Cng(T) : 135.5
Line: 16INCH DTtoG(M):2059063.5 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 15.1 Brg(T): 322.0

FIX # 23 19:35:00 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:35:00) Logging File : MOBILE1.003

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485135.17 N 5444450.73 Ht +25.03 Lat 41 9 3.5543 Long 146 49 22.250E

Offset 1 DATUM : E 485135.17 N 5444450.73
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485135.57 N 5444450.51
 Offset 3 SSS STERN (Hdg) : E 485131.52 N 5444442.10
 Offset 4 CENTRE STERN (Hdg) : E 485131.89 N 5444446.13
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485126.90 N 5444441.22
 Speed MG(K) : 0.0 Corrected Gyro(T) : 349.3 Corr. : +0.0 Cmg(T) : 135.5
 Line: 161NCH DTog(M):2059053.4 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
 Waypoint: IHN A6084 Dist(M): 14.9 Brg(T): 322.0

FIX # 24 19:35:14 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 19:35:14) Logging File : MOBILE1.003

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485135.72 N 5444450.57 Ht +25.00 Lat 41 9 3.5595 Long 146 49 22.274E

Offset 1 DATUM : E 485135.72 N 5444450.57
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485133.24 N 5444458.29
 Offset 3 SSS STERN (Hdg) : E 485131.95 N 5444441.99
 Offset 4 CENTRE STERN (Hdg) : E 485131.29 N 5444440.02
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.32 N 5444441.17
 Speed MG(K) : 0.0 Corrected Gyro(T) : 350.2 Corr. : +0.0 Cmg(T) : 135.5
 Line: 161NCH DTog(M):2059053.8 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
 Waypoint: IHN A6084 Dist(M): 15.4 Brg(T): 320.8

FIX # 25 19:35:29 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 19:35:29) Logging File : MOBILE1.003

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485135.92 N 5444450.71 Ht +25.21 Lat 41 9 3.5543 Long 146 49 22.282E

Offset 1 DATUM : E 485135.92 N 5444450.71
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485133.53 N 5444458.40
 Offset 3 SSS STERN (Hdg) : E 485132.05 N 5444442.18
 Offset 4 CENTRE STERN (Hdg) : E 485132.37 N 5444440.20
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.41 N 5444441.42
 Speed MG(K) : 0.1 Corrected Gyro(T) : 350.8 Corr. : +0.0 Cmg(T) : 135.5
 Line: 161NCH DTog(M):2059053.7 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
 Waypoint: IHN A6084 Dist(M): 15.4 Brg(T): 319.9

FIX # 26 19:35:44 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 19:35:44) Logging File : MOBILE1.003

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485135.91 N 5444450.57 Ht +24.86 Lat 41 9 3.5595 Long 146 49 22.281E

Offset 1 DATUM : E 485135.91 N 5444450.57
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485133.47 N 5444458.27
 Offset 3 SSS STERN (Hdg) : E 485132.08 N 5444442.01
 Offset 4 CENTRE STERN (Hdg) : E 485132.42 N 5444440.03
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.45 N 5444441.22
 Speed MG(K) : 0.0 Corrected Gyro(T) : 350.5 Corr. : +0.0 Cmg(T) : 135.5
 Line: 161NCH DTog(M):2059053.8 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
 Waypoint: IHN A6084 Dist(M): 15.5 Brg(T): 320.3

FIX # 27 19:35:59 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 19:35:59) Logging File : MOBILE1.003

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485135.90 N 5444450.72 Ht +26.12 Lat 41 9 3.5543 Long 146 49 22.277E

Offset 1 DATUM : E 485135.80 N 5444450.72
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485133.34 N 5444458.43
 Offset 3 SSS STERN (Hdg) : E 485132.00 N 5444442.15
 Offset 4 CENTRE STERN (Hdg) : E 485132.34 N 5444440.18
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.37 N 5444441.35
 Speed MG(K) : 0.0 Corrected Gyro(T) : 350.3 Corr. : +0.0 Cmg(T) : 135.5
 Line: 161NCH DTog(M):2059053.7 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
 Waypoint: IHN A6084 Dist(M): 15.3 Brg(T): 320.2

FIX # 28 19:36:14 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 19:36:14) Logging File : MOBILE1.003

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485135.97 N 5444450.59 Ht +25.25 Lat 41 9 3.5585 Long 146 49 22.284E

Offset 1 DATUM : E 485135.97 N 5444450.59
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485133.51 N 5444458.31
 Offset 3 SSS STERN (Hdg) : E 485132.17 N 5444442.02
 Offset 4 CENTRE STERN (Hdg) : E 485132.51 N 5444440.05
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.53 N 5444441.22
 Speed MG(K) : 0.0 Corrected Gyro(T) : 350.3 Corr. : +0.0 Cmg(T) : 135.5
 Line: 161NCH DTog(M):2059053.8 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
 Waypoint: IHN A6084 Dist(M): 15.5 Brg(T): 320.0

FIX # 29 19:36:30 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 19:36:30) Logging File : MOBILE1.003

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485136.12 N 5444450.60 Ht +25.33 Lat 41 9 3.5585 Long 146 49 22.291E

547047

Offset 1 DATUM : E 485136.12 N 5444450.60
Offset 2 HYDRO TOWPOINT (Hdg) : E 485139.71 N 5444458.30
Offset 3 SSS STERN (Hdg) : E 485132.28 N 5444442.05
Offset 4 CENTRE STERN (Hdg) : E 485132.60 N 5444440.08
Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.64 N 5444441.29
Speed MG(K) : 0.0 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cmg(T) : 135.5
Line: 16INCH DTtoG(M):2059063.9 DofL(M): -9999.9 KP: -2058.558 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 15.6 Brg(T): 319.6

FIX # 30 19:36:45 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:36:45) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485136.24 N 5444450.67 Ht +25.45 Lat 41 9 3.5565 Long 146 49 22.296E
Offset 1 DATUM : E 485136.24 N 5444450.67
Offset 2 HYDRO TOWPOINT (Hdg) : E 485139.83 N 5444458.36
Offset 3 SSS STERN (Hdg) : E 485132.39 N 5444442.12
Offset 4 CENTRE STERN (Hdg) : E 485132.72 N 5444440.14
Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.76 N 5444441.35
Speed MG(K) : 0.0 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cmg(T) : 135.5
Line: 16INCH DTtoG(M):2059063.9 DofL(M): -9999.9 KP: -2058.558 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 15.7 Brg(T): 319.1

FIX # 31 19:37:00 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:37:00) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485136.07 N 5444450.82 Ht +25.52 Lat 41 9 3.5515 Long 146 49 22.289E
Offset 1 DATUM : E 485136.07 N 5444450.82
Offset 2 HYDRO TOWPOINT (Hdg) : E 485139.66 N 5444458.51
Offset 3 SSS STERN (Hdg) : E 485132.22 N 5444442.27
Offset 4 CENTRE STERN (Hdg) : E 485132.55 N 5444440.30
Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.59 N 5444441.50
Speed MG(K) : 0.0 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cmg(T) : 135.5
Line: 16INCH DTtoG(M):2059063.7 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 15.4 Brg(T): 319.2

FIX # 32 19:37:15 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:37:15) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485136.13 N 5444450.77 Ht +25.51 Lat 41 9 3.5535 Long 146 49 22.291E
Offset 1 DATUM : E 485136.13 N 5444450.77
Offset 2 HYDRO TOWPOINT (Hdg) : E 485139.67 N 5444458.49
Offset 3 SSS STERN (Hdg) : E 485132.33 N 5444442.20
Offset 4 CENTRE STERN (Hdg) : E 485132.67 N 5444440.23
Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.70 N 5444441.40
Speed MG(K) : 0.0 Corrected Gyro(T) : 350.3 Corr. : +0.0 Cmg(T) : 135.5
Line: 16INCH DTtoG(M):2059063.7 DofL(M): -9999.9 KP: -2058.557 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 15.5 Brg(T): 319.1

FIX # 33 19:37:30 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:37:30) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485135.95 N 5444450.51 Ht +25.38 Lat 41 9 3.5615 Long 146 49 22.289E
Offset 1 DATUM : E 485135.95 N 5444450.51
Offset 2 HYDRO TOWPOINT (Hdg) : E 485139.42 N 5444458.25
Offset 3 SSS STERN (Hdg) : E 485132.24 N 5444441.91
Offset 4 CENTRE STERN (Hdg) : E 485132.59 N 5444439.94
Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.61 N 5444441.07
Speed MG(K) : 0.0 Corrected Gyro(T) : 349.8 Corr. : +0.0 Cmg(T) : 135.5
Line: 16INCH DTtoG(M):2059063.9 DofL(M): -9999.9 KP: -2058.558 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 15.6 Brg(T): 320.2

FIX # 34 19:37:44 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:37:44) Logging File : MOBILE1.003
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485135.74 N 5444450.45 Ht +25.51 Lat 41 9 3.5635 Long 146 49 22.274E
Offset 1 DATUM : E 485135.74 N 5444450.45
Offset 2 HYDRO TOWPOINT (Hdg) : E 485139.12 N 5444458.23
Offset 3 SSS STERN (Hdg) : E 485132.11 N 5444441.80
Offset 4 CENTRE STERN (Hdg) : E 485132.49 N 5444439.84
Offset 5 BOOMER TOWPOINT (Hdg) : E 485127.50 N 5444440.91
Speed MG(K) : 0.0 Corrected Gyro(T) : 349.2 Corr. : +0.0 Cmg(T) : 135.5
Line: 16INCH DTtoG(M):2059063.9 DofL(M): -9999.9 KP: -2058.558 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 15.5 Brg(T): 321.0

FIX # 35 19:37:59 1 Dec 1998 Time Zone +11
BLUE FIN (Last position update 19:37:59) Logging File : MOBILE1.003

547048

APPENDIX D

STATIC DIFFERENTIAL GPS CHECK

DGPS integrity check Job No 2830C1 1 Dec 1998

FR1 Blue Fin

547049

Base Point - observation dock

Antenna over survey control point I MIV

AGD84

GNS505 System Data 1 Dec 1998 17:05:53

Job Number : 2830C1
Description : BASS STRAIT OFFSHORE PERMIT 1/27-P SITE SURVEY
Client : GLOBEX FAR EAST
Surveyor : MATTHEW TUCK / BERNARD TRAY

Note:

Antenna offset zero
for health check.

Spheroid : AGD 84

Eccentricity ² = 0.006694542
Semi-major axis = 6378160.000 Metres

Projection : UTM/IM

Grid Scale Const = 0.9996000
Unit Conv. Factor = 1.0000000
False Easting = 500000.00 Metres
False Northing = 1000000.00 Metres
Central Meridian = 147 DEG 00 MIN 00.000 SEC E
Lat of Origin = 00 DEG 00 MIN 00.000 SEC

System Type Definition

A RACAL UK00A
B Not Defined
C Not Defined
D Not Defined

Station Data for System Type A : RACAL UK00A

GPS Spheroid : WGS 84

Eccentricity ² = .00669438
Semi-major axis = 6378137.00 metres

Transformation Parameters to : AGD 84 Spheroid

DX = +116.000 Metres
DY = +50.470 Metres
DZ = -141.690 Metres
Rotation (X) = +.2300 seconds
Rotation (Y) = +.3900 seconds
Rotation (Z) = +.3440 seconds
Scaling (ppm) = -.0983

Station Data for System Type B : Not Defined

No Station Data

Station Data for System Type C : Not Defined

No Station Data

Station Data for System Type D : Not Defined

No Station Data

Pattern Corrections and Standard Deviations

System A RACAL UK00A

C-D Corrections :-
Latit. +0.000 Secs
Long. +0.000 Secs
Height +0.000 M

System B Not Defined

No Data

System C Not Defined

No Data

Pattern Corrections and Standard Deviations

System D Not Defined

No Data

Mobile System Assignments

Svs Mobile	System Type	Status
1 BLUE FIN	RACAL UK00A	ON

Receiver Pattern Codes

Sys 1 BLUE FIN
RACAL UK00A
Receiver1 Receiver2
ON OFF
Geogs 1

547050

Computation Pattern Codes

Comp 1 BLUE FIN
(ON) TRACKINGJ
LOP Patt Code SRC HRS
1 Geogs 111 1

S=System R=Receiver C=Channel *=Pattern temporarily not used in computation
Antennae/Transducer/Beacon/Target Offsets

System 1 RACAL UK00A
for BLUE FIN

Receiver 1
X Y Height
+0.00 +0.00 +0.00

Receiver 2
X Y Height
+0.00 +0.00 +0.00

.....
Heading
.....
+Y
.....
-X, X, +X
.....
-Y
.....

Offset 1= Offset 2=

Receiver Interface Addresses

BLUE FIN:-
Sys 1 RACAL UK00A
Rx 1 : 3201
Rx 2 :

P = Prioritised Receiver : Not Set.

Peripheral Interface Addresses

<u>Inputs</u>		<u>Outputs</u>
GOLF 1		Link to TUGNAV
GOLF 2		Link to GRREP
Time Sync	3201	Shell QC Output
		C-0 Output
		Nav. Echo
		Grid Position
		Mobile Position
		UIS System
		KP Output
		UIvertech Scanner
		Pseudo Nav String
		PEP-CTD Output
		Shot Controller
		Skyfix Gyro SECHDT
		KP to NeSA PRDC
		Norcom Telegrams

Comms Configuration

Digiboard 1: Addresses 3201 - 3208

547051

Addr	Baud	Data Bits	Parity	Stop Bits	Term Char	Term Count
3201	9600	8	NONE	1	10	0
3202	9600	8	NONE	1	10	0
3203	9600	8	NONE	1	10	0
3204	9600	8	NONE	1	10	0
3205	9600	8	NONE	1	10	0
3206	9600	8	NONE	1	10	0
3207	4800	8	NONE	1	10	0
3208	9600	8	NONE	1	10	0

Digiboard 2: Addresses 3301 - 3308

Not Interfaced

Digiboard 3: Addresses 3401 - 3408

Not Interfaced

Digiboard 4: Addresses 3501 - 3508

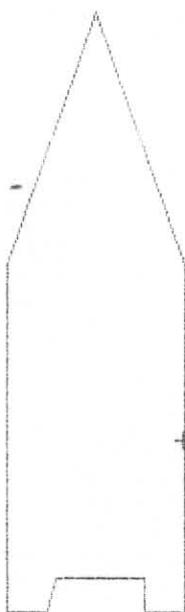
Not Interfaced

Comms Ports 1 and 2 : Addresses 9 and 11

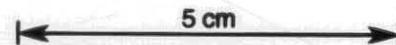
Addr	Baud	Data Bits	Parity	Stop Bits	Term Char	Term Count
9	9600	8	NONE	1	10	0
11	Not Present					

Shape Definition: BLUE FIN

Antennas Positions



Scale:  = 10 grid units



CURRENT OFFSET Posn : DATUM
+0.00 X, +0.00 Y

Waypoint Co-ordinates:

1	IHN AG094	E	485125.97	N	5444462.47
2	IHS	E	485206.80	N	5444144.61
3	IHN AG066	E	485127.27	N	5444462.34

Track Guidance Line Data:

Line Description	KP SOL	SOL East,North	EOL East,North
1 16INCH	0.000	380216.00, 7655724.00	379819.00, 7656602.00

Offsets for BLUE FIN

No	Name	X Coord	Y Coord	Dir
1	DATUM	+0.00	+0.00	On Hdg
2	HYDR0 TOWPOINT	+4.90	+7.00	On Hdg
3	SSS STERN	-5.20	-7.80	On Hdg
4	CENTRE STERN	-5.20	-9.80	On Hdg
5	BOOMER TOWPOINT	-9.90	-7.80	On Hdg

Verified by:

DEREK EVANS

(sign)

(print)

1 Dec 1998 17:08:08

Static check of the the Skyfix/Skyfix Differential GPS was carried out with the FRV Bluefish moored alongside the Northern end of the Inspection Wharf, Beauty Point, Tasmania. The vessel was moored adjacent to control point IHS enabling the vessel G.P.S. antenna to be temporarily set up over the control point. This provided a real time integrity check of the onboard navigation system. Reference stations used during the calibration were Adelaide, Melbourne and Sydney. Position fixes were made over a 15 minute period. The AGD84 and WGS84 positions generated onboard were logged and then meaned to give a comparative position to the known co-ordinated point IHN.

The following co-ordinates were provided by the Port of Launceston PTY Ltd. for control point IHN.

Co-ordinates were provided in AGD 66 Datum.

<u>Station</u>	<u>Eastings(m)</u>	<u>Northings(m)</u>
IHN	485127.266	5444462.344

A block shift from AGD 66 to AGD 84 was applied to the co-ordinates above. The values for the block shift were derived from published Australian Surveying and Lands Dept. figures calculated for Burnie. These were dE -1.30 m, dN +0.13 m from AGD66 to AGD84.

The resultant co-ordinates for station IHN in AGD84 datum were:

<u>Station</u>	<u>Eastings(m)</u>	<u>Northings(m)</u>
IHN	485125.966	5444462.474

The mean of 27 fixes taken over a period of 15 minutes provided an AGD84 position as follows.

<u>Station</u>	<u>Eastings(m)</u>	<u>Northings(m)</u>
IHN	485124.92	5444463.52

This represented a difference in position of 1.47m. (dE 1.046m, dN -1.046m).

D.G.P.S. INTEGRITY CHECK

JOB NO : 2830CI
 VESSEL : FRV "BLUEFIN"

SYSTEM : SKYFIXSPOT/MULTIFIX II
 DATE : 01-Dec-98

	<u>AGD84'</u>		<u>WGS84</u>	
Northing	Easting	Latitude	Longitude	
485124.92	5444463.63	41° 57' 57.722	146° 49'	26.707
485124.9	5444463.48	41° 57' 57.728	146° 49'	26.708
485124.72	5444463.67	41° 57' 57.723	146° 49'	26.699
485124.84	5444463.27	41° 57' 57.729	146° 49'	26.704
485124.69	5444463.5	41° 57' 57.728	146° 49'	26.696
485124.22	5444463.71	41° 57' 57.722	146° 49'	26.681
485124.71	5444463.61	41° 57' 57.722	146° 49'	26.696
485124.66	5444463.7	41° 57' 57.722	146° 49'	26.696
485124.79	5444463.45	41° 57' 57.728	146° 49'	26.701
485124.83	5444463.76	41° 57' 57.719	146° 49'	26.704
485124.99	5444463.55	41° 57' 57.725	146° 49'	26.71
485125.05	5444463.44	41° 57' 57.729	146° 49'	26.713
485124.9	5444463.52	41° 57' 57.725	146° 49'	26.705
485124.82	5444463.71	41° 57' 57.72	146° 49'	26.704
485124.96	5444463.57	41° 57' 57.728	146° 49'	26.71
485124.88	5444463.64	41° 57' 57.722	146° 49'	26.705
485124.99	5444463.41	41° 57' 57.732	146° 49'	26.714
485125.26	5444463.3	41° 57' 57.732	146° 49'	26.717
485125.33	5444463.06	41° 57' 57.74	146° 49'	26.717
485124.94	5444463.35	41° 57' 57.737	146° 49'	26.716
485125.54	5444463.13	41° 57' 57.74	146° 49'	26.731
485126.1	5444463.14	41° 57' 57.734	146° 49'	26.739
485125.14	5444463.25	41° 57' 57.735	146° 49'	26.719
485124.98	5444463.71	41° 57' 57.72	146° 49'	26.71
485125.05	5444463.46	41° 57' 57.728	146° 49'	26.713
485123.46	5444464.67	41° 57' 57.689	146° 49'	26.646
485125.1	5444463.26	41° 57' 57.734	146° 49'	26.716
Average :	485124.9174	5444463.517	41° 57' 57.726	146° 49' 26.707
Std Dev :	0.44113	0.33253	0.00962	0.01658

P2/94 logging started for BLUE FIN at fix # 1 on file C:\GNS505\GNSLOG\MOBILE1.002

FIX # 1 17:14:18 1 Dec 1998 Time Zone +11
 BLUE FIN (Last position update 17:14:18) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.92 N 5444463.63 Ht +22.72 Lat 41 9 3.1355 Long 146 49 21.811E
 Offset 1 DATUM : E 485124.92 N 5444463.63
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.53 N 5444471.32
 Offset 3 SSS STERN (Hdg) : E 485121.05 N 5444455.10
 Offset 4 CENTRE STERN (Hdg) : E 485121.37 N 5444453.12
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.41 N 5444454.34
 Speed MG(K) : 0.0 Corrected Gyro(T) : 350.8 Corr. : +0.0 Cmg(T) : 176.2
 Line: 16INCH DToG(M):2059047.4 DofL(M) : -9999.9 KP: -2058.541 CC Speed(K) : 0.0
 Waypoint: IHN AG084 Dist(M) : 1.6 Brg(T) : 135.2
 Pitch : +0.0 Roll : +0.0 Heave : +0.0 Age: 999.9
 COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.92 N 5444463.63 Ht +22.72
 C-Ds applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:14:15.0
 ANTENNA Lat: 41 8 57.722 S Long: 146 49 26.707 E Height: 5.10 M
 Mode: HT AIDED HDOP: .9 PDOP: 1.6 Output Delay(s): 1.7 Ellipse Max(m): 6.8 Ellipse Min(m): 5.9 Ellipse Dir(°): 348.0
 Lat Sd(m): 5.4 Long Sd(m): 4.8 Height Sd(m): 5.9 Unit Var: 0.0 F Test: PASS Ext Rel(m): 4.9 Ext Rel LOP: 17 W Test: OK
 Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 8 17:18:00 1 Dec 1998 Time Zone +11
 BLUE FIN (Last position update 17:18:00) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.90 N 5444463.48 Ht +22.38 Lat 41 9 3.1405 Long 146 49 21.810E
 Offset 1 DATUM : E 485124.90 N 5444463.48
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.55 N 5444471.14
 Offset 3 SSS STERN (Hdg) : E 485120.97 N 5444454.96
 Offset 4 CENTRE STERN (Hdg) : E 485121.28 N 5444452.99
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.33 N 5444454.23
 Speed MG(K) : 0.0 Corrected Gyro(T) : 351.2 Corr. : +0.0 Cmg(T) : 176.2
 Line: 16INCH DToG(M):2059047.5 DofL(M) : -9999.9 KP: -2058.541 CC Speed(K) : 0.0
 Waypoint: IHN AG084 Dist(M) : 1.5 Brg(T) : 133.3
 Pitch : +0.0 Roll : +0.0 Heave : +0.0 Age: 999.9
 Deso 25 Chan 1 : 14.25 GMS Corrections for Heave: OFF Tdr Z Corr: OFF Depth Sensor: OFF Age: 0.0
 COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.90 N 5444463.48 Ht +22.38
 C-Ds applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:17:57.0
 ANTENNA Lat: 41 8 57.728 S Long: 146 49 26.708 E Height: 4.80 M
 Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 1.7 Ellipse Max(m): 7.0 Ellipse Min(m): 6.0 Ellipse Dir(°): 339.0
 Lat Sd(m): 5.5 Long Sd(m): 4.9 Height Sd(m): 7.1 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.3 Ext Rel LOP: 17 W Test: OK
 Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 9 17:18:30 1 Dec 1998 Time Zone +11
 BLUE FIN (Last position update 17:18:30) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.72 N 5444463.67 Ht +22.32 Lat 41 9 3.1346 Long 146 49 21.802E
 Offset 1 DATUM : E 485124.72 N 5444463.67
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.32 N 5444471.35
 Offset 3 SSS STERN (Hdg) : E 485120.84 N 5444455.13
 Offset 4 CENTRE STERN (Hdg) : E 485121.16 N 5444453.16
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.20 N 5444454.37
 Speed MG(K) : 0.0 Corrected Gyro(T) : 350.8 Corr. : +0.0 Cmg(T) : 176.2
 Line: 16INCH DToG(M):2059047.3 DofL(M) : -9999.9 KP: -2058.541 CC Speed(K) : 0.0
 Waypoint: IHN AG084 Dist(M) : 1.7 Brg(T) : 133.8
 Pitch : +0.0 Roll : +0.0 Heave : +0.0 Age: 999.9
 Deso 25 Chan 1 : 14.35 GMS Corrections for Heave: OFF Tdr Z Corr: OFF Depth Sensor: OFF Age: 9.2
 COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.72 N 5444463.67 Ht +22.32
 C-Ds applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:18:27.0
 ANTENNA Lat: 41 8 57.723 S Long: 146 49 26.899 E Height: 4.70 M
 Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 1.7 Ellipse Max(m): 7.0 Ellipse Min(m): 6.0 Ellipse Dir(°): 338.0
 Lat Sd(m): 5.5 Long Sd(m): 4.9 Height Sd(m): 7.2 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.4 Ext Rel LOP: 17 W Test: OK
 Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 10 17:18:59 1 Dec 1998 Time Zone +11
 BLUE FIN (Last position update 17:18:59) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.84 N 5444463.27 Ht +22.28 Lat 41 9 3.1465 Long 146 49 21.808E
 Offset 1 DATUM : E 485124.84 N 5444463.27
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.43 N 5444470.97
 Offset 3 SSS STERN (Hdg) : E 485120.99 N 5444454.73

Offset 4 CENTRE STERN (Hdg) : E 485121.32 N 5444452.75
Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.36 N 5444452.95

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Speed MG(K): 0.0 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cmg(T) : 176.2
Line: 16INCH DTaG(M):2059047.7 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
Waypoint: IHN A6084 Dist(M): 1.4 Brg(T): 125.5
Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.84 N 5444463.27 Ht +22.26
C-U's applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
UTC Time :06:18:57.0

ANTENNA Lat: 41 8 57.729 S Long: 146 49 26.704 E Height: 4.60 M
Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 1.7 Ellipse Max(m): 7.0 Ellipse Min(m): 6.0 Ellipse Dir(°): 336.0
Lat Sd(m): 5.5 Long Sd(m): 5.0 Height Sd(m): 7.2 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.4 Ext Rel LOP: 17 U Test: OK
Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 11 17:19:29 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:19:29) Logging File : MOBILE1.002
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485124.63 N 5444463.50 Ht +22.40 Lat 41 9 3.1395 Long 146 49 21.801E
Offset 1 DATUM : E 485124.69 N 5444463.50
Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.30 N 5444471.18
Offset 3 SSS STERN (Hdg) : E 485120.81 N 5444454.96
Offset 4 CENTRE STERN (Hdg) : E 485121.14 N 5444452.99
Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.18 N 5444454.20
Speed MG(K): 0.0 Corrected Gyro(T) : 350.8 Corr. : +0.0 Cmg(T) : 176.2
Line: 16INCH DTaG(M):2059047.4 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
Waypoint: IHN A6084 Dist(M): 1.6 Brg(T): 128.8
Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.69 N 5444463.50 Ht +22.40
C-U's applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
UTC Time :06:19:27.0

ANTENNA Lat: 41 8 57.728 S Long: 146 49 26.696 E Height: 4.70 M
Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 1.6 Ellipse Max(m): 7.0 Ellipse Min(m): 6.1 Ellipse Dir(°): 335.0
Lat Sd(m): 5.5 Long Sd(m): 5.0 Height Sd(m): 7.2 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.5 Ext Rel LOP: 17 U Test: OK
Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 12 17:19:59 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:19:59) Logging File : MOBILE1.002
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485124.22 N 5444463.71 Ht +22.44 Lat 41 9 3.1325 Long 146 49 21.781E
Offset 1 DATUM : E 485124.22 N 5444463.71
Offset 2 HYDRO TOWPOINT (Hdg) : E 485127.81 N 5444471.40
Offset 3 SSS STERN (Hdg) : E 485120.37 N 5444455.16
Offset 4 CENTRE STERN (Hdg) : E 485120.70 N 5444453.19
Offset 5 BOOMER TOWPOINT (Hdg) : E 485115.74 N 5444454.39
Speed MG(K): 0.0 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cmg(T) : 176.2
Line: 16INCH DTaG(M):2059047.1 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
Waypoint: IHN A6084 Dist(M): 2.1 Brg(T): 125.4
Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.22 N 5444463.71 Ht +22.44
C-U's applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
UTC Time :06:19:56.0

ANTENNA Lat: 41 8 57.722 S Long: 146 49 26.681 E Height: 4.80 M
Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 2.6 Ellipse Max(m): 7.1 Ellipse Min(m): 6.1 Ellipse Dir(°): 334.0
Lat Sd(m): 5.5 Long Sd(m): 5.0 Height Sd(m): 7.3 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.6 Ext Rel LOP: 17 U Test: OK
Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 13 17:20:30 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:20:30) Logging File : MOBILE1.002
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 485124.71 N 5444463.61 Ht +22.31 Lat 41 9 3.1355 Long 146 49 21.802E
Offset 1 DATUM : E 485124.71 N 5444463.61
Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.30 N 5444471.31
Offset 3 SSS STERN (Hdg) : E 485120.86 N 5444455.07
Offset 4 CENTRE STERN (Hdg) : E 485121.19 N 5444453.09
Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.23 N 5444454.30
Speed MG(K): 0.0 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cmg(T) : 176.2
Line: 16INCH DTaG(M):2059047.3 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
Waypoint: IHN A6084 Dist(M): 1.7 Brg(T): 132.4
Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.71 N 5444463.61 Ht +22.31
C-U's applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
UTC Time :06:20:27.0

ANTENNA Lat: 41 8 57.722 S Long: 146 49 26.696 E Height: 4.70 M
Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 1.7 Ellipse Max(m): 7.1 Ellipse Min(m): 6.0 Ellipse Dir(°): 334.0
Lat Sd(m): 5.5 Long Sd(m): 5.0 Height Sd(m): 7.3 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.6 Ext Rel LOP: 17 U Test: OK
Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 14 17:21:00 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:21:00) Logging File : MOBILE1.002
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)

DATUM : E 495124.66 N 5444463.70 Ht +22.54 Lat 41 9 3.1325 Long 146 49 21.800E
Offset 1 DATUM : E 495124.66 N 5444463.70

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Offset 2 HYDRO TOWPOINT (Hdg) : E 495128.23 N 5444471.41
Offset 3 SSS STERN (Hdg) : E 495120.84 N 5444455.14
Offset 4 CENTRE STERN (Hdg) : E 495121.17 N 5444453.17
Offset 5 BOOMER TOWPOINT (Hdg) : E 495116.21 N 5444454.36
Speed MG(K) : 0.0 Corrected Gyro(T) : 350.5 Corr. : +0.0 Cmg(T) : 176.2
Line: 16INCH DTOf(M):2059047.2 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 1.8 Brg(T): 133.4
Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 495124.66 N 5444463.70 Ht +22.54
C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
UTC Time :06:20:56.0

ANTENNA Lat: 41 8 57.722 S Long: 146 49 26.696 E Height: 4.90 M
Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 2.6 Ellipse Max(m): 7.1 Ellipse Min(m): 6.1 Ellipse Dir(°): 333.0
Lat Sd(m): 5.5 Long Sd(m): 5.0 Height Sd(m): 7.4 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.7 Ext Rel LOP: 17 U Test: OK
Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 15 17:21:29 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 17:21:29) Logging File : MOBILE1.002
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 495124.79 N 5444463.45 Ht +22.41 Lat 41 9 3.1415 Long 146 49 21.805E
Offset 1 DATUM : E 495124.79 N 5444463.45
Offset 2 HYDRO TOWPOINT (Hdg) : E 495128.37 N 5444471.14
Offset 3 SSS STERN (Hdg) : E 495120.94 N 5444454.90
Offset 4 CENTRE STERN (Hdg) : E 495121.27 N 5444452.93
Offset 5 BOOMER TOWPOINT (Hdg) : E 495116.30 N 5444454.13
Speed MG(K) : 0.0 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cmg(T) : 176.2
Line: 16INCH DTOf(M):2059047.5 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 1.5 Brg(T): 129.8
Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 495124.79 N 5444463.45 Ht +22.41
C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
UTC Time :06:21:27.0

ANTENNA Lat: 41 8 57.728 S Long: 146 49 26.701 E Height: 4.80 M
Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 1.7 Ellipse Max(m): 7.1 Ellipse Min(m): 6.1 Ellipse Dir(°): 332.0
Lat Sd(m): 5.5 Long Sd(m): 5.0 Height Sd(m): 7.4 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.8 Ext Rel LOP: 17 U Test: OK
Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 16 17:21:59 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 17:21:59) Logging File : MOBILE1.002
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 495124.83 N 5444463.75 Ht +22.75 Lat 41 9 3.1315 Long 146 49 21.807E
Offset 1 DATUM : E 495124.83 N 5444463.75
Offset 2 HYDRO TOWPOINT (Hdg) : E 495128.40 N 5444471.46
Offset 3 SSS STERN (Hdg) : E 495121.01 N 5444455.20
Offset 4 CENTRE STERN (Hdg) : E 495121.34 N 5444453.23
Offset 5 BOOMER TOWPOINT (Hdg) : E 495116.37 N 5444454.41
Speed MG(K) : 0.0 Corrected Gyro(T) : 350.5 Corr. : +0.0 Cmg(T) : 176.2
Line: 16INCH DTOf(M):2059047.3 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 1.7 Brg(T): 136.6
Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 495124.83 N 5444463.75 Ht +22.75
C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
UTC Time :06:21:57.0

ANTENNA Lat: 41 8 57.719 S Long: 146 49 26.704 E Height: 5.20 M
Mode: HT AIDED HDOP: .9 PDOP: 1.7 Output Delay(s): 1.7 Ellipse Max(m): 7.2 Ellipse Min(m): 6.1 Ellipse Dir(°): 331.0
Lat Sd(m): 5.5 Long Sd(m): 5.1 Height Sd(m): 7.4 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.9 Ext Rel LOP: 17 U Test: OK
Total SVs: 22 SVs: 1,3,29,17,21,23,26,31 Reference Stns: 208,205,204,

FIX # 17 17:22:29 1 Dec 1998 Time Zone +11

BLUE FIX (Last position update 17:22:29) Logging File : MOBILE1.002
CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
DATUM : E 495124.99 N 5444463.55 Ht +22.63 Lat 41 9 3.1375 Long 146 49 21.814E
Offset 1 DATUM : E 495124.99 N 5444463.55
Offset 2 HYDRO TOWPOINT (Hdg) : E 495128.57 N 5444471.25
Offset 3 SSS STERN (Hdg) : E 495121.14 N 5444455.01
Offset 4 CENTRE STERN (Hdg) : E 495121.47 N 5444453.03
Offset 5 BOOMER TOWPOINT (Hdg) : E 495116.50 N 5444454.24
Speed MG(K) : 0.0 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cmg(T) : 176.2
Line: 16INCH DTOf(M):2059047.5 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
Waypoint: IHN AG084 Dist(M): 1.5 Brg(T): 137.9
Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 495124.99 N 5444463.55 Ht +22.63
C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
UTC Time :06:22:27.0

ANTENNA Lat: 41 8 57.725 S Long: 146 49 26.710 E Height: 5.00 M
Mode: HT AIDED HDOP: 1.1 PDOP: 2.2 Output Delay(s): 1.7 Ellipse Max(m): 7.2 Ellipse Min(m): 6.1 Ellipse Dir(°): 330.0
Lat Sd(m): 5.5 Long Sd(m): 5.1 Height Sd(m): 7.5 Unit Var: 0.0 F Test: PASS Ext Rel(m): 6.0 Ext Rel LOP: 17 U Test: OK
Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 18 17:23:00 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:23:00) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485125.05 N 544463.44 Ht +22.37 Lat 41 9 3.1415 Long 146 49 21.817E
 Offset 1 DATUM : E 485125.05 N 544463.44
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.61 N 5444471.15
 Offset 3 SSS STERN (Hdg) : E 485121.22 N 5444454.89
 Offset 4 CENTRE STERN (Hdg) : E 485121.56 N 5444452.91
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.59 N 5444454.10
 Speed MG(K) : 0.0 Corrected Gyro(T) : 350.5 Corr. : +0.0 Cng(T) : 176.2
 Line: 16INCH DToG(M):2059047.6 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
 Waypoint: IHN AG084 Dist(M): 1.3 Brg(T): 136.7
 Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
 COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 485125.05 N 544463.44 Ht +22.37
 C-Us applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:22:57.0
 ANTENNA Lat: 41 8 57.729 S Long: 146 49 26.713 E Height: 4.80 M
 Mode: HT AIDED HDOP: 1.1 PDOP: 2.2 Output Delay(s): 1.7 Ellipse Max(m): 7.2 Ellipse Min(m): 6.1 Ellipse Dir(°): 329.6
 Lat Sd(m): 5.5 Long Sd(m): 5.1 Height Sd(m): 7.5 Unit Var: 0.0 F Test: PASS Ext Rel(m): 6.0 Ext Rel LOP: 17 U Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 19 17:23:30 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:23:30) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.90 N 544463.52 Ht +22.50 Lat 41 9 3.1395 Long 146 49 21.810E
 Offset 1 DATUM : E 485124.90 N 544463.52
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.47 N 5444471.22
 Offset 3 SSS STERN (Hdg) : E 485121.08 N 5444454.96
 Offset 4 CENTRE STERN (Hdg) : E 485121.41 N 5444452.99
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.44 N 5444454.17
 Speed MG(K) : 0.0 Corrected Gyro(T) : 350.5 Corr. : +0.0 Cng(T) : 176.2
 Line: 16INCH DToG(M):2059047.5 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
 Waypoint: IHN AG084 Dist(M): 1.5 Brg(T): 134.5
 Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
 COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 485124.90 N 544463.52 Ht +22.50
 C-Us applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:23:26.0
 ANTENNA Lat: 41 8 57.725 S Long: 146 49 26.705 E Height: 5.00 M
 Mode: HT AIDED HDOP: 1.1 PDOP: 2.2 Output Delay(s): 2.6 Ellipse Max(m): 7.2 Ellipse Min(m): 6.1 Ellipse Dir(°): 330.0
 Lat Sd(m): 5.5 Long Sd(m): 5.1 Height Sd(m): 7.5 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.9 Ext Rel LOP: 17 U Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 20 17:23:59 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:23:59) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.82 N 544463.71 Ht +22.40 Lat 41 9 3.1325 Long 146 49 21.807E
 Offset 1 DATUM : E 485124.82 N 544463.71
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.48 N 5444471.37
 Offset 3 SSS STERN (Hdg) : E 485120.90 N 5444455.19
 Offset 4 CENTRE STERN (Hdg) : E 485121.21 N 5444453.22
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.26 N 5444454.46
 Speed MG(K) : 0.0 Corrected Gyro(T) : 351.2 Corr. : +0.0 Cng(T) : 176.2
 Line: 16INCH DToG(M):2059047.3 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
 Waypoint: IHN AG084 Dist(M): 1.7 Brg(T): 137.3
 Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
 COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 485124.82 N 544463.71 Ht +22.40
 C-Us applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:23:56.0
 ANTENNA Lat: 41 8 57.720 S Long: 146 49 26.704 E Height: 4.80 M
 Mode: HT AIDED HDOP: 1.1 PDOP: 2.2 Output Delay(s): 2.6 Ellipse Max(m): 7.2 Ellipse Min(m): 6.1 Ellipse Dir(°): 329.0
 Lat Sd(m): 5.5 Long Sd(m): 5.1 Height Sd(m): 7.5 Unit Var: 0.0 F Test: PASS Ext Rel(m): 6.0 Ext Rel LOP: 17 U Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 21 17:24:29 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:24:29) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.96 N 544463.57 Ht +22.46 Lat 41 9 3.1375 Long 146 49 21.813E
 Offset 1 DATUM : E 485124.96 N 544463.57
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.61 N 5444471.22
 Offset 3 SSS STERN (Hdg) : E 485121.01 N 5444455.07
 Offset 4 CENTRE STERN (Hdg) : E 485121.32 N 5444453.09
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.37 N 5444454.35
 Speed MG(K) : 0.0 Corrected Gyro(T) : 351.3 Corr. : +0.0 Cng(T) : 176.2
 Line: 16INCH DToG(M):2059047.5 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
 Waypoint: IHN AG084 Dist(M): 1.5 Brg(T): 137.6
 Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9
 COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 485124.96 N 544463.57 Ht +22.46
 C-Us applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:24:27.0
 ANTENNA Lat: 41 8 57.728 S Long: 146 49 26.710 E Height: 4.90 M

Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.7 Ellipse Max(m): 7.1 Ellipse Min(m): 6.1 Ellipse Dir(°): 329.0
 Lat Sd(m): 5.5 Long Sd(m): 5.1 Height Sd(m): 7.5 Unit Var: 0.0 F Test: PASS Ext Rel(m): 0.0 Ext Rel LOP: 17 W Test: OK

Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 22 17:24:59 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:24:59) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.88 N 544463.64 Ht +22.28 Lat 41 9 3.1345 Long 146 49 21.804E
 Offset 1 DATUM : E 485124.88 N 544463.64
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.58 N 544471.28
 Offset 3 SSS STERN (Hdg) : E 485120.51 N 544455.15
 Offset 4 CENTRE STERN (Hdg) : E 485121.21 N 544453.18
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.26 N 544454.45
 Speed MG(K): 0.0 Corrected Gyro(T) : 351.5 Corr. : +0.0 Cmg(T) : 176.2
 Line: 16INCH DTtoG(M):2059047.4 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
 Waypoint: IHN AG084 Dist(M): 1.6 Brg(T): 137.2
 Pitch : +0.0 Roll : +0.0 Heave : +0.0 Age: 999.9
 COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.88 N 544463.64 Ht +22.28
 C-Us applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:24:57.0

ANTENNA Lat: 41 8 57.722 S Long: 146 49 26.705 E Height: 4.70 M
 Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.7 Ellipse Max(m): 7.2 Ellipse Min(m): 6.1 Ellipse Dir(°): 328.0
 Lat Sd(m): 5.5 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 6.0 Ext Rel LOP: 17 W Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 23 17:25:30 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:25:30) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485124.99 N 544463.41 Ht +22.51 Lat 41 9 3.1425 Long 146 49 21.814E
 Offset 1 DATUM : E 485124.99 N 544463.41
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.71 N 544471.04
 Offset 3 SSS STERN (Hdg) : E 485120.99 N 544454.93
 Offset 4 CENTRE STERN (Hdg) : E 485121.29 N 544452.95
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.35 N 544454.24
 Speed MG(K): 0.0 Corrected Gyro(T) : 351.7 Corr. : +0.0 Cmg(T) : 176.2
 Line: 16INCH DTtoG(M):2059047.6 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
 Waypoint: IHN AG084 Dist(M): 1.4 Brg(T): 134.1
 Pitch : +0.0 Roll : +0.0 Heave : +0.0 Age: 999.9
 COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485124.99 N 544463.41 Ht +22.51
 C-Us applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:25:27.0

ANTENNA Lat: 41 8 57.732 S Long: 146 49 26.714 E Height: 4.80 M
 Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.7 Ellipse Max(m): 7.1 Ellipse Min(m): 6.1 Ellipse Dir(°): 329.0
 Lat Sd(m): 5.4 Long Sd(m): 5.1 Height Sd(m): 7.5 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.9 Ext Rel LOP: 17 W Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 24 17:26:00 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:26:00) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485125.26 N 544463.30 Ht +22.50 Lat 41 9 3.1463 Long 146 49 21.826E
 Offset 1 DATUM : E 485125.26 N 544463.30
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.58 N 544470.94
 Offset 3 SSS STERN (Hdg) : E 485121.29 N 544454.80
 Offset 4 CENTRE STERN (Hdg) : E 485121.29 N 544452.83
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.64 N 544454.10
 Speed MG(K): 0.0 Corrected Gyro(T) : 351.5 Corr. : +0.0 Cmg(T) : 176.2
 Line: 16INCH DTtoG(M):2059047.9 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
 Waypoint: IHN AG084 Dist(M): 1.1 Brg(T): 139.5
 Pitch : +0.0 Roll : +0.0 Heave : +0.0 Age: 999.9
 COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM : E 485125.26 N 544463.30 Ht +22.50
 C-Us applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC Time :06:25:57.0

ANTENNA Lat: 41 8 57.732 S Long: 146 49 26.717 E Height: 4.90 M
 Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.7 Ellipse Max(m): 7.1 Ellipse Min(m): 6.1 Ellipse Dir(°): 328.0
 Lat Sd(m): 5.4 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.9 Ext Rel LOP: 17 W Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 25 17:26:29 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:26:29) Logging File : MOBILE1.002
 CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)
 DATUM : E 485125.33 N 544463.06 Ht +22.25 Lat 41 9 3.1535 Long 146 49 21.829E
 Offset 1 DATUM : E 485125.33 N 544463.06
 Offset 2 HYDRO TOWPOINT (Hdg) : E 485129.01 N 544470.71
 Offset 3 SSS STERN (Hdg) : E 485121.39 N 544454.55
 Offset 4 CENTRE STERN (Hdg) : E 485121.69 N 544452.58
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.74 N 544453.84
 Speed MG(K): 0.0 Corrected Gyro(T) : 351.3 Corr. : +0.0 Cmg(T) : 176.2
 Line: 16INCH DTtoG(M):2059048.1 DofL(M): -9999.9 KP: -2058.542 CC Speed(K): 0.0
 Waypoint: IHN AG084 Dist(M): .9 Brg(T): 132.8
 Pitch : +0.0 Roll : +0.0 Heave : +0.0 Age: 999.9

COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 485125.33 N 544463.06 Ht +22.23
 C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84

UTC Time :06:26:27.0

ANTENNA Lat: 41 8 57.740 S Long: 146 19 26.717 E Height: 4.70 M
 Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.7 Ellipse Max(m): 7.1 Ellipse Min(m): 6.1 Ellipse Dir(°): 328.0
 Lat Sd(m): 5.4 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.8 Ext Rel LOP: 17 U Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 26 17:26:59 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:26:59) Logging File : MOBILE1.002

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)

DATUM : E 485124.94 N 544463.35 Ht +22.21 Lat 41 9 3.1445 Long 146 49 21.812E

Offset 1 DATUM : E 485124.94 N 544463.35

Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.64 N 544470.99

Offset 3 SSS STERN (Hdg) : E 485120.97 N 544454.86

Offset 4 CENTRE STERN (Hdg) : E 485121.27 N 544452.88

Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.32 N 544454.16

Speed MG(K): 0.0 Corrected Gyro(T) : 351.5 Corr. : +0.0 Cng(T) : 176.2

Line: 16INCH DToG(M):2059047.7 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0

Waypoint: IHN AG084 Dist(M): 1.3 Brg(T): 130.7

Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9

COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 485124.94 N 544463.35 Ht +22.21

C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84

UTC Time :06:26:57.0

ANTENNA Lat: 41 8 57.737 S Long: 146 49 26.716 E Height: 4.60 M

Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.8 Ellipse Max(m): 7.0 Ellipse Min(m): 6.1 Ellipse Dir(°): 328.0
 Lat Sd(m): 5.4 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.8 Ext Rel LOP: 17 U Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 27 17:27:29 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:27:29) Logging File : MOBILE1.002

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)

DATUM : E 485125.54 N 544463.13 Ht +22.10 Lat 41 9 3.1515 Long 146 49 21.838E

Offset 1 DATUM : E 485125.54 N 544463.13

Offset 2 HYDRO TOWPOINT (Hdg) : E 485129.22 N 544470.78

Offset 3 SSS STERN (Hdg) : E 485121.53 N 544454.63

Offset 4 CENTRE STERN (Hdg) : E 485121.90 N 544452.65

Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.95 N 544453.91

Speed MG(K): 0.0 Corrected Gyro(T) : 351.3 Corr. : +0.0 Cng(T) : 176.2

Line: 16INCH DToG(M):2059048.1 DofL(M): -9999.9 KP: -2058.542 CC Speed(K): 0.0

Waypoint: IHN AG084 Dist(M): .8 Brg(T): 147.2

Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9

COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 485125.54 N 544463.13 Ht +22.10

C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84

UTC Time :06:27:27.0

ANTENNA Lat: 41 8 57.740 S Long: 146 49 26.731 E Height: 4.50 M

Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.7 Ellipse Max(m): 7.0 Ellipse Min(m): 6.1 Ellipse Dir(°): 328.0
 Lat Sd(m): 5.4 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.8 Ext Rel LOP: 17 U Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 28 17:28:00 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:28:00) Logging File : MOBILE1.002

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)

DATUM : E 485126.10 N 544463.14 Ht +21.90 Lat 41 9 3.1515 Long 146 49 21.862E

Offset 1 DATUM : E 485126.10 N 544463.14

Offset 2 HYDRO TOWPOINT (Hdg) : E 485129.79 N 544470.78

Offset 3 SSS STERN (Hdg) : E 485122.12 N 544454.65

Offset 4 CENTRE STERN (Hdg) : E 485122.42 N 544452.67

Offset 5 BOOMER TOWPOINT (Hdg) : E 485117.48 N 544453.95

Speed MG(K): 0.0 Corrected Gyro(T) : 351.5 Corr. : +0.0 Cng(T) : 176.2

Line: 16INCH DToG(M):2059048.3 DofL(M): -9999.9 KP: -2058.542 CC Speed(K): 0.0

Waypoint: IHN AG084 Dist(M): .7 Brg(T): 191.2

Pitch : +0.0 Roll : +0.0 Heave: +0.0 Age: 999.9

COMP 1 RACAL UK00A (Tracking) DESKEWED DATUM : E 485126.10 N 544463.14 Ht +21.90

C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84

UTC Time :06:27:57.0

ANTENNA Lat: 41 8 57.734 S Long: 146 49 26.739 E Height: 4.50 M

Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.8 Ellipse Max(m): 7.0 Ellipse Min(m): 6.1 Ellipse Dir(°): 327.0
 Lat Sd(m): 5.4 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.8 Ext Rel LOP: 17 U Test: OK
 Total SVs: 21 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 29 17:28:30 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:28:30) Logging File : MOBILE1.002

CURRENT OFFSET FROM DATUM : +0.00 X +0.00 Y (DATUM)

DATUM : E 485125.14 N 544463.25 Ht +22.26 Lat 41 9 3.1475 Long 146 49 21.821E

Offset 1 DATUM : E 485125.14 N 544463.25

Offset 2 HYDRO TOWPOINT (Hdg) : E 485128.81 N 544470.90

Offset 3 SSS STERN (Hdg) : E 485121.19 N 544454.75

Offset 4 CENTRE STERN (Hdg) : E 485121.50 N 544452.77

Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.55 N 544454.16

Speed MG(K): 0.0 Corrected Gyro(T): 351.3 Corr. : +0.0 Cmg(T): 175.2
Line: 16INCH DToG(M): 2059017.8 DofL(M): -9999.9 KP: -2058.54 CC Speed(K): 0.0

547061

Waypoint: IHN AG084 Dist(M): 1.1 Brg(T): 133.3
Pitch: +0.0 Roll: +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM: E 485125.11 N 544463.25 Ht +22.25
C-0s applied: dLat: +0.00 dLong: +0.00 dHeight: +0.00 Rx spheroid: WGS 84
UTC Time :06:28:27.0

ANTENNA Lat: 41 8 57.735 S Long: 146 49 26.719 E Height: 4.50 M
Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.7 Ellipse Max(m): 7.0 Ellipse Min(m): 6.1 Ellipse Dir(°): 328.0
Lat Sd(m): 5.4 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.7 Ext Rel LOP: 17 U Test: OK
Total SVs: 20 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 30 17:29:00 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:29:00) Logging File: MOBILE1.002

CURRENT OFFSET FROM DATUM: +0.00 X +0.00 Y (DATUM)
DATUM: E 485124.98 N 544463.71 Ht +22.27 Lat 41 9 3.1525 Long 146 49 21.814E
Offset 1 DATUM (Hdg): E 485124.98 N 544463.71
Offset 2 HYDRO TOWPOINT (Hdg): E 485128.63 N 5444471.38
Offset 3 SSS STERN (Hdg): E 485121.06 N 5444465.20
Offset 4 CENTRE STERN (Hdg): E 485121.57 N 5444453.22
Offset 5 BOOMER TOWPOINT (Hdg): E 485116.41 N 5444454.47

Speed MG(K): 0.0 Corrected Gyro(T): 351.2 Corr. : +0.0 Cmg(T): 176.2
Line: 16INCH DToG(M): 2059047.4 DofL(M): -9999.9 KP: -2058.54 CC Speed(K): 0.0

Waypoint: IHN AG084 Dist(M): 1.6 Brg(T): 141.6
Pitch: +0.0 Roll: +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM: E 485124.98 N 544463.71 Ht +22.27
C-0s applied: dLat: +0.00 dLong: +0.00 dHeight: +0.00 Rx spheroid: WGS 84
UTC Time :06:28:56.0

ANTENNA Lat: 41 8 57.720 S Long: 146 49 26.710 E Height: 4.60 M
Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 2.7 Ellipse Max(m): 7.0 Ellipse Min(m): 6.1 Ellipse Dir(°): 327.0
Lat Sd(m): 5.4 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.7 Ext Rel LOP: 17 U Test: OK
Total SVs: 20 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 31 17:29:29 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:29:29) Logging File: MOBILE1.002

CURRENT OFFSET FROM DATUM: +0.00 X +0.00 Y (DATUM)
DATUM: E 485125.05 N 544463.46 Ht +22.37 Lat 41 9 3.1405 Long 146 49 21.817E
Offset 1 DATUM (Hdg): E 485125.05 N 544463.46
Offset 2 HYDRO TOWPOINT (Hdg): E 485128.68 N 5444471.13
Offset 3 SSS STERN (Hdg): E 485121.15 N 5444454.93
Offset 4 CENTRE STERN (Hdg): E 485121.17 N 5444452.96
Offset 5 BOOMER TOWPOINT (Hdg): E 485116.51 N 5444454.19

Speed MG(K): 0.0 Corrected Gyro(T): 351.0 Corr. : +0.0 Cmg(T): 176.2
Line: 16INCH DToG(M): 2059047.6 DofL(M): -9999.9 KP: -2058.54 CC Speed(K): 0.0

Waypoint: IHN AG084 Dist(M): 1.3 Brg(T): 137.1
Pitch: +0.0 Roll: +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM: E 485125.05 N 544463.46 Ht +22.37
C-0s applied: dLat: +0.00 dLong: +0.00 dHeight: +0.00 Rx spheroid: WGS 84
UTC Time :06:29:27.0

ANTENNA Lat: 41 8 57.728 S Long: 146 49 26.713 E Height: 4.70 M
Mode: HT AIDED HDOP: 1.1 PDOP: 2.3 Output Delay(s): 1.8 Ellipse Max(m): 6.9 Ellipse Min(m): 6.0 Ellipse Dir(°): 327.0
Lat Sd(m): 5.3 Long Sd(m): 5.1 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.6 Ext Rel LOP: 17 U Test: OK
Total SVs: 20 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

FIX # 32 17:29:59 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:29:59) Logging File: MOBILE1.002

CURRENT OFFSET FROM DATUM: +0.00 X +0.00 Y (DATUM)
DATUM: E 485123.46 N 544464.67 Ht +22.01 Lat 41 9 3.1015 Long 146 49 21.749E
Offset 1 DATUM (Hdg): E 485123.46 N 544464.67
Offset 2 HYDRO TOWPOINT (Hdg): E 485127.05 N 5444472.37
Offset 3 SSS STERN (Hdg): E 485119.61 N 5444456.12
Offset 4 CENTRE STERN (Hdg): E 485119.94 N 5444454.15
Offset 5 BOOMER TOWPOINT (Hdg): E 485114.98 N 5444455.35

Speed MG(K): .3 Corrected Gyro(T): 350.7 Corr. : +0.0 Cmg(T): 307.8
Line: 16INCH DToG(M): 2059045.9 DofL(M): -9999.9 KP: -2058.539 CC Speed(K): 0.0

Waypoint: IHN AG084 Dist(M): 3.3 Brg(T): 131.4
Pitch: +0.0 Roll: +0.0 Heave: +0.0 Age: 999.9
COMP 1 RACAL UK008 (Tracking) DESKEWED DATUM: E 485123.46 N 544464.67 Ht +22.01
C-0s applied: dLat: +0.00 dLong: +0.00 dHeight: +0.00 Rx spheroid: WGS 84
UTC Time :06:29:57.0

ANTENNA Lat: 41 8 57.689 S Long: 146 49 26.646 E Height: 4.40 M
Mode: HT AIDED HDOP: 1.1 PDOP: 2.4 Output Delay(s): 1.7 Ellipse Max(m): 8.6 Ellipse Min(m): 7.5 Ellipse Dir(°): 316.0
Lat Sd(m): 6.5 Long Sd(m): 6.4 Height Sd(m): 8.2 Unit Var: 0.0 F Test: PASS Ext Rel(m): 9.7 Ext Rel LOP: 17 U Test: OK
Total SVs: 13 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,204,

FIX # 33 17:30:30 1 Dec 1998 Time Zone +11

BLUE FIN (Last position update 17:30:30) Logging File: MOBILE1.002

CURRENT OFFSET FROM DATUM: +0.00 X +0.00 Y (DATUM)
DATUM: E 485125.10 N 544463.26 Ht +22.44 Lat 41 9 3.1475 Long 146 49 21.819E
Offset 1 DATUM (Hdg): E 485125.10 N 544463.26

Offset 2 HVRD TOWPOINT (Hdg) : E 485128.68 N 544470.95
 Offset 3 SSS STERN (Hdg) : E 485121.25 N 544464.71

Offset 4 CENTRE STERN (Hdg) : E 485121.58 N 544462.74
 Offset 5 BOOMER TOWPOINT (Hdg) : E 485116.61 N 544463.94
 Speed MG(K) : 1 Corrected Gyro(T) : 350.7 Corr. : +0.0 Cng(T) : 136.7
 Line: 16INCH DToG(M):2053047.8 DofL(M): -9999.9 KP: -2058.541 CC Speed(K): 0.0
 Waypoint: IHN AG884 Dist(M): 1.2 Org(T): 132.3
 Pitch : +0.0 Roll : +0.0 Heave : +0.0 Age: 999.9
 COMP 1 RACAL UK00A (Tracking): GSKEDCO DATUM : E 485125.10 N 544463.26 Ht +22.44
 C-0s applied : dLat : +0.00 dLong : +0.00 dHeight : +0.00 Rx spheroid : WGS 84
 UTC time :06:30:27.0

ANTENNA Lat: 41 8 57.734 S Long: 146 49 26.716 E Height: 4.80 M
 Mode: HT AIDED HDOP: 1.1 PDOP: 2.4 Output Delay(s): 1.7 Ellipse Max(m): 6.9 Ellipse Min(m): 6.0 Ellipse Dir(°): 327.0
 Lat Sd(m): 5.3 Long Sd(m): 5.0 Height Sd(m): 7.6 Unit Var: 0.0 F Test: PASS Ext Rel(m): 5.6 Ext Rel LOP: 17 U Test: OK
 Total SVs: 20 SVs: 1,3,29,17,21,23,31 Reference Stns: 208,205,204,

Mean 485124.92 AGD 84
 5444463.52

WGS 84 41° 8' 57.726" 485238.749mE
 146° 49' 26.707" 5444666.509mN
 UTM Zone 55

Antenna over control point IHN.

coords: E 485127.266 } AGD 66
 N 5444462.344 }

Block shift to AGD 84 (from Australian Lands dept)

Bearing E -1.30m, N +0.13m

coords: E 485125.966 } AGD 84
 N 5444462.474 }

AGD84

Diff Multifix II to IHN = 1.046mE, -1.046mN

W 584

WGS84 IHN U.T.M. Zone 55 E 485239.801

N 5444645.485

∴ Diff multifix II to IHN = 1.052mE, -1.024mN

547063

APPENDIX E

BAR CHECK

DRAGONHT
2.03M

CH1
@ 5MTR

PAR
CHECK

GLOBEX
2830 cl

7 DEC 98

CH1
@ 10MTR

CH2
@ 10MTR

20 1506

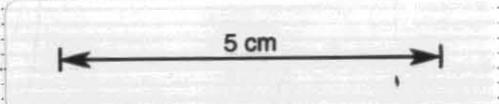
20 151

5 cm

ZERO PAPER

00M

s/s 1506



PRAEWIT
@
2.01M

CH1
@10M

CH2
@10M

2/12/98
BAR CHECK

CH2
@13M

GLOBEX

DRAWING
2.05

20V5
1506

CH1
@5M

CH2
@5M

CH2 CH1
@10M @10M

CH2 CH1
@13M @13M

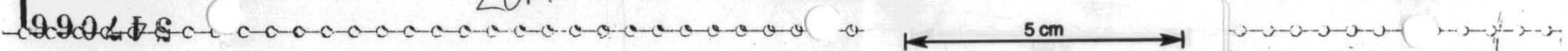
504

20M

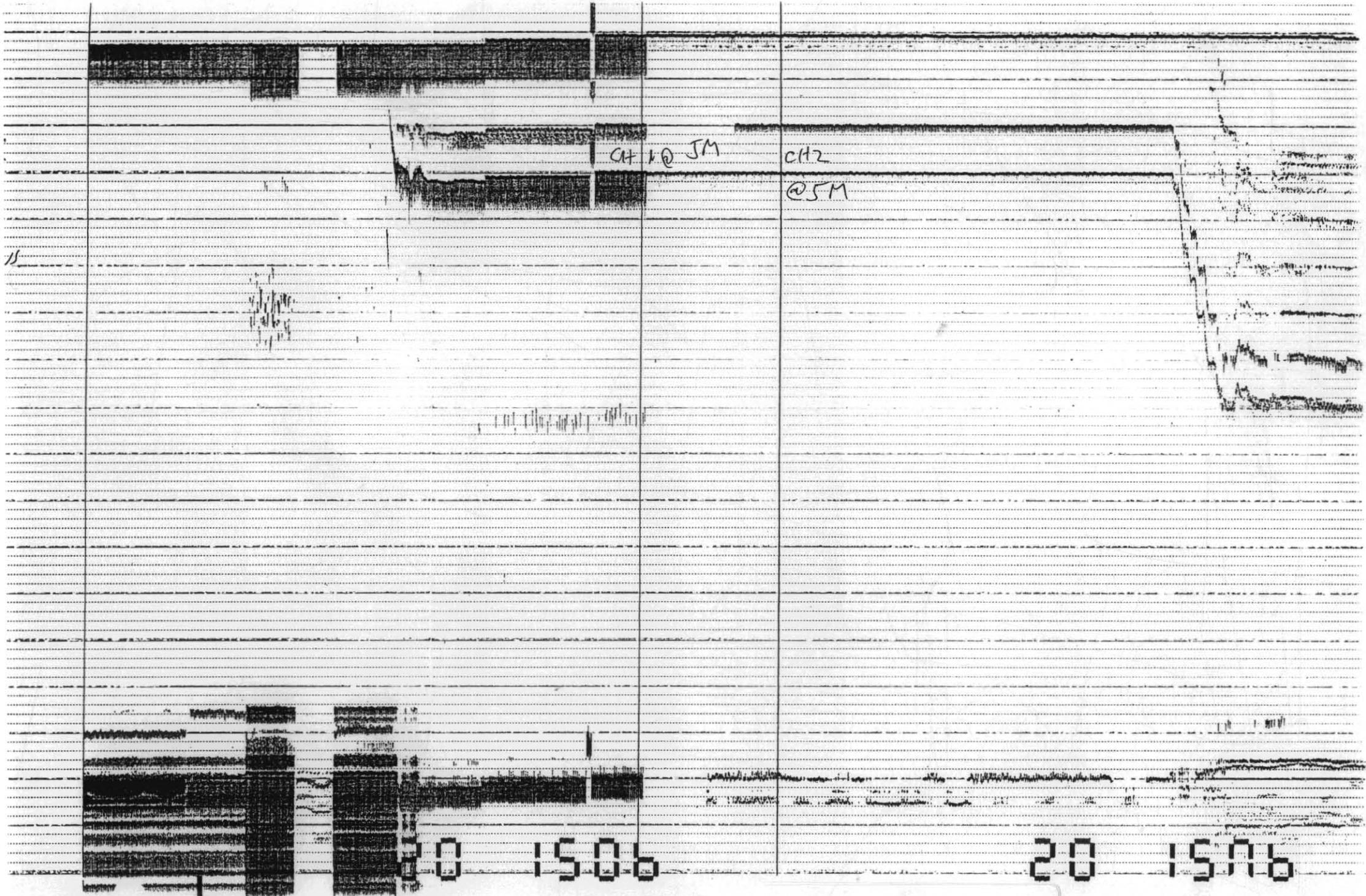
20

1506

20M 20



5 cm



542067

5 cm

9051 02

9051 08

547068

APPENDIX F

SEAWATER VELOCITY OF SOUND PROFILE

VELOCITY OF PROPAGATION AT THE BARRAMUNDI-1 SITE

File header created by DATALOG on 03-12-98 6:54:57 AM

Device: 600-CTD, Serial number: 17455

Header text:

Mode: DEPTH_SAMPLE

Pressure trip (dBar): 2.000, Pressure increment (dBar): 5.000

File name B1

Site information VELOCITY OF PROGATION AT THE BARRAMUNDI-1 SITE

Battery voltage 10.3V

Conductivity coefficients: 13 +1.0053097e-13 -3.4297404e-09 +2.9815901e-03 -8.3481903e-02

Temperature coefficients: 12 +7.2582293e-10 -1.3044801e-03 +1.4491999e+01

Pressure coefficients: 12 -1.4055599e-09 +8.0688095e-02 +9.2783298e+00

Pressure tare 9.9238

Speed of sound formula Chen & Millero

Date	Time	Conductivity	Temperature	Pressure	Salinity	Density	SoundSpeed	Flow	Direction
03-12-98	6:23:43	43.35356	15.12876	2.097889	35.28075	26.16934	1507.442	0	0
03-12-98	6:23:55	43.38007	14.75423	7.019853	35.64392	26.55378	1506.764	0	0
03-12-98	6:24:09	43.38891	14.75031	12.02249	35.65356	26.58428	1506.846	0	0
03-12-98	6:24:21	43.37713	14.73335	17.02512	35.6562	26.61222	1506.878	0	0
03-12-98	6:24:34	43.42132	14.72161	22.02774	35.70559	26.6751	1506.981	0	0
03-12-98	6:24:47	43.42132	14.72161	27.03035	35.70351	26.69568	1507.062	0	0
03-12-98	6:24:58	43.34767	14.66812	32.03294	35.68276	26.71356	1506.951	0	0
03-12-98	6:25:12	43.27697	14.55722	37.11622	35.7175	26.78711	1506.722	0	0
03-12-98	6:25:24	43.22983	14.51548	42.0381	35.71037	26.81252	1506.662	0	0
03-12-98	6:25:35	42.73201	14.25852	47.04067	35.48345	26.71499	1505.656	0	0
03-12-98	6:25:49	42.52583	13.81517	52.04322	35.69922	26.99831	1504.559	0	0
03-12-98	6:26:02	42.52583	13.76302	57.04576	35.74574	27.06752	1504.527	0	0
03-12-98	6:26:14	42.53172	13.7565	62.04829	35.75524	27.09849	1504.6	0	0
03-12-98	6:26:26	42.54055	13.7565	67.05082	35.76141	27.12551	1504.69	0	0
03-12-98	6:26:39	42.5435	13.7565	72.05333	35.76205	27.14825	1504.774	0	0
03-12-98	6:26:58	42.55233	13.7539	77.05582	35.77066	27.17771	1504.858	0	0
03-12-98	6:26:59	42.55822	13.7539	76.97514	35.77624	27.18166	1504.863	0	0

547070

Date	Time	Conductivity	Temperature	Pressure	Salinity	Density	SoundSpeed	Flow	Direction
03-12-98	6:26:59	42.55233	13.7539	77.13651	35.77063	27.17804	1504.859	0	0
03-12-98	6:27:03	42.5435	13.7552	76.97514	35.76117	27.16973	1504.85	0	0
03-12-98	6:27:17	42.5435	13.7539	71.97264	35.76452	27.15036	1504.767	0	0
03-12-98	6:27:29	42.54055	13.7552	66.97013	35.76267	27.1264	1504.686	0	0
03-12-98	6:27:43	42.53172	13.7552	61.88692	35.75652	27.09904	1504.595	0	0
03-12-98	6:27:54	42.52583	13.7565	56.96508	35.75186	27.07327	1504.512	0	0
03-12-98	6:28:07	42.52583	13.76433	51.96253	35.74669	27.04538	1504.449	0	0
03-12-98	6:28:19	42.64954	13.81256	46.95998	35.82009	27.06972	1504.609	0	0
03-12-98	6:28:32	43.17975	14.33678	41.87673	35.82936	26.9424	1506.228	0	0
03-12-98	6:28:45	43.2858	14.51809	36.95484	35.76186	26.82915	1506.647	0	0
03-12-98	6:28:57	43.34472	14.57418	31.95226	35.76662	26.79843	1506.748	0	0
03-12-98	6:29:09	43.42426	14.67073	26.94966	35.75309	26.74473	1506.957	0	0
03-12-98	6:29:22	43.43899	14.71248	21.94705	35.7303	26.69582	1506.98	0	0
03-12-98	6:29:34	43.43899	14.72422	16.94444	35.72158	26.66433	1506.924	0	0
03-12-98	6:29:47	43.45078	14.74379	11.86112	35.71656	26.63361	1506.896	0	0
03-12-98	6:29:58	43.4331	14.7464	6.939164	35.69994	26.59838	1506.804	0	0
03-12-98	6:30:11	43.41248	14.75031	1.936513	35.67945	26.55951	1506.709	0	0

Mean: 1505.854559

Time Zone : Perth Time

547071

Velocity of Propagation at the Site

File header created by DATALOG on 07-12-98 1:44:58 PM

Device: 600-CTD, Serial number: 17455

Header text:

Mode: DEPTH_SAMPLE

Pressure trip (dBar): 2.000, Pressure increment (dBar): 5.000

File name FILE10

Site information NO SITE INFORMATION

Battery voltage 10.3V

Conductivity coefficients: 13 +1.0053097e-13 -3.4297404e-09 +2.9815901e-03 -8.3481903e-02

Temperature coefficients: 12 +7.2582293e-10 -1.3044801e-03 +1.4491999e+01

Pressure coefficients: 12 -1.4055599e-09 +8.0688095e-02 +9.2783298e+00

Pressure tare 9.9238

Speed of sound formula Chen & Millero

Date	Time	Conductivity	Temperature	Pressure	Salinity	Density	SoundSpeed	Flow	Direction	
07-12-98	13:32:57	42.72906	14.02639	72.05333	35.68472	27.03125	1505.558	0	0	
07-12-98	13:33:09	42.7379	14.02378	77.05582	35.69328	27.06065	1505.642	0	0	
07-12-98	13:33:27	42.74084	14.02509	76.97514	35.69485	27.06123	1505.647	0	0	
07-12-98	13:33:40	42.73201	14.02509	71.97264	35.68871	27.03425	1505.557	0	0	
07-12-98	13:33:53	42.72612	14.0277	66.97013	35.6829	27.00698	1505.476	0	0	
07-12-98	13:34:05	42.71139	14.02639	61.88692	35.67249	26.97663	1505.375	0	0	
07-12-98	13:34:19	42.69961	14.02509	56.96508	35.66477	26.94907	1505.281	0	0	
07-12-98	13:34:29	43.18859	14.14897	51.96253	36.0083	27.16586	1506.001	0	0	
07-12-98	13:34:42	43.30053	14.6081	46.95998	35.68828	26.79714	1507.013	0	0	
07-12-98	13:34:44	43.30053	14.61332	47.04067	35.68344	26.79263	1507.026	0	0	
07-12-98	13:34:46	43.30348	14.61854	46.95998	35.68139	26.78955	1507.038	0	0	
07-12-98	13:34:57	43.30053	14.62376	41.87673	35.67599	26.76169	1506.964	0	0	
07-12-98	13:35:11	43.30053	14.63028	36.95484	35.67205	26.73539	1506.899	0	0	
07-12-98	13:35:24	43.30053	14.63289	31.95226	35.67173	26.71239	1506.824	0	0	
07-12-98	13:35:34	43.30053	14.64072	26.94966	35.66662	26.68454	1506.76	0	0	
07-12-98	13:35:48	43.2858	14.64855	21.94705	35.64793	26.6462	1506.681	0	0	
07-12-98	13:36:00	43.29169	14.65768	16.86375	35.64709	26.621	1506.625	0	0	
07-12-98	13:36:13	43.3624	14.73074	11.9418	35.64716	26.58326	1506.775	0	0	
07-12-98	13:36:26	43.46551	14.82338	6.858476	35.65909	26.54962	1506.999	0	0	
07-12-98	13:36:38	43.48318	14.86514	1.855824	35.63913	26.50285	1507.025	0	0	
							Average :	1506.3583		

Note : Perth Local Time

VELOCITY OF PROPAGATION CHECK AT BEAUTY POINT

File header created by DATALOG on 01-12-98 4:53:07 PM

Device: 600-CTD, Serial number: 17455

Header text: Along the jetty at Beauty Point

Mode: DEPTH_SAMPLE

Pressure trip (dBar): 2.000, Pressure increment (dBar): 5.000

File name FILE0

Site information ALONGSIDE THE JETTY

Battery voltage 10.3V

Conductivity coefficients: 13 +1.0053097e-13 -3.4297404e-09 +2.9815901e-03 -8.3481903e-02

Temperature coefficients: 12 +7.2582293e-10 -1.3044801e-03 +1.4491999e+01

Pressure coefficients: 12 -1.4055599e-09 +8.0688095e-02 +9.2783298e+00

Pressure tare 9.9238

Speed of sound formula Chen & Millero

Date	Time	Conductivity	Temperature	Pressure	Salinity	Density	SoundSpeed	Flow	Direction
01-12-98	16:02:19	38.59806	16.76268	2.0172	29.73952	21.54439	1506.121	0	0
01-12-98	16:02:36	39.5047	16.44121	7.019853	30.76204	22.42308	1506.387	0	0
01-12-98	16:02:54	39.57536	16.42291	12.02249	30.83567	22.5059	1506.498	0	0
01-12-98	16:03:24	39.59891	16.41246	11.9418	30.86421	22.52979	1506.497	0	0
01-12-98	16:03:34	39.51648	16.41899	6.939164	30.78939	22.44871	1506.349	0	0
01-12-98	16:03:47	38.69814	16.53659	1.936513	29.99393	21.79005	1505.716	0	0

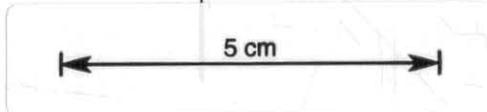
547073

APPENDIX G

SIDE SCAN SONAR RUB TEST

SIDE SCAN
RUB TEST
AFTER END
RETERM.
5 Dec. 1998

547074

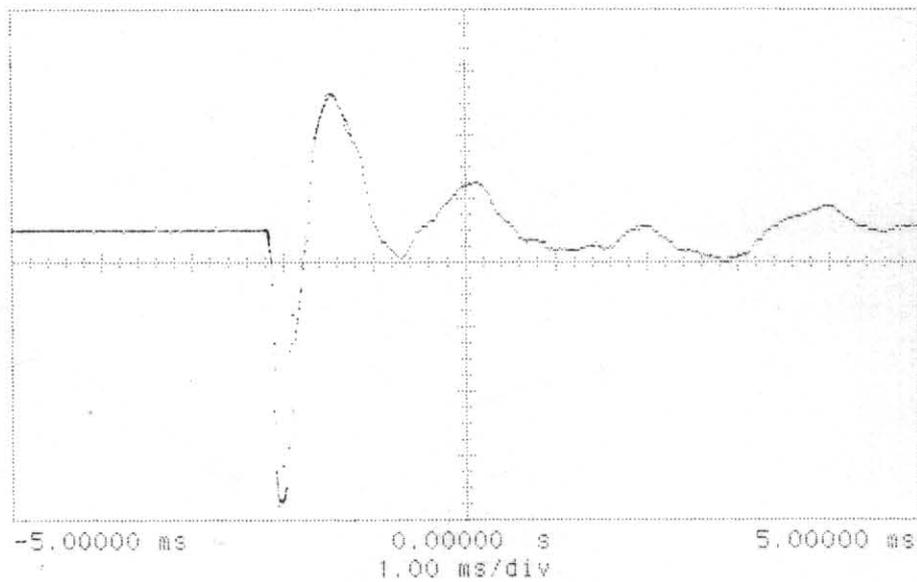


547075

APPENDIX H

BOOMER PULSE TEST

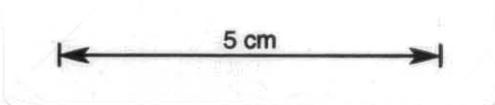
As stopped



CHANNEL

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off	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
200 mV/div			
offset 125.000 mV			
dc		ac	
BW lim			

more preset probe



547077

APPENDIX I

SAFETY

PROJECT SAFETY REPORT

RACAL SURVEY AUSTRALIA

PROJECT SAFETY STATISTICS

VESSEL/RIG: Bluefin JOB No.: 2830C1
 LOCATION: Bass Strait PERMIT: T/27-P
 CLIENT: Globex PROJECT: site survey
 REPORT FROM: 29th ^{Nov} Dec 98 / 10:30AM TO: 9th Dec 98 / 20:00
 (Date / Time) (Date / Time)

No. of Personnel: RSA 5 Vessel 5 Sub-Contractor _____

	HOURS	EVENTS
MAN-HOURS WORKED (RSA Personnel)	<u>1367.5</u>	
MAN-HOURS WORKED (Vessel Crew)	<u>1010</u>	
MAN-HOURS WORKED (Sub-Contractor)	<u>—</u>	
TOTAL MAN-HOURS WORKED	<u>2377.5</u>	
LOST WORKDAY CASES		<u>N.I</u>
RESTRICTED WORKDAY CASES		<u>N.I</u>
MEDICAL TREATMENT CASES		<u>N.I</u>
FIRST AID CASES		<u>N.I</u>
NEAR MISS INCIDENTS		<u>N.I</u>
LOST WORKDAYS		<u>N.I</u>
RESTRICTED WORKDAYS		<u>N.I</u>
VEHICLE ACCIDENTS		<u>N.I</u>
LOST TIME ACCIDENTS		<u>N.I</u>

PROJECT SAFETY REPORT

Page: 2 of 2

VESSEL/RIG: Bluefin JOB No.: 2830C1**SAFETY MEETINGS**

30th Nov - Pre-mobilisation safety meeting -
Vessel familiarisation meeting -
2nd Dec - Project safety meeting and muster-drill
8th Dec - Toolbox safety meeting prior to coring operations

INCIDENTS

None.

OTHER INFORMATION**JSA REVIEW & MODIFICATION****PARTY CHIEF**

NAME: M. Tuck
SIGNATURE: [Signature]
DATE: 9th Dec 1998

CLIENT REP

NAME: DEREK EVANS
SIGNATURE: [Signature]
DATE: 9 Dec 98

547081

RACAL SURVEY AUSTRALIA LIMITED

HYDROGRAPHIC HOUSE
(P.O. Box 515)
4 LEDGAR ROAD
BALCATT
WESTERN AUSTRALIA 6021

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FAX NO: (08) 9344 8783
INTERNATIONAL TEL: 61 8 9344 7166
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DOCUMENT AND/OR SOFTWARE ISSUE TRANSMITTAL FORM

DOCUMENT/SOFTWARE TITLE: Emergency Response Plan
Offshore Survey Services

COPY NO. (where applicable): 4

REVISION IDENTIFICATION: Revision 1

NO. OF COPIES: 1

ISSUED TO: Client Representative Blue Fin

ISSUED BY: Ken Eddy

DATE: 27-11-98

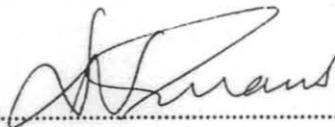
INSTRUCTIONS

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DOCUMENT AND/OR SOFTWARE ISSUE TRANSMITTAL FORM

DOCUMENT/SOFTWARE TITLE: Safety Management Plan
Offshore Survey Services
Document No. RSASMP-1

COPY NO. (where applicable): 3

REVISION IDENTIFICATION: Revision 1

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ISSUED TO: Vessel Master Blue Fin

ISSUED BY: Ken Eddy

DATE: 27-11-98

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R. F. WALKER

Signature:

R F Walker

Date:

30-11-98

547083

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WESTERN AUSTRALIA 6021

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INTERNATIONAL TEL: 61 8 9344 7166
INTERNATIONAL FAX: 61 8 9344 8783

DOCUMENT AND/OR SOFTWARE ISSUE TRANSMITTAL FORM

DOCUMENT/SOFTWARE TITLE: Safety Management Plan
Offshore Survey Services
Document No. RSASMP-1

COPY NO. (where applicable): ~~4~~

REVISION IDENTIFICATION: Revision 1

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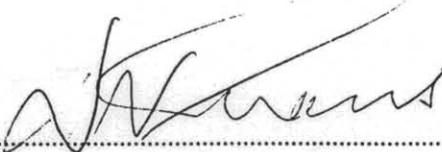
ISSUED BY: Ken Eddy

DATE: 27-11-98

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Name:



Signature:

DEREK EVANS

Date:

1 Dec 98

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APPENDIX J

SURVEY LINE LOGS

ANALOGU LOG SHEETS

IDENT: Globex		AREA: Bas Strait		SITE: Barramundi-1		JOB NO. 2830C1	
NAV. SYSTEM Skystix		ECHO SOUNDER DRAFT: VELOCITY OF PROP. 1505.8^{2.05} M M/SEC		SURVEY DATUM Echo Sounder		VESSEL Bivejin	
DATUM → STERN 7.8 M		DATUM → ECHO SOUNDER		DATUM SSS		DATUM 130cm	
		M FWD AFT M PORT STED		M FWD AFT M PORT STED		M FWD AFT M PORT STED	

DATE	LINE	FIXES		TIMES		DISC	FILE	ES ROLL	EQUIPMENT RANGES					CABLE OUT FROM STERN			COMMENTS		
		SOL	EOL	SOL	EOL				E/S	SSS	Banner DART	SSS Roll	Banner Roll	SSS	Banner	Hydrof			
3/12/12	1	17	63	22:11	22:37		002	1	50-100	100	41	1	1	150	16	19	hdg 270°		
"	4	64	114	22:50	23:21		003				1			170	16	19	hdg 90°		
5/12/18	30	115	163	08:22	08:40		004	2	50-100	100	1	1	1	163	16	19	hdg 270 90°		
		27	114																
7/12/18	2	164	214	17:34	17:57		005	2	50-100	100	1	1	1	200	19	19	hdg 90°		
"	5	215	267	18:24	18:40		006	2	50-100	100	1	1	1	180	19	19	hdg 270° SSS cable out 160m.		
"	8	268	318	18:51	19:16		007	2	50-100	100	1	1	1	180	19	19	hdg 90° SSS cable out 120m.		
"	11	319	366	19:22	19:46		008	2	50-100	100	1	2	1	163	19	19	hdg 270°		
"	14	367	417	19:56	20:18		009	2	50-100	100	1	2	1	179	19	19	hdg 90°		
"	17	418	468	20:24	20:49		010	2	50-100	100	1	2	1	162	19	19	hdg 270°		
"	20	469	520	20:57	21:23		011	2	50-100	100	1	2	1	178	19	19	hdg 90°		
"	23	521	571	21:30	21:55		012	2	50-100	100	2	2	1	161	19	19	hdg 270°		
"	26	572	622	22:03	22:29		013	2	50-100	100	2	2	1	171	19	19	hdg 90		
"	29	623	673	22:36	23:01		014	2	50-100	100	2	2	1	160	19	19	hdg 270°		
"	28	674	724	23:12	23:37		015	3	50-100	100	2	2	1	176	19	19	hdg 90		
"	25	725	774	23:44	00:08		016	3	50-100	100	2	2/3	1	160	19	19	hdg 270 SSS cable increased to 180m Fix 731		
8/12/18	22	775	826	00:14	00:40		017	3	50-100	100	2	3	1	180	19	19	hdg 90		
"	19	827	876	00:47	01:11		018	3	50-100	100	2	3	1	180	19	19	hdg 270		
"	16	877	927	01:18	01:43		019	3	50-100	100	2	3	1	180	19	19	hdg 90 - Centreline		
"	13	928	976	01:50	02:13		20	3	50-100	100	2	3	1	180	19	19	hdg 270°		
"	10	977	1024	02:28	02:51		21	3	50-100	100	2	3	1	180	19	19	hdg 90		
"	7	1025	1076	02:58	03:23		23	3	50-100	100	2	3	1	180	19	19	hdg 270		
"	4A	1077	1125	03:57	04:20		24	3	50-100	100	3	3	1	150	19	19	hdg 90		
"	3	1126	1175	04:32	04:56		25	3	50-100	100	3	3	1	180	19	19	hdg 270		
"	6	1176	1225	05:03	05:28		26	3	50-100	100	3	4	1	180	19	19	hdg 90		
SURVEYOR		M. Pink						OPERATOR								CLIENT			

547085

APPENDIX K

DROP CORE DESCRIPTIONS

DESCRIPTION OF SOIL SAMPLE



Client: Globex Far East

Project: Barramundi-1

Area: Bass Strait

Co-ordinates: E: 391 415

Approx. Water Depth: 74 m

Job No.: 2830 C 1

N: 5 609 011

Time: 1623

Date: 08 Dec. 1998

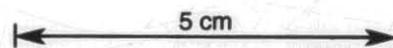
Core No.: 1

Attempt No.: 1

Type of Corer: Gravity

Recovery: 1.08m Barrel Length: 2 m

Depth (m)	Lithology	Sample No.	DESCRIPTION	(N/cm ²)	
				Torvane	Penetromete
1.08m		1	Top: Very muddy SAND, fine, brown well sorted , occasional shell fragments to 10mm Base: Firm, olive green CLAY	N/A	N/A
Remarks: Drop corer dropped from approx. 8m above seabed –			Cutter Condition on recovery: undamaged		



DESCRIPTION OF SOIL SAMPLE

RACAL

Client: Globex Far East

Project: Barramundi-1

Area: Bass Strait

Co-ordinates: E: 391 416

Approx. Water Depth: 75 m

Job No.: 2830 C 1

N: 5 610 079

Time: 1651

Date: 08 Dec. 1998

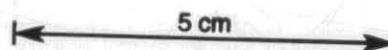
Core No.: 2

Attempt No.: 1

Type of Corer: Gravity

Recovery: 0.63m Barrel Length: 2 m

Depth (m)	Lithology	Sample No.	DESCRIPTION	(N/cm ²)	
				Torvane	Penetromete
0.63m		2	<p>Top: Very muddy SAND, fine, brown well sorted , occasional shell fragments to 10mm</p> <p>Base: Muddy, sandy, shelly GRAVEL, poorly sorted, angular shell frags to 15mm</p>	N/A	N/A
Remarks: Drop corer dropped from approx. 8m above seabed –			Cutter Condition on recovery: undamaged		



DESCRIPTION OF SOIL SAMPLE



Client: Globex Far East

Project: Barramundi-1

Area: Bass Strait

Co-ordinates: E: 392 480

Approx. Water Depth: 74 m

Job No.: 2830 C 1

N: 5 609 003

Time: 1710

Date: 08 Dec. 1998

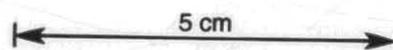
Core No.: 3

Attempt No.: 1

Type of Corer: Gravity

Recovery: 1.06m Barrel Length: 2 m

Depth (m)	Lithology	Sample No.	DESCRIPTION	(N/cm ²)	
				Torvane	Penetromete
1.06m		2	<p>Top: Very muddy SAND, fine, brown well sorted , occasional shell fragments to 10mm</p> <p>Base: Shelly, very muddy, loose, poorly sorted, SAND. Occasional very weakly cemented nodules to 2mm</p>	N/A	N/A
<p>Remarks: Drop corer dropped from approx. 8m above seabed –</p>			<p>Cutter Condition on recovery: undamaged</p>		



DESCRIPTION OF SOIL SAMPLE

RACAL

Client: Globex Far East

Project: Barramundi-1

Area: Bass Strait

Co-ordinates: E: 391 401

Approx. Water Depth: 74 m

Job No.: 2830 C 1

N: 5 607 942

Time: 1724

Date: 08 Dec. 1998

Core No.: 4

Attempt No.: 1

Type of Corer: Gravity

Recovery: 1.23m Barrel Length: 2 m

Depth (m)	Lithology	Sample No.	DESCRIPTION	(N/cm ²)	
				Torvane	Penetromete
1.23m		2	<p>Top: Very muddy SAND, fine, brown well sorted ,</p> <p>Base: Firm, olive green CLAY</p>	N/A	N/A
Remarks: Drop corer dropped from approx. 8m above seabed –			Cutter Condition on recovery: undamaged		

5 cm

DESCRIPTION OF SOIL SAMPLE



Client: Globex Far East

Project: Barramundi-1

Area: Bass Strait

Co-ordinates: E: 390 345

Approx. Water Depth: 75 m

Job No.: 2830 C 1

N: 5 609 012

Time: 1736

Date: 08 Dec. 1998

Core No.: 5

Attempt No.: 1

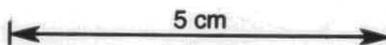
Type of Corer: Gravity

Recovery: 0.89m Barrel Length: 2 m

Depth (m)	Lithology	Sample No.	DESCRIPTION	(N/cm ²)	
				Torvane	Penetromete
0.89m		2	<p>Top: Very muddy SAND, fine, brown well sorted , occ. shell frags.</p> <p>Base: Firm, olive green CLAY</p>	N/A	N/A

Remarks: Drop corer dropped from approx. 8m above seabed –

Cutter Condition on recovery: undamaged



APPENDIX L

TIDAL PREDICTIONS

Barramundi-1

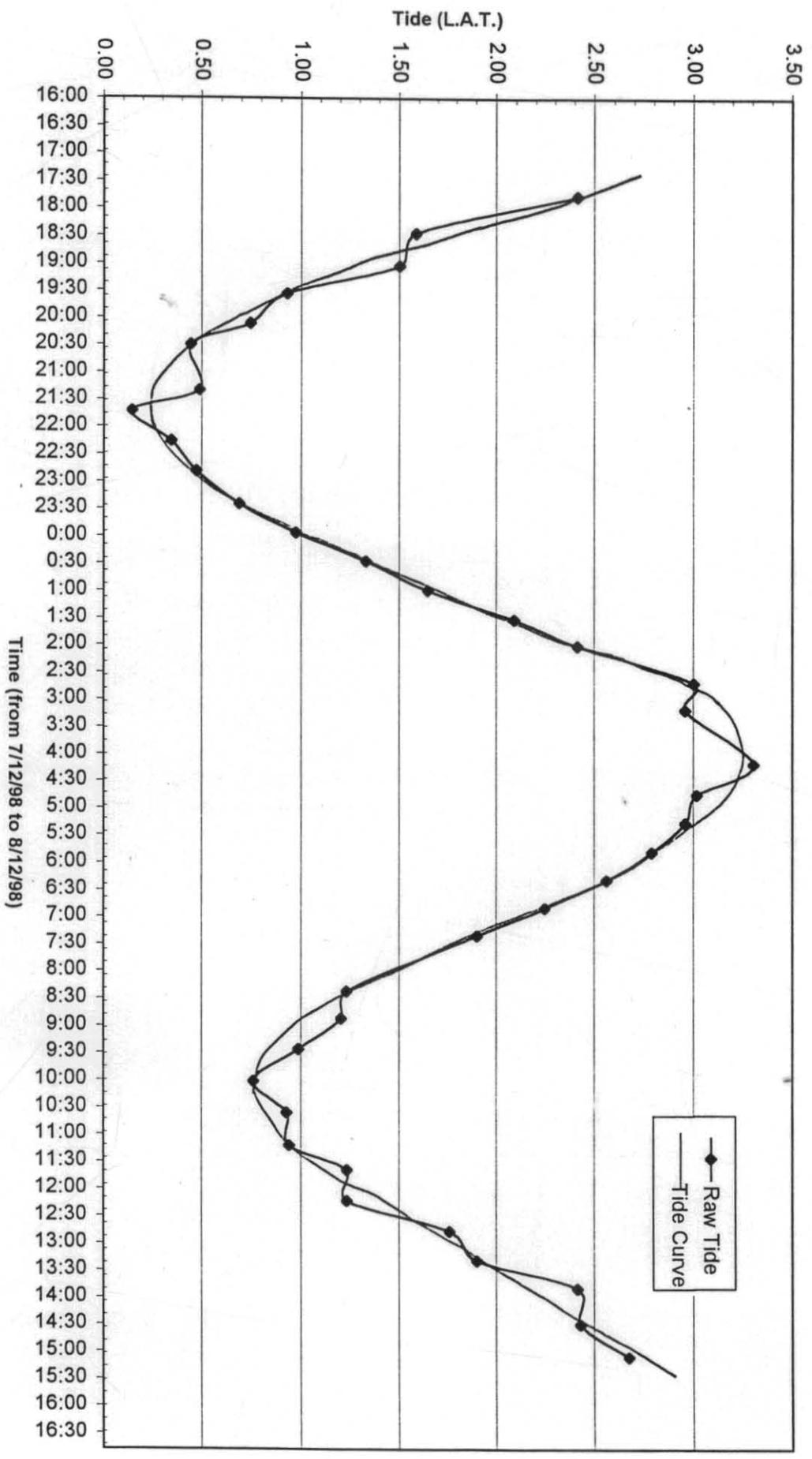
Soundings were reduced to mean sea level using the crossing analysis method and adjusted to lowest astronomical tide using a co-tidal Zo (1.65) calculated from the standard ports Stanley, Rabbit Island and Port Phillip Heads.

Date	Time (24 hrs)	Tide (metres)
7/12/98	17:30	2.60
7/12/98	18:00	2.18
7/12/98	18:30	1.70
7/12/98	19:00	1.25
7/12/98	19:30	0.90
7/12/98	20:00	0.65
7/12/98	20:30	0.40
7/12/98	21:00	0.30
7/12/98	21:30	0.22
7/12/98	22:00	0.25
7/12/98	22:30	0.34
7/12/98	23:00	0.50
7/12/98	23:30	0.70
8/12/98	0:00	1.00
8/12/98	0:30	1.30
8/12/98	1:00	1.62
8/12/98	1:30	2.00
8/12/98	2:00	2.35
8/12/98	2:30	2.85
8/12/98	3:00	3.10
8/12/98	3:30	3.20
8/12/98	4:00	3.25
8/12/98	4:30	3.20
8/12/98	5:00	3.08
8/12/98	5:30	2.90
8/12/98	6:00	2.65
8/12/98	6:30	2.40
8/12/98	7:00	2.10
8/12/98	7:30	1.77
8/12/98	8:00	1.50
8/12/98	8:30	1.20
8/12/98	9:00	1.00
8/12/98	9:30	0.80
8/12/98	10:00	0.77
8/12/98	10:30	0.80
8/12/98	11:00	0.90
8/12/98	11:30	1.00
8/12/98	12:00	1.26
8/12/98	12:30	1.50
8/12/98	13:00	1.70
8/12/98	13:30	2.00
8/12/98	14:00	2.20
8/12/98	14:30	2.44
8/12/98	15:00	2.68
8/12/98	15:30	2.90

Barramundi-1 Crossing Analysis

	North - South lines							M values/Bj	Vj	Time	Raw Tide	
	32	33	34	35	36	37	38					
31	0.1	0.2	0.5	0.5	0.8	1.1	1.9	5.1	0.89	12/7/98 17:47	2.42	
30A	0	-0.2	0.5	0.5	0.6	0.8	1.3	3.5	0.66	12/7/98 18:27	1.59	
29	0.1	0.5	1	1	1.2	1.7	1.6	7.1	1.18	12/7/98 19:03	1.50	
28	0.2	0.4	0.8	0.8	0.7	1.3	1.4	5.6	0.96	12/7/98 19:34	0.93	
27	-0.1	-0.1	0	0	0.4	0.8	1	2	0.45	12/7/98 20:07	0.75	
26	1.1	0.9	0.8	0.8	1.2	1.5	1.7	8	1.30	12/7/98 20:30	0.45	
25	-0.3	-0.2	0.2	0.2	0.8	1.3	1.6	3.6	0.68	12/7/98 21:20	0.49	
24	-0.9	-0.3	0.3	0.3	0.5	0.8	1.1	1.8	0.42	12/7/98 21:43	0.15	
23	0.7	0.9	1.2	1.2	1.8	1.4	2.2	9.4	1.50	12/7/98 22:16	0.35	
22	-0.7	-0.3	0.2	0.2	0.5	0.4	0.8	1.1	0.32	12/7/98 22:49	0.47	
21A	-1.4	-1.9	-1.6	-1.6	-1	-0.4	-0.4	-8.3	-1.02	12/7/98 23:25	0.69	
20	0.5	0.6	0.8	0.8	1	1.3	2	7	1.16	12/7/98 23:56	0.97	
19	-0.8	-0.7	-0.4	-0.4	0.1	0.4	0.7	-1.1	0.00	12/8/98 0:27	1.33	
18	-1.6	-0.1	-0.8	-0.8	-0.2	0	0.6	-2.9	-0.25	12/8/98 0:59	1.65	
17	0.6	0.6	0.9	0.9	0.9	1.5	1.9	7.3	1.20	12/8/98 1:31	2.09	
16	-1	-1	-0.9	-0.9	-0.4	-0.2	0.2	-4.2	-0.44	12/8/98 2:00	2.42	
15	-1.2	-1.3	-0.9	-0.9	-0.6	-0.5	0.1	-5.3	-0.60	12/8/98 2:40	3.00	
14	0	0	0.6	0.6	0.9	1.1	2	5.2	0.90	12/8/98 3:10	2.96	
13	-1.3	-1.3	-1.3	-1.3	-0.5	-0.8	0	-6.5	-0.77	12/8/98 4:10	3.30	
12	-1.5	-2.3	-1.4	-1.4	-0.6	-0.7	0.4	-7.5	-0.91	12/8/98 4:44	3.02	
11	0	0	0.5	0.5	0.8	0.8	1.3	3.9	0.72	12/8/98 5:15	2.96	
10	-2.5	-2	-1.9	-1.9	-1.1	-0.7	-0.5	-10.6	-1.35	12/8/98 5:47	2.79	
9	-1.8	-2.1	-1.4	-1.4	-1.3	-0.8	-0.3	-9.1	-1.14	12/8/98 6:18	2.56	
8	-0.4	-0.9	-0.4	-0.4	0.4	0.5	1.1	-0.1	0.15	12/8/98 6:49	2.25	
7	-1.5	-2.1	-1.9	-1.9	-1.3	-1.2	-0.4	-10.3	-1.31	12/8/98 7:20	1.90	
6	-2	-2	-1.8	-1.8	-1	-1.1	-0.6	-10.3	-1.31	12/8/98 8:22	1.23	
5	-0.7	-0.8	-0.4	-0.4	0.4	0.3	0.9	-0.7	0.06	12/8/98 8:52	1.20	
4A	-2.3	-2.8	-2.1	-2.1	-1.2	-1.3	-0.9	-12.7	-1.65	12/8/98 9:26	0.99	
3	-1.9	-2	-2.1	-2.1	-0.8	-1.2	-0.6	-10.7	-1.37	12/8/98 10:02	0.76	
2	-1.3	-1.1	-2	-2	0	-0.6	0.5	-6.5	-0.77	12/8/98 10:36	0.93	
1A	-1.6	-1.7	-1	-1	-0.6	-0.7	0	-6.6	-0.78	12/8/98 11:12	0.94	
								-1.1263158		12/8/98 11:39	1.23	
N values/Ai	-23.5	-23.1	-14	-14	2.4	6.8	22.6	-1.12632	-1.1263158	W value	12/8/98 12:13	1.23
											12/8/98 12:47	1.76
Ui	0.72	0.71	0.42	0.42	-0.11	-0.26	-0.77				12/8/98 13:19	1.91
											12/8/98 13:50	2.42
											12/8/98 14:30	2.43
											12/8/98 15:06	2.67

Crossing Analysis - Barramundi-1



5 cm

Crossing Analysis, an Easy Method to Calculate the Tidal Curve from Bathymetric Data

by J.L. Oustlant, Geophysicist, Geomex Surveys, Singapore

Abstract

Numerous bathymetric surveys are carried out for the oil industry in areas which are remote from any Port of tidal predictions and where the installation of a tide recorder proves impracticable due to excessive water depth and/or time constraint.

The described method has been developed recently at Geomex Surveys to solve the problem of reconstructing the tide curve when bathymetric data has been acquired in such conditions.

The data collected for the oil industry rig site surveys is composed of numerous sounding lines of relatively short lengths surveyed on a grid basis. The sole data which is available for the tidal correction calculation are the raw soundings recorded, the accurate position of the line crossing points and the time. (A line crossing point occurs wherever two survey lines intersect). At these locations the differences of sounding depths tend to be equal to the tidal variation which has occurred between the time elapsed. A statistical computation for all the crossings aims to define the best constant depth correction for each line.

Mathematical Development

The Figure 1 shows a typical grid of M longitudinal (eg. north-south) lines indexed i (i= 1 to M) and N transverse (eg. east-west) lines indexed j (j = 1 to N). We obtain (M x N) crossings and differences of soundings noted Xij:

$$(1) X_{ij} = Z_i - Z_j \tag{1}$$

Conventionally we always subtract the sounding of the transverse line from the sounding of the longitudinal line to avoid any error of algebraical sign in the following calculations.

The values to be computed are the corrections, constant for each line, so that the sum of the residual differences is minimum. For each longitudinal line i, a correction U_i has to be calculated.

For each transverse line j, a correction V_j has to be calculated. The residual difference of soundings at each crossing will be:

$$(Z_i + U_i) - (Z_j + V_j) = X_{ij} + U_i - V_j = \epsilon_{ij} \tag{2}$$

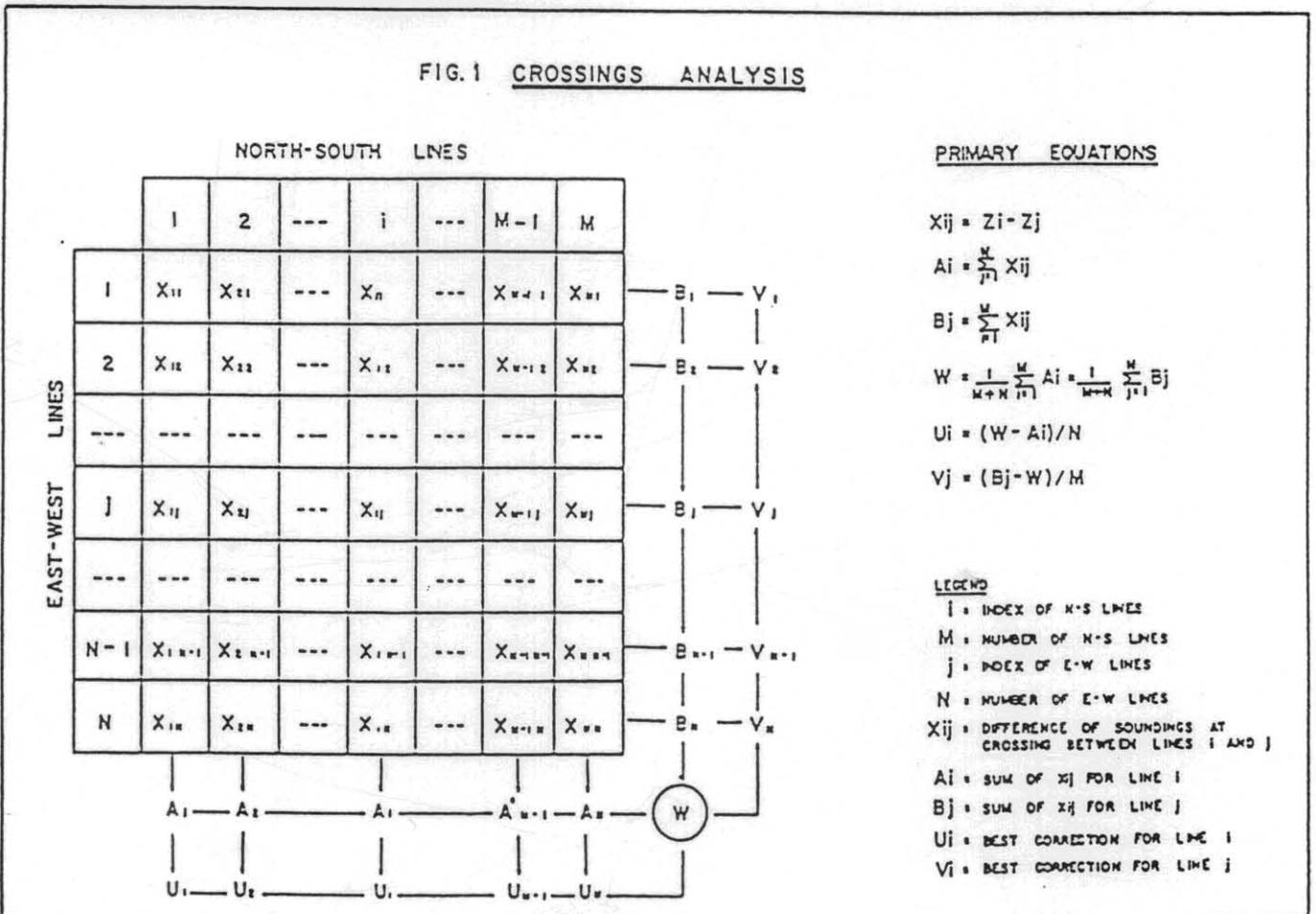
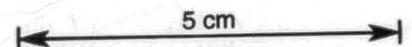


Fig. 1 Crossing Analysis



so that for any line i:

$$\sum_{j=1}^M \epsilon_{ij} = 0 \tag{3a}$$

and for any line j:

$$\sum_{i=1}^M \epsilon_{ij} = 0 \tag{3b}$$

We already notice that an infinite number of solutions (U_i, V_j) exist which solve the equation (2) since:

$$X_{1j} + U_1 - V_j = X_{1j} + (U_1 + K) - (V_j + K)$$

K being an arbitrary constant which depends on the datum.

In a first stage we will use a provisional datum which is the mean of the 2 (M x N) raw soundings measured at the crossings. Consequently, we propose the following equality:

$$\sum Z_1 + \sum Z_j = \sum (Z_1 + U_i) + \sum (Z_j + V_j)$$

That is to say

$$\sum_{j=1}^M V_j = - \sum_{i=1}^M U_i = W \tag{4}$$

This parameter W will determine the Mean Tide level at the location and for the period of survey in favourable conditions, i.e. if the survey has been carried out continuously over a sufficiently long period.

If the relations (3a) and (3b) are fully filled (see Discussion) therefore:

$$\sum_{i=1}^M \epsilon_{ij} = 0 = \sum_{i=1}^M X_{ij} + M U_i - \sum_{i=1}^M V_j \tag{5a}$$

$$\sum_{i=1}^M \epsilon_{ij} = 0 = \sum_{i=1}^M X_{ij} + \sum_{i=1}^M U_i - M V_j \tag{5b}$$

We note A_i the sum of the initial differences along each longitudinal line i, and B_j the similar sum along each transverse line j. A_i and B_j are then deduced from the equations (5a) and (5b):

$$A_i = \sum_{j=1}^M X_{ij} = \sum_{j=1}^M V_j - M U_i \tag{6a}$$

$$B_j = \sum_{i=1}^M X_{ij} = M V_j - \sum_{i=1}^M U_i \tag{6b}$$

and in considering the relation (4)

$$A_i = W - M U_i \tag{7a}$$

$$B_j = M V_j + W \tag{7b}$$

The parameter W is calculated in summing the M sums A_i or the N sums B_j :

$$\sum_{i=1}^M A_i = M W - N \sum_{i=1}^M U_i = (M + N) W \tag{8a}$$

$$\sum_{j=1}^M B_j = M \sum_{j=1}^M V_j + N W = (M + N) W \tag{8b}$$

$$\text{Therefore } W = \sum_{i=1}^M A_i / (M + N) \tag{9a}$$

$$\text{or } W = \sum_{j=1}^M B_j / (M + N) \tag{9b}$$

Consequently, the parameter W is the mean of all the initial differences of soundings at crossings:

$$W = \sum_{i=1}^M \sum_{j=1}^M X_{ij} / (M + N) \tag{10}$$

Knowing W, it is now possible to calculate the best constant correction for each line:

$$U_i = (W - A_i) / M \tag{11a}$$

$$V_j = (B_j - W) / M \tag{11b}$$

Discussion

: residual differences of soundings at crossings will not be ways equal to zero since the tidal correction is not exactly

constant for a line and because other causes of discrepancies interfere. In favourable cases these other causes of discrepancies (eg. variation of sound velocity in water) can be reduced to a minimum and the residual differences are only due to the variation of the tide along a line and to the uncertainties of measurements on the records. The uncertainties of measurements are not correlated and randomly affect the differences of soundings at crossings. Consequently, the sum of such residual differences for each line is practically nil and the relations (3a) and (3b) can be accepted as fully filled.

The main problem is the variation of the tide along a survey line. This factor is negligible when the lines are short. For longer lines, the correction U_i or V_j will represent the mean tide i.e. the tide for the mid-time of the line. Since the variation of the tide is approximately linear within the common interval, of the time between the start of the line and the end of the line, the negative residual differences for one half of the line will compensate the positive residuals for the second half.

Consequently, the sum of the residuals for each line will remain practically nil and the relations (3a) and (3b) fulfilled.

Application

The Figure 2 is the flow chart for the compilation of a bathymetric map using crossings analysis.

The difference of soundings at a crossing should represent the difference of tide within the interval of time between the intersected lines. Consequently, all other cause of discrepancy should be minimized prior to the Crossings Analysis. For instance, accurate corrections for the variation of sound velocity in sea water will be applied on the raw soundings and a realistic smoothing of the seabed trace will aim to attenuate the transducer motion due to swell.

Each couple of soundings to be subtracted should correspond to the same reflecting point of the seabed. Therefore, an accurate plotting of these crossings locations has to be done on the positioning map and marked on the records in taking into account the offset of the Echo Sounder from the fix position.

Then the soundings are measured at these locations and the differences for all the crossings are plotted in a Table such as the one shown in Figure 1. The sum of the differences for each line is then performed and we obtain M values of A_i and N values of B_j .

The parameter W is calculated using the equation (9a). At this stage, it is advised to check if no error has been made during the previous operations by re-calculating the parameter W using the second equation (9b). If a different factor W is then found, one has to come back to check all the A_i and all the B_j values.

It is now possible to calculate the best constant corrections U_i and V_j for all lines using the equations (11a) and (11b).

When the series of U_i, V_j are obtained, it is useful to calculate the residual differences at crossings and then to verify the efficiency of the analysis by comparing with the initial differences.

A good representation of the efficiency of the method is to draw the cumulative frequency distribution curves for the initial differences of soundings and for the residual differences. An example is given in Figure 3 for a survey carried out in an area where the mean water depth is 90 m. and during a period when the tidal range was 1.3 m.

In this example, 84% of the crossings exhibited discrepancies greater than 20 cm., but only 7% of the residuals were still greater than this value after analysis.

Since the tidal corrections have to be subtracted from the

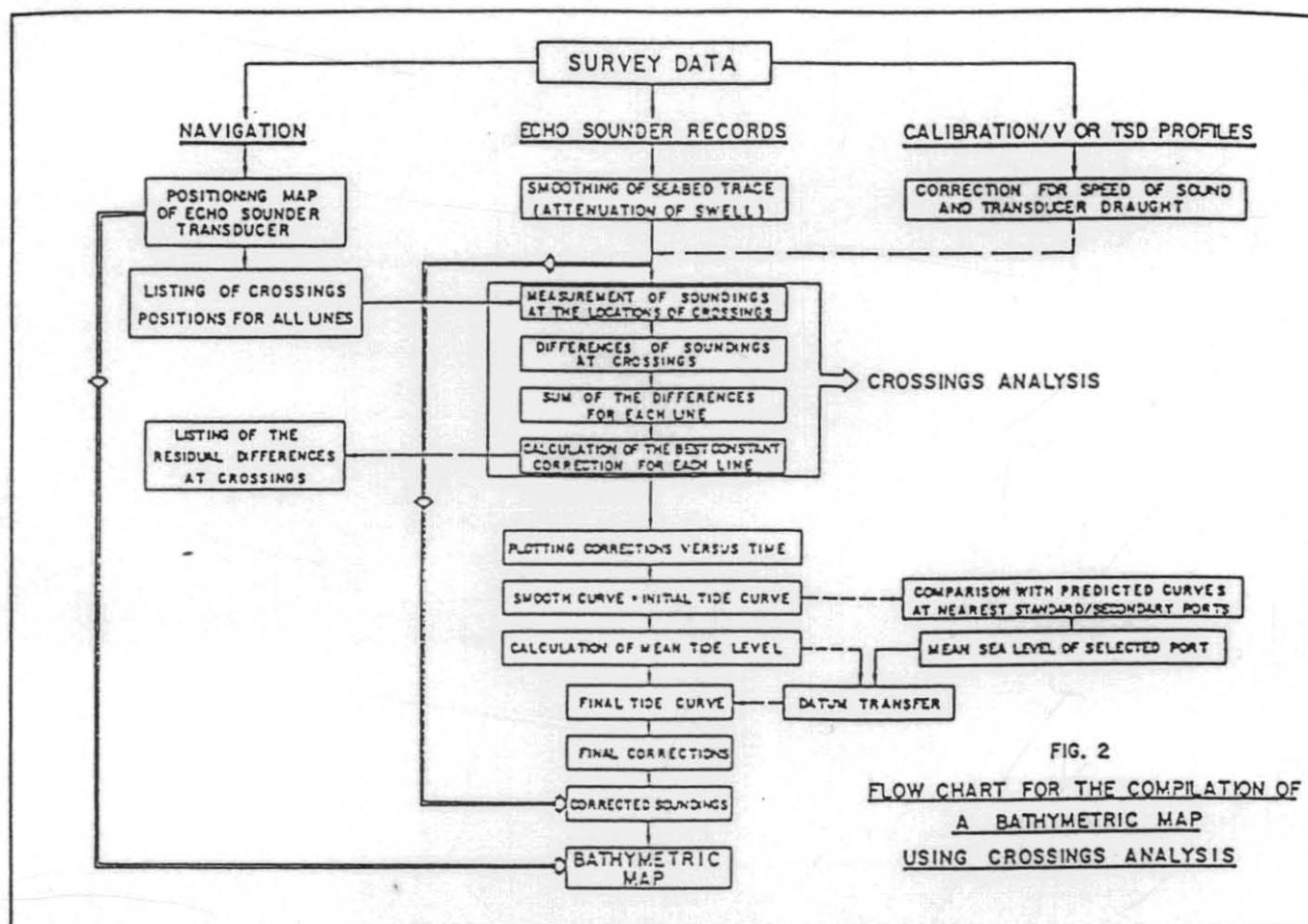


FIG. 2
FLOW CHART FOR THE COMPILATION OF
A BATHYMETRIC MAP
USING CROSSINGS ANALYSIS

Fig. 2
Flow Chart for the compilation of a Bathymetric Map using
Crossings Analysis

soundings, the values $-U_i$ and $-V_j$ are plotted versus the time.

The mid-time is taken for each line to minimize the effect of the variation of the tide along a survey line.

The Figure 4 gives an example of such a plotting for a survey carried out over a period of five days.

A smooth curve is then drawn which represents the empirical tide curve for the survey. It is still an initial tide curve since no datum is known yet. The only datum which can be directly calculated from the curve is the Mean Tide Level. This calculation can be done if the survey has been carried out continuously over a period of at least 39 hours. Then the Mean Tide Level is calculated with the usual filter. If the duration of the survey was smaller, we will be satisfied in using the values $-U_i$ and $-V_j$ as tidal corrections to be subtracted to the soundings and in this case the sounding datum (level zero) will be entirely determined by the parameter W .

In most of the cases, the calculated Mean Tide Level will be very near the level zero for U_i and V_j since W has been introduced precisely in this aim for the computation of the corrections. This is the case for the example given in Figure 4. At this stage, a bathymetric map can be compiled with soundings reduced to the Mean Tide Level.

However, it is often required to reduce soundings to Chart Datum (C.D.) or to the Lowest Astronomical Tide (L.A.T.). Consequently, we will have to carry out a datum transfer from

Fig. 3
Cumulative frequency distribution of the initial differences* of soundings at Crossings and of the residual differences* after Crossings Analysis.

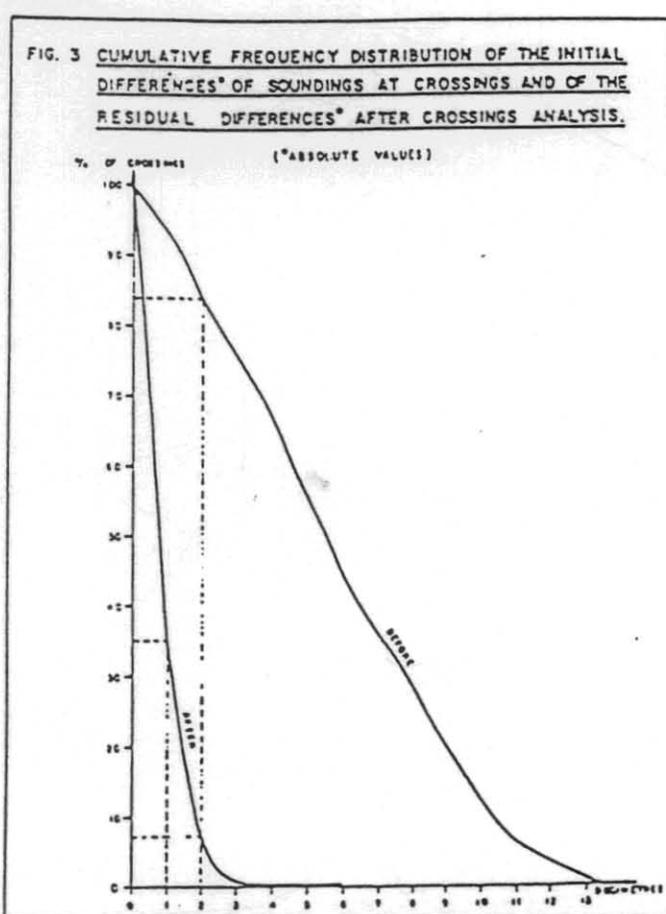


FIG. 4 TIDE FROM CROSSINGS ANALYSIS

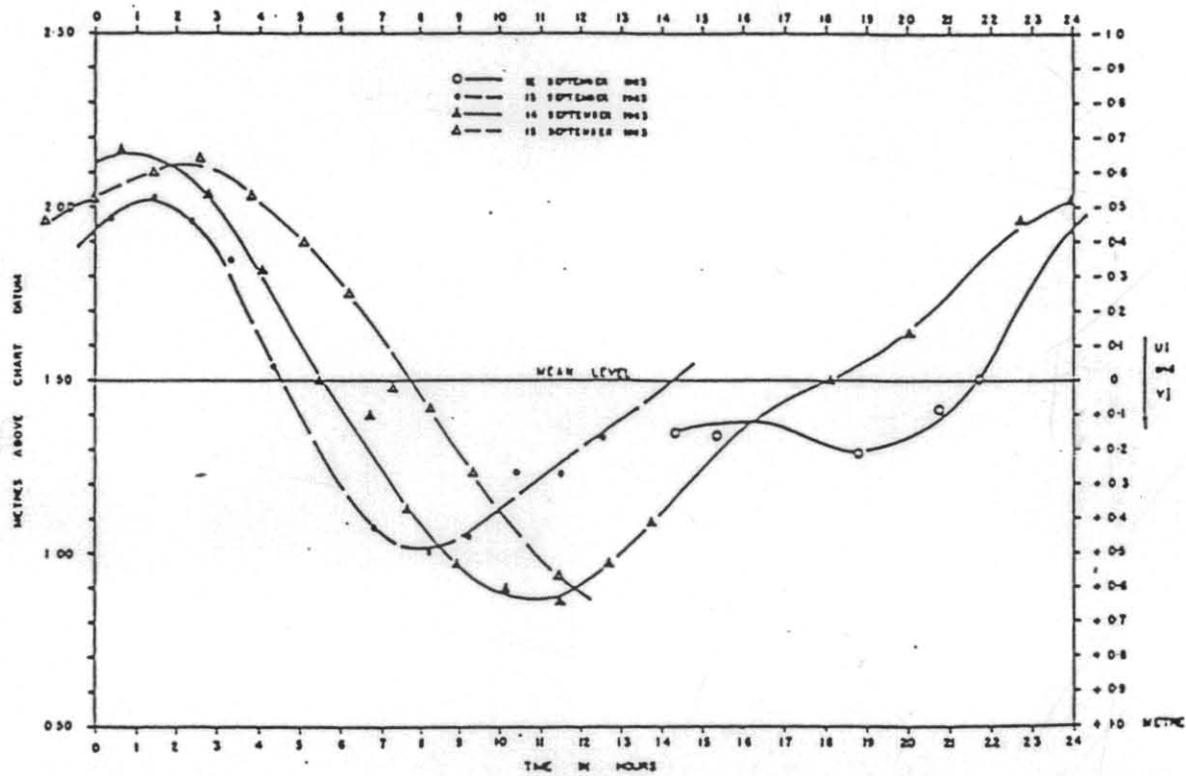


Fig. 4
Tide from Crossings Analysis

FIG. 5 COMPARISON BETWEEN PREDICTED AND "ACTUAL" TIDAL CURVES

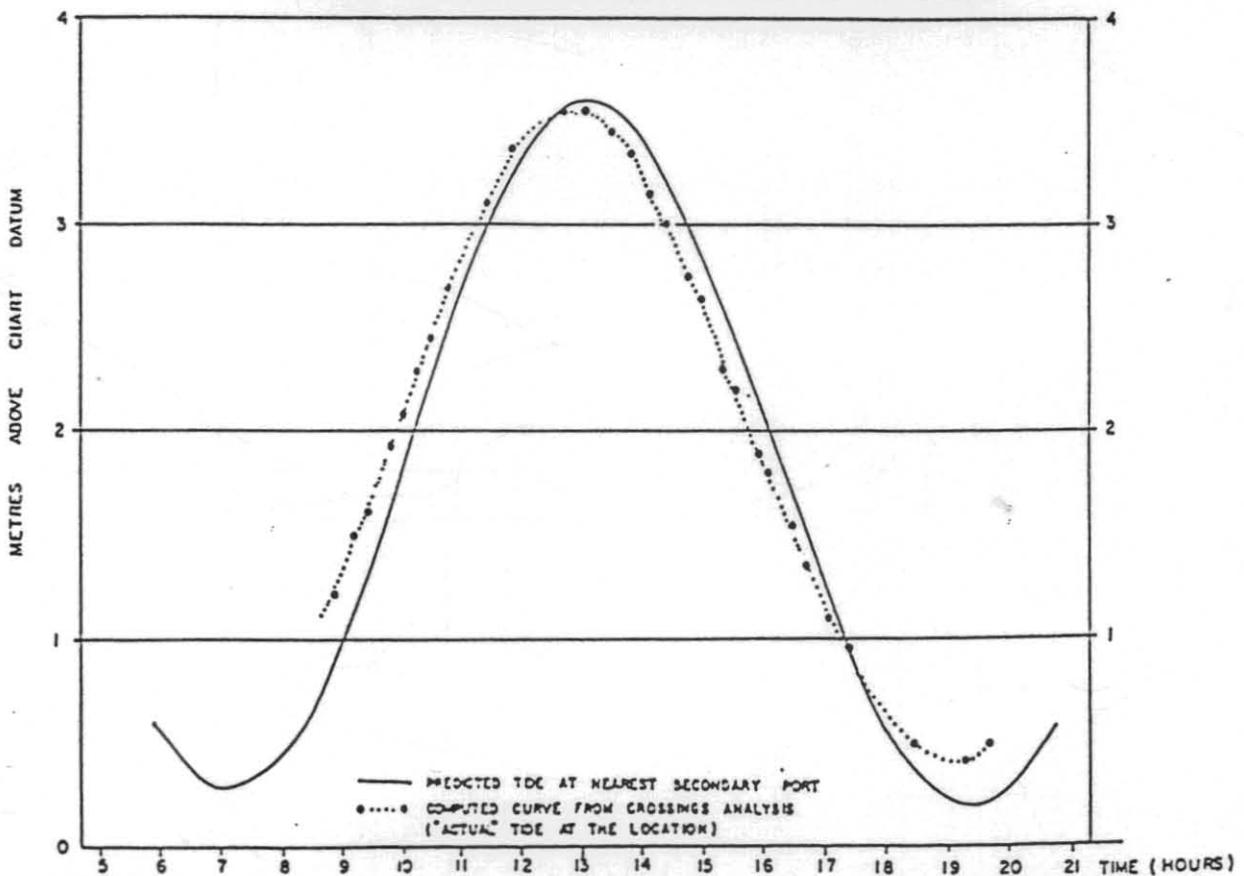


Fig. 5
Comparison between predicted and "actual" tidal curves

5 cm

a port where tidal predictions or better still actual recorded tide levels are available over the same period and where the relationship between the Mean Tide Level and the Datum is (or can be) established. This port is selected so that the predicted (or actual) tide curve at this station and the empirical tide curve at the survey location show similar shape and amplitude during the period of survey.

The Mean Tide Level at the port is then assumed to be the same as the Mean Tide Level at the survey location and consequently the difference between Mean Tide Level and Datum (L.A.T. or C.D.) at the port can be applied to the empirical tide curve. In the example given in Figure 4, the difference of 1.50 m. being the height of M.T.L. above C.D. at the nearest port is added to the initial tide curve to obtain a final tide curve. The final tide corrections are deduced from this curve to correct the soundings and to compile the bathymetric map referring to depths below Datum.

Reliability and Limitation of the Method

The reality of such a calculated tide curve can be proved using the method at a location not so far from a port and therefore

the predicted and "actual" curves can be directly compared. This has been done in the example shown in Figure 5. In this example, the port of prediction is situated at about 50 km. from the survey location. The shapes and the amplitudes of the curves are very similar while a time difference (phase lag) of about 20 mins. can be noticed which is probably due to the lag of the tide between the survey location and the port.

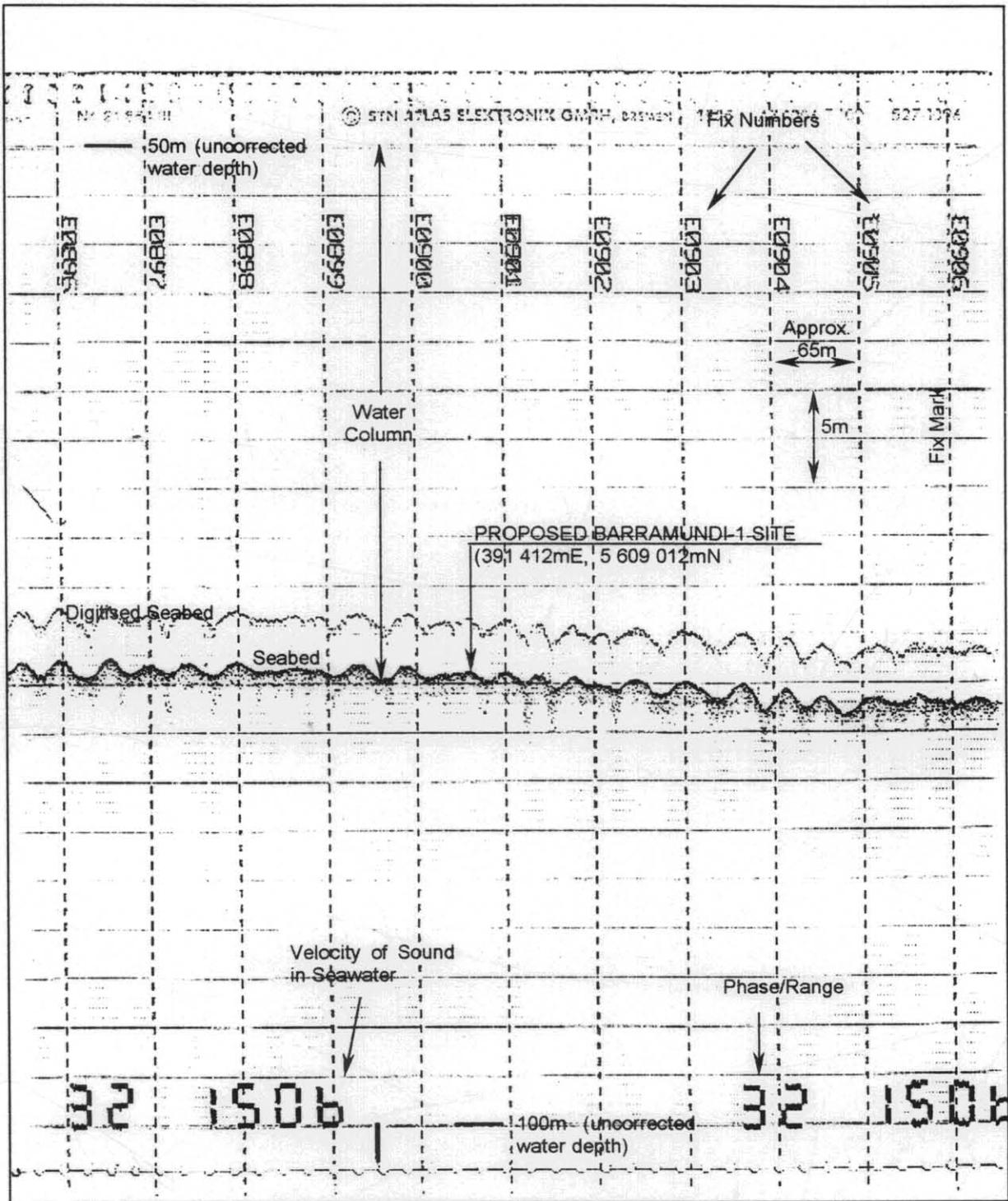
The best "Crossing Analysis" is achieved when the following conditions are fulfilled:-

- (i) The lines are sufficiently short in time and the tidal range is not unusually large so that the tidal variation from the beginning to the end of each line is negligible.
- (ii) The seabed is smooth enough and the horizontal positioning is accurate so that the soundings picked up at each intersection of lines refer to the same reflecting point on the bottom.
- (iii) There was no large fluctuations of the velocity of sound propagation in sea water during the survey.
- (iv) The survey has been carried out continuously over a sufficiently long period which includes at least one high water and one low water.

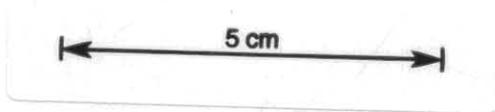
547094

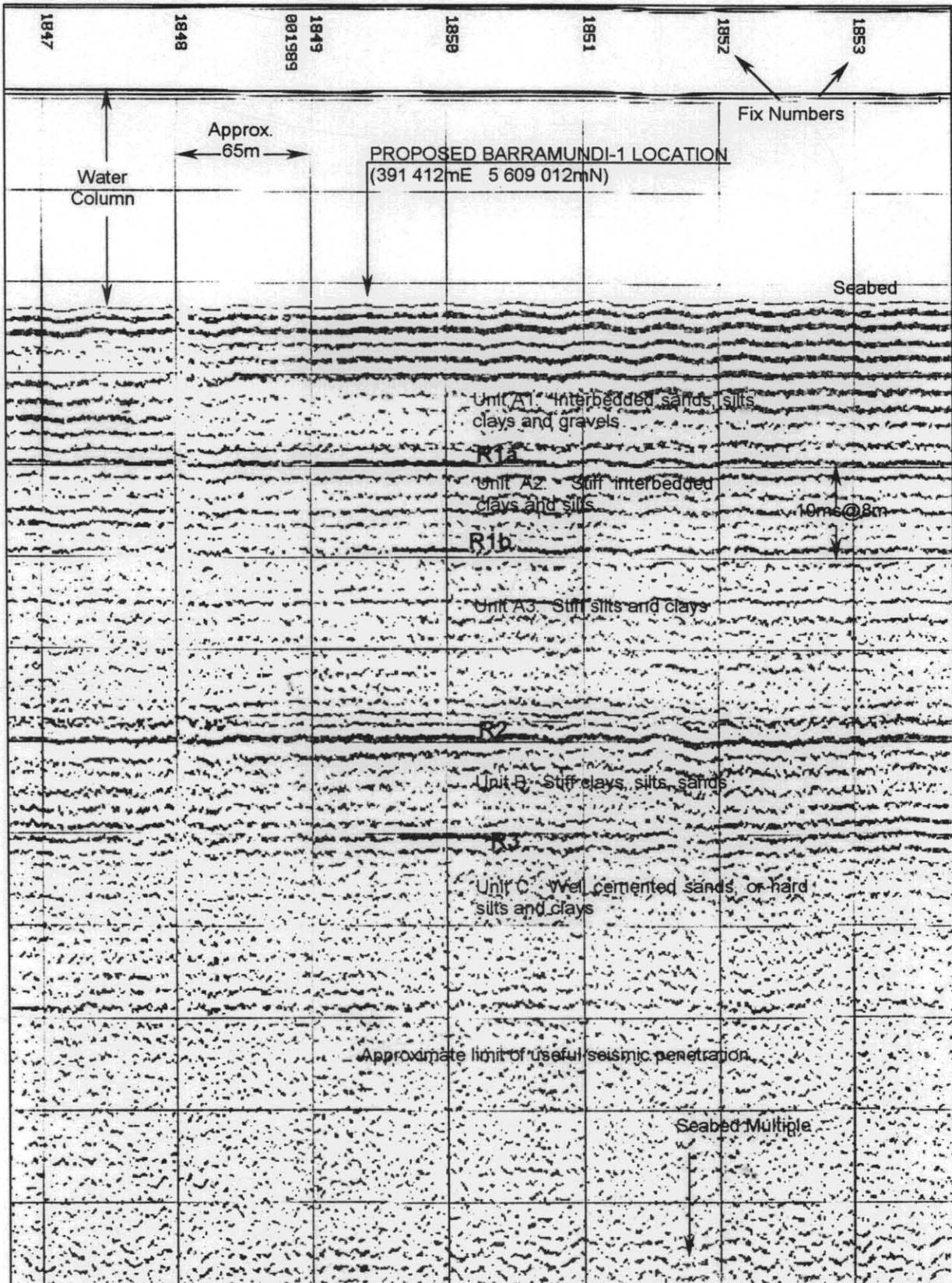
APPENDIX M

DATA EXAMPLES



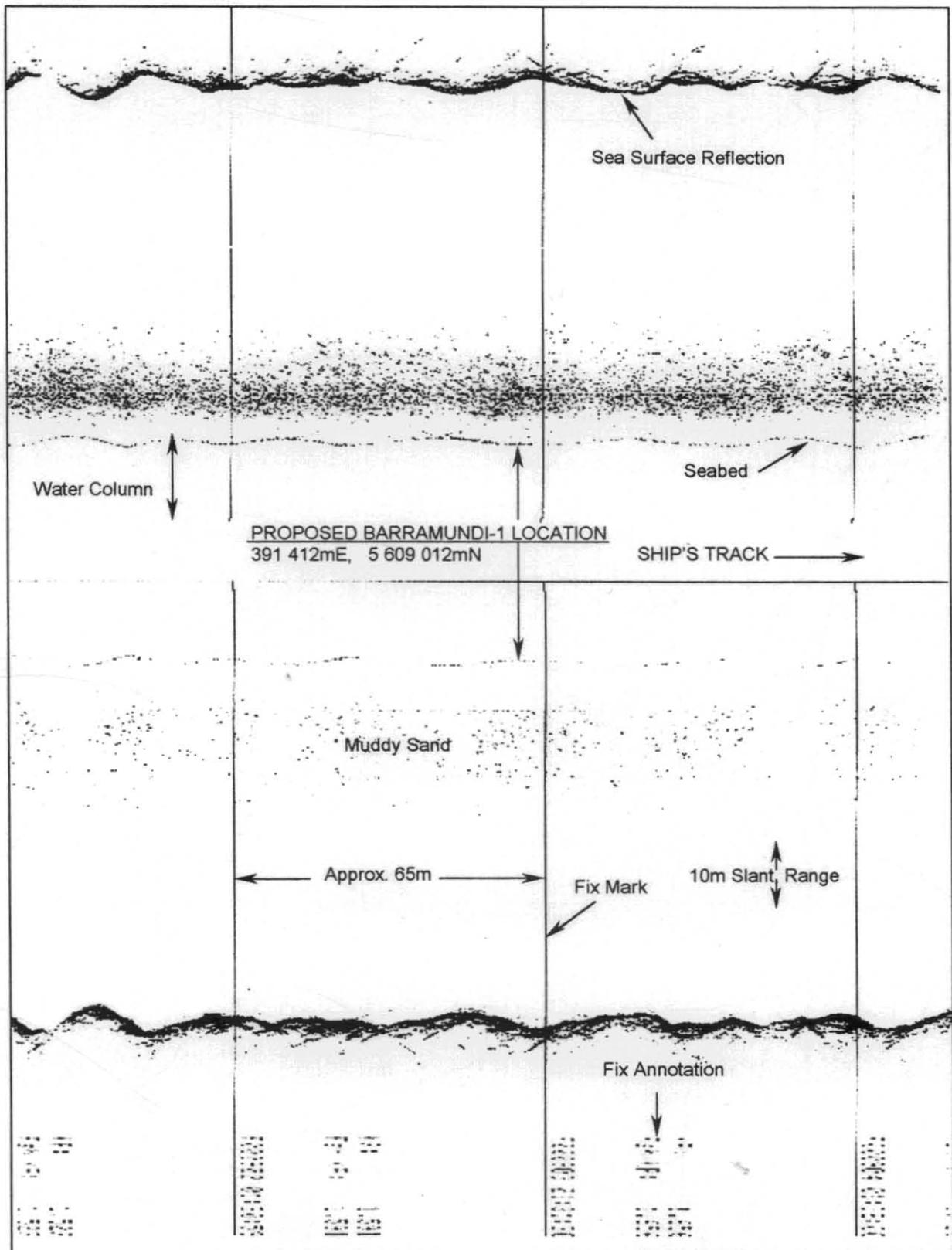
ECHO SOUNDER DATA EXAMPLE OVER PROPOSED BARRAMUNDI-1 DRILLING LOCATION





**BOOMER DATA EXAMPLE OVER PROPOSED BARRAMUNDI-1 LOCATION
LINE 35 (HDG 000°)**

5 cm



100KHZ SIDE SCAN SONAR DATA EXAMPLE OVER PROPOSED BARRAMUNDI-1 DRILLING LOCATION - LINE 16

547097

APPENDIX N

DAILY FIELD PROGRESS REPORT SHEETS

Site: 3rd DeLFB Client: Globex Job No.: 283001 Vessel: Bluefin Location: Bass Strait

PAGE 1 OF

Equipment	Op
SkyFix	
LandStar	✓
Gyro	✓
PCGNS	✓
MultiFix II	✓
GRREP	✓
SkyTrac	
Core+Job	✓

Equipment	Op
Deso Echo Sounder	✓
Sidescan	✓
Boomer	✓
Heave Co.	✓
STD-12	✓
ENSIN	✓

Racal Personnel
M.T.
B.T.
D.B.
L.E.
J.C.
Client Personnel
D.E.

WX	Sea State	Swell	Wind Dir.
0000			
0600	1m	1m	270
1200	1m	1.5m	270
1800	1.5m	2m	270

DIARY OF OPERATIONS

TIME	Time Zone = UTC+ 11
09:08	Vessel on location at Barramundi-1 site.
09:20	STD probe deployed, e/s deployed. Mean velocity 1505.86m/s
09:50	Commence bar check, draught 205m, velocity 1505.86m/s
10:00	Run scout line through centre of site, water depth @ 78m
11:15	Deploy boomer, 16m cable out from towpoint, commence tuning boomer.
11:30	Vessel running along navigation lines to test vessel handling capabilities.
12:00	SSS prepared for deployment and rub tested on deck.
13:00	SSS deployed and tuned, vessel heading towards North end of prospect to commence survey production.
13:16	SSS retermination required. recover zonal fish and commence retermination.
18:00	Continue SSS retermination.
20:30	SSS deployed and tested to be working.
21:30	tuning SSS, heading towards test line.
22:04	Commence test line.
22:09	test line completed, all sensors working and accepted. head to line 1
22:11	SOL line 1, F.F. 11, hdg 270
22:37	GOL 1, L.F. 67, data quality poor due to sea conditions
22:56	SOL line 4, F.F. 68, hdg 90°
23:21	GOL line 4, L.F. 114, wind 270°, 23Kts, sea 2-3 metres
23:30	data quality on line 1 and 4 unacceptable due to noise caused by sea conditions, recover equipment.
17:00	Standby on location, w.o.w.

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 M. Neil
SURVEYOR/ENGINEER

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

Signature [Signature]
CLIENT REPRESENTATIVE

Date: 5th Dec 98 Client: Globex Job No.: 283001 Vessel: Bluefin Location: Bass Strait

PAGE 1 OF 1

Equipment	Op	
SkyFix		
LandStar	/	
Gyro	/	
PCGNS	/	
MultiFix II	/	
GRREP	/	
SkyTrac		
Crabgrab	/	

Equipment	Op	
Deso Echo Sounder	/	
Sidescan	/	
Boomer	/	
Heave Co.	/	
STD-12	/	
ENSIN	/	

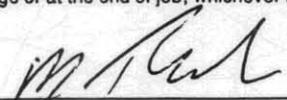
Racal Personnel
M.T.
B.T.
D.B.
L.E.
J.L.
Client Personnel
DE

WX	Sea State	Swell	Wind Dir.
0000	Rough	2m	270
0600		2m	270
1200		4m	270
1800		4m	270

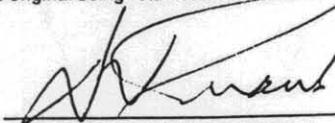
DIARY OF OPERATIONS

TIME	Time Zone = UTC+1)
0000	Vessel standing by on location, Britannia-2, W.O.W.
0500	" " " " " "
0730	Swell decreasing, deploy equipment to attempt to run lines.
0800	Tuning SSS and boomer, heading to line 30.
0900	Recover SSS due to fault possibly caused by jolting effect of vessel on cable due to poor weather.
0930	Weather deteriorating, unsuitable for survey, sea 3m+, wind 25kts, increasing.
1300	Deploy SSS to test, working O.K.
13:30	Echo-sounder bracket weld broken by large 4m swell. Weather deteriorating and forecasted to increase to 30-40kts.
15:40	Recover equipment and head towards Launceston to shelter from weather.
18:00	En route to Launceston. W.O.W.
24:00	" " " " " W.O.W.

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Signature  SURVEYOR/ENGINEER

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

Signature  CLIENT REPRESENTATIVE

Date: 7th Dec 98 Client: Globex

Job No.: 2830C1 Vessel: Bivefin

Location: Bass Strait

PAGE 1 OF 2

Equipment	Op
SkyFix	✓
LandStar	✓
Gyro	✓
PCGNS	✓
MultiFix II	✓
GRREP	✓
SkyTrac	
Coregrab	✓

Equipment	Op
Deso Echo Sounder	✓
Sidescan	✓
Boomer	✓
Heave Co.	✓
STD-12	✓
ENSIN	✓

Racal Personnel
M.T.
B.T.
D.B.
L.E.
S.L.
Client Personnel
D.E.

WX	Sea State	Swell	Wind Dir.
0000		1	230
0600		1	230
1200		1	230
1800		1	230

DIARY OF OPERATIONS

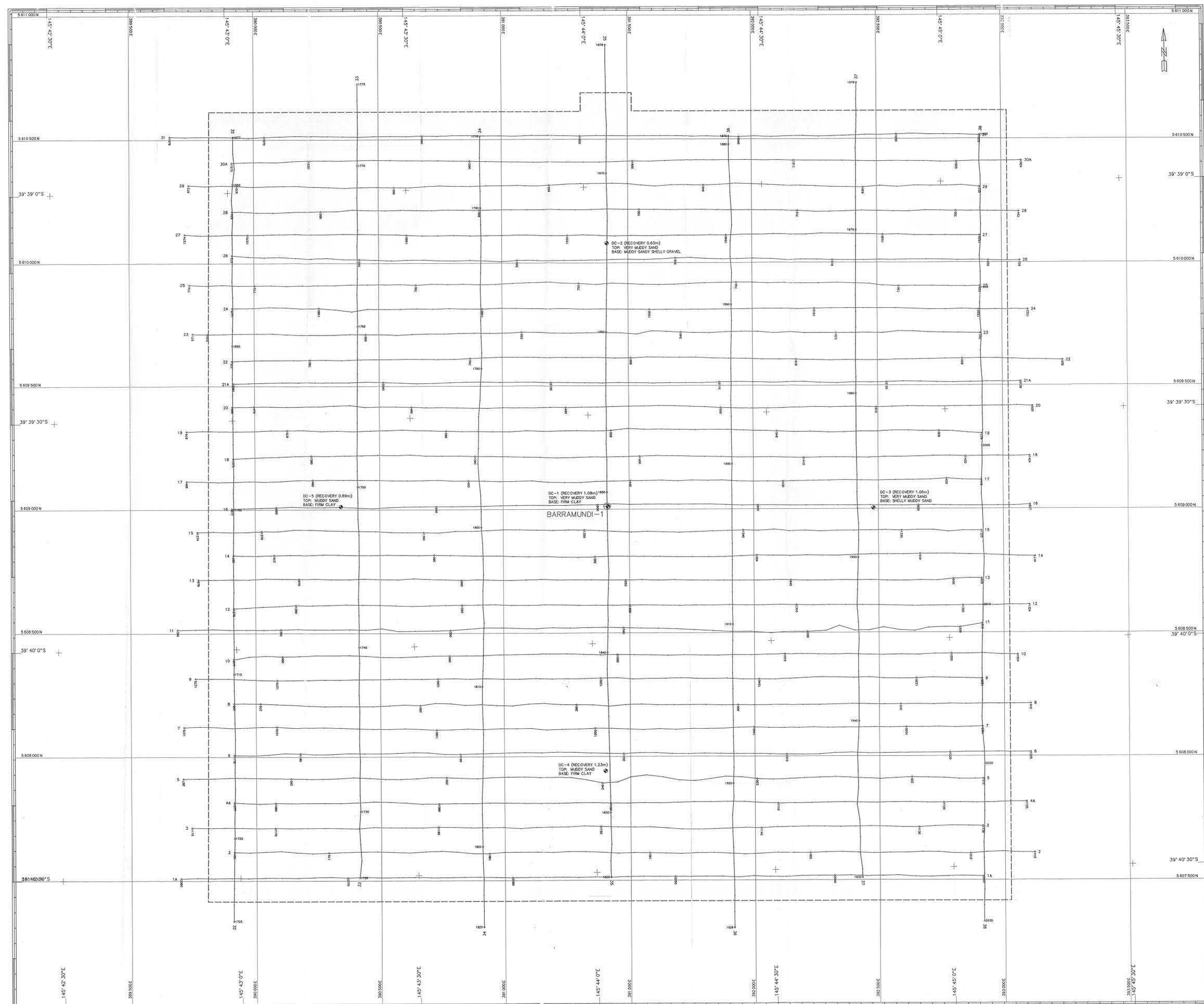
TIME	Time Zone = UTC+11
0000	Alongside AMC wharf.
0600	Depart AMC wharf for location.
1630	Vessel on location Barramundi-1, deploy o/s, make TS observations.
1640	Bar check completed, draught 2.03m, velocity 1506.5 m/s
1650	Deploy boomer + side scan sonar.
1700	Tuning boomer + side scan sonar.
1710	Heading to line 2, continue tuning equipment.
1734	SOL 2, F.F 164, hdg 90°
1759	EOL 2, LF 214
1814	SOL 5, FF 215, hdg 270°
1840	EOL 5, LF 267
1851	SOL 8, FF 268, hdg 90°
1916	EOL 8, LF 318
1922	SOL 11, FF 319, hdg 270°
1946	EOL 11, LF 366
1956	SOL 14, FF 367, hdg 90°
2018	EOL 14, LF 417
2024	SOL 17, FF 418, hdg 270°
2049	EOL 17, LF 468
2057	SOL 20, FF 469, hdg 90°
2123	EOL 20, LF 520
2130	SOL 23, FF 521, hdg 270°
2155	EOL 23, LF 571
2203	SOL 26, FF 572, hdg 90°
2229	EOL 26, LF 622
2236	SOL 29, FF 623, hdg 270°

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.

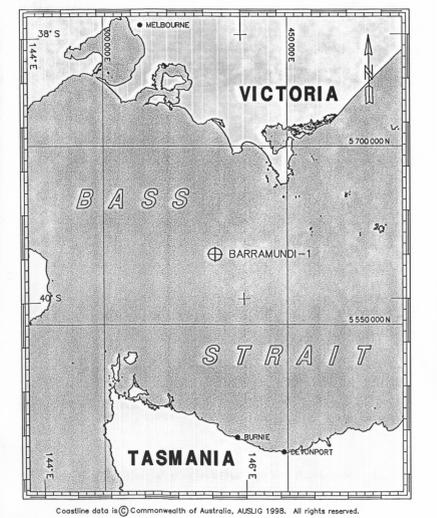
Signature M.T.
SURVEYOR/ENGINEER

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

Signature [Signature]
CLIENT REPRESENTATIVE



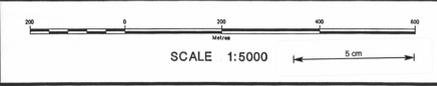
GENERAL LOCATION DIAGRAM



LEGEND

- GENERAL**
- PROPOSED BARRAMUNDI-1 LOCATION (391 412mE, 5 609 012mN)
 - DROP CORE LOCATION WITH DESIGNATOR AND BRIEF DESCRIPTION
 - VESSEL TRACK (DATUM POSITION)
- SEABED FEATURES**
- ENTIRE SITE CONSISTS OF PATCHY MEDIUM REFLECTIVITY SEABED WITH DISCRETE HIGH REFLECTIVITY PATCHES INTERPRETED AS MUDDY SAND WITH LOCALISED SHELLY AREAS
 - LIMIT OF SIDE SCAN SONAR COVERAGE

NOTES:
1. VESSEL POSITIONING SYSTEM: DIFFERENTIAL GPS



GEODETIC INFORMATION :
DATUM: AUSTRALIAN GEODETIC DATUM 1984
PROJECTION: AUSTRALIAN MAP GRID ZONE 55 CM 147° E

REFERENCE DRAWINGS

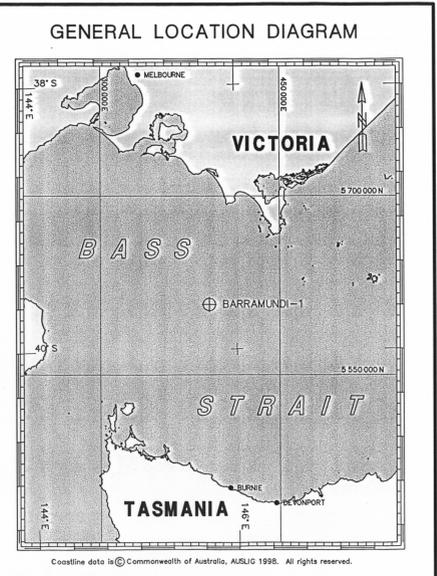
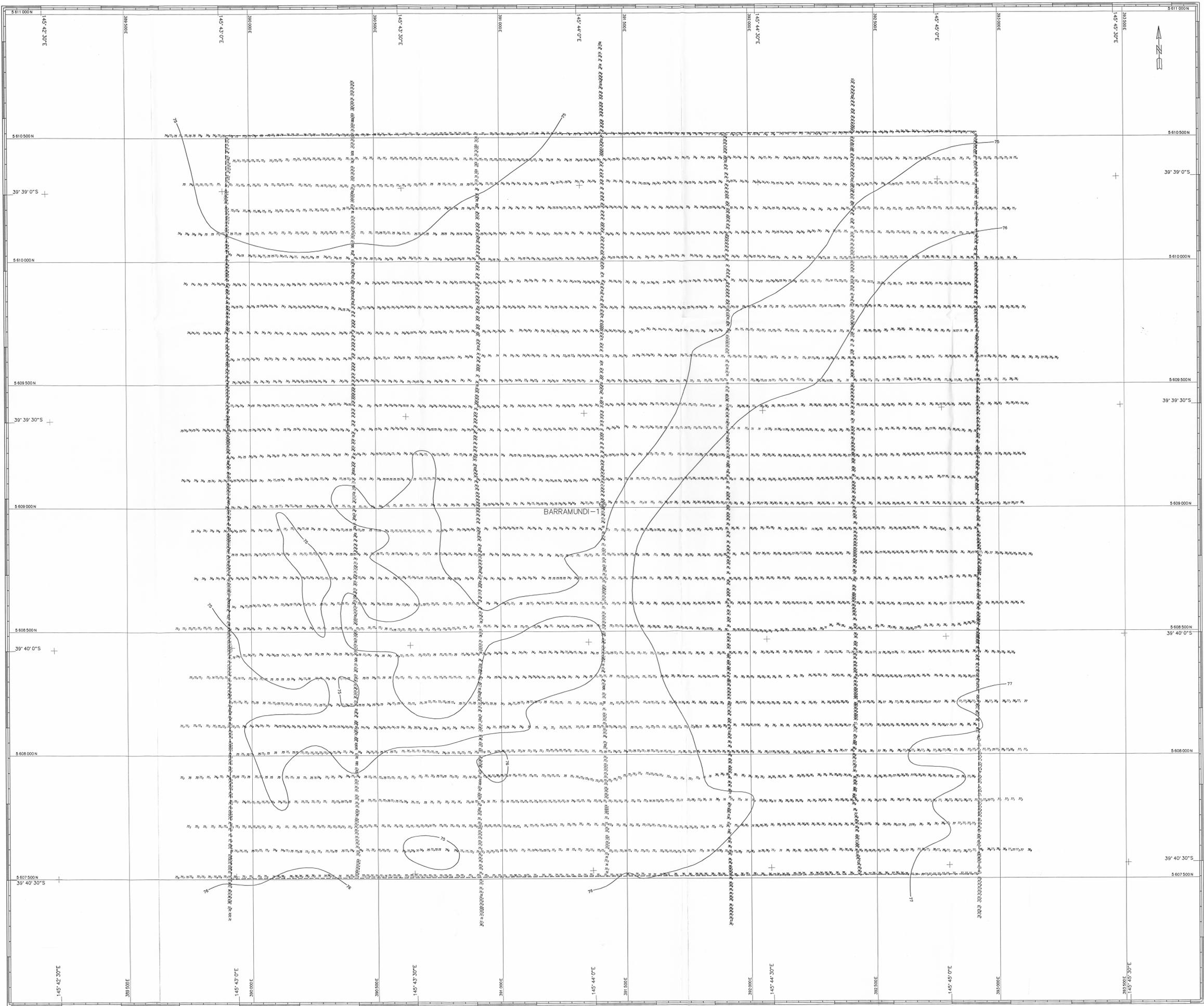
Racal Survey Australia Limited
RACAL
Racal Survey Australia Limited 4 Ledger Road Balcatta 6021
Telephone: +61 (0)8 9344 7166 Facsimile: +61 (0)8 9344 8783

GLOBEX FAR EAST

BARRAMUNDI-1 SITE SURVEY
TRACK AND SEABED FEATURES
DRAWING

Party Chief: M. Tuck	Drawn: S. Angelides	Racal Drawing No: 2830C1-1	REV: 0
Vessel: FTV Bluefin	Interpreted: J. Cowans	Sheet 1 of 4	
Date: December 1998	Approved: A. Kerr		
Approved for Issue:	Date:		

DRAWING NO: 01-0455



LEGEND

GENERAL

⊕ PROPOSED BARRAMUNDI-1 LOCATION (39° 41' 21\"/>

--- LIMIT OF SURVEY

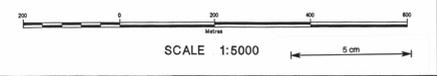
BATHYMETRY

75 76 75 BATHYMETRIC SOUNDINGS IN METRES AND DECIMITRES

~ BATHYMETRIC CONTOURS (SEE NOTE 4)

NOTES:

1. VESSEL POSITIONING SYSTEM: DIFFERENTIAL GPS
2. BATHYMETRY REDUCED TO LAT USING THE CROSSING ANALYSIS METHOD (SEE RACAL REPORT 2830C1) USING A CO-TIDAL Z₀ VALUE (1.65m) CALCULATED FROM THE STANDARD PORTS OF STANLEY, RABBIT ISLAND AND PORT PHILLIP HEADS
3. A VELOCITY OF SOUND IN SEAWATER OF 1506m/s WAS USED DURING THE SURVEY
4. BATHYMETRIC CONTOURS REPRESENT BROAD DEPTH CHANGES. MEANINGFUL CONTOURING CANNOT BE PERFORMED SATISFACTORILY ON SUCH A FLAT SITE



GEODETIC INFORMATION :
 DATUM: AUSTRALIAN GEODETIC DATUM 1984
 PROJECTION: AUSTRALIAN MAP GRID ZONE 55 CM 147° E

REFERENCE DRAWINGS

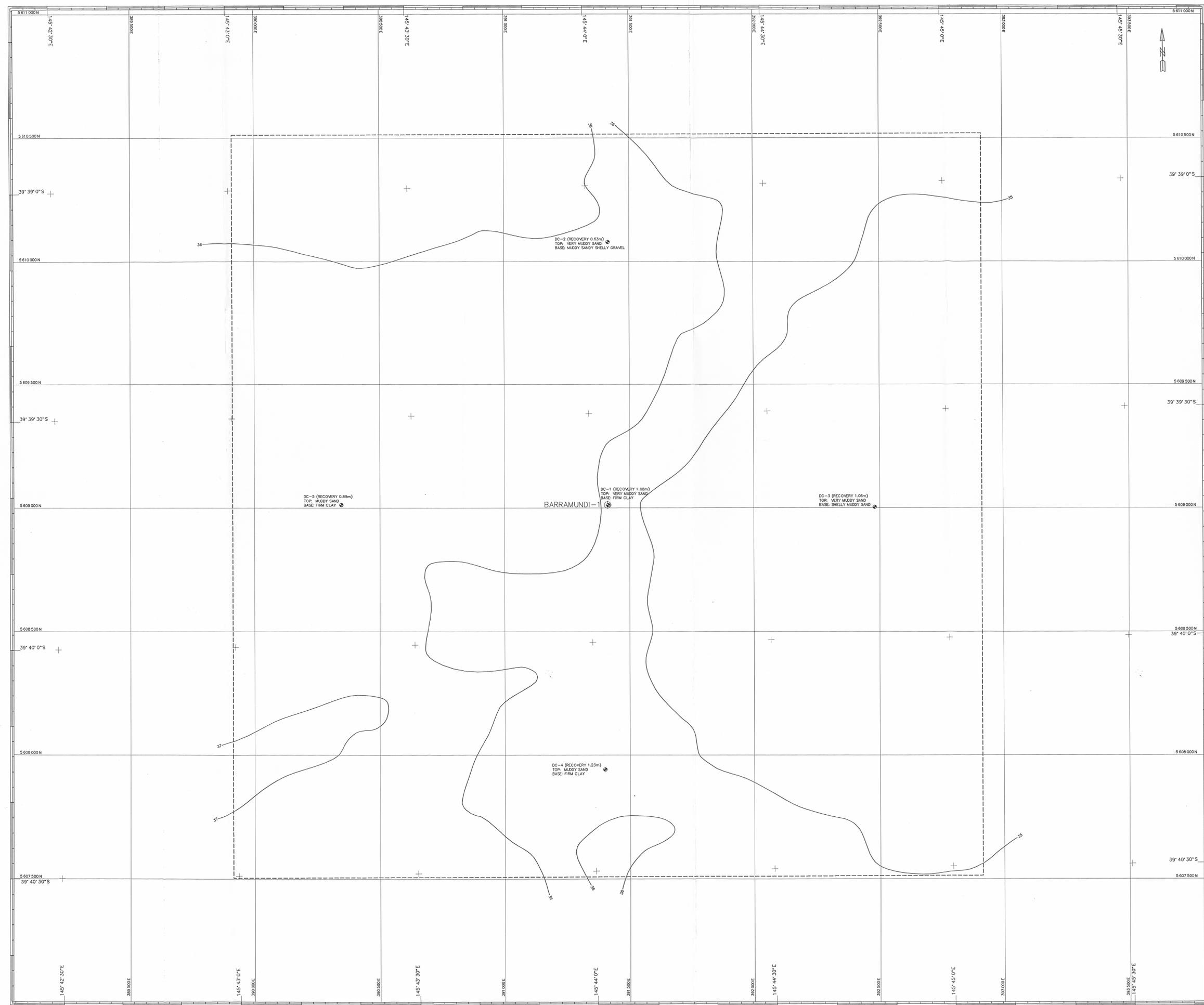
Racal Survey Australia Limited
RACAL
 Racal Survey Australia Limited 4 Ledger Road Balcatta 6021
 Telephone: +61 (0)8 9344 7166 Facsimile: +61 (0)8 9344 8783

GLOBEX FAR EAST

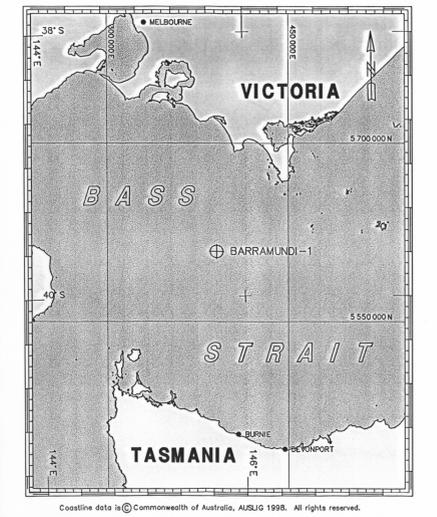
BARRAMUNDI-1 SITE SURVEY
BATHYMETRY DRAWING
 547112

Party Chief	M. Tuck	Drawn	S. Angelides	Revised Drawing No.	2830C1-2	Sheet	2 of 4	REV	0
Vessel	FTV Bluefin	Interpreted	J. Cowans	Date					
Date	December 1998	Approved	A. Kerr	Date					
Approved For Issue		Date							

DRAWING NO. 3
 CR. 0455



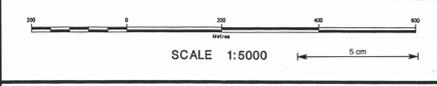
GENERAL LOCATION DIAGRAM



LEGEND

- GENERAL**
- ⊕ PROPOSED BARRAMUNDI-1 LOCATION (391 412mE 5 609 012mN)
 - ⊙ DC-1 DROP CORE LOCATION WITH DESIGNATOR AND BRIEF DESCRIPTION
 - SURVEY LIMITS
- ISOPACHS**
- ~ ISOPACH TO BASE OF UNIT 1 (REFLECTOR R2) IN METRES

- NOTES:**
1. VESSEL POSITIONING SYSTEM: DIFFERENTIAL GPS
 2. A SEISMIC VELOCITY OF 1600m/s HAS BEEN ASSUMED FOR BOOMER TIME/DEPTH CONVERSION



GEODETTIC INFORMATION :
 DATUM: AUSTRALIAN GEODETTIC DATUM 1984
 PROJECTION: AUSTRALIAN MAP GRID ZONE 55 GM 147° E

REFERENCE DRAWINGS

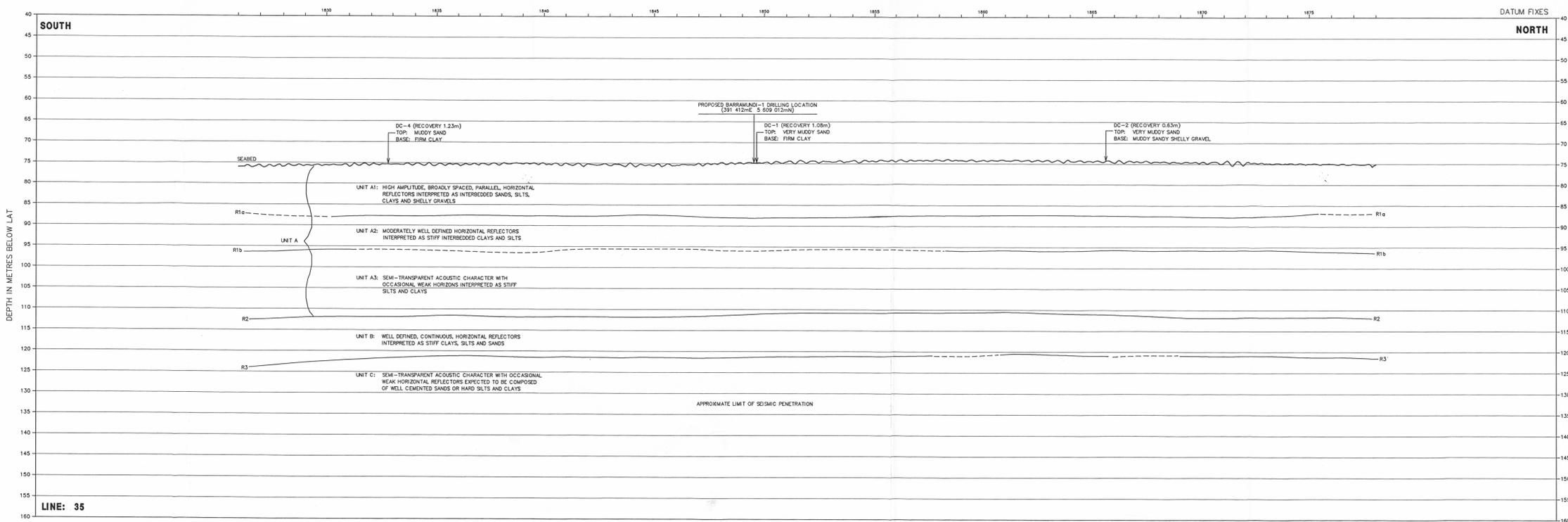
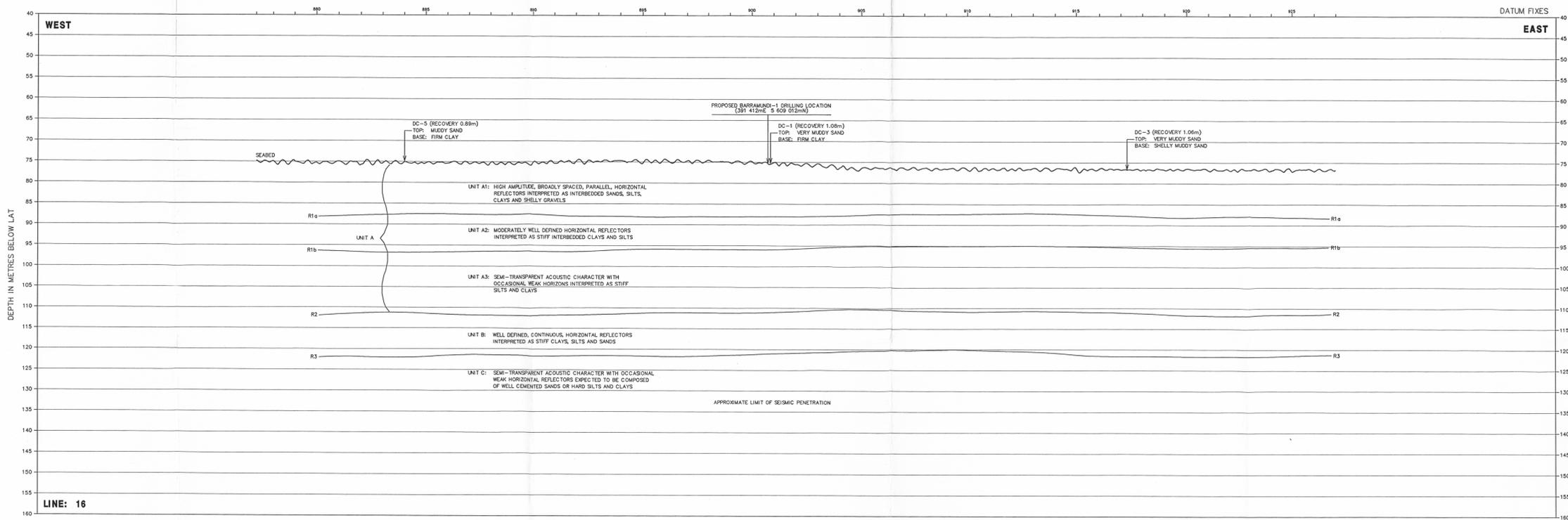
Racal Survey Australia Limited
RACAL
 Racal Survey Australia Limited 4 Ledger Road Balcatta 6021
 Telephone: +61 (0)8 9344 7166 Facsimile: +61 (0)8 9344 8783

GLOBEX FAR EAST

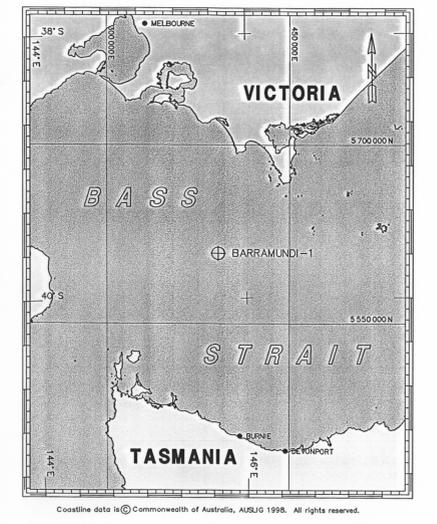
BARRAMUNDI-1 SITE SURVEY
ISOPACH DRAWING
 547113

Party Chief M. Tuck	Drawn S. Angelides	Racal Drawing No. 2830C1-3	Sheet 3 of 4	REV: 0
Used FTV Bluefin	Interpreted J. Cowans			
Date December 1998	Approved A. Kerr			
Approval For Issue	Date			

DRAWING APP. 3
OR C430



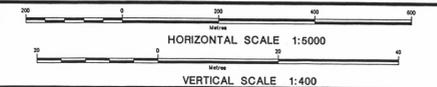
GENERAL LOCATION DIAGRAM



LEGEND

- PROFILES**
- SEABED
 - SUB SEABED REFLECTOR
 - INDISTINCT SUB SEABED REFLECTOR

- NOTES:
1. VESSEL POSITIONING SYSTEM: DIFFERENTIAL GPS
 2. AN ASSUMED SEISMIC VELOCITY OF SOUND OF 1600m/s WAS USED FOR BOOMER TIME/DEPTH CONVERSION



GEODETC INFORMATION :
 DATUM: AUSTRALIAN GEODETC DATUM 1984
 PROJECTION: AUSTRALIAN MAP GRID ZONE 55 CM 147° E

REFERENCE DRAWINGS

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GLOBEX FAR EAST
 547114
BARRAMUNDI-1 SITE SURVEY
GEOLOGICAL PROFILES

Party Chief M. Tuck	Drawn S. Angelides	Revised Drawing No. 2830C1-4	REV: 0
Vessel FTV Bluefin	Interpreted J. Cowans	Sheet 4 of 4	
Date December 1998	Approved A. Kerr		
Approved For Issue	Date		

DRAWINGS N° 14
 OR. 0635