

483001

TPR
OR-380
Vol I

FIELD SUPERVISION REPORT

FOR

MAXUS ENERGY CORPORATION

1990 T/24P MARINE SEISMIC SURVEY
STRAHAN SUB-BASIN
SORELL BASIN

NOVEMBER 22 - DECEMBER 5 1990

CONTRACTOR : HALLIBURTON GEOPHYSICAL SERVICES

VESSEL : MAGNIFICENT CREEK

SUPERVISOR : KENNETH FEE

AUSTRAL GEOPHYSICAL CONSULTANTS LTD.

MINES		
FILE T/24P-SAP		
23 MAY 1994		
DOC. REF.		
OFFICE	FOR ACTION	FOR INFO.
See Log 110		
W/24P	19/5/94	
REVISION	DATE	

TPR
OR-380
VOL I

CONTENTS

- 1.1 OBJECTIVES
- 1.2 SURVEY PARAMETERS
- 1.3 PROSPECT MAPS

- 2.1 NARRATIVE DIARY
- 2.2 CONCLUSIONS AND RECOMMENDATIONS

- 3.1 WEATHER
- 3.2 TIDES
- 3.3 NAVIGATION HAZARDS (Not with Report)
- 3.4 EXTERNAL INTERFERENCE
- 3.5 CONTRACTUAL DISCUSSIONS

- 4.1 PERSONNEL

- 5.1 VESSEL SPECIFICATIONS
- 5.2 VESSEL SAFETY

- 6.1 INSTRUMENTS SPECIFICATIONS
- 6.2 INSTRUMENTS DESCRIPTION
- 6.3 INSTRUMENTS DIAGRAMS
- 6.4 INSTRUMENTS TESTS

- 7.1 STREAMER CABLE SPECIFICATIONS
- 7.2 STREAMER CABLE DESCRIPTION
- 7.3 STREAMER CABLE DIAGRAM
- 7.4 STREAMER CABLE TESTS

- 8.1 ENERGY SOURCE SPECIFICATIONS
- 8.2 ENERGY SOURCE DESCRIPTION
- 8.3 ENERGY SOURCE DIAGRAM
- 8.4 ENERGY SOURCE TESTS

- 9.1 NAVIGATION SYSTEM SPECIFICATIONS
- 9.2 NAVIGATION SYSTEM DESCRIPTION
- 9.3 NAVIGATION CHAIN DIAGRAM
- 9.4 NAVIGATION SYSTEM CALIBRATIONS

- 10.1 ACTIVITY LOG
- 10.2 LINE ANALYSIS
- 10.3 TIME ANALYSIS
- 10.4 LINE LOGS

APPENDIX A : GRAVITY SURVEY

APPENDIX B : MAGNETOMETER SURVEY

ACKNOWLEDGEMENT

The author hereby acknowledges that some of the equipment descriptions and diagrams contained in this report are proprietary data of Halliburton Geophysical Services, reproduced with permission of that Company's representatives.

1.1

OBJECTIVES

Maxus Energy Corporation, on behalf of itself and its Partners, contracted Halliburton Geophysical Services Ltd. to carry out a specific marine 2D seismic survey in the block, held under permit T/24P, located off the West coast of Tasmania, Australia.

The prospect, designated MXT90, comprised 25 lines on a detailed grid and two regional lines which together were thought to total approximately 800 kms, including the stacking run-outs. The parameters and conditions for the survey were as specified in the Maxus Energy Corporation contract T/24P with amendments later received in writing from the Company's Australian representative, J. Taylor Geophysical Services Pty Ltd.

The Contractor provided the vessel, Magnificent Creek, its own personnel and equipment to carry out the survey.

Primary navigation for the survey was the SERCEL Syledis chain furnished and operated by personnel from Halliburton Geophysical Services. There was no secondary navigation system other than the Contractor's Magnavox Transit Satnav system which provided a gross error check.

Austral Geophysical Consultants were requested to provide onboard supervision of data acquisition and operational liaison with J. Taylor Geophysical Services and those tasks were carried out by the author of this report.

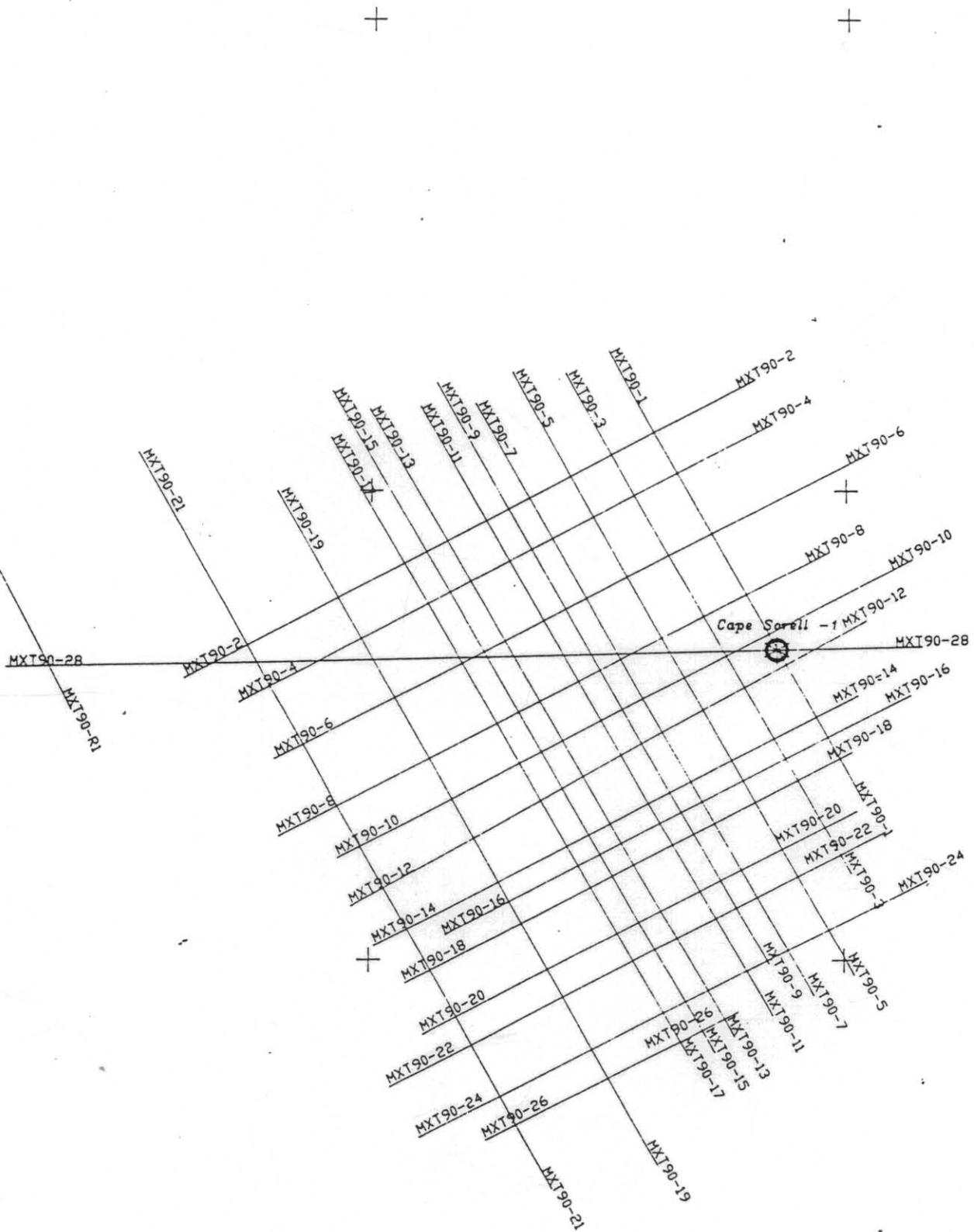
Kenneth A. Fee

1.2.2

PARAMETERS

SEISMIC RECORDING SYSTEM:	TITAN 1000
No. OF CHANNELS:	300 + auxiliaries
RECORDING FILTER HIGH-CUT:	180 Hz/72 db per octave
LOW-CUT:	8 Hz/18 db per octave
SAMPLE RATE:	2 ms
RECORD LENGTH:	6 seconds
FORMAT	SEG D
STREAMER CABLE:	TITAN Digital multiplexed (telemetric optical fibre)
ACTIVE LENGTH:	3750 m
No. OF GROUPS:	300
GROUP LENGTH:	12.5 m
GROUP SPACING:	12.5 m
PHONES PER GROUP:	32
PHONE TYPE	HGS Dish type, acceleration canceling
SENSITIVITY:	53.4 microvolts/microbar
DEPTH TOWED:	9 - 10 metres
DEPTH CONTROL	Model 396 Compass Digibirds
TYPICAL NOISE:	Traces 1 - 276 = 1 - 3 ubars; 277 - 300 & "bird" groups = 3 - 7 *
SEISMIC ENERGY SOURCE:	HGS Sleeve airgun array
CAPACITY	2180 cu.in.
No. OF GUNS:	64
AIR PRESSURE:	2000 psi nominal; 1800 psi minimum.
DEPTH TOWED:	9 m
TYPICAL OUTPUT:	102 bar/mtr quoted
PRIMARY TO BUBBLE RATIO:	13:1 quoted
GUN ARRAY SPACING:	See diagram
NEAR TRACE OFFSET	153 m average.
ECHO SOUNDER:	SIMRAD EA
WATER VELOCITY	1498 m/sec
PRIMARY NAVIGATION SYSTEM:	SERCEL Syledis
SECONDARY NAVIGATION:	Magnavox Transit Satnav
SHOTPOINT INTERVAL:	25 m
COVERAGE:	75 fold
KILOMETRES COMPLETED:	809.775
CHARGEABLE HOURS	4.50
SURVEY DURATION:	Nov 22 - Dec 5, 1990

(* ambient noise only)



5 cm

The Halliburton Geophysical Services seismic survey ship, Magnificent Creek, docked in Bell Bay, Tasmania at 2054 hrs on November 21, 1990. On the same day, the author travelled to Launceston, (approx. 40 kms upriver from Bell Bay), as did the relieving seismic and marine crews.

On November 22 the crew change hand-over was made and the vessel was re-supplied and re-fuelled. The Gravity survey equipment also arrived and installation was begun by the Edcon operators during the afternoon.

The HGS Party Chief advised the author that the vessel would be ready to sail at 1800 hrs on November 23 but that ETD had to be amended when problems were experienced with the installation of the gravity meter and its recording equipment. It was not until 1830 hrs that the system became stable enough to take the first still reading alongside the dock and the sailing time was therefore postponed until 0600 hrs next day. There was no reference datum point for the gravity system in Bell Bay and it had been requested that HGS tie the readings at the dock with a known point at Launceston airport but the portable gravity meter needed for that procedure was not available at the time. To comply with the requirement, HGS marked the wharf at the point where the still readings were taken, the times and tide heights were logged and it was arranged that the tie with the airport datum point would be made on return to port at the completion of the survey.

The fourth and last of the gravity meter still readings was completed at 0544 hrs on November 24 and the vessel sailed from Bell Bay at 0612 hrs. The weather at the time was fairly bad with just about a half gale blowing but even that was an improvement on the wind strength of the past couple of days in port. From all weather reports, it was unlikely that anything would have been achieved had the vessel sailed any earlier and, with an estimated travel time to the prospect of 24 hours and the necessity to scout the area for lobster pots, it was thought preferable to sail, and arrive, at first light.

M.V. Magnificent Creek arrived in the prospect area just after 0600 hrs on November 25 and as the Syledis chain was not yet fully operational, attempts were made to scout for lobster pots and/or other obstructions. Visibility for such an exercise was poor with the wind WSW force 6/7, choppy seas on a 3m swell. One small fishing vessel was sighted close inshore but no radio contact established.

At 0945 hrs signals were obtained from 3 of the 4 Syledis base stations and the vessel got under way to cut baselines. En route, a lifeboat muster was held which also included a demonstration of procedure for the survival suits carried aboard. By 1405 hrs the Yarrana Hill - Watts Hill and Trial Harbour - Watts Hill baselines had been cut with what seemed to be acceptable results (approximately 2.5m C - O errors) and, as sea conditions had deteriorated further making it impossible to do any effective scouting, the ship got under way to the middle of the prospect to take a series of 3-way fixes. Word was passed from shore

2.1.2

of a further delay in the installation of the fourth Syledis beacon at the Hibbs Pyramid site, weather conditions being considered too rough for helicopter flying.

The vessel stood by on prospect for the remainder of the afternoon and early evening and it was observed that the CEP (Circular Error Probability) figures computed by the CMS system were higher than expected, considering the baseline crossing results. At the time it was thought that the poor weather conditions may have contributed but when the 4th beacon (Hibbs Pyramid) became operational from 2130 hrs a more serious discrepancy was shown. Using the other 3 stations, fixes showed differences of up to 20m in ranges to the Trial Harbour station and it was apparent that, despite the baseline C - O measurements recorded (0.92 and 2.43m), some error existed in the positioning of that beacon. By the time that conclusion became inescapable, it proved impossible to raise the shore-based navigation personnel by radio to query either the co-ordinates of the beacon or its location relative to the Trig. point.

The early morning hours of November 26 were occupied with further baseline crossing and 3-way fixing, using alternative delay settings from the short and long range calibrations, but the error was not resolved. From 0645 hrs until 0950 hrs scouting operations were conducted and no obstructions were seen. At that latter time a corrected set of co-ordinates were received for the Trial Harbour Syledis site and when those were entered into the CMS the CEP figures were reduced to around 2 m. The Trial Harbour baselines were cut again but then only produced C - O differences of 6 m average, which was not considered acceptable. While awaiting response from another R/T call ashore, the Magnetometer sensor was deployed and tested. The recorded results were noisy but that had been anticipated in the heavy sea conditions.

At 1125 hrs another set of corrected co-ordinates were received for the Trial Harbour base station which produced C - O errors of 4 m when the baselines were cut once more. A series of 3-way fixes were also taken and CEP figures were then seen to be generally under 2 m. It appeared that finally the Syledis chain was proved to acceptable tolerance.

At 1650 hrs the tailbuoy was heaved over and deployment of the streamer began. Streaming the cable was expected to take much longer than usual as the configuration used on the previous survey was quite different to that required by Maxus. By midnight 3 live sections had been replaced because of various faults, as had one of the SEMs (Streamer Electronic Module). At that time the weather was much improved and the seas had subsided, although the residual swell was still about 3 m.

All of November 27 was spent on streamer work: reconfiguration, repair, adjustments to cable balance, and testing. In all, another two live cable sections, a stretch section, a SEM, a program plug and a deck cable repeater were replaced before all components tested good on the final deployment at 2230 hrs.

One of the cable sections which had caused an intermittent electrical

2.1.3

ground leakage fault was found on retrieval to be holed. The damage was fairly superficial but the hole in the cable skin appeared to have been caused by some kind of bite. Time taken to replace the section and cost of re-skinning would be Client-chargeable under the terms of the contract if it was agreed that the contract was in operation prior to the first shotpoint having been recorded. Details of the occurrence were included on the daily report faxed to J. Taylor to enable him to discuss the matter with HGS.

At midnight all systems (except the Magnetometer) were operational and tested and the vessel was on the run-in to its first line. It was decided that weather conditions were too good to wait to resolve the cause of the ground spike problem showing in Magnetometer recording.

The first line of the survey, MXT90-10, was started at 0007 hrs on Nov. 28 and production was uninterrupted during the day which resulted in a total of over 157 kms. Not unexpectedly however, data recording was affected by random swell noise throughout those lines on headings which were almost directly with, or against, the ocean swell. At its towing depth of 9 - 10 metres, the cable was inevitably shaken by the heavy ground swell even though the weather was very good. Winds were light and seas slight and it could be said that conditions were as favourable as could be expected in this particular area. Swell noise was markedly reduced on the last line of the day (uncompleted at midnight), which was aligned much more along the troughs between swells.

A ground leakage fault, discovered in the control system chassis, was the reason no magnetic data was recorded on the first line but, that apart, there were no problems or delays on the day. Syledis radionav signals were very stable and CEP figures were generally below 2 m. The same three stations were used for all lines and ranges from the fourth beacon were also logged and recorded, although not used in fixing.

November 29 was another very good day with no delays incurred and 145 kms surveyed on seven lines. Operating conditions were identical to the previous day and data collection was similarly affected by the long swell. To date, the MXT90-1 was the only line shot roughly parallel to the swells and it had shown greatly a greatly reduced incidence in the noise bursts. After discussion with the HGS Party Chief, it had been agreed that the ENE/WSW lines would be completed as early as possible, while conditions remained good, as it was felt that any deterioration would halt data acquisition in those directions very quickly. The prevailing weather pattern is from the West and as a streamer cable is always much quieter when towed along the troughs between seas than across them, operations could continue longer on a (roughly) N/S axis.

Syledis navigation signals continued to be very stable and doubtless the high pressure weather system assisted radio propagation. All four ranges were recorded but, as before, on-line positioning was by 3-way fixing from the beacons located at Trial Harbour (2), Yarrana Hill (3) and Watts Hill (4).

2.1.4

The wellhead, Cape Sorell-1, was traversed on line MXT90-1 and although no sign was visible on the fathometer strip chart, a distinct magnetic anomaly was recorded over the location.

November 30 continued the unbroken run of data collection and once more over 150 kms were surveyed on the day. All E/W lines on the detailed prospect were now completed and on the N/S lines the reduction in swell noise interference was quite dramatic. Recorded data quality was high and even minor faults were rare. One cable group (trace 236) developed occasional ground spikes and on two or three lines there were a (very) few files on which the TITAN system showed data transmission errors.

Syledis signals remained stable and 3-way positioning CEP figures calculated by the CMS II were almost all less than 2 metres. Gravity and Magnetic recording was uneventful except for the anomaly shown by the latter when the C. Sorell-1 well was traversed again on line MXT90-28.

As it had from the beginning of the survey, the source array continued to perform extremely well. To date, all lines were started with the full array and there were only two occasions when a gun was lost before a line was finished.

December 1 produced the best daily total with over 162 kms surveyed and once again there were no operational delays. At 1005 hrs, on the line change between MXT90-9 and MXT90-5, the work boat was launched in order to transfer one of the HGS crew members whose overdue relief had now arrived. Compressor Mechanic, R. Barnes had been obliged to delay his return from break for personal reasons but was now available to relieve D. Waugh and was ferried out to the prospect area by a cruising launch, Wilderness Explorer, chartered by HGS. No time was lost and the transfers were carried out safely, with due care.

Daily instrument tests had shown trace 289 to be weak and this was now noted on all Observer and Q.C. logs. Trace 236 continued to generate occasional ground spikes and the same occurred on trace 89 for one line only. As from the beginning of the survey, readings from # 2 Compass Bird were intermittent, but all of the above faults were considered to be of a minor nature and in no way likely to significantly affect the quality of acquired data. The same weather conditions were experienced and, on traversed headings of the day's lines, only occasional slight swell noise was observed.

Of a more serious nature was the failure of the Instrument room SIMRAD echo sounder soon after the start of MXT90-7. The fathometer remained off for the rest of the line while the fault was found and repaired and it was regrettable that the ship's echo sounder on the bridge was also defunct, having a transducer problem which required a dry-dock repair. A discussion was held with the Party Chief and it was agreed that the HGS would re-run the line at the end of the end of the survey to record water depths, at no cost to the Client.

The Syledis chain continued to give reliable performance from the same

2.1.5

stations used throughout, although some slight signal interference was observed late in the day, probably caused by the rain squalls reported ashore.

December 2 started as well as all previous production days but did not finish that way. Four lines were completed for a total of 153.425 kms but that total stood only until next morning when it was revealed that line MXT90-19 had been shot on a wrong alignment. The line was shot as per the end-point co-ordinates provided for the vessel by HGS but, regrettably, there was an error in the Longitude at the Southern end which swung the line away from the positioning intended by Maxus. After discussions during the morning between all of the parties concerned it was resolved that : (1) the crew had shot the line as per instructed; (2) incorrect co-ordinates had been sent to the crew by the HGS offices; (3) by request, the line would be re-shot; (4) no cost would be charged to the Client.

The last line of the day, MXT90-R1, was almost 55 kms in length and by the time the vessel neared its Northern end the SNR of Syledis signals had deteriorated considerably because of the ranges required and some rain squalls along the shoreline. Altogether 4 shotpoints were missed (no data recorded) because of erratic navigation signals. Another more minor failure was a tape transport malfunction on the Gravity/Magnetic system which meant that those data were recorded on the strip charts only, for about a distance of two kilometres, (SP 695 - 615 approx).

A recording delay of 0.5 seconds was employed from SP 1425 on that line as the first returns had arrival times of over 1.2 secs in some water depths.

December 4 saw the last line surveyed and the trailing gear retrieved before the error with the positioning of MXT90-19 was discovered. Data acquired on MXT90-R2 was affected by swell noise once more as the line ran West/East, but also a circle was required just over 2 kms from the end because of streamer power failure. The 84 x SP overlap on resumption was non-chargeable. At the start of line the SIMRAD echo sounder was unable to track in water depths estimated from first returns to be approximately 1680 metres and sounding did not start until SP 297 at a depth of 1295 m. A recording delay of 0.5 seconds used from the FSP was removed after 16 kms at SP 767.

After circling the line was completed without incident and the trailing gear recovered, the cable SEMs being removed on retrieval for testing. It had been then intended to run the fathometer survey on line MXT90-7 before crossing the Syledis baselines as a post survey check, but plans were changed with the necessity to re-shoot MXT90-19. The streamer was fully re-deployed and tested before the end of the fathometer run and no major faults were found.

The re-shoot of MXT90-19 was made without incident although the weather and sea conditions were worsening. The line was completed at 2310 hrs to produce a final survey total of 809.775 kms on 27 lines.

2.1.6

By 0300hrs on December 4 all trailing gear was recovered and the vessel got under way to cut Syledis baselines. Those crossings were made with satisfactory results between 0500 hrs and 0800 hrs at which latter time the Magnificent Creek was headed back to Bell Bay.

An unscheduled fire drill had occurred at 0700 hrs when a main engine gasket blew and the resultant fumes tripped a smoke sensor. The false alarm at least proved the value of routine procedures practised in the fire drills, as the off-duty crew members were roused and assembled at the muster point in good time.

En route, the cable SEMs and the TITAN system were given the "Monthly" instrument tests. On board analysis showed nothing seriously amiss and the test tape was included in the data shipment to the HGS processing centre in Sydney.

The author attended the safety meeting which was held that day for all crew members and a brief summary of the general discussion can be found in section 4.2.2.

During the afternoon word was received of an accident which occurred to the helicopter being used for de-mobilising the Syledis base stations. The aircraft had reportedly crash-landed, but neither of the two men on board at the time suffered any injury. No other details were available at the time except that another chopper had to be chartered to complete the job.

At midnight the vessel was still under way to port, directly into a half gale blowing from the N.E.

M.V. Magnificent Creek arrived at the mouth of the Tamar River at 1030 hrs on December 5, delayed about three hours by conditions en route. Because of the revised ETA, no pilot was available until 1230 hrs and the vessel finally docked in Bell Bay at 1330 hrs. Although the same wharf was used, the previous berth was occupied and it was necessary to mark a new gravity datum point and measure its relation to the one established before sailing on November 23 and 24.

The gravity still readings were begun half an hour later and advice was received from HGS that the portable meter required for the reference point tie would be arriving the next day. The author left the vessel to make phone calls and was later informed by chance that the engineer from Tasmanian Mines Division had arrived with the portable meter and was checking the datum points on the wharf.

On arrival back at the vessel it was discovered that those tasks were all but completed. The engineer, R. Richardson stated to the EDCON personnel that he felt nothing was amiss with the readings obtained but that he was unable to do his final computations at the site and would forward the final results directly to HGS. The last onboard still reading and K-check was completed at 2015 hrs, following which the beam was unclamped and demobilisation of the system began.

2.1.7

The author travelled home on December 6 and between flights was able to call John Taylor from Sydney airport to appraise him of the latter developments.

CONCLUSIONS & RECOMMENDATIONS

The MXT90 survey in the Sorell Basin was conducted for the most part in very good weather conditions and, as a result, took much less time than anticipated. Client-chargeable downtime totalled only 11.25 hrs, none of it for weather, although a further 15.48 hours were claimed at the Standby rate by the Contractor. Those hours were not conceded as chargeable at the time, but were left for further discussion by the Principals. Reference to the two incidents involved is made later in this report, (section 10.3).

As well as enabling speedy completion, the good weather ensured that a better quality of data was acquired, by the reduction in swell noise interference in at least one shooting direction. Propagation of the Syledis radio signals was also generally more consistent in the high pressure atmosphere, giving more reliable positioning. Another factor some times overlooked perhaps, when considering the effects of weather on a marine survey in such an area, is the extra difficulty the crew experience in conducting operations in heavy seas, where equipment is much more prone to damage and routine procedures are more awkward and time consuming on a rolling deck. The West coast of Tasmania is noted for a persistently large swell from the Southern Ocean so it is thought that this survey benefited from exceptionally good conditions.

Once started, data collection was at a very good rate and a circle was required only once on the survey, and then not until 2.325 kms from the last SP of the regional line MXT90-R2, when a streamer power failure occurred. The one blot on this otherwise excellent performance was the necessity to go back and re-shoot line MXT90-19.

The first pass on that line was made on a wrong azimuth, the result of incorrect endpoint coordinates, which were supplied to the crew from Houston via their Perth office. The re-shoot required 10.75 hrs, all of which was at the Contractor's expense. It is inevitable that questions are asked when such a potentially expensive error is made, but in this case it is felt that the field crew can be absolved from whatever blame may be cast. Two separate sets of line end co-ordinates were supplied to the crew and both contained the geographical error which caused the problem: a simple transposition of the number 2 for the number 7 in the minutes of degree of Longitude for one of the line endpoints. As per routine, the two sets were checked against each other before the line was entered into the CMS III navigation system, and the Longitude and Latitude were also verified as matching the Eastings and Northings of the UTM grid. The line as shot did not, of course, run parallel to the others on that heading but then, there is no rule which says that must always be the case. There is the possibility that the on-duty navigator could have ignored the line end points supplied and entered the coordinates printed on the margin of one of the prospect maps, but the maps had been clearly stamped "Provisional", and were thus not considered in any way likely to overrule all other documentation provided.

In the event, data was acquired on the line intended by the Client with out any loss of quality and at no additional cost.

2.2.2

The various features which may be considered hazards to operations in this area are referred to in section 3.3 below, but only the need to scout the prospect for lobster pots was responsible for any downtime. A sharp watch was kept for such obstacles throughout the first couple of days while the vessel was engaged in other activities such as baseline crossings or working on the cable. A total of another 4.5 hours was then needed exclusively for scouting and the time was considered well spent. In common with their brethren in many countries, Australian fishermen are very quick to make claims for damages and compensation if there is the slightest likelihood of a survey vessel causing interference to their normal activities. In all, only a few inshore fishing boats were seen and most proved co-operative when contacted by radio.

No other occurrence resulted in "Standby" charges to Maxus, unless it should later be decided to accept liability for the cable damage which was sustained prior to the start of the survey proper. The cuts to the skin of the cable section appeared likely to have been caused by a bite of some sort and the time taken to replace the holed section was 3.25 hours.

The survey vessel, Magnificent Creek, handled the assignment without serious problems but one or two minor occurrences demonstrated that the dry-docking scheduled for later in the month is not before time. The ship's engineers were kept very busy with repairs to one of the main engines and a generator, as well as auxiliary plant such as the fresh water system and the air-conditioning to the instrument room and gun shack. None of the above cost any loss of production although one instance of air-conditioning failure necessitated a shut down in both the instrument room and shooting shack: fortunately that occurred before data acquisition commenced. Although well rigged and equipped, the vessel is now approaching the veteran stage and is in need of an overhaul.

The ship is fairly quiet acoustically under average sea conditions but the increased cable sensitivity of 53.4 ubars/uvolt and the shorter cable groups used tend to accentuate vessel propagated noise. Unless the water is shallower than, say, 100 metres and as long as increased engine power is not required to counteract big seas or tidal currents, the front end cable noise levels are generally about 5 - 10 ubars. On this survey slightly higher values were recorded at those times when the ship was pitching into the swell.

The TITAN 1000 recording system has now been in service for a couple of years and is proving to be a fairly reliable and flexible unit. Onboard problems were confined to occasional missed records because of data transmission errors: the most files lost consecutively was 5, on MXT90-26, so no significant loss of fold coverage occurred.

Inevitably, there were a few more failures with the in-water components of the system but here again performance was considered above average. The greatest number of bad files for any reason was 12 (0.74%) on line MXT90-28, with no more than 3 of those consecutive. MXT90-2 had 10 bad

2.2.3

files (0.8%), with 4 consecutive. On lines MXT90-6 and -26 the low cut filter dropped out on SEM # 20 for 10 and 2 files respectively. This meant that effectively traces # 229 - 240 had only a TITAN system low-cut of 3 Hz when those files were recorded.

All cable traces were good at the start of the survey and remained so for the first 3 days although trace 289 showed signs of low amplitude 60 hz pick-up. That trace failed the Daily DRD test on December 1st and was logged as bad from then on. Intermittent ground spikes were observed on trace 236, also from Dec 1, and trace 86 showed a similar fault on three lines. Those minor defects apart, the streamer was in good shape with satisfactory balance and ambient noise levels. Swell noise was persistent on the E/W line headings and there was some unavoidable undulation, but none that exceeded specifications longer than momentarily.

As has now come to be expected, the VSX Sleeve airgun array performed with great reliability. All lines but for the last, (the re-shoot of MXT90-19) were started with the full array and there was a failure of a single gun on only four lines. The T.I. Sleeve gun has proven to be the most dependable airgun available to the industry, both for its low failure rate and consistent timing.

Of the ancilliary equipment, the failure of the SIMRAD EA echo sounder on MXT90-7 was unusual and necessitated a re-run on that line at the end of the survey to acquire the missing bathymetric record. It was regrettable that neither of the ship's fathometers functioned during the voyage, due to a transducer problem which will require dry-docking to repair.

The one other malfunction of note was the inability to record Magnetic data on the first line, caused by a grounding fault in the system rack. There was also a distance of about 2 kms on MXT90-R1 for which gravity and magnetic data were not recorded to tape, because of a problem with the system tape transport. Strip chart recording was maintained.

The stable performance of the Syledis navigation chain was another good feature of the survey. There was a delay initially in the setting up of the station at Hibbs Pyramid, caused mostly by the bad weather which hindered helicopter operations. Calibration of the chain also took longer than necessary because incorrect co-ordinates were supplied to the vessel for the location of the beacon on the Trial Harbour site. Once calibration was completed satisfactorily, good positioning control was obtained.

The same three stations were used for all lines on the main prospect, and ranges from the fourth beacon were also logged and recorded through-out. For the longer, regional lines it became necessary to switch beacons as ranges increased and SNR deteriorated. There were four SPs missed towards the Northern end of MXT90-R1 (2x on the stacking runout) because jumpy signals confused CMS computations. Some small amount of signal instability was observed at times during the morning and evening

2.2.4

skywave periods and, occasionally local rain squalls affected one or more stations but the CMS III system CEP calculations were below 3 m, metres, mostly 0 -2 m and often 0 - 1 m. The sole exception occurred on MXT90-6 when signal noise bursts raised the CEP estimates to 3 - 6 m from SP 950 to SP 1010. A local squall was thought to be the likely cause.

The CMS III navigation control system is now well short of state-of-the-art. The software is outdated and although an updated version is frequently said to be on its way, it has yet to make an appearance. Its capabilities were not stretched on a routine 2D survey of this type but it is interesting to speculate whether the error in shooting MXT90-19 could have been avoided if the system had greater capacity. Most of the other Contractor's equivalent systems have the facility to generate prospect maps once all line end co-ordinates have been entered. It is then easy to build another map, adding each line as it is completed, to provide visual comparison and detection of possible discrepancies.

The auxiliary Gravity and Magnetometer surveys were fairly trouble-free after some early problems with installation. The initial still readings and K-checks did not start until the evening of November 23 and were not finished until just before the vessel sailed at 0600 hrs Nov. 24. The teething problems with the rig-up were understandable as part of a new installation. There was no reference point established for the gravity meter at the dock but a benchmark was painted on the wharf once the still readings commenced. On its return to Bell Bay the vessel was unable to dock in exactly the same spot but another point was marked at the new location, some 159 metres upriver from the first. A portable meter was then employed to compare results with the shipboard readings and to tie with a known base at Beaconsfield, near Launceston airport. The latter operation was carried out by an engineer from the Tasmanian Mines division who was to forward the computed results directly to HGS.

At sea, problems with the systems were few but again the quality of recorded data was affected by the heavy seas at times. For instance, noise on Magnetometer recording was generally about 2 -3 gamma but that could rise to 6 or 8 gamma in rough weather. Gravity recording was also affected by the rough conditions, causing pen wiggles of 0.5 mgal. A minor but persistent problem was the failure of the the SP counter to annotate automatically. Gravity data were recorded on all lines, the magnetic data on all but the first, and the operators supplied by EDCON appeared to be keen and competent in their work.

The Halliburton Geophysical Services seismic crew were enthusiastic and sufficiently well experienced to perform their tasks in a workmanlike manner, under the direction of an able Party Chief. Co-operation with the Client Representative was very good and all personnel aboard worked toward a successful survey. Good working practices are established on the Magnificent Creek and the Contractor also maintains a commitment to proper training and safety procedures.

To summarise, the MXT90 survey was carried out in what could have been

2.2.5

a difficult area in a relatively short time, in a professional manner, with the sole reservation being the necessity to reshoot line MXT90-19.

The good weather encountered during the period of the survey was the main contributing factor to the absence of any major downtime and the light traffic, uncluttered prospect and moderate tides in the area were also helpful. The vessel, its equipment and crew all performed well and it is worth noting that an efficient, well run operation is needed to take advantage of the opportunity presented by a weather "window".

Equipment malfunctions were infrequent and only 4.50 hrs were assessed as chargeable at the Standby rate, although the figure could be revised upward should Maxus concede liability for time taken for the initial gravimeter still readings and the replacement of a holed cable section, both of which occurred prior to commencement of data collection.

Acquired data were unavoidably affected on some lines by the prevailing ocean swell but the overall quality otherwise appeared high. The incidence of bad files during recording was low, and a circle was needed on only one line. Despite periodic difficulties steering the ship in big seas, Syledis radionavigation provided stable signals for the most part and post-plotting should produce good positioning.

It is thought that the data produced by this survey are up to industry standards and should greatly assist in the Company's assessments of the area.

3.1

WEATHER ANALYSIS

DATE 1990	A.M.			P.M.		
	WIND	SEA	SWELL(m)	WIND	SEA	SWELL(m)
24/11	W 5	moderate	1.0	WSW 6	mod/rough	1.5
25/11	WSW 6	mod/rough	2/3	WSW 7/9/6	rough	3/4
26/11	WSW 6/3	rough/moderate	4.0	WSW 4/NW 2	mod/slight	3.0
27/11	WNW 3/5	moderate	3.0	WNW 5/3	mod/slight	3.0
28/11	NW 2/W 3	slight	3.0	W 2/SW 4	slight	3.0
29/11	SW 3/1	slight/rippled	3.0	Light airs	rippled	3.0
30/11	SW 3/airs	slt/rippled	3.0	Airs/SW 2	rippled	3.0
01/12	SSW 2	rippled	3.0	SSW 2/S 3	rip/slight	3.0
02/12	S 3/airs	rippled	3.0	S 2/3	rippled	3.0
03/12	S 3/SE 4	slight	3.0	SE 4/S 6	slight/mod	3.0
04/12	S 5/2	slight	3.0	Airs/NE 6	calm/rough	3.0
05/12	E 6/3	rough/slight	3/1	In Port		

3.2

TIDE TABLE

DATE 1990	HIGH WATER A.M.		HIGH WATER P.M.	
	TIME	HEIGHT(m)	TIME	HEIGHT(m)
24/11	0205	1.5	1150	1.6
25/11	0232	1.5	1244	1.6
26/11	0259	1.6	1345	1.5 Np
27/11	0327	1.6	1452	1.5
28/11	0357	1.7	1607	1.4
29/11	0431	1.8	1730	1.4
30/11	0508	1.8	1858	1.4
01/12	0551	1.9	2016	1.4
02/12	0640	2.0	2130	1.4
03/12	0737	2.0	2242	1.5 Sp
04/12	0837	2.0 Sp	2344	1.5
05/12	0939	2.0	--	-
06/12	0036	1.5	1044	1.9
07/12	0121	1.6	1152	1.8
08/12	0203	1.6	1302	1.6
09/12	0243	1.7	1410	1.5
10/12	0321	1.7	1519	1.4

The above table is high water times for Hobart, the nearest "Standard Port" : Lat 42 deg 53'S x Long 147 deg 20' E, time zone - 1000 (i.e. GMT + 10 hours).

Corrections should be made for the nearest "Secondary Port" at Cape Sorell : Lat 42 deg 12'S x Long 145 deg 13' E, as follows :

Time differences (mins)		Height differences (metres)	
HHW	LLW	MHHW	MLHW
*	*	-0.7	-0.7

* Variable according to harmonic constants : all information received indicated that no definite time differences have been established.

3.4

OPERATIONAL INTERFERENCE

In the absence of any other seismic vessels, and because the shipping was scarce and confined to small vessels, no coherent noise interference to data recording was experienced from those sources.

The Magnificent Creek is a reasonably quiet boat provided that sea conditions do not demand excessive engine power to counteract strong tidal currents, for instance. Ambient cable noise when shooting in optimum directions was in the order of 1 - 3 ubars on the bulk of the cable groups, rising to 3 - 7 u bars on groups carrying or adjacent to "birds" and on the near 24 traces. Traversing the swells typically increased the corresponding noise levels to 2 - 5 ubars and 5 - 12 ubars.

Heavy swell action was continuous throughout the survey and affected data quality, more particularly on the ENE/WSW lines which ran almost directly against or with the seas. Lines along the troughs were much less affected and swell noise on those was slight and occasional.

3.5

CONTRACTUAL DISCUSSIONS

Prior to travelling to Tasmania for this survey, several discussions of the project were held between John Taylor and the author. These however, were of a fairly general nature because at that stage some operational specifications had not been finalised and no definitive contract had been signed with HGS by Maxus.

- November 22 : on arrival Bell Bay 2 copies of the programme maps and a provisional contract were received from J. Taylor. Phoned J. Taylor and discussed those parameters still not decided. Fax then received with confirmation of data acquisition parameters and some other amendments to Contract.
- Nov 23 : Fax received from J. Taylor outlining desired SP numbering protocol etc.
Fax from HGS re contract clause Appendix G, Article 1.5 relating to "damage to marine harvesting" (approved by Maxus)
- Nov 24 : Fax sent from vessel with sitrep for previous 3 days and notification of vessel sailing.
- Nov 25 : Faxed activity report (via J. Taylor).
- Nov 26 : Faxed activity report & notification that HGS wish to bill for gravity system port check at "Standby" rates.
- Nov 27 : Faxed activity report: queried Client liability for cable damage (probably caused by marine fauna) prior to start of contract; i.e. before first SP recorded in spec.
- Nov 28 : Production report faxed.
- Nov 29 : Production report faxed.
- Nov 30 : Marisat call to John Taylor with sitrep and briefing on survey to date. Received fax confirming coords well Cape Sorell-1.
Production report faxed.
- December 1 : Production report faxed.
- Dec 2 : Production report faxed.
- Dec 3 : Marisat call to John Taylor who queried length of line MXT90-19. Examination showed line to have been shot as per pre-plots provided to vessel but one of end coordinates seemed incorrect. Line plotted and verified positioning not what required by Maxus. Two more Marisat calls and one received from HGS Perth : outcome was that HGS appeared to have given the wrong endpoint to the field crew and the line therefore is to be shot again at Contractor's expense.

4.1

PERSONNEL

SEISMIC CREW

A. Welfare	Party Manager
M. Chen	Instrument Engineer
G. Kennedy	Systems operator
R. Mervin	" "
T. Moojen	" "
D. Harris	" " (trainee)
M. Wilson	Quality Controller
A. Edwards	" "
D. Waugh	Compressor Engineer (Replaced by R. Barnes 12 Dec. 1990)
A. Temmen	Airgun Mechanic
M. Harmans	" "
G. Constant	" "
S. King	" "
L. Arnold	" "
E. Brod	Gravity operator (Edcon)
D. Landis	" " "
K. Fee	Client Rep. (Austral Geo. Cons.)

SHORE BASED (HGS)

L. Williams	Administrator (Departed 28/11/90)
B. Tuck	Syledis chain maintenance

MARINE CREW

A. Dwyer	Master
J. Bramwell	Mate
J. Rennie	Chief Engineer
J. Schutt	2nd Engineer
P. Conway	Greaser
J. McCulloch	A.B.
A. Dean	A.B.
C. McCorrison	A.B.
B. Berveling	Chief Steward
A. Richmond	2nd Steward
G. Cant	Chief Cook
D. Stone	2nd Cook

5.1

VESSEL SPECIFICATIONS

NAME	Magnificent Creek
CALL SIGN	VJLC
BUILT	Carrington Slipways, N.S.W.
TYPE	Rig tender, adapted for seismic work
YEAR	1974
OWNERS	Finbar Marine Group
FLAG	Australian
PORT OF REGISTRY	Fremantle, W.A.
LENGTH	62.32m (190 ft.)
BEAM	14.20m (43.3 ft.)
DRAUGHT	4.69m (14.3 ft.)
TONNAGE	Gross : 1272.18 ; Net : 738.9
MAIN ENGINES	4 x Daihatsu Diesel (2 per shaft)
GENERATORS	2 x 250 KW Kato/Cat. D3464150 50 Hz
PROPELLERS	2 x fixed pitch
BOW THRUSTER	KA ME WA
AUTOPILOT	Decca ARKAS 42E 14/550
GYRO COMPASS	Plath Navigator II
RADARS	1 x JRC JMA-3710 plotting radar 1 x Furuno FR 711
RADIOS	Sailor Type R1117 Codan Type 6081-S Mk 2B (24v) Sailor Type 144B VHF Philips FM 320 CB Sea Eagle Mk II CB AWA TR 235A (aircraft)
INMARSAT COMMUNICATION	Magnavox telephone/telex/fax
WEATHERFAX	KODEN FX 7181
FATHOMETERS	SIMRAD EP 2BN) Neither SIMRAD EA OSS D600) operational.
CAPACITIES	Fuel : 250 m3 Water ; 150 m3. *
CONSUMPTION	Fuel : 5 - 6 tons per day Water : 5 tons per day
EVAPORATOR	OSMATRON : capacity 5 tons per day
SPEED	Max.: 12.5 knots; cruising 9.5 knots
ENDURANCE	35 - 40 days
ACCOMODATION	34 men

* Present working capacities.

5.2

VESSEL SAFETY

EQUIPMENT

Life boats	None
Life rafts	4 x 25 man inflatable
Rescue boat	Inflatable dinghy with outboard
Work boat	Semi-rigid runabout (outboards)
Emergency radios	2 x fixed, 1 x portable
Life boat/raft radio	1 x EPIRB
Life jackets	Cabins: 100 % ; On deck: 100 %
Survival suits	On deck: 100 %
Life rings	Standard: Y ; With lights: Y
Fire pump main	Engine room
Standby pump	Main deck
Fire extinguishers	Foam: Y ; Powder: Y ; Water: Y Halon: Y
Inert Gas systems	Engine room, Bow thruster room
Foam systems	Streamer reel
Foam hoses	Streamer spares storage Helideck
Fire suits	Main deck, bridge.
Fire blankets	x 2
Breathing apparatus	x 2
Resuscitators	x 2
Line throwers	Y
Pyrotechnics	Y
Safety lines, harnesses	Y
Flotation work vests	Y
Eye protectors	Y
Ear protectors	Y
Safety boots	Y
Medical supplies, equipment	Y

PROCEDURES

Station bills (In Messroom)	Read/signed by all crew
Emergency equipment drawings	All decks
Fire drill, equipment inspection	Monthly
Abandon ship drill	Monthly
Man overboard drill	Monthly
Safety meetings	Monthly (H.G.S.)
Safety Officer	Monthly rotation (H.G.S.)
Fire fighting instruction	Annually (H.G.S.)
First aid instruction	Annually (H.G.S.)
Sea survival instruction	Annually (H.G.S.)
Emergency radio inspection	Annually
Pyrotechnics inspection	Annually
Welding procedure enforcement	Standard procedure
No smoking areas enforcement	Not 100 %

5.2.2

On November 25, en route to the prospect area, a lifeboat muster was held: lifejackets were checked and a talk given on stations and procedures. A demonstration of donning a Bayley survival suit was given, together with a short talk on the points to be borne in mind in the event of abandoning ship in cold waters.

On November 26 a fire drill was held, equipment inspected and the crew practised their allotted tasks in such an emergency.

To assist in general awareness of responsibilities in either of the above situations, a Station Bill is posted in the mess room listing each man's post and task and allocated life raft. All crew members are required to note these and to sign the Station Bill in acknowledgement. Also aboard are manuals on sea survival, general safety requirements and the handling of hazardous materials, which are compulsory reading for crew members.

On December 4 a safety meeting was held for combined seismic and marine crews at which all personnel were invited to make contributions. Matters discussed were : areas of the vessel in need of repair and therefore dangerous; additional encouragement of personnel to familiarise themselves with emergency and general safety procedure by reading available literature; appointment of "Safety Man of the Month"; small boat handling procedures for the workboat and MOB boat; Coxswain courses to be run for same and the requirement to bring to the attention of the Master, the Party Chief or the Safety Man, any event or state of affairs which any crew member felt could be a hazard. It was stressed that it was not necessary to wait for safety meetings or dry-docking to have such things attended to.

6.1

INSTRUMENTS SPECIFICATIONS

TYPE	TITAN 1000
No. OF CHANNELS	300 x data + 12 x auxiliary
TAPE TRANSPORTS	3 x Storage Tek 1950
TAPE FORMAT	SEG D 16 bit quaternary
RECORDING TAPES	Memorex Seismic 3600, 6250 b.p.i.
TAPE SPEED	125 IPS
SAMPLE RATE	2 ms
RECORD LENGTH	6 seconds
AMPLIFIER	IFP (in 12 db steps)
GAIN CONSTANT	Programmable : Low = 4.15 db (used) High = +7.88 db
LOW CUT FILTER	8 Hz at 18 db/octave
HIGH CUT FILTER	180 Hz at 72 db/octave
NOISE RECORD FILTERS	Same
NOTCH FILTER	Out
REPRODUCE MODE	Defloat with PGC
REPRODUCE SETTINGS	Variable
POLARITY CONVENTION	SEG Normal
DYNAMIC RANGE	Gain constant low 114 db
FULL SCALE SIGNAL (Referred to EIN)	Gain constant high 110 db
EQUIVALENT INPUT NOISE	Preamp low = 0.35 uB RMS Preamp high = 0.17 uB RMS
CROSS FEED ISOLATION	80 db between any 2 channels
DISTORTION	0.1 % 8 - 256 Hz
GAIN ACCURACY	+/- 2 % channel to channel, SEM to SEM
OTHER:	Multiplexed streamer operation : figures include TITAN 1000 recording system plus streamer
PLOTTERS/LOGGERS	Westren "Fastbox II" Q.C.System CITOH Electronics CI600 T.I. Omni 800 (ADL) EPC single trace profiler

FIELD COMPUTER SYSTEM III (FCS)

The FCS III is designed around a Gould SEL 32/2705 32 bit mini-computer. The SEL 32/2705 features a high speed data bus capable of 26 megabytes per second, a powerful real-time operating system, significant computing capacity and a large address space for up to 1000 data channels. It has a 1 megabyte memory and a 340 megabyte disk for the operating system. The system interfaces to the SEL bus chassis or the I/O expansion chassis.

The devices with SELbus interfaces include a mass memory, magnetic tape system, system disk, Read-After-Write/Digital Data Checker and Fastbox plotter interface and controller. I/O expansion devices include the operator console and a line printer/graphics plotter.

An Amplifier Controller interfaces the FCS III with the SCS Ethernet data output ports via two coaxial cables, each capable of 256 seismic data channels. The Amplifier Controller provides data formatting, sample rate decimation, recording delays, buffering and status word storage. The FCS II has a 16 Me gabyte mass memory to store the input data from the Amplifier Controller.

The mass memory is configured into two 8 megabyte blocks. The data from all channels for one record are written into one half of the mass memory, while the previous record is being read from the other half. The data read from memory are passed to the high speed tape controller where the 32 bit storage words are split into four 8-bit bytes. The tape formatter sends the 8-bit write data to the appropriate tape drive (1 of 3 available) and receives the 8-bit Read-After-Write data.

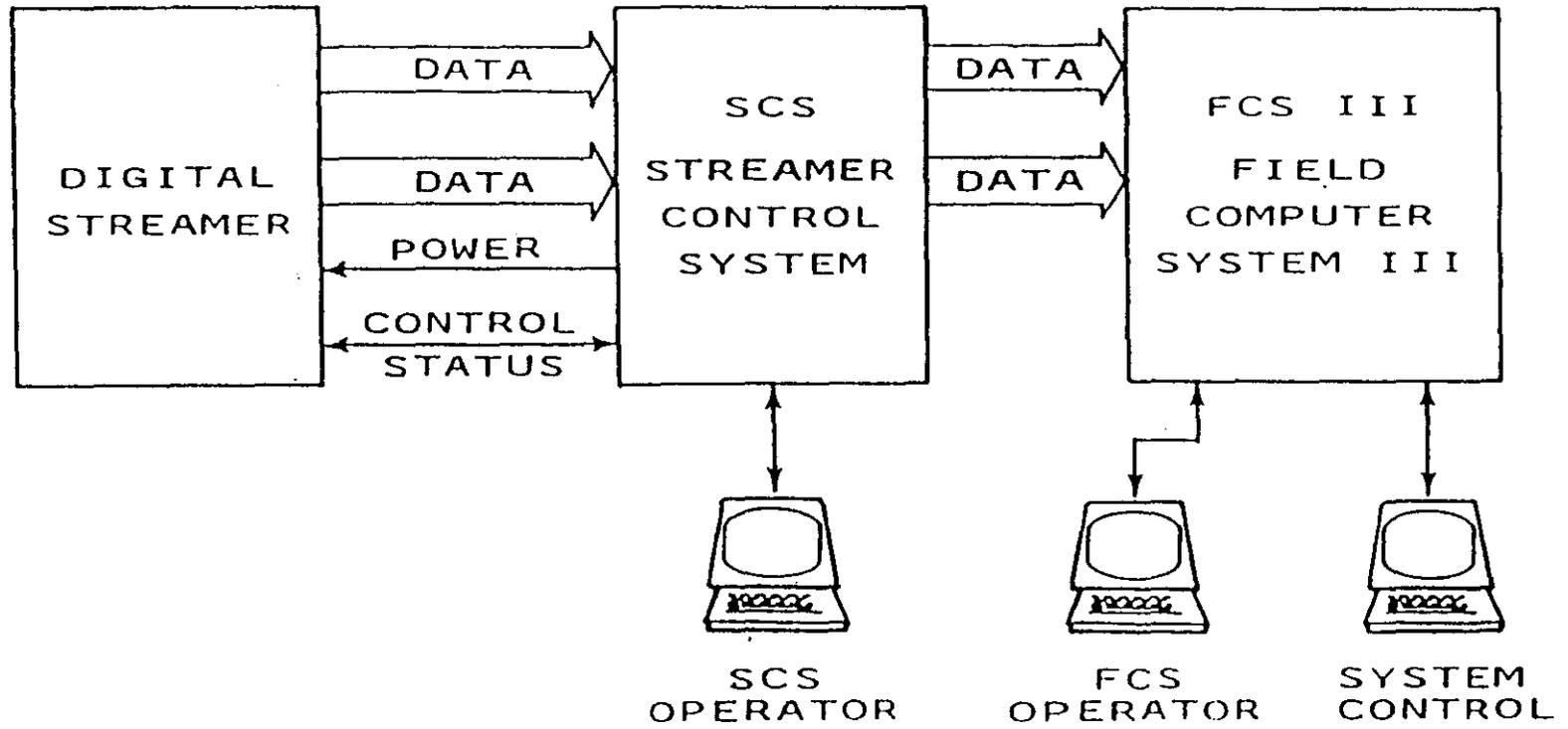
The Read-After-Write data are then made available to the SELbus where they are used by the Read-After-Write Data Checker/Digital Data Checker which performs parity and header data checks as well as having the facility to display (on oscilloscope) either all recorded traces for one complete record or two stored traces (switch selectable) for one record.

The same Read-After-Write data are also picked off the SELbus by the Fastbox plotter interface. The Fastbox is controlled by a 980B minicomputer which is interfaced to a Qume supervisory terminal. Required display parameters are entered into this terminal and control the GeoSpace Plotter output. The output of the plotter is therefore independent of any other display system and, as such, program gain control parameters etc. can be changed to provide the best hard copy interpretation for any given area without affecting oscilloscope or single trace profiler displays.

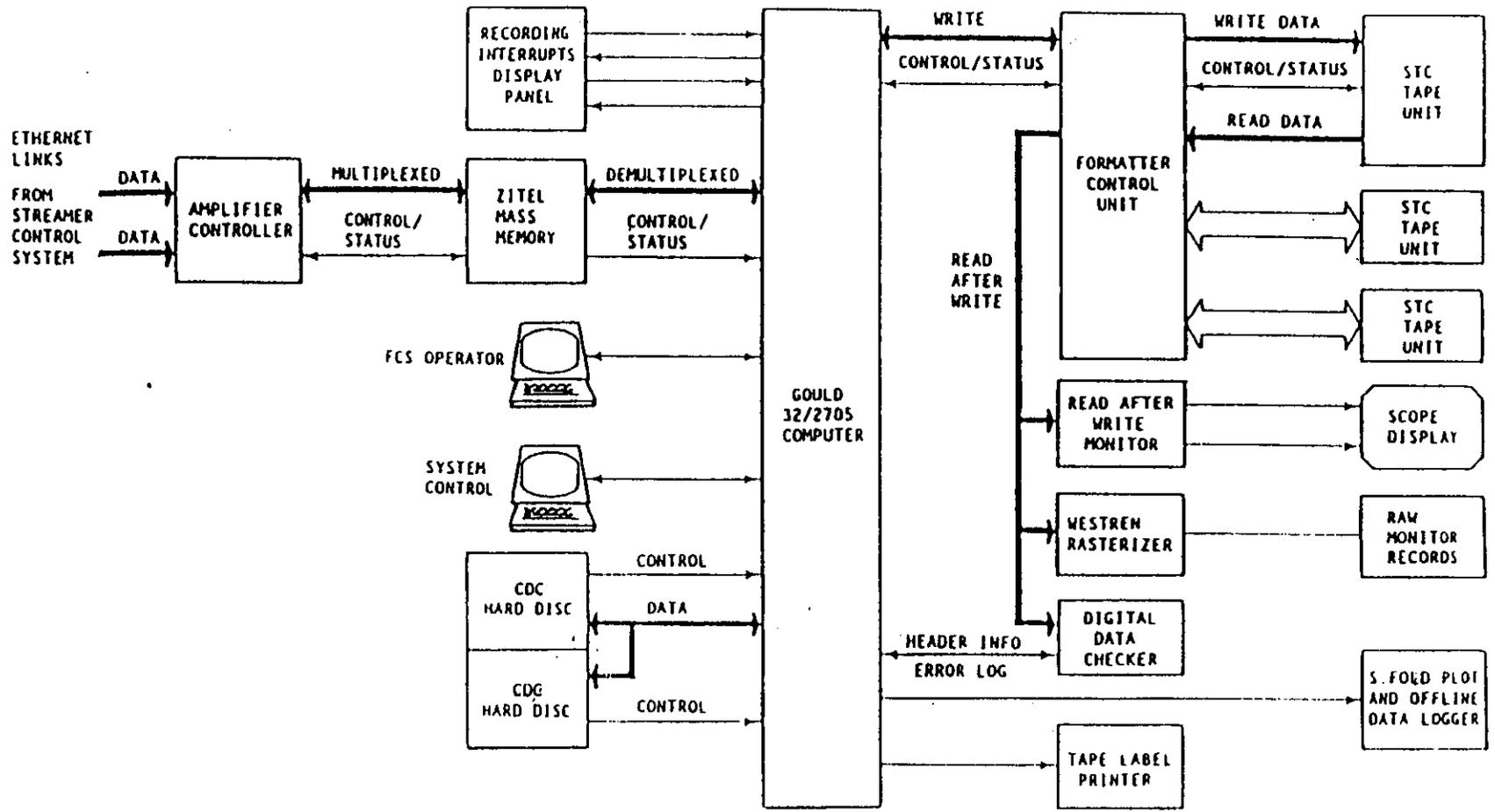
6.2.3

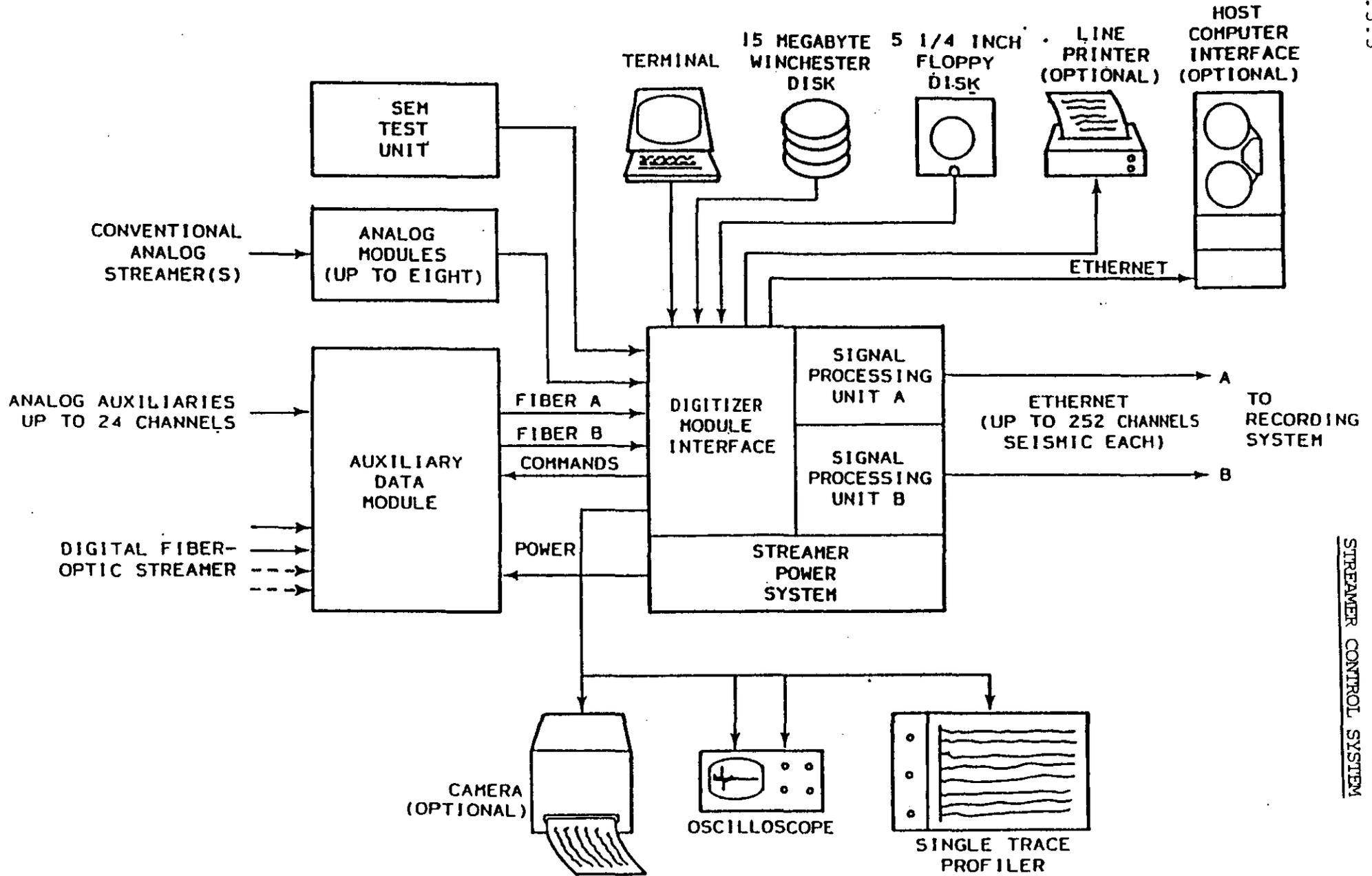
be input via a video display terminal. It maintains the system software that controls the application of the configuration commands to the streamer interface, data I/O interface, reproduce data, streamer simulator and status processing functions via control bus. Configuration and control of the signal processing function are provided via RS-232 serial link. The display terminal is also connected to the control function via RS-232 interface.

The control function provides an interface to a Winchester hard disk unit to facilitate storage and control of system software. A floppy disk unit is provided to back up the Winchester and to download new software releases. A line printer provides hard copy of configuration of disk files.



RECORDING INSTRUMENTS DIAGRAM





6.4

RECORDING INSTRUMENTS TESTS

A full set of 'monthly' instrument tests is generally performed only at the start or finish of each survey or at the end of each five week voyage, if the survey takes more than one trip to complete.

Copies of the summary of the tests carried out on December 4 are included overleaf. Onboard analysis showed only minor problems to have developed with two of the SEMs, regarding DRD tests for SEM # 5 and SEM # 25. Both showed below par response to the DRD, the former probably only because the test oscillator was set too high, and the latter on the last step (# 9).

During daily tests channel # 289 failed Harmonic Distortion tests after the first couple of production days and was logged as a bad trace from that time.

As is the usual practice, the test tapes will be processed by H.G.S., Sydney, and the results forwarded directly to the Company.

Aboard the Magnificent Creek the daily tests carried out were :

- Converter Dynamic Range Determination (DRD)
- In water DRD
- Harmonic distortion
- DC Offset/Noise analysis
- Cable Q.C. test

Monthly tests include :

- Equivalent Input Noise test (EIN)
- A/D Converter dynamic range test
- Filter pulse test
- Crossfeed isolation test
- Amplifier harmonic distortion
- Individual SEM checks
- Skew check on all tape transports
- All ones/alternate ones on tape transports
- Pattern tests : consist of input of various digital patterns into system and checking data at computer centre.

SEM S/N	REEL RECORDS	COMMENTS
2038	1-21	PASSED
2020	22-42	PASSED
2011	43-63	PASSED
2005	64-84	PASSED
2041	85-105	FAILS DRD 1-4 (TEST OSCILLATOR SLIGHTLY HIGH)
2004	106-126	PASSED
2130	127-147	PASSED
2189	148-168	PASSED
2033	169-189	PASSED
2001	190-210	PASSED
2021	211-231	PASSED
2027	232-252	PASSED
2042	253-273	PASSED
2040	274-294	PASSED
2035	295-315	PASSED
2030	316-336	PASSED
2127	337-357	PASSED
2002	358-378	PASSED
2074	421-441	PASSED
2043	442-462	PASSED
2016	463-483	PASSED
2013	484-504	PASSED
2028	505-525	PASSED
2010	538-558	PASSED
2008	559-579	ALL CHANNELS FAILED DRD 9 (SPARE)
2015	580-600	PASSED (SPARE)

7.1

STREAMER CABLE SPECIFICATIONS

STREAMER TYPE	Digital Multiplexed
MECHANICAL COUPLING	Stainless steel quick connect, field replaceable. Removable electrical connector with field replaceable pins and sockets.
STRAIN MEMBER TYPE	Kevlar
SECTION TENSILE STRENGTH	Exceeds 2500 lbs straight, steady pull
STREAMER DIAMETER	2.6 inches
STREAMER LENGTH ACTIVE	3750 metres
SEISMIC GROUP LENGTH	12.5m standard unmixed
GROUP MIXING	Up to five basic groups may be mixed, with or without weighting to form a supergroup. Mixing may be overlapping (rolling) or non-overlapping. Each basic group may contribute to up to 5 supergroups.
HYDROPHONES	GSI Dish type, acceleration cancelling
HYDROPHONE SPACING	Linear: 1 x phone every 0.3906 metres.
HYDROPHONES PER GROUP	32 for 12.5m group length 16 for 6.25m groups
GROUP CAPACITANCE	62 nf nominal for 12.5m groups 31 nf nominal for 6.25m groups
GROUP CHARGE SENSITIVITY (prior to preamp for 12.5m)	33.1 picocoulombs/pascal +/- 1 db = 3310 nanocoulombs/bar
GROUP SENSITIVITY	Low preamp = 33.1 uvolt/uBar +/- 1.2 db Hi preamp = 132.4 uvolt/uBar +/- 1.2 db
GROUP VOLTAGE SENSITIVITY	53.4 uvolt/uBar +/- 1.2 db. (prior to preamp for 12.5m group - calculated using nominal gain constant)
SIGNAL COUPLING	Control signals on twisted pair wire; power and depth control on separate wires. Data return via dual independent optical fibres (240 channels each). hydrophone groups connected to each SEM via individual twisted pairs. Common twisted pairs for heading sensor system
STREAMER POWER	160 to 290 volts AC, 1.5 Khz synchronised to SEM clock. Automatic safety shutdown and ground leakage detection.
SEISMIC CHANNELS PER SEM	12
NUMBER OF SEMS	25 + 1 for auxiliaries (300 channel) 42 max for 504 seismic channels + 4 aux

7.1.2

MAXIMUM NUMBER OF CHANNELS VIA OPTICAL FIBRE

SEISMIC	480
AUXILIARY INPUT	28
DC OFFSET	42
DEPTH (at SEM)	40
WATERBREAK SENSOR	40 (.25ms sample rate in lieu of seis)
Q.C. STATUS	42
CONFIGURATION STATUS	42
TEST OSCILLATOR OUTPUT	42 (used for internal Q.C.)

FIBRE OPTICAL TX RATE	7.182 Mbit
BIT ERROR RATE TYPICAL	Better than 1 in 10^{-6}
PRACTICAL MEASUREMENT	Better than 1 in 10^{-7} = 4 bit errors in 6 sec/fibre

HEADING/DEPTH SENSORS	Maximum 40 heading sensors and depth sensors externally mounted in combined units. Redundant depth data available from transducers internal to SEMs.
-----------------------	--

DEPTH CONTROL	Wiring provided for coil operated and sea water return type cable levellers.
---------------	--

STREAMER ELECTRONICS MODULE (SEM) PERFORMANCE

AMPLIFIER TYPE	Low noise charge preamplifier followed by unity gain Low-cut and anti-alias filter stages. followed by an Instantaneous Floating Point Amplifier (IFPA)
FREQUENCY RESPONSE (3db)	4 to 220 Hz
A/D CONVERTER TYPE	14 bit successive approximation +sign bit
LINEARITY (TYPICAL)	+/- 0.0015 % FSR (+/- 0.5 LSB)
FULL SCALE ABSOLUTE	+/- 0.05 % FSR
ZERO	+/- 0.05 % FSR
GAIN	+/- 0.05 % FSR
A/D CONVERTER DYNAMIC RANGE	78 db min.
PREAMPLIFIER TYPE	Differential input FET capacitive charge amplifier
GAIN CONSTANT	Remote programmed by operator through onboard electronics. Can be set to low or high setting. The actual gain value is determined by the hydrophone capacitance. The nominal gain constant for 62 nf capacitance is ; Low = 4.15 db ; high = +7.88 db
IFP GAIN	Min x 1 = 4 exp 0 = 0 db Max x 16,384 = 4 exp 7 = 84 db Resolution is 12 db steps

7.1.4

DC OFFSET	Maximum of 1024mv at input to A//D Converter at max gain. (Approx 64 uv at input to IFP)
OFFSET CORRECTION	Gain related and residual offset correction is applied in digital filters in onboard system.
SEM MULTIPLEXED CHANNEL ALLOCATION	Seismic I/P ch 1 - 12 SEM internal use ch 13 DC offset correction ch 14 Test oscillator ch 15 Depth ch 16
REMOTE CONFIGURATION	Module address Preamp Gain Low and High Gain mode fixed or float.

HYDROPHONE SPECIFICATIONS

OPERATING TEMPERATURE	32 F to 100 F ; 0 C to 38 C
OPERATING DEPTH	To 200 feet ; 61m
DESTRUCTION DEPTH	900 feet ; 275m
CAPACITANCE	0.0062 Farads +/- 1.7 %
RESISTANCE	Greater than 1000 megohm
VOLTAGE SENSITIVITY	34.5 db re 1 v/bar +/- 1.5 (-185.5 db re 1 v/Pa)
CHARGE SENSITIVITY	10.4 db re 1 Pc/Pa +/- 2.0
DEPTH SENSITIVITY	less than 1 db from 0 to 20
TEMPERATURE SENSITIVITY	less than 1 db from 0 C to 38 C
MOTION SENSITIVITY	less than 3 mv at 1 G and 45 Hz
FREQUENCY RESPONSE	2 Hz - 1,500 Hz: flat to less than 1db
LOWEST MECHANICAL RESONANCE	2 KHz

7.2

STREAMER CABLE DESCRIPTION

This streamer is an upgraded version of the 480 channel digital fibre optic system which entered service in early 1986. The system is comprised of three major sub-systems. The streamer contains up to 504 hydrophone groups with a basic group length of 12.5 metres, but up to five of these at a time may be combined to form predefined 'super-groups' by use of external programming plugs. The seismic data from these are conditioned and converted to a digital form in electronic units in the streamer and returned to the ship via optical fibres.

This is an active streamer, which receives electrical power from the ship for the electronics modules and receives commands which configure the system in the water. On the ship, the seismic data are received by the Streamer Control System (SCS) which checks the integrity of the data, performs digital operations on them, and presents them in a serial form to the Recording system on Ethernet links. The operator sets up and controls the operation of the streamer from a terminal on the SCS and also monitors its performance. The data received by the recording system from the SCS are demultiplexed into trace sequential format in a mass memory and have record and trace headers appended. These data are then recorded on 6250 bpi tape drives. The recording system performs additional automatic quality checks on the data and provides several displays for operator evaluation.

Configuration and control of the SEMs is provided by the SCS via the command bus. Power is provided by the streamer power system via the power bus.

In the 300 channel configuration, SEMs 1 through 21 process digital data from previous SEMs and place them consecutively on fibre 'A'. At SEM 22 optical fibre 'A' is carrying its maximum number of seismic data channels so SEM 22 switches all of the data from SEMs 1 through 21 onto optical fibre 'B'. The data from SEMs 1 - 21 continue to be synchronised, re-timed and placed on fibre 'B' at each forward SEM, while the data being collected in the forward portion of the streamer, 22 - 25, are processed and put on optical fibre 'A'.

M/V MAGNIFICENT CREEK

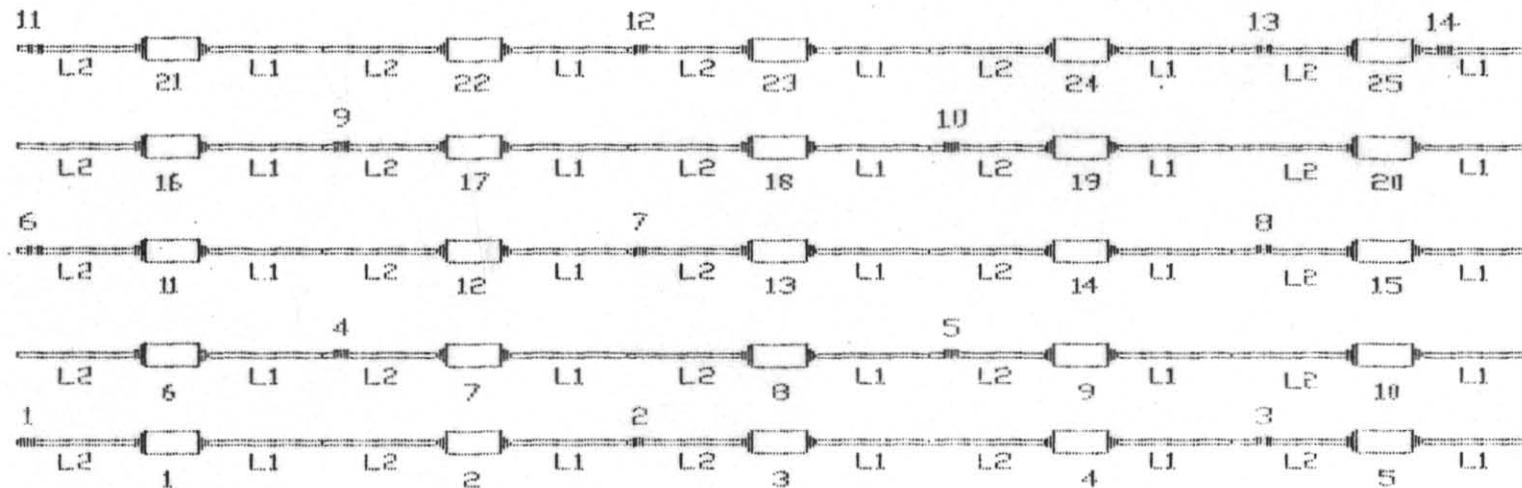
H.G.S. 300 TRACE STREAMER

CLIENT: MAXUS, ENERGY CORP.

PERMIT: T24/P

DATE: NOV/DEC 1990

7.3



KEY

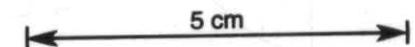
- : DEPTH COMPASS LOCATION (BIRD)
- ◻ : STREAMER ELECTRONIC MODULE (SEM)

NOTES

- 1: TOTAL LENGTH OF A L1/SEM/L2 CLUSTER IS 150M
- 2: LENGTH OF ONE GROUP IS 12.5M
- 3: THE CENTRAL NAV. POINT IS THE POSITION THAT ALL ANTENNAE ARE REFERENCED TO AND A SHOT OCCURS WHEN THE C.D.P. IS OVER THE PREPLOTTED SHOTPOINT CO-ORDINATE.

STREAMER CABLE DIAGRAM

483040



7.4.

STREAMER CABLE TESTS

Testing of the SEMs is referred to in previous section 6.4.

Other daily test on the streamer consist of offset distance checks and ambient noise records, both carried out at the beginning and end of each line, and a cable Q.C. test which was carried out daily by request. The latter measures cable response and is useful for checking on groups which may be weak.

As well as the monitor records obtained from the WESTREN Plotter, it is also possible to obtain a hard copy print-out of the cable noise of each group, sampled simultaneously for 2 ms. As a matter of practice, however, this is produced only after the end of the line. The computer time needed for the operation makes it impractical on approach to line when other test procedures, such as checking the airgun timing, are also necessary.

8.1

ENERGY SOURCE SPECIFICATIONS

ENERGY SOURCE	VSX Sleeve airguns
MANUFACTURER	Texas Instruments
NUMBER OF GUNS	64
WAVE SHAPE KITS	No
TOTAL ARRAY VOLUME	2180 cu.in.
TYPICAL PEAK OUTPUT	102 bar/metres quoted
PULSE TO BUBBLE RATIO	13 : 1 quoted
TYPICAL VALUES OBSERVED	No tests carried out
OPERATING AIR PRESSURE	2000 psi
DELAY TW 0 TO PEAK POWER	51.2 ms
GUN TIMING METHOD	TIGER System
OPERATING GUN DEPTH	8 - 10 m
DEPTH MONITORING	Hydrostatic air flow lines and gauges; measured strops to Norwegian buoys
ARRAY GEOMETRY MONITORING	Arrival time of output from selected guns to geophones on gun strings and near grp.
MINIMUM ARRAY VOLUME	Not less than 2000 cu.in.
MINIMUM AIR PRESSURE	Not less than 1800 psi
FAR FIELD SIGNATURE	Not recorded
NUMBER OF COMPRESSORS	8
TYPE & CAPACITY	3 x SULLAIR 300 SCFM, driven by Cater- pillar 3406 engines. (2 x on-line) 5 x PB-44 600 SCFM, driven by GM-671. (3 x on-line)
MINMUM RECYCLE TIME	8 seconds
ARRAY GEOMETRY	8.33m gun string separation (4 x strings)
OFFSET CNP TO CENTRE ARRAY	107m
CENTRE ARRAY TO CENTRE NEAR CABLE GROUP (No. 300)	150 m nominal

8.2

ENERGY SOURCE DESCRIPTION

The VSX Sleeve Gun array source incorporates a new concept in airgun design in that the shuttle is an external sleeve that produces a full 360 degree port. This allows a more efficient accoustical pulse than does the traditional airgun. Three chambers control the movement of the shuttle: the air spring return chamber; the firing chamber and the main chamber.

The air spring chamber is constantly fed by an air supply through the fill passage. Its purpose is twofold: firstly, it holds the shuttle closed when the gun is not firing and, secondly, it provides a spring return, or recoil, to return the shuttle to its closed position.

The firing chamber controls the firing of the airgun: it is fed by a solenoid valve which is normally in the closed position. When an electrical impulse is sent to the solenoid valve it opens and supplies air to the firing chamber. This creates a force imbalance that opens the shuttle. Once the shuttle is completely open, small exhaust ports in the firing chamber dump the air pressure. Once this chamber and the main chamber have exhausted, the shuttle returns to the closed position.

The main air chamber is exhausted very rapidly to create an explosion or accoustical blast. This chamber also contributes a majority of the opening force on the shuttle, causing it to open quickly. As soon as the firing chamber has moved the shuttle far enough to break the face seal bewteen the shuttle and the chamber sleeve, the high pressure air rushes under the shuttle flange, thus exposing a much greater area to the chamber pressure. This is by far the greatest force acting on the shuttle.

After the shuttle has opened fully, there is no longer any pressure in the main chamber or the firing chamber. The pressure in the air spring chamber is sufficient to close the shuttle.

To ensure accurate timing, the Sleeve Gun incorporates a ring of magnets in the top of the shuttle. As the shuttle moves towards the timing coil, located in the cap of the gun, an electrical impulse is generated. This pulse is sent to the Texas Instruments Airgun Controller (TIGER) which controls precisely the timing of each individual airgun.

8.2.2

ENRGY SOURCE OPERATION

The energy source used on the Magnificent Creek for this survey consisted of four sub-arrays with a total capacity of 2180 cubic inches. The sub-arrays were towed with a spread of 8.3 metres between them at a distance of 70 metres from the stern of the vessel to the first gun on each string.

8.2.2.

Each sub-array included two low pressure, open ended air lines to enable depth monitoring by means of static air pressure at all times. The arrays were supported by at the required 9 mtr depth by means of plastic Norwegian buoys on measured strops.

The Texas Instruments Airgun Controllers (TIGER II) monitored the firing of each airgun in the array: individual gun firing times were continuously controlled to give phasing within +/- 1 millisecond to ensure maximum pulse amplitude and front-to-back (peak to bubble) ratio. The TIGER II also performed a quality control function by indicating with individual LED displays the status of any gun which was not operating correctly; "self-fire" or "no-fire", for instance. The airgun performances were logged on both the CMS navigation tape and the Automatic Data Logger (ADL) printer.

8.2.3 TIGER II SYSTEM

Manufacturer	Texas Instruments
Model	T.I. 990
Maximum channels	64
Channels used	64
Timing delay	51.2 ms
Firmware	Version 1.3

The Texas Instruments Airgun Controller is a micro-processor-based unit that supervises all firing, timing and control functions for the airgun array. The TIGER II monitors the shuttle pulse of each airgun and continuously adjusts individual gun firing times to synchronise the array to within the specified 1 millisecond standard deviation.

A fire sequence is initiated on receipt of wireblast from the (TITAN) FCS. The TIGER II returns Field Time Break (FTB) to the recording instruments and fires the guns a nominal 51.2 ms later. When used with a digital streamer, the TIGER II synchronises FTB with the sample interval of the digital streamer data. This synchronisation is called "multiplex streamer mode".

The TIGER II may be operated independently in stand-alone mode, or in computer mode via a link to the CMS III. Stand-alone mode enables all normal gun control functions to be implemented from the front panel keyboard. The airgun array is unaffected by the selection of stand-alone mode, insofar as performance is concerned, although performance monitoring is then limited.

The computer mode link to the CMS III facilitates data logging of individual gun performance in real-time, as well as the production of graphically presented performance statistics at the end of a line.

M/V MAGNIFICENT CREEK

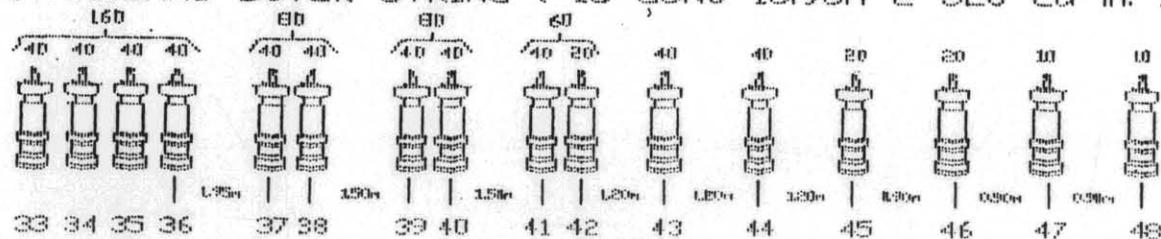
2180 CUBIC-INCH SLEEVE AIRGUN ARRAY

CLIENT: MAXUS ENERGY CORP.

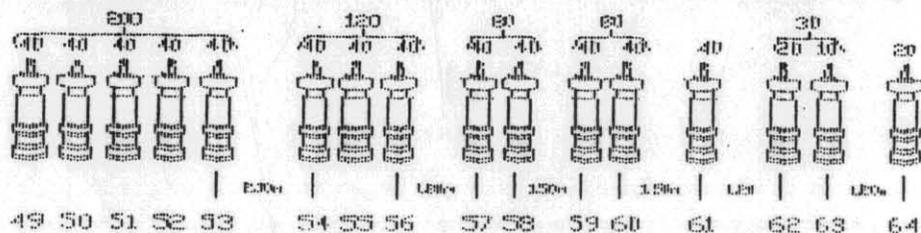
8.3.1

DATE: NOVEMBER - DECEMBER 1990

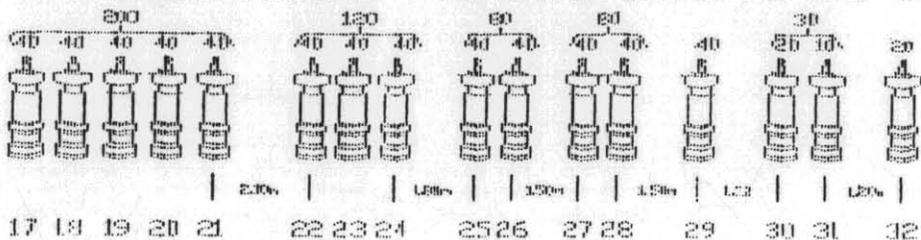
STARBOARD OUTER STRING (16 GUNS 13.95m @ 520 cu in.)



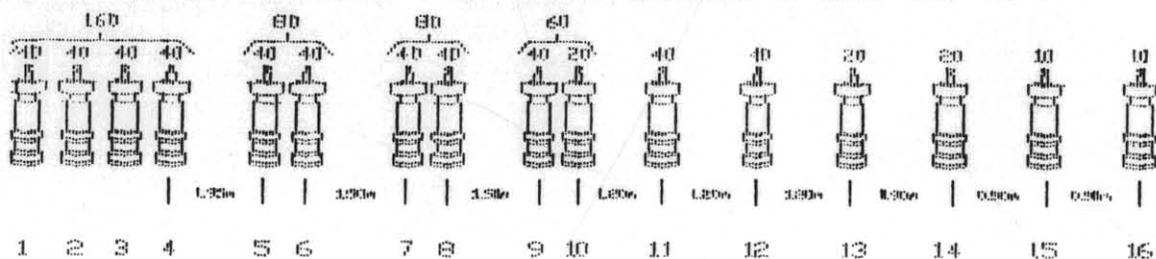
STARBOARD INNER STRING (16 GUNS 13.35m @ 570 cu in.)



PORT INNER STRING (16 GUNS 13.35m @ 570 cu in.)



PORT OUTER STRING (16 GUNS 13.95m @ 520 cu in.)



SOURCE ARRAY DIAGRAM

483045

5 cm

M/V MAGNIFICENT CREEK

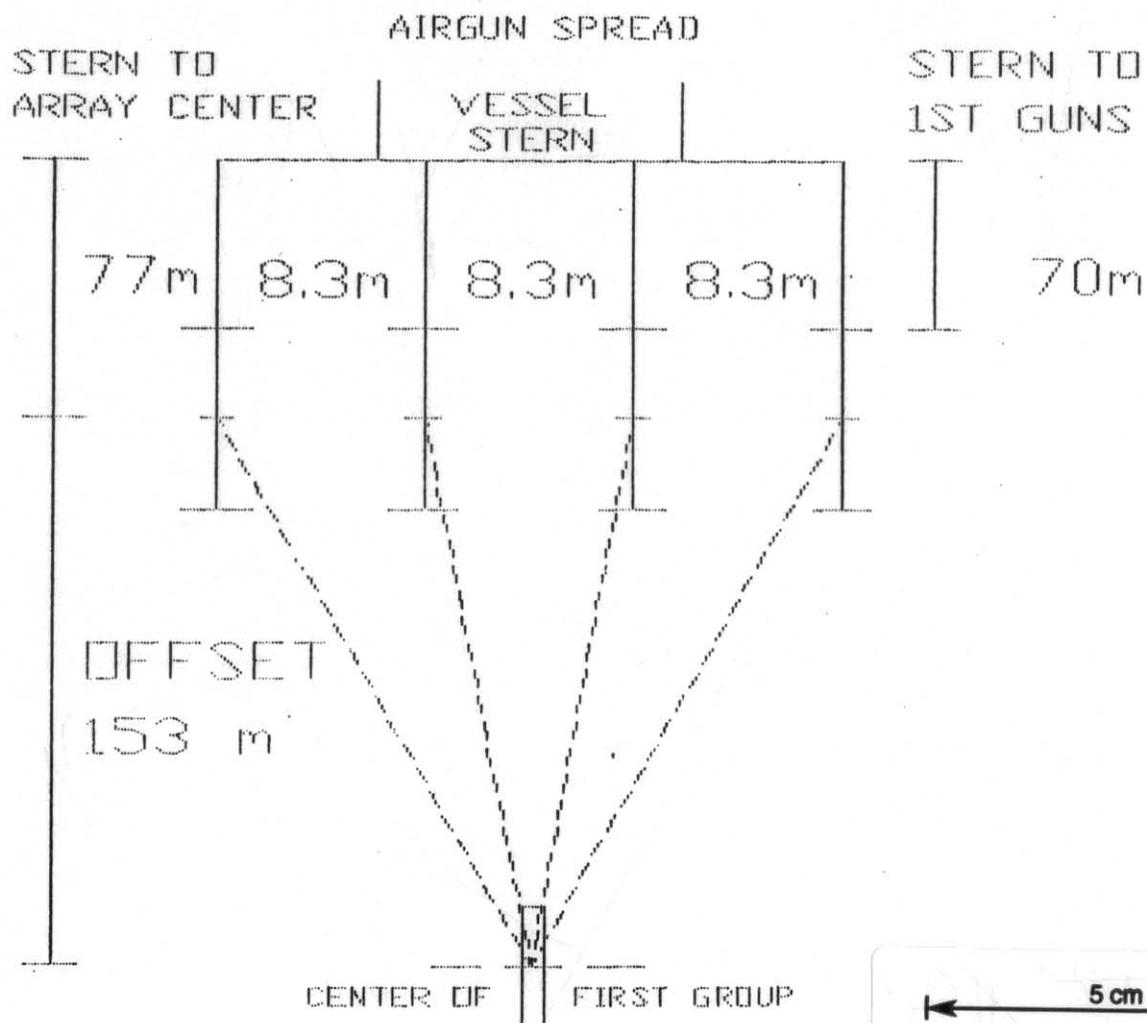
SPREAD AND OFFSET DIAGRAM

CLIENT: MAXUS ENERGY CORP.

DATE: NOVEMBER - DECEMBER 1990

8.3.2

CONVENTIONAL TOW ARRAY



483046

8.4

ENERGY SOURCE TESTS

No tests were carried out on the output of the array or any component of it. No near or far field recording is done as a matter of practice.

Near cable group offset distance is checked at the start and finish of each line, using return times from hydrophones in fixed positions on each gun string.

By request, airgun array spread calculations were made at least once a day,

9.1

NAVIGATION SPECIFICATIONS

PRIMARY NAVIGATION SYSTEM	SERCEL Syledis
SYSTEM MODE	Range/Range
OPERATING FREQUENCY	420 - 450 MHz
SURVEY COMPANY	Halliburton Geophysical Services
SPHEROID	Australian National (ANS)
SEMI-MAJOR AXIS	6378160.0 metres
INVERSE FLATTENING	298.25 metres
LOCAL DATUM	Australian Geodetic 1984
ZONE	55
CENTRAL MERIDIAN	147° E.
SCALE FACTOR	0.9996000
WGS to ANS Conversion	Delta X = 122 m Delta Y = 41 m Delta Z = -146 m

These datum shift parameters were used solely to transform WGS-72 Transit Satellite fixes into local datum.

SYLEDIS BASE STATIONS		LATITUDE (S)	LONGITUDE (E)
Trial Harbour	(CODE 02)	041 55 53.02	145 10 43.73
Yarrana Hill	(CODE 03)	041 41 49.07	144 56 22.38
Watts Hill	(CODE 04)	042 12 03.31	145 11 40.36
Hibbs Pyramid	(CODE 05)	042 36 21.47	145 16 29.41

Distance from antenna (CNP) to centre source array = 107.00 m.

Distance from antenna to centre near trace of streamer = 260.00 m.

9.2

NAVIGATION SYSTEMS DESCRIPTION

Sercel SYLEDIS is a range/range pulse system which consists of two or more fixed base stations and a mobile station. The mobile set interrogates the fixed stations with a pulse train and when that is received by the fixed stations they respond with their own pulse trains. By measuring the elapsed time from interrogation to response, the distance from the mobile station to the fixed station can be calculated.

Data from the SYLEDIS Mobile Receiver were interfaced into the Texas Instruments Configurable Marine System (CMS III) which recorded ranges and provided shooting and recording intervals. The hardware for the system consisted of T.I. 980B computers (see below) and Video Display Units together with T.I. Omni 700 printers.

On-line steering was done by reference to the VDU screen mounted on the bridge and and paper chart track plotters. Those were driven by the CMS III, operating on data supplied by the Syledis Mobile set. The CMS III system gave all positioning fix information and also displayed and logged were peripheral data such as the water depths, cable depths, cable compass readings, airgun timing etc.

A Magnavox Transit Satellite system provided a gross error check for the primary navigation system. The tape transports incorporated in the Satnav system were also used to record to tape the navigation and other data mentioned above.

9.2.2.

CONFIGURABLE MARINE SYSTEM III DESCRIPTION

The CMS III is at the centre of the data collection operation and although its most visible function is survey control and navigation data recording, the system also collects and records data from a variety of sources. The system comprises a central T.I. 980B mini-computer networked to three T.I. 990-based sub-systems. Various peripheral systems are interfaced directly to the 980B computer, or to one of its T.I.990 sub-systems.

The major functions of the 980B central computer are to record all non seismic data on its own tape transports, provide seismic line control, provide data to the Automatic Data Logger (ADL) for real time quality control, provide selectable data over an external quality control link, (XQC), and drive a graphic plotter for guidance of vessel steering

The 980B computer has an operator interface provided by the 990 QC sub-system which is used to enter line control and prospect level parameters. A sub-set of the data recorded to tape is routinely passed to the 990 QC and displayed on a VDU. The same data are passed to the ADL for quality control. Additionally the 990 QC permits the operator to

9.2.2 contd.

interrogate the 980B at any time for additional data.

A second 990-based sub-system is the 990NAV system. Dedicated to navigation, it provides the 980B with filtered navigation data for use by the line control program, as well as raw data for recording on tape.

The OBB/STS/TIGER 990-based sub-system is the third one in the CMS III. This mini-computer runs under the DX 10 multi-tasking operation which allows the computer to perform its three major tasks as though they were running on separate machines. The three functions are: streamer tracking (STS); real time binning (OBB); TIGER II quality control.

9.2.3 990 NAVIGATION SYSTEM DESCRIPTION

The 990 NAV sub-system of the CMS III performs all navigation tasks, navigating in real time from raw range data supplied by external radio positioning systems, (such as Syledis). The raw, unfiltered ranges are passed by the 980B computer for recording to tape and for printing on the ADL printer. Filtered position and velocity data are also passed to the 980B for use by the line control program, resident in the 980B software.

The 990 NAV is configured with twelve 32-bit parallel interfaces, known as multisensors, which provide the system with the capability of reading up to 12 ranges simultaneously. The 990 NAV is also capable of using satellite, gyro and sonar data.

The 990 NAV software comprises five major elements: range processing, system definition, multi-way fix computation, dead reckoning and fix/dead reckoning integration.

The range processing software is used to filter and derive a velocity for each range. Each range is processed independently, in accordance with a set of twelve masks entered by the operator. This allows filter characteristics to be individually tailored to each range, independent of other ranges. The range processing software also produces statistical quality control data for individual ranges.

The system definition portion of the program allows the operator to define a navigation system by selecting any combination of two to four ranges. The selected ranges are usually from the same physical navigation equipment, but the 990 NAV could use ranges from up to four different navigation systems, if required.

The filtered ranges are passed to the multi-way fix algorithm which generates fixes for each defined system, along with the statistical quality control data. The range velocity data is passed to the dead reckoning routines which compute filtered velocities and azimuths for each defined system.

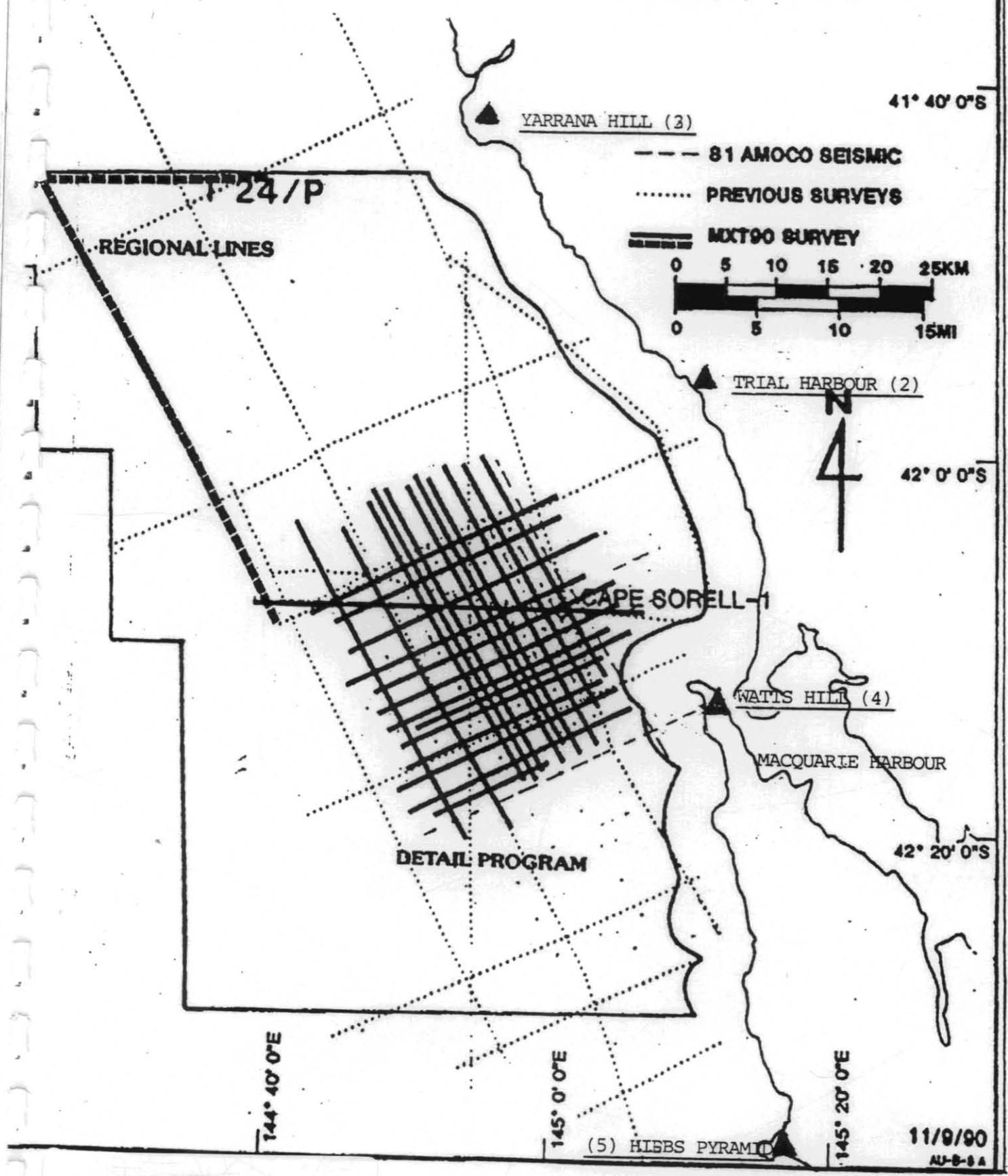
9.2.3 contd

The operator defines the primary and secondary navigation sources from the previously defined systems by selecting a source, velocity and an azimuth. Alternatively, the operator may select GPS or Transit Satellite for a fix source, sonar for velocity and gyro for azimuth data. The primary and secondary navigation may use any combination of available sources.

The integration routines put the several separate routines together by integrating the available fixing sources and dead reckoning data. The integration software applies dead reckoning updates each second to the last known position for the primary and secondary systems. At operator-defined intervals, the dead-reckoned position is updated by the selected fix source. Fix intervals may be as frequent as every few seconds, as is the case with radionav systems, or as infrequently as every few hours in the case of Transit Satellite fixing.

Quality control data from the 990 NAV system includes range variances, missed ranges, range spikes, fix circular error probability (CEP) and fix residuals. Additionally the system computes the range C - O values from the primary position to all initialised base stations.

AUSTRALIA WESTERN TASMANIA



41° 40' 0" S

YARRANA HILL (3)

--- 81 AMOCO SEISMIC

..... PREVIOUS SURVEYS

==== MXT90 SURVEY



▲ TRIAL HARBOUR (2)



42° 0' 0" S

CAPE SORELL-1

▲ WATTS HILL (4)

MACQUARIE HARBOUR

42° 20' 0" S

DETAIL PROGRAM

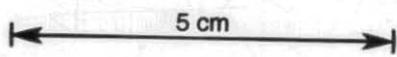
144° 40' 0" E

145° 0' 0" E

145° 20' 0" E

(5) HIEBS PYRAMID

11/9/90
AU-B-8A

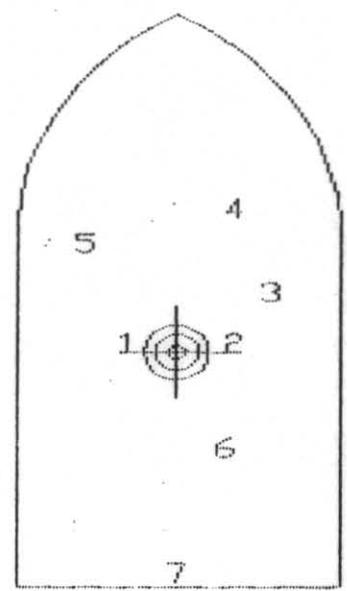
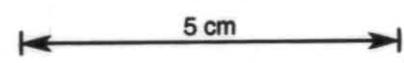


M/V MAGNIFICENT CREEK ANTENNAE LOCATION DIAGRAM

CLIENT: MAXUS ENERGY CORP. AREA: T/24P

DATE: NOV/DEC 1990

9.3.2



8
9
10
11

KEY			
LOCATION	OFFSET FROM CNP		
	X (+ STB)	Y (+ FWD)	
CNP	0.00 m	0.00 m	
1 PRIMARY SYLEDIS ANTENNA	-0.70 m	0.00 m	
2 SECONDARY SYLEDIS ANTENNA	0.70 m	0.00 m	
3 TRANSIT SATELLITE ANTENNA	1.00 m	2.50 m	
4 FATHOMETER TRANSDUCER	3.17 m	2.40 m	
5 SONAR TRANSDUCER	-2.98 m	2.49 m	
6 GRAVITY METER	0.2 m	- 1.2 m	
7 CENTRE-STERN	0.00 m	- 29.79 m	
8 CENTRE OF SOURCE	0.00 m	- 106.8 m	
9 MAGNETOMETER SENSOR	15.75 m	- 210 m	
10 CENTRE OF NEAR GROUP	0.00 m	- 260 m	
11 NEAR COMPASS	0.00 m	- 316 m	

NB: THE COMMON NAV POINT (CNP) IS THE REFERENCE POINT FOR SHOT CONTROL.

483053

NOTE : Until 1243 hrs on November 26 incorrect co-ordinates were used for the Trial Harbour base station. The crossing at that time (Baseline I.D. 15) was the first with the corrected Lat & Long.

HALLIBURTON GEOPHYSICAL SERVICESBASELINE CROSSING COMPUTATION

BASELINE I.D. : 1

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 11-25-1990

TIME : 10:50:38

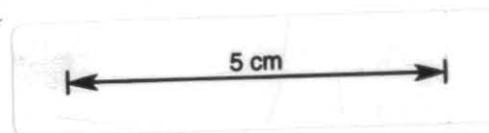
COMMENTS : BASELINE CROSSING

CALCULATED VALUE = 59835.72 Metres

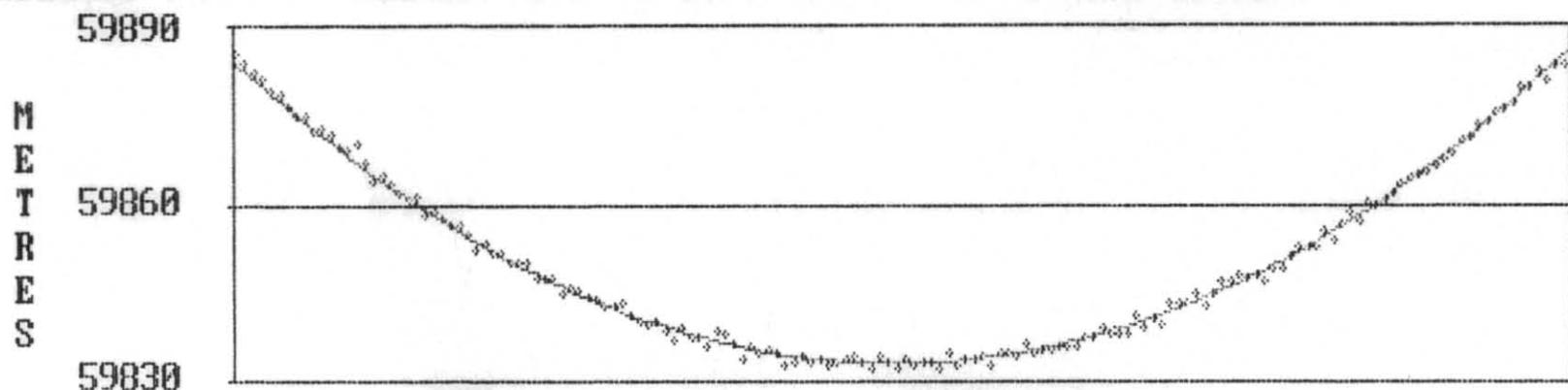
OBSERVED VALUE = 59832.99 Metres

DELTA = +2.73 Metres

483056

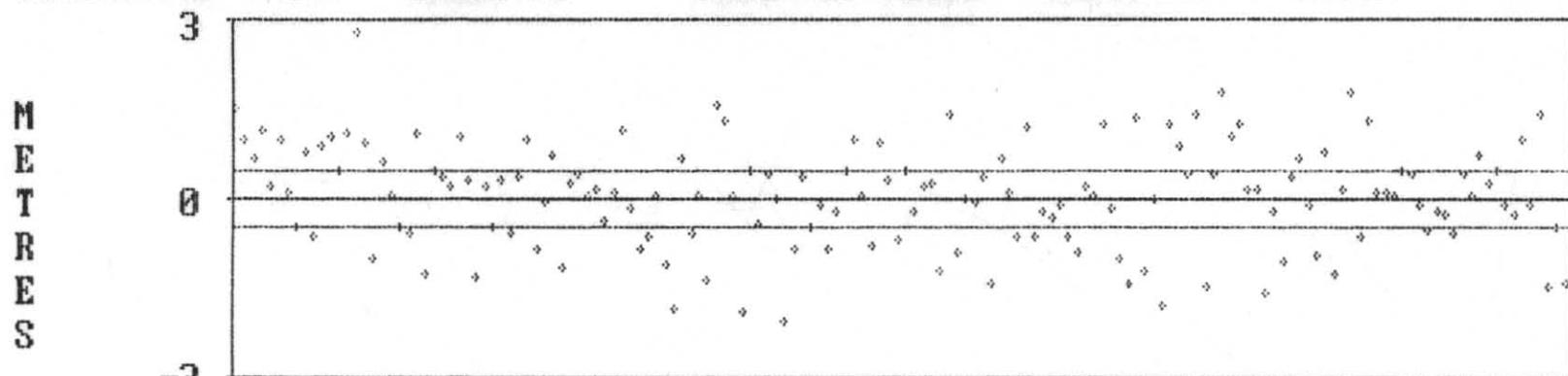


BASELINE I.D. = 1 YARRANA HILL to WATTS HILL 11-25-1990 10:50:38



INPUT ○○○○○○○○○○ CURVE FIT _____

Calculated Value = 59835.72 Observed Value = 59832.99 Delta = +2.73



DELTA ○○○○○○○○○○ STD. DEV. _____

HALLIBURTON GEOPHYSICAL SERVICES

BASELINE CROSSING COMPUTATION

BASELINE I.D. : CROSSING #1

STATION 1 : TRIAL HARBOU LAT 41 55 53.02 S LON 145 10 42.92 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 11-25-1990

TIME : 11:54:18

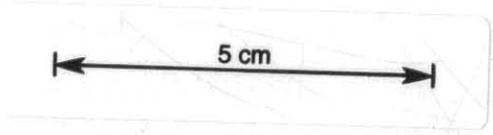
COMMENTS :

483057

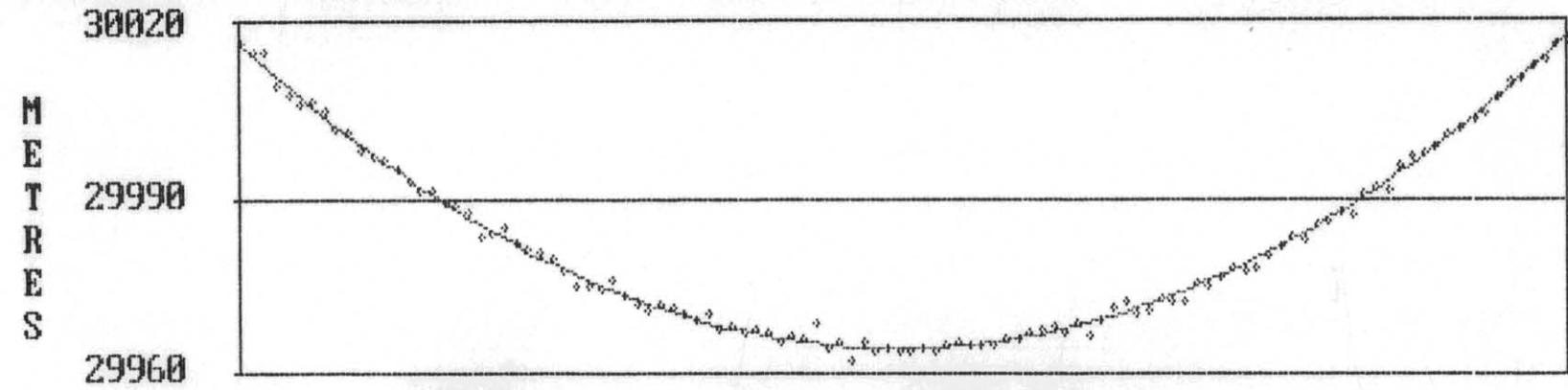
CALCULATED VALUE = 29966.59 Metres

OBSERVED VALUE = 29964.16 Metres

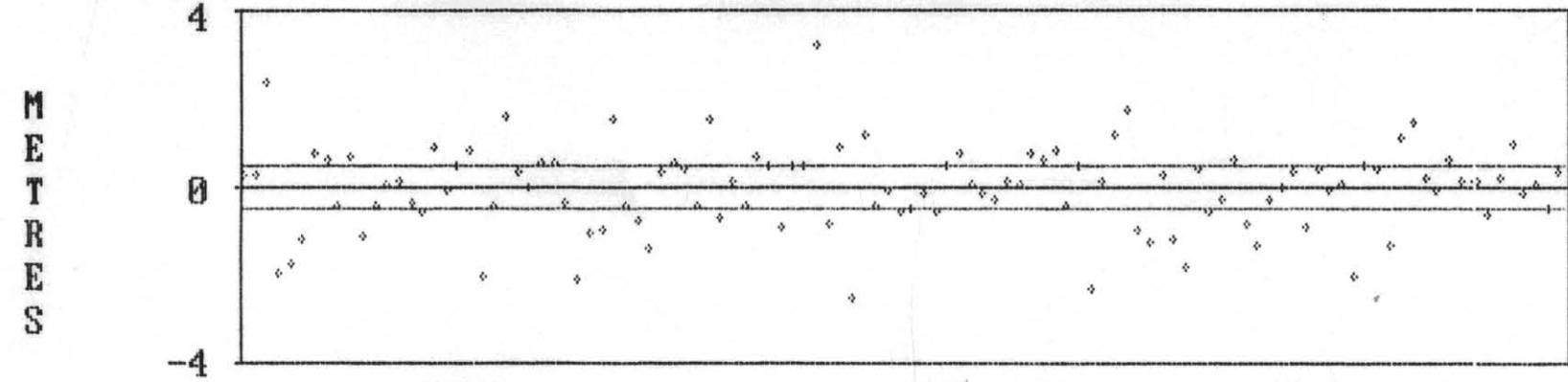
DELTA = +2.43 Metres



BASELINE I.D.= CROSSING #1 TRIAL HARBOU to WATTS HILL 11-25-1990 11:54:18



Calculated Value= 29966.59 Observed Value= 29964.16 Delta= +2.43



DELTA STD. DEV.

BASELINE CROSSING COMPUTATION

BASELINE I.D. : CROSSING #2

STATION 1 : TRIAL HARBOU LAT 41 55 53.02 S LON 145 10 42.92 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 11-25-1990

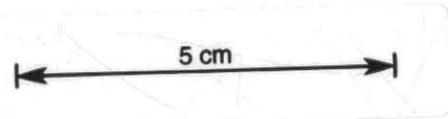
TIME : 12:23:47

COMMENTS :

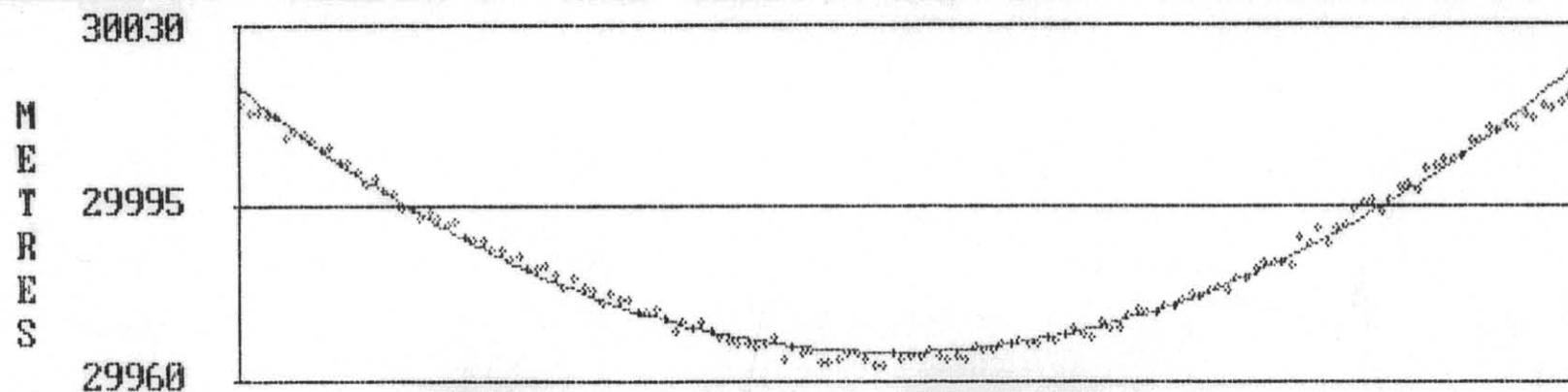
CALCULATED VALUE = 29966.59 Metres

OBSERVED VALUE = 29965.67 Metres

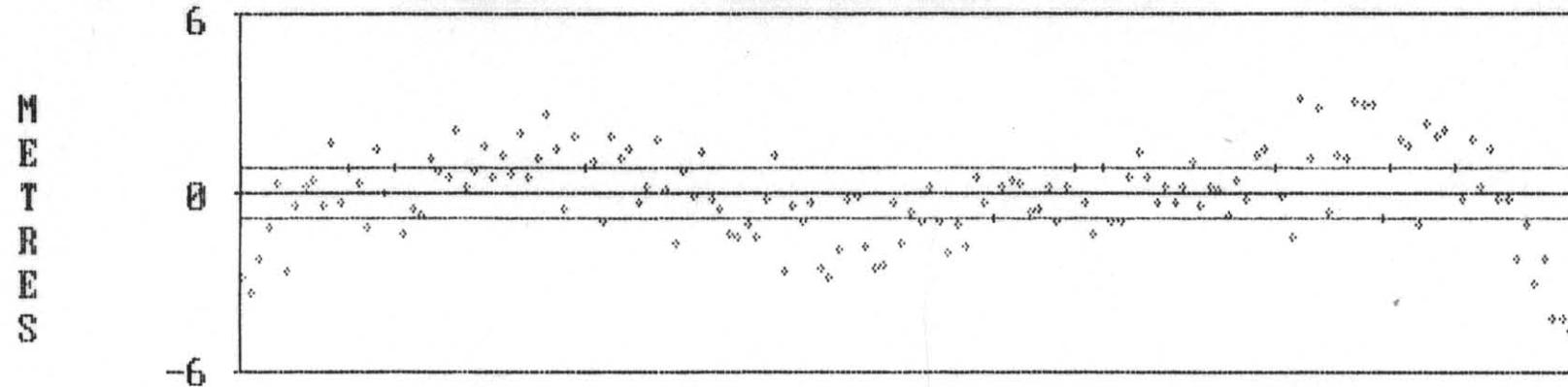
DELTA = +0.92 Metres



BASELINE I.D.= CROSSING #2 TRIAL HARBOU to WATTS HILL 11-25-1990 12:23:47



Calculated Value= 29966.59 Observed Value= 29965.67 Delta= +0.92



DELTA STD. DEV.

HALLIBURTON GEOPHYSICAL SERVICES

483061

BASELINE CROSSING COMPUTATION

BASELINE I.D. : CROSSING #2

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 11-25-1990

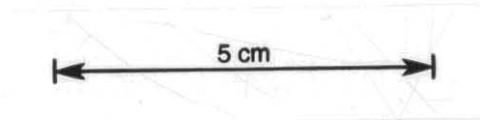
TIME : 12:51:01

COMMENTS :

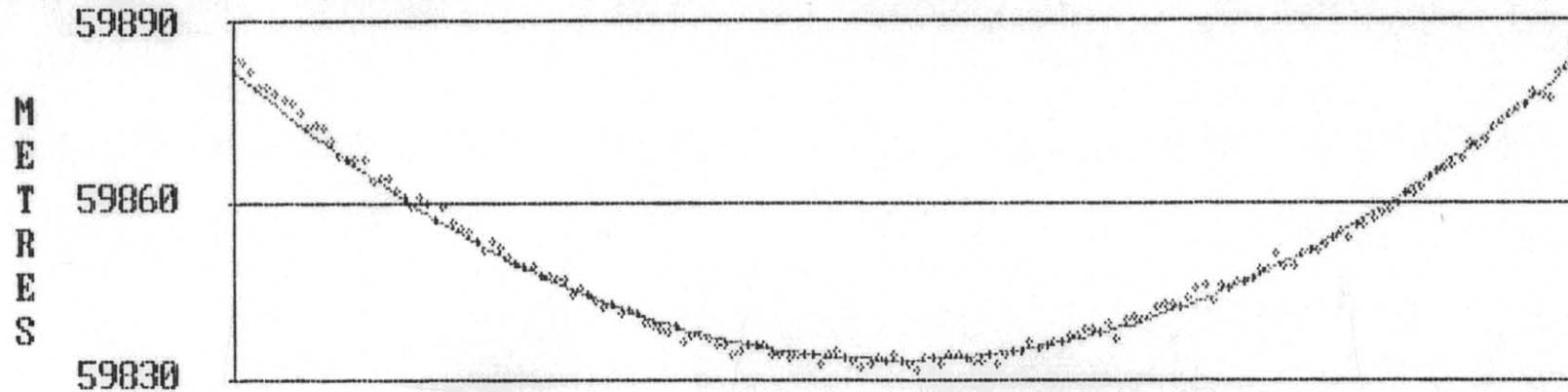
CALCULATED VALUE = 59835.72 Metres

OBSERVED VALUE = 59833.35 Metres

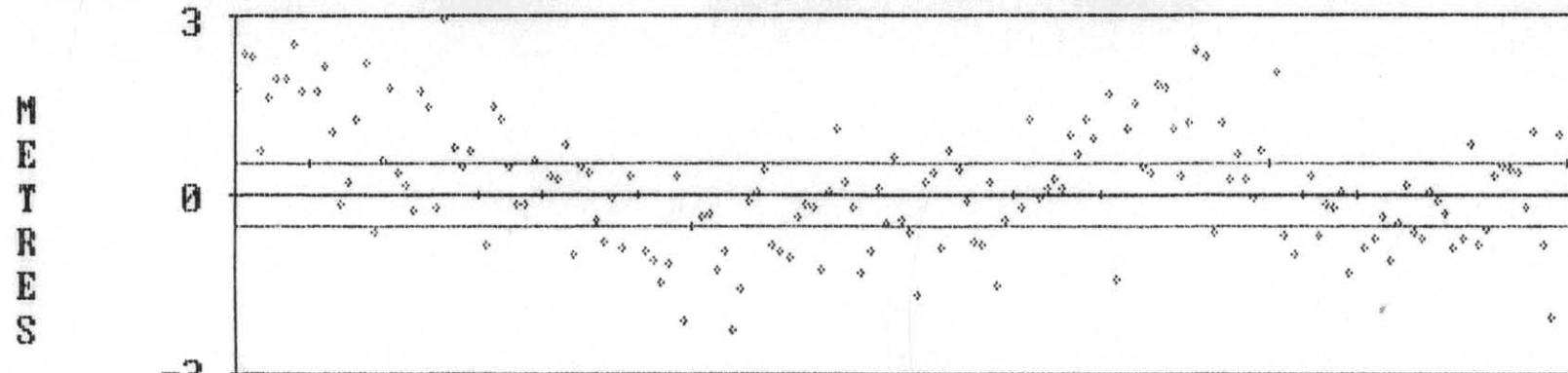
DELTA = +2.37 Metres



BASELINE I.D. = CROSSING #2 YARRANA HILL to WATTS HILL 11-25-1990 12:51:01



Calculated Value = **INPUT** ○○○○○○○○○○ **CURVE FIT** _____
 Observed Value = 59835.72 59833.35 Delta = +2.37



DELTA ○○○○○○○○○○ **STD. DEV.** _____

BASELINE CROSSING COMPUTATION

BASELINE I.D. : 6

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : HIBBS PYRAMI LAT 42 36 21.47 S LON 145 16 29.41 E

DATE : 11-26-1990

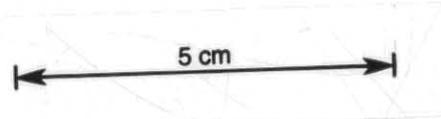
TIME : 02:28:56

COMMENTS : BASELINE CROSSING

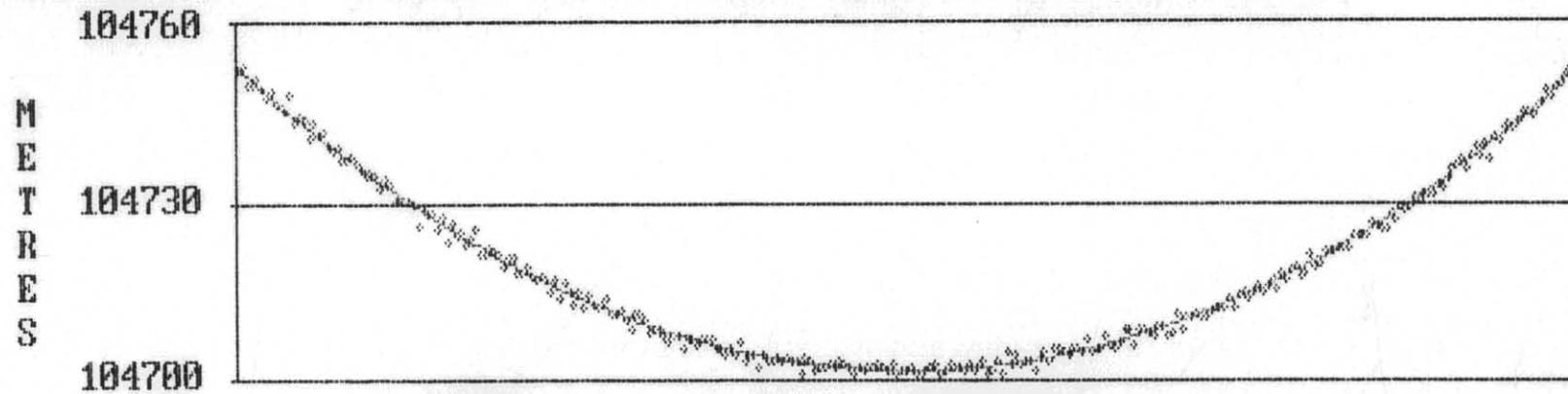
CALCULATED VALUE = 104702.50 Metres

OBSERVED VALUE = 104701.58 Metres

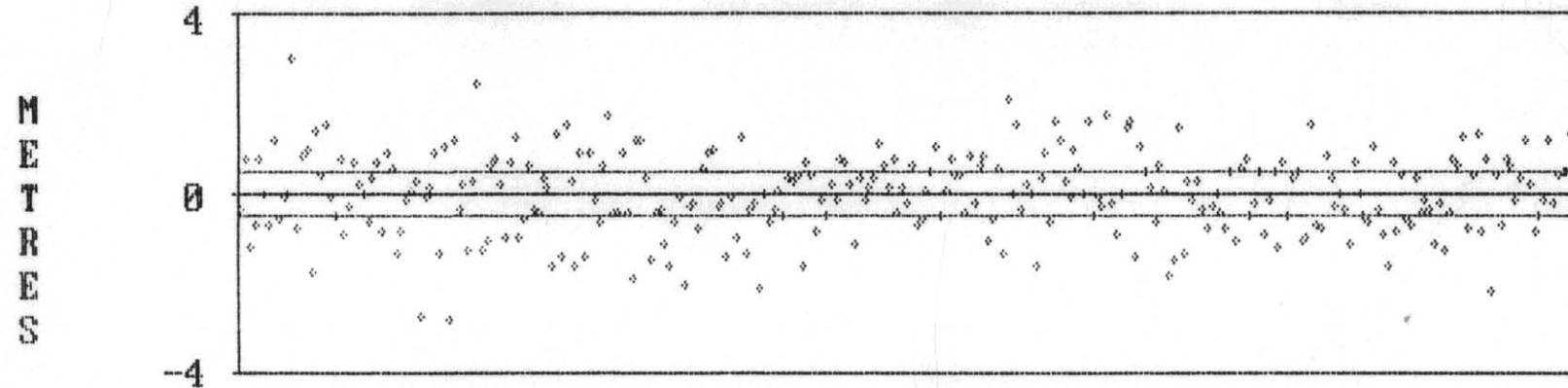
DELTA = +0.92 Metres



BASELINE I.D.= 6 YARRANA HILL to HIBBS PYRAMI 11-26-1990 02:28:56



INPUT ○○○○○○○○○○ CURVE FIT _____
 Calculated Value= 104702.50 Observed Value= 104701.58 Delta= +0.92



DELTA ○○○○○○○○○○ STD. DEV. _____

HALLIBURTON GEOPHYSICAL SERVICES

483065

BASELINE CROSSING COMPUTATION

BASELINE I.D. : 7

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 11-26-1990

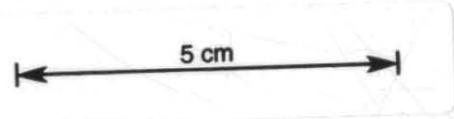
TIME : 03:01:38

COMMENTS : BASELINE CROSSING

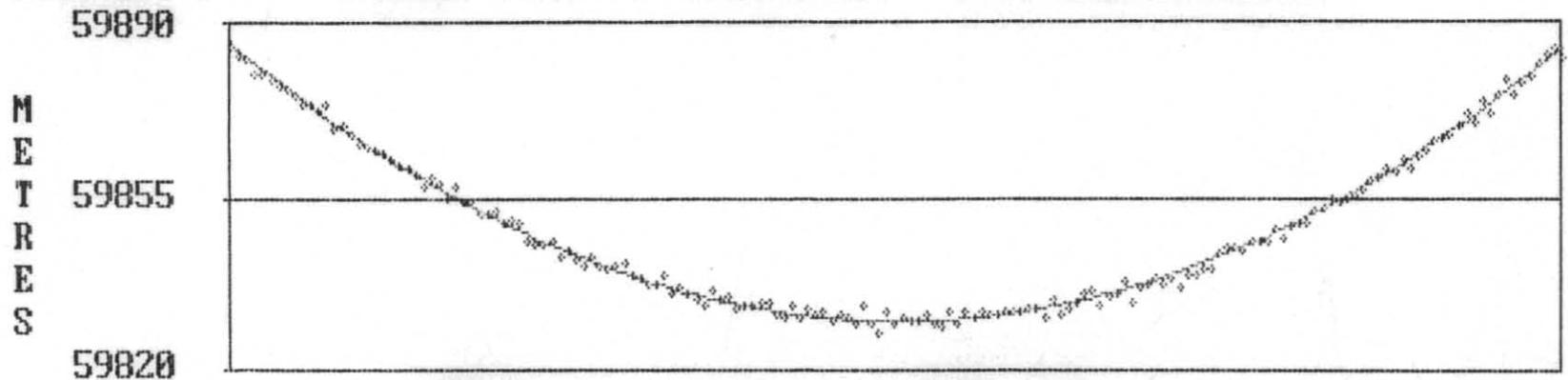
CALCULATED VALUE = 59835.72 Metres

OBSERVED VALUE = 59829.72 Metres

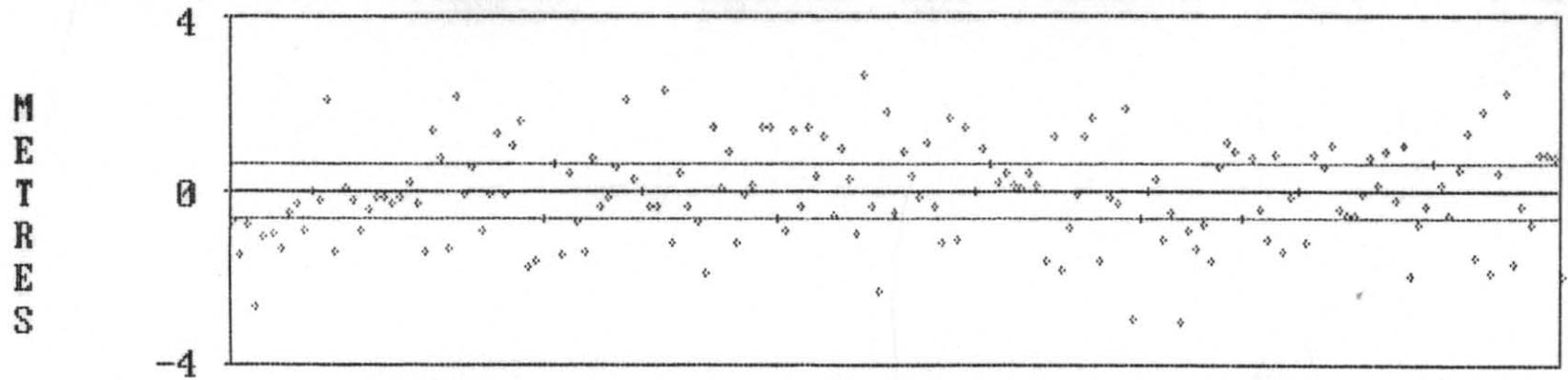
DELTA = +6.00 Metres



BASELINE I.D.= 7 YARRANA HILL to WATTS HILL 11-26-1990 03:01:38



INPUT ○○○○○○○○○○ CURVE FIT _____
 Calculated Value= 59835.72 Observed Value= 59829.72 Delta= +6.00



DELTA ○○○○○○○○○○ STD. DEV. _____

HALLIBURTON GEOPHYSICAL SERVICES

483067

BASELINE CROSSING COMPUTATION

BASELINE I.D. : 10

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 11-26-1990

TIME : 04:11:10

COMMENTS : BASELINE CROSSING

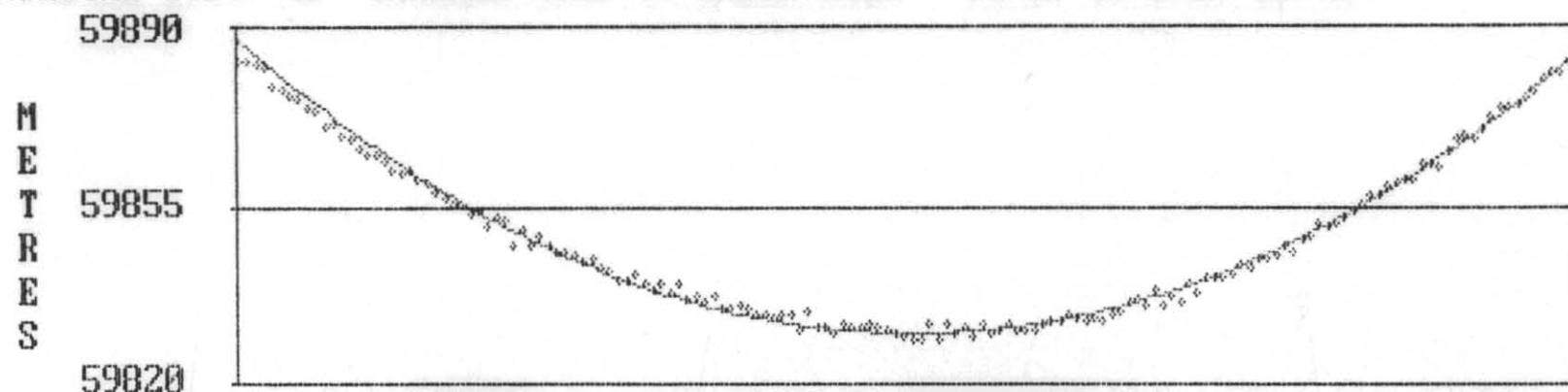
CALCULATED VALUE = 59835.72 Metres

OBSERVED VALUE = 59829.87 Metres

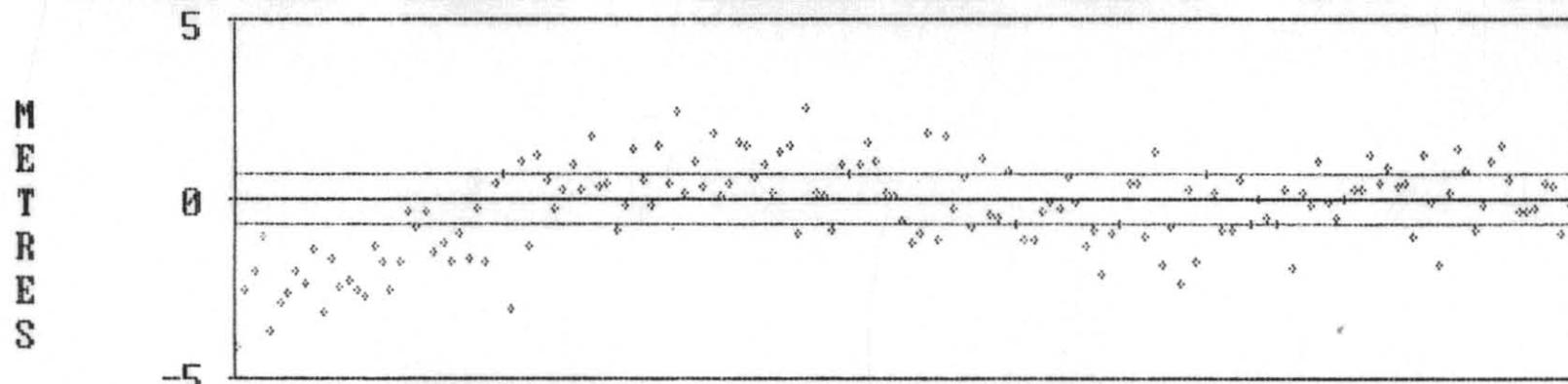
DELTA = +5.85 Metres

5 cm

BASELINE I.D.= 10 YARRANA HILL to WATTS HILL 11-26-1990 04:11:10



INPUT ○○○○○○○○○○ CURVE FIT _____
 Calculated Value= 59835.72 Observed Value= 59829.87 Delta= +5.85



DELTA ○○○○○○○○○○ STD. DEV. _____

HALLIBURTON GEOPHYSICAL SERVICES

BASELINE CROSSING COMPUTATION

BASELINE I.D. : 11

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : HIBBS PYRAMI LAT 42 36 21.47 S LON 145 16 29.41 E

DATE : 11-26-1990

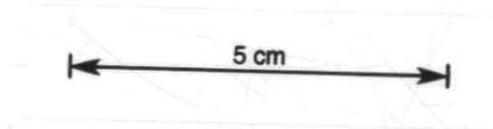
TIME : 04:38:03

COMMENTS : BASELINE CROSSING

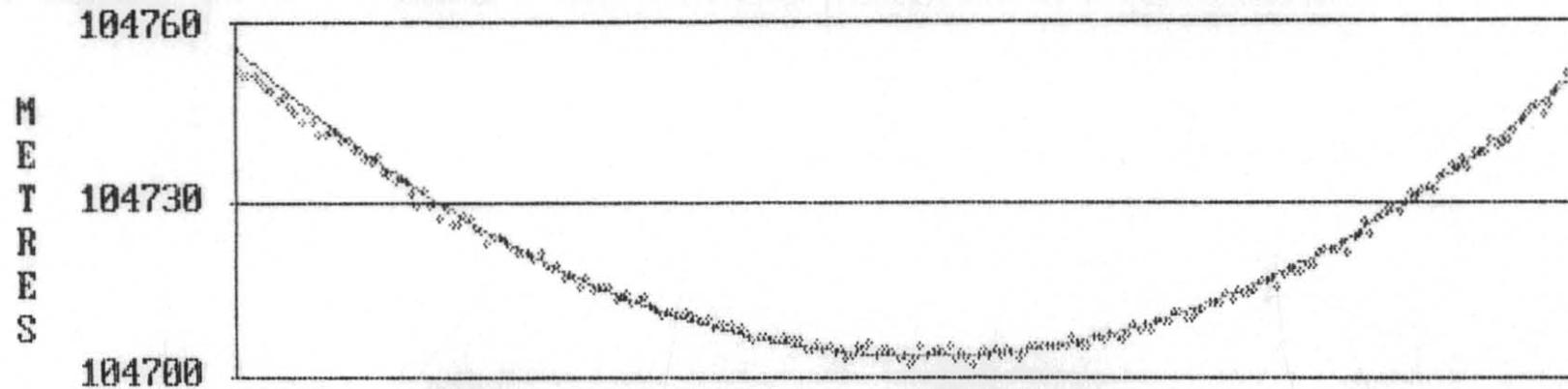
CALCULATED VALUE = 104702.50 Metres

OBSERVED VALUE = 104703.45 Metres

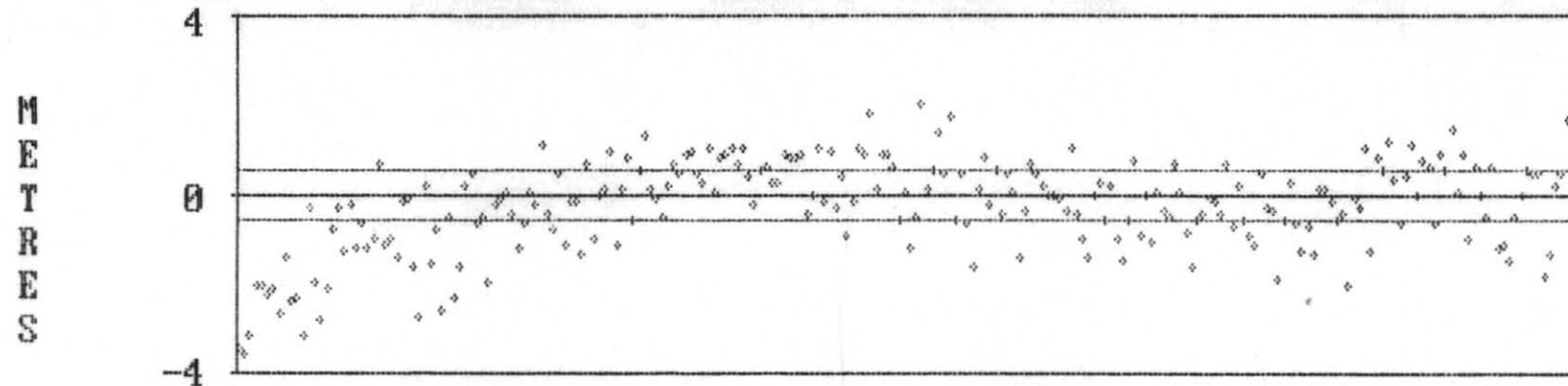
DELTA = -0.95 Metres



BASELINE I.D. = 11 YARRANA HILL to HIBBS PYRAMI 11-26-1990 04:38:03



INPUT ○○○○○○○○○○ CURVE FIT _____
Calculated Value = 104702.50 Observed Value = 104703.45 Delta = -0.95



DELTA ○○○○○○○○○○ STD. DEV. _____

HALLIBURTON GEOPHYSICAL SERVICESBASELINE CROSSING COMPUTATION

BASELINE I.D. : 14

STATION 1 : TRIAL HARBOU LAT 41 55 53.02 S LON 145 10 43.73 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 11-26-1990

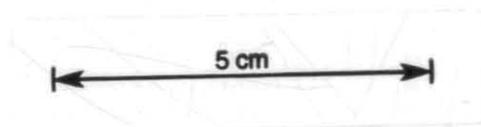
TIME : 12:11:29

COMMENTS : BASELINE CROSSING

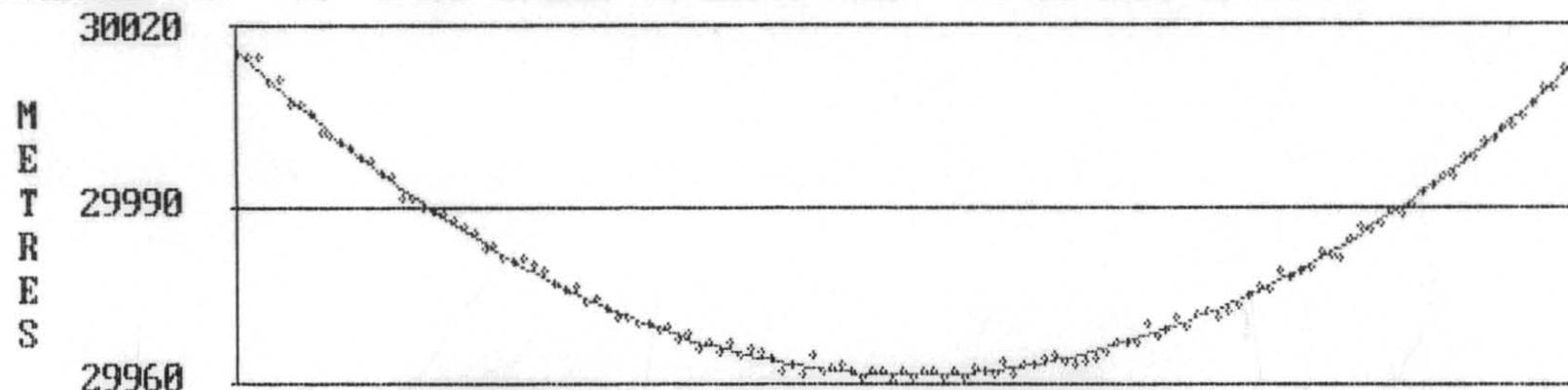
CALCULATED VALUE = 29965.78 Metres

OBSERVED VALUE = 29961.44 Metres

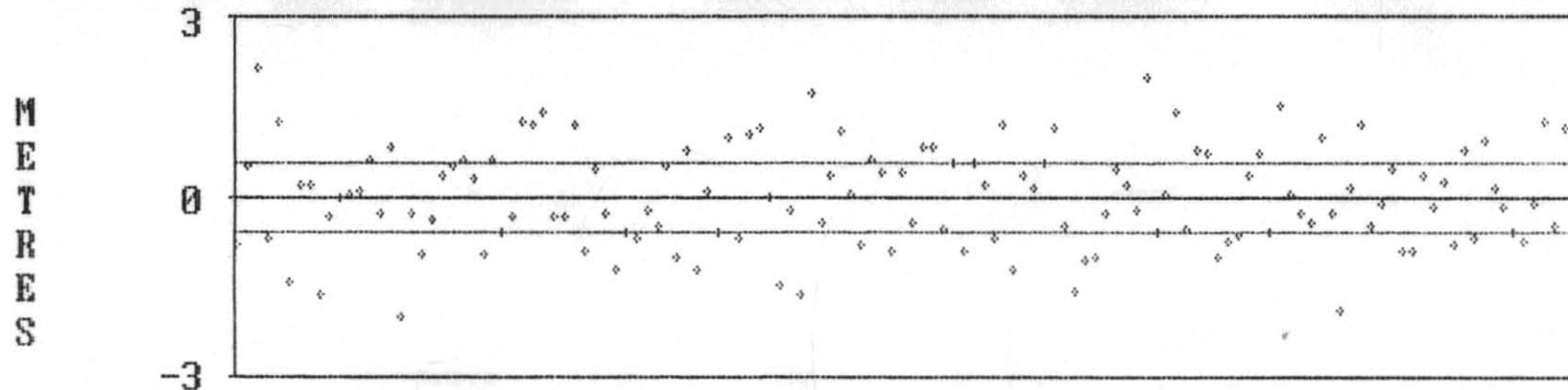
DELTA = +4.34 Metres



BASELINE I.D.= 14 TRIAL HARBOU to WATTS HILL 11-26-1990 12:11:29



Calculated Value= 29965.78 Observed Value= 29961.44 Delta= +4.34



DELTA STD. DEV.

HALLIBURTON GEOPHYSICAL SERVICESBASELINE CROSSING COMPUTATION

BASELINE I.D. : 15

STATION 1 : TRIAL HARBOU LAT 41 55 53.02 S LON 145 10 43.73 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 11-26-1990

TIME : 12:43:41

COMMENTS :

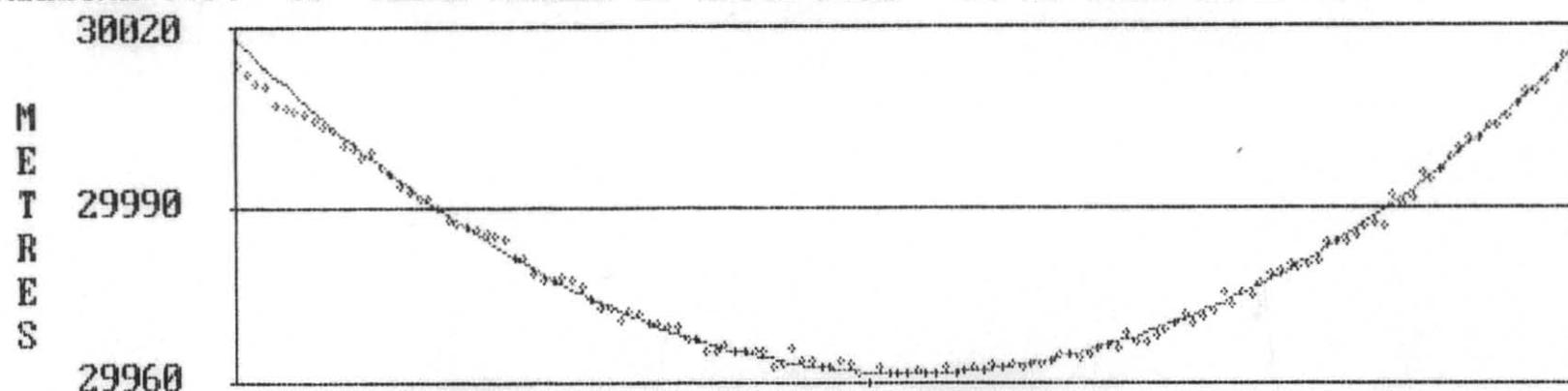
CALCULATED VALUE = 29965.78 Metres

OBSERVED VALUE = 29961.55 Metres

DELTA = +4.23 Metres

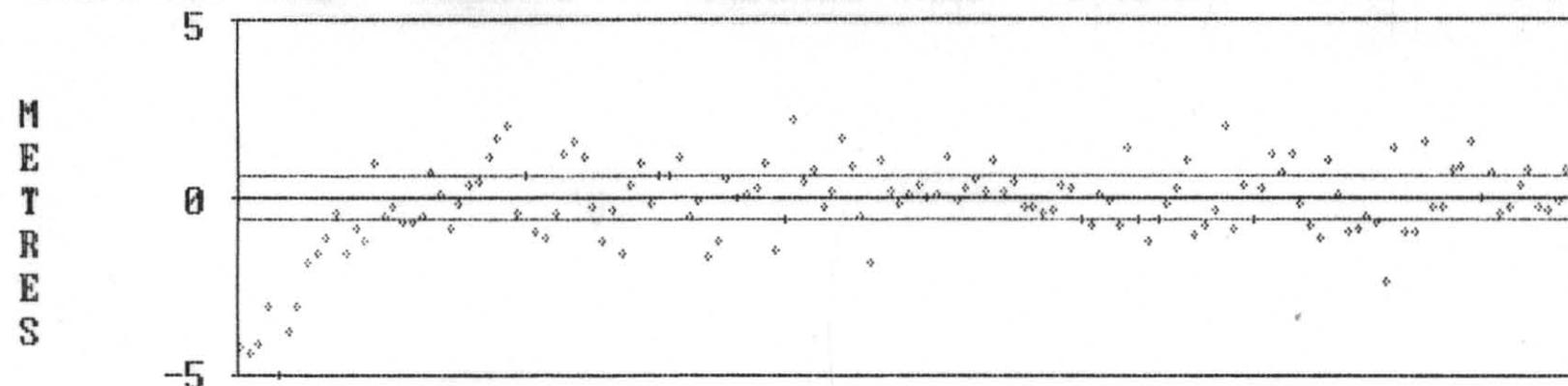


BASELINE I.D.= 15 TRIAL HARBOU to WATTS HILL 11-26-1990 12:43:41



INPUT ○○○○○○○○○○ CURVE FIT —————

Calculated Value= 29965.78 Observed Value= 29961.55 Delta= +4.23



DELTA ○○○○○○○○○○ STD. DEV. —————

HALLIBURTON GEOPHYSICAL SERVICESBASELINE CROSSING COMPUTATION

BASELINE I.D. : 16

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : HIBBS PYRAMI LAT 42 36 21.47 S LON 145 16 29.41 E

DATE : 12-04-1990

TIME : 03:58:12

COMMENTS :

CALCULATED VALUE = 104702.50 Metres

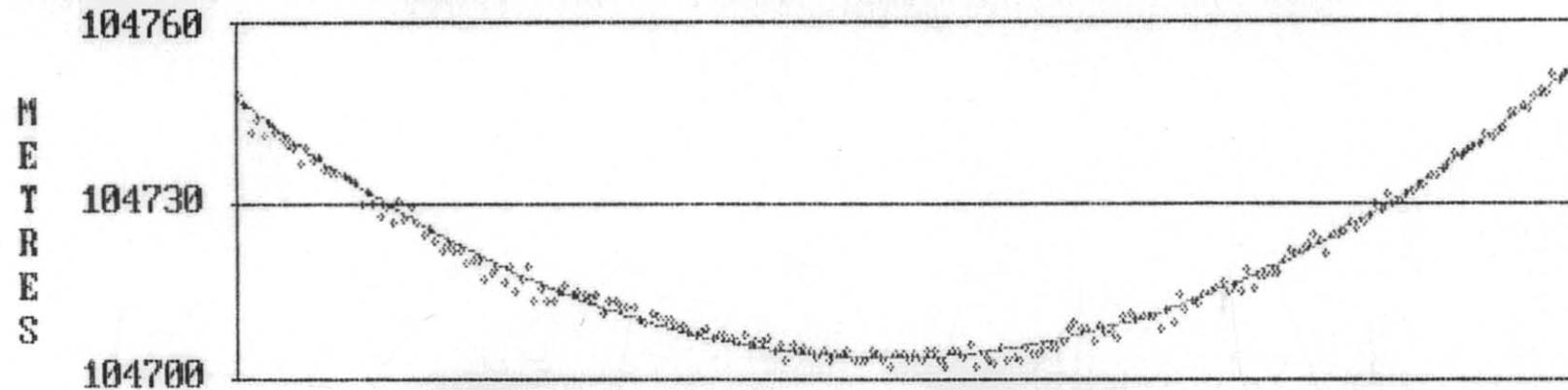
OBSERVED VALUE = 104703.61 Metres

DELTA = -1.11 Metres

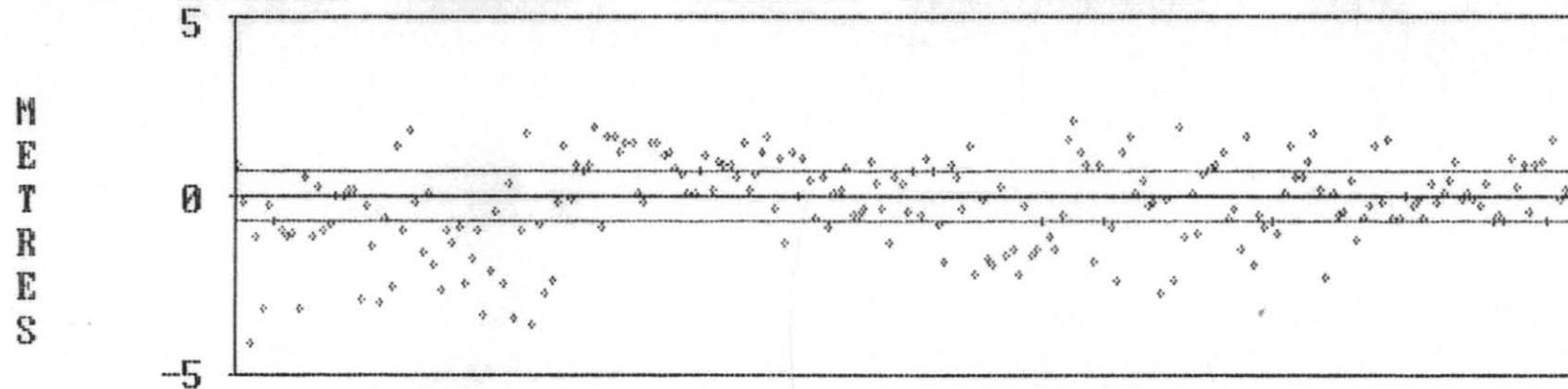
483076

5 cm

BASELINE I.D. = 16 YARRANA HILL to HIBBS PYRAMI 12-04-1990 03:58:12



Calculated Value = 104702.50 Observed Value = 104703.61 Delta = -1.11



DELTA STD. DEV.

HALLIBURTON GEOPHYSICAL SERVICES

BASELINE CROSSING COMPUTATION

BASELINE I.D. : 17

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 12-04-1990

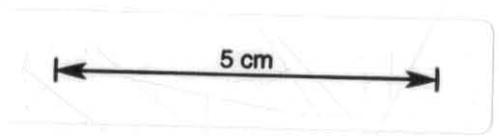
TIME : 05:36:36

COMMENTS : BASELINE CROSSING

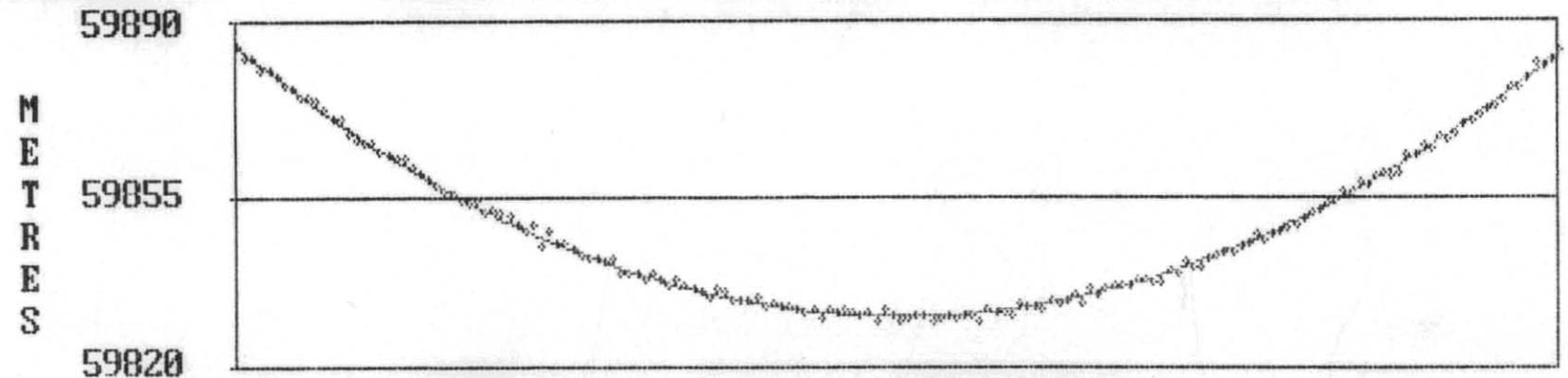
CALCULATED VALUE = 59835.72 Metres

OBSERVED VALUE = 59830.28 Metres

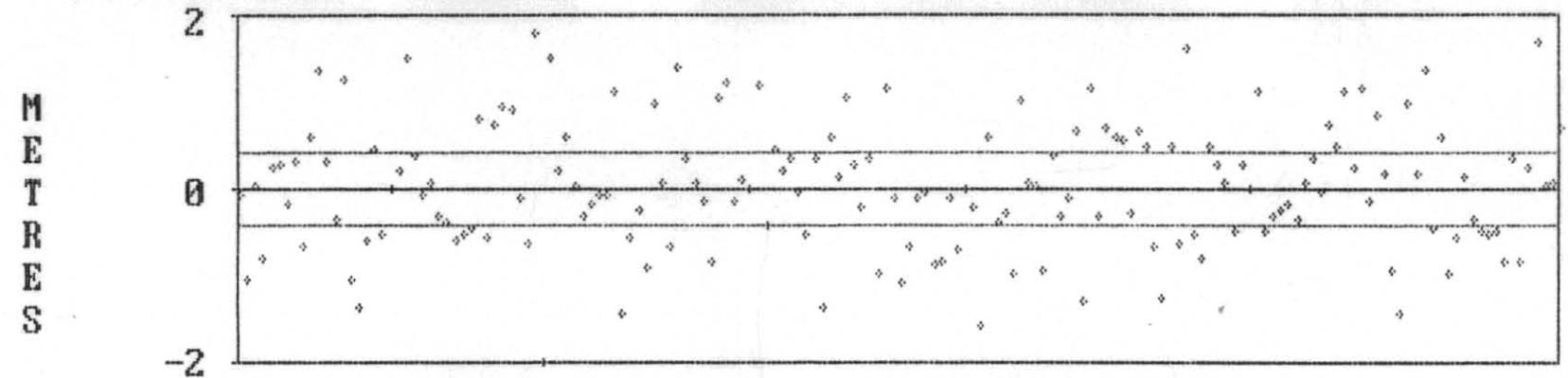
DELTA = +5.44 Metres



BASELINE I.D.= 17 YARRANA HILL to WATTS HILL 12-04-1990 05:36:36



INPUT ○○○○○○○○○○ CURVE FIT _____
Calculated Value= 59835.72 Observed Value= 59830.28 Delta= +5.44



DELTA ○○○○○○○○○○ STD. DEV. _____

HALLIBURTON GEOPHYSICAL SERVICESBASELINE CROSSING COMPUTATION

BASELINE I.D. : 18

STATION 1 : TRIAL HARBOU LAT 41 55 53.02 S LON 145 10 43.73 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 12-04-1990

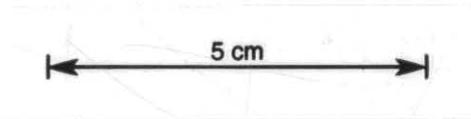
TIME : 05:56:46

COMMENTS : BASELINE CROSSING

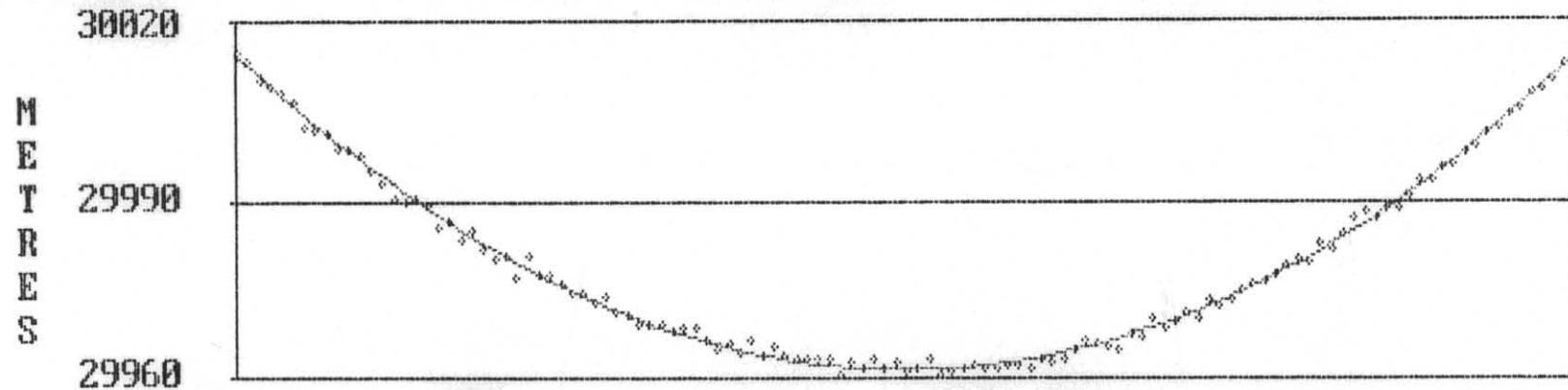
CALCULATED VALUE = 29965.78 Metres

OBSERVED VALUE = 29961.33 Metres

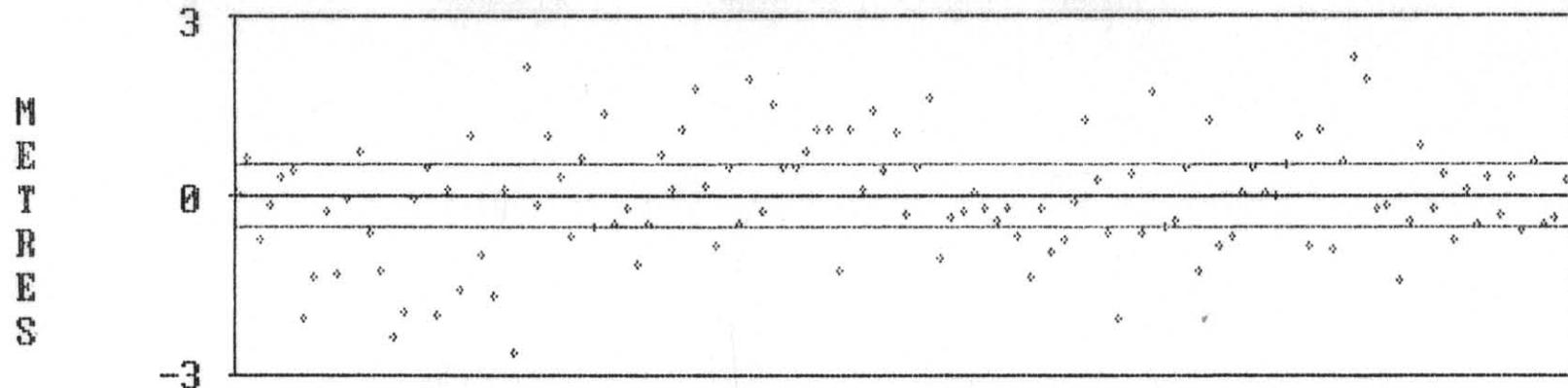
DELTA = +4.45 Metres



BASELINE I.D.= 18 TRIAL HARBOU to WATTS HILL 12-04-1990 05:56:46



Calculated Value= 29965.78 Observed Value= 29961.33 Delta= +4.45



DELTA STD. DEV.

BASELINE CROSSING COMPUTATION

BASELINE I.D. : 19

STATION 1 : TRIAL HARBOU LAT 41 55 53.02 S LON 145 10 43.73 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 12-04-1990

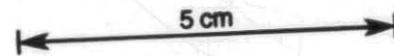
TIME : 06:24:04

COMMENTS : BASELINE CROSSING

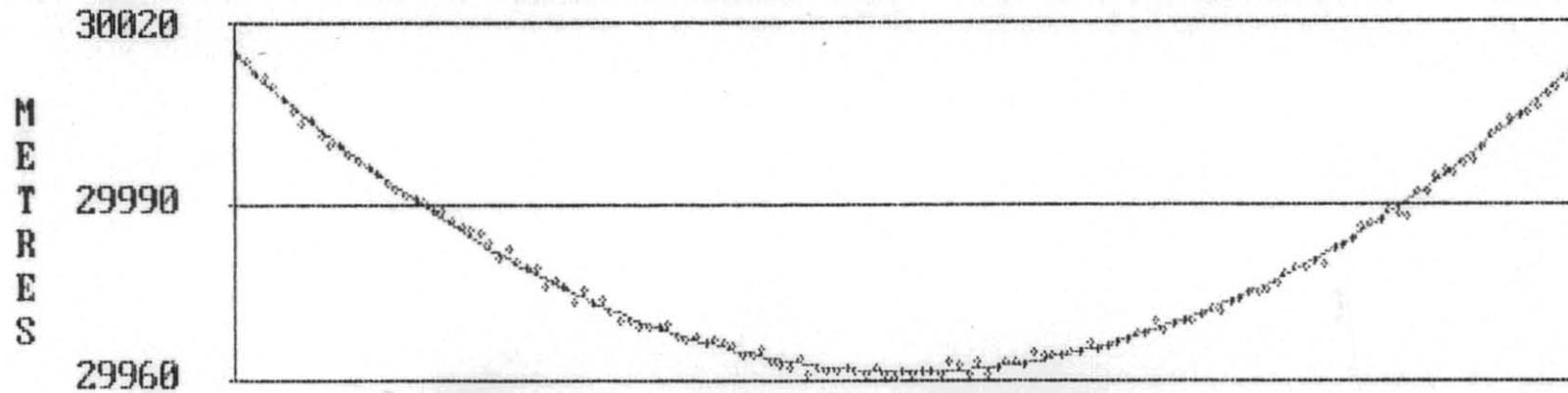
CALCULATED VALUE = 29965.78 Metres

OBSERVED VALUE = 29961.48 Metres

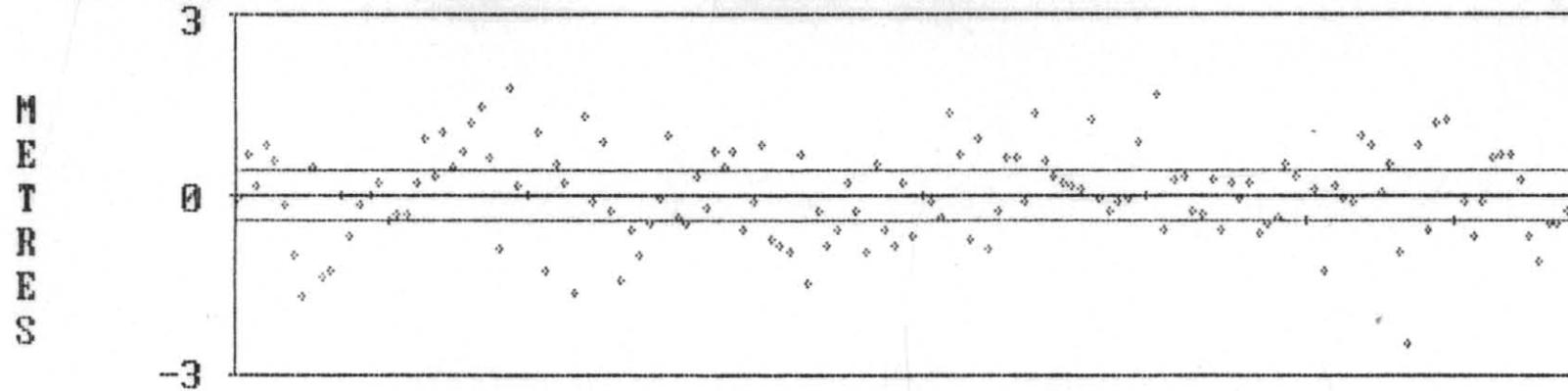
DELTA = +4.30 Metres



BASELINE I.D. = 19 TRIAL HARBOU to WATTS HILL 12-04-1990 06:24:04



INPUT ○○○○○○○○○○ CURVE FIT _____
 Calculated Value= 29965.78 Observed Value= 29961.48 Delta= +4.30



DELTA ○○○○○○○○○○ STD. DEV. _____

BASELINE CROSSING COMPUTATION

BASELINE I.D. : 20

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : WATTS HILL LAT 42 12 03.31 S LON 145 11 40.36 E

DATE : 12-04-1990

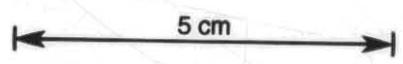
TIME : 06:47:07

COMMENTS : BASELINE CROSSING

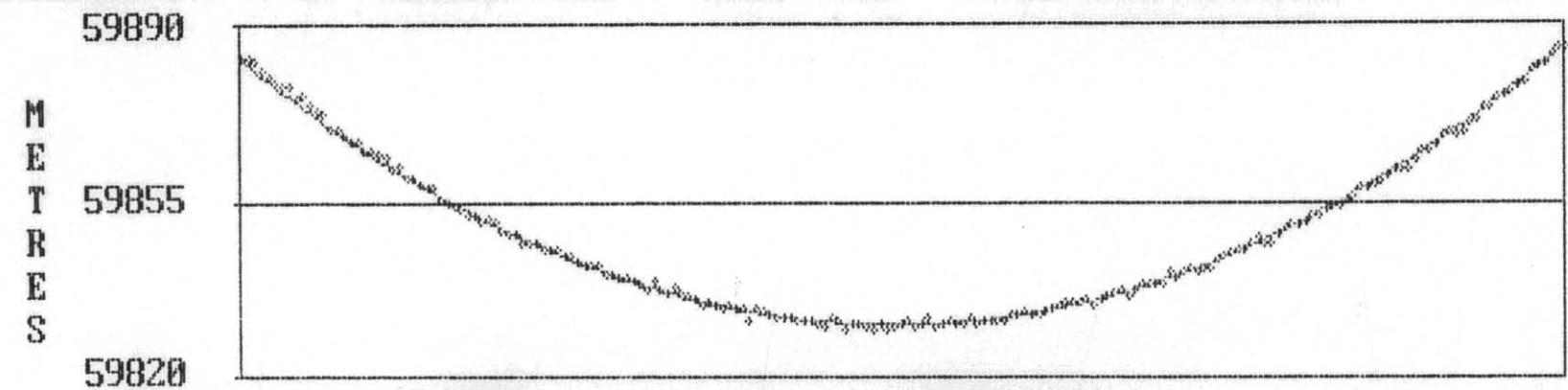
CALCULATED VALUE = 59835.72 Metres

OBSERVED VALUE = 59830.27 Metres

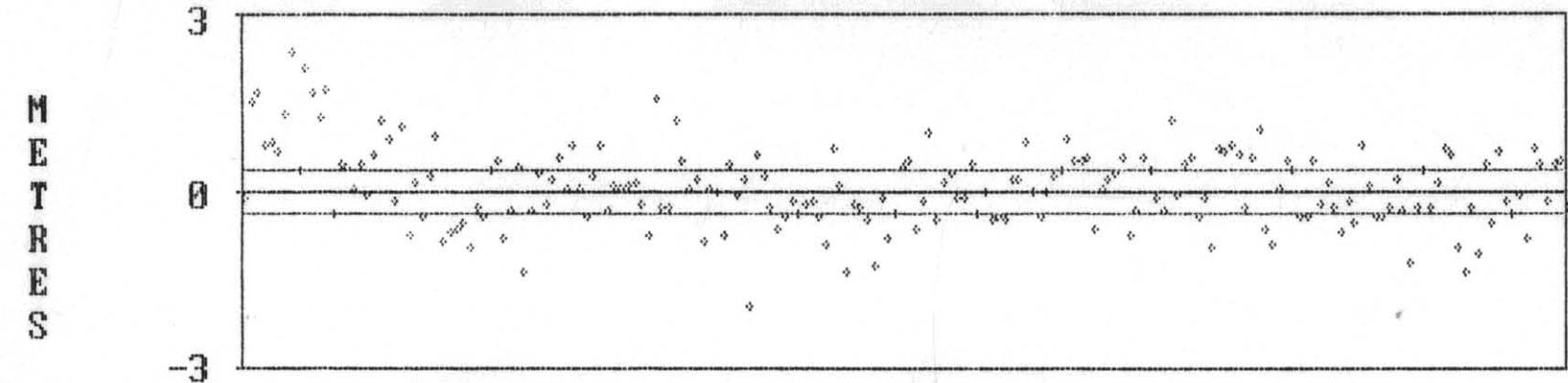
DELTA = +5.45 Metres



BASELINE I.D. = 20 YARRANA HILL to WATTS HILL 12-04-1990 06:47:07



INPUT ○○○○○○○○○○ CURVE FIT _____
Calculated Value= 59835.72 Observed Value= 59830.27 Delta= +5.45



DELTA ○○○○○○○○○○ STD. DEV. _____

BASELINE CROSSING COMPUTATION

BASELINE I.D. : 21

STATION 1 : YARRANA HILL LAT 41 41 49.07 S LON 144 56 22.38 E

STATION 2 : HIBBS PYRAMI LAT 42 36 21.47 S LON 145 16 29.41 E

DATE : 12-04-1990

TIME : 07:21:41

COMMENTS : BASELINE CROSSING

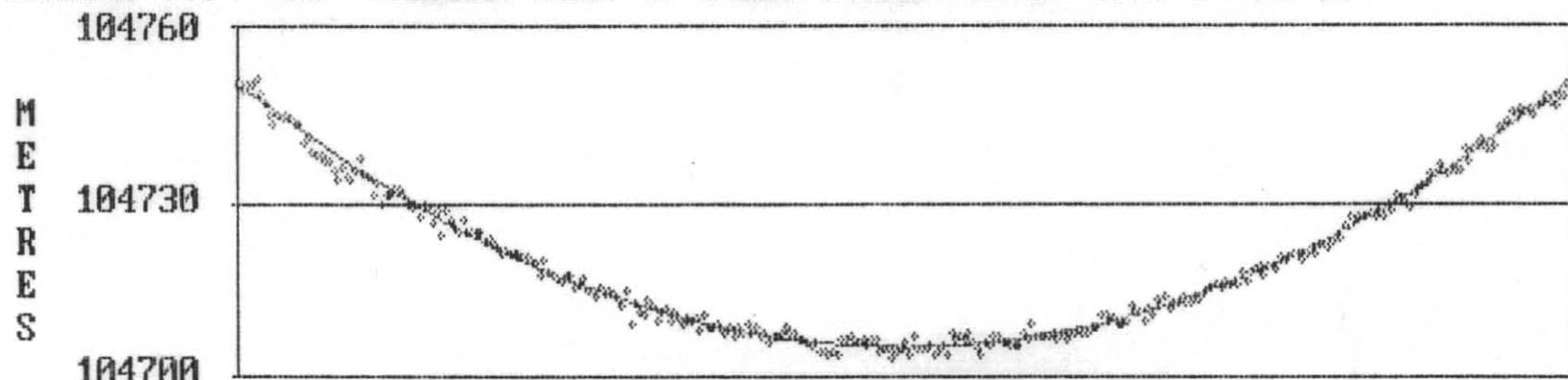
CALCULATED VALUE = 104702.50 Metres

OBSERVED VALUE = 104704.99 Metres

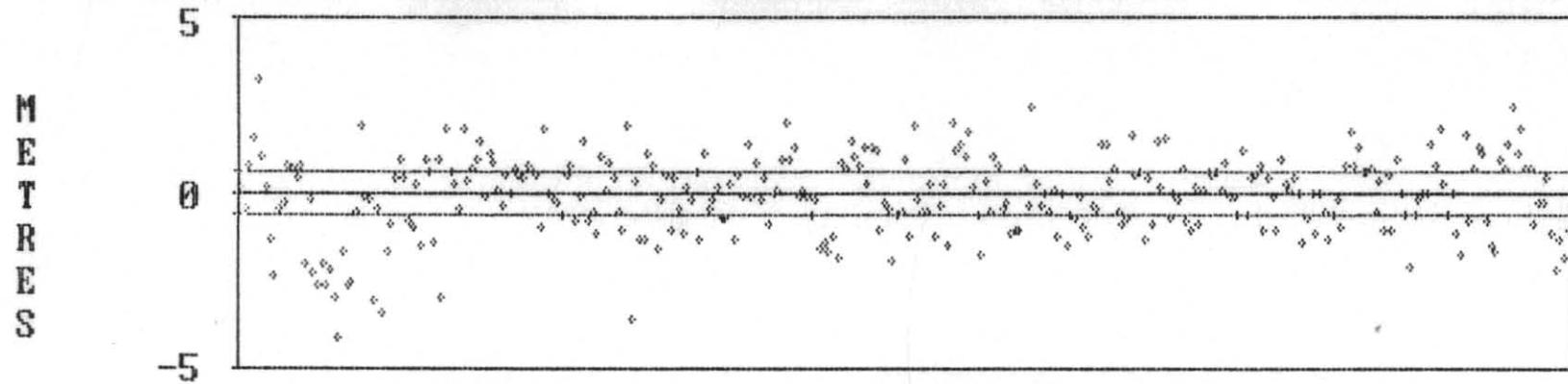
DELTA = -2.49 Metres

5 cm

BASELINE I.D. = 21 YARRANA HILL to HIBBS PYRAMI 12-04-1990 07:21:41



Calculated Value = 104702.50 Observed Value = 104704.99 Delta = -2.49



DELTA STD. DEV.

10.1

SURVEY ACTIVITY DETAILS

483087

FROM	TO	ACTIVITY	TOTAL	CHARGE
**		DATE 22/11/90		
	00:00-24:00	CREW CHANGE / RE-SUPPLY	24.000	0.000
**	Subtotal	**	24.000	0.000
***	Total	***	24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
**		DATE 23/11/90		
	00:00-24:00	CREW CHANGE / RE-SUPPLY	24.000	0.000
**	Subtotal	**	24.000	0.000
***	Total	***	24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
**		DATE 24/11/90		
	00:00-06:12	CREW CHANGE / RE-SUPPLY	6.200	0.000
	06:12-24:00	TRAVEL TO PROSPECT	17.800	0.000
**	Subtotal	**	24.000	0.000
***	Total	***	24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
**		DATE 25/11/90		
	00:00-06:12	TRAVEL TO PROSPECT	6.200	0.000
	06:12-09:45	STANDBY WEATHER (NON-CHARGEABLE)	3.550	0.000
	09:45-24:00	CUTTING SYLEDIS BASELINES	14.250	0.000
**	Subtotal	**	24.000	0.000
***	Total	***	24.000	0.000

10.1.2

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
** DATE 26/11/90				
00:00-06:45		CALIBRATING SYLEDIS CHAIN	6.750	0.000
06:45-10:05		SCOUTING PROSPECT FOR LOBSTER POTS	3.333	3.333
10:05-13:20		CALIBRATING SYLEDIS CHAIN	3.250	0.000
13:20-14:30		SCOUTING FOR LOBSTER POTS	1.167	1.167
14:30-16:50		CALIBRATING SYLEDIS	2.333	0.000
16:50-24:00		DEPLOYING STREAMER	7.167	0.000
** Subtotal **			24.000	4.500
*** Total ***			24.000	4.500

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
** DATE 27/11/90				
00:00-19:15		DEPLOY & TEST STREAMER	19.250	0.000
19:15-22:30		REPAIR STREAMER DAMAGE	3.250	0.000
22:30-24:00		DEPLOY & TEST SOURCE	1.500	0.000
** Subtotal **			24.000	0.000
*** Total ***			24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
** DATE 28/11/90				
00:00-00:07		LINE CHANGE	0.117	0.000
00:07-03:12		SHOOTING MXT90-10	3.083	0.000
03:12-04:16		LINE CHANGE	1.067	0.000
04:16-07:07		SHOOTING MXT90-8	2.850	0.000
07:07-08:20		LINE CHANGE	1.217	0.000
08:20-11:34		SHOOTING MXT90-6	3.233	0.000
11:34-12:44		LINE CHANGE	1.167	0.000
12:44-15:42		SHOOTING MXT90-4	2.967	0.000
15:42-17:09		LINE CHANGE	1.450	0.000
17:09-20:20		SHOOTING MXT90-2	3.183	0.000
20:20-22:35		LINE CHANGE	2.250	0.000
22:35-24:00		SHOOTING MXT90-1	1.416	0.000
** Subtotal **			24.000	0.000
*** Total ***			24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
		DATE 29/11/90		
00:00-01:06		SHOOTING MXT90-1	1.100	0.000
01:06-02:17		LINE CHANGE	1.183	0.000
02:17-03:46		SHOOTING MXT90-26	1.483	0.000
03:46-05:18		LINE CHANGE	1.533	0.000
05:18-08:05		SHOOTING MXT90-24	2.783	0.000
08:05-09:46		LINE CHANGE	1.683	0.000
09:46-12:28		SHOOTING MXT90-22	2.700	0.000
12:28-13:43		LINE CHANGE	1.250	0.000
13:43-16:10		SHOOTING MXT90-20	2.450	0.000
16:10-17:33		LINE CHANGE	1.383	0.000
17:33-20:02		SHOOTING MXT90-18	2.483	0.000
20:02-21:21		LINE CHANGE	1.317	0.000
21:21-23:56		SHOOTING MXT90-16	2.583	0.000
23:56-24:00		LINE CHANGE	0.069	0.000
** Subtotal **			24.000	0.000
*** Total ***			24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
		DATE 30/11/90		
00:00-01:09		LINE CHANGE	1.150	0.000
01:09-03:48		SHOOTING MXT90-14	2.650	0.000
03:48-05:01		LINE CHANGE	1.217	0.000
05:01-07:54		SHOOTING MXT90-12	2.883	0.000
07:54-09:24		LINE CHANGE	1.500	0.000
09:24-13:44		SHOOTING MXT90-28	4.333	0.000
13:44-16:10		LINE CHANGE	2.433	0.000
16:10-20:08		SHOOTING MXT90-21	3.967	0.000
20:08-21:36		LINE CHANGE	1.467	0.000
21:36-24:00		SHOOTING MXT90-17	2.400	0.000
** Subtotal **			24.000	0.000
*** Total ***			24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
		DATE 01/12/90		
00:00-01:03		SHOOTING MXT90-17	1.050	0.000
01:03-02:21		LINE CHANGE	1.300	0.000
02:21-05:36		SHOOTING MXT90-13	3.250	0.000
05:36-06:41		LINE CHANGE	1.083	0.000
06:41-09:42		SHOOTING MXT90-9	3.017	0.000
09:42-11:08		LINE CHANGE	1.433	0.000
11:08-14:19		SHOOTING MXT90-5	3.183	0.000
14:19-15:24		LINE CHANGE	1.083	0.000
15:24-18:08		SHOOTING MXT90-3	2.733	0.000
18:08-19:28		LINE CHANGE	1.333	0.000
19:28-22:35		SHOOTING MXT90-7	3.117	0.000
22:35-24:00		LINE CHANGE	1.418	0.000
** Subtotal **			24.000	0.000
*** Total ***			24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
		DATE 02/12/90		
00:00-00:04		LINE CHANGE	0.067	0.000
00:04-03:17		SHOOTING MXT90-11	3.217	0.000
03:17-04:44		LINE CHANGE	1.450	0.000
04:44-08:10		SHOOTING MXT90-15	3.433	0.000
08:10-10:09		LINE CHANGE	1.983	0.000
10:09-13:21		(WRONGLY) SHOOTING MXT90-19	3.200	0.000
13:21-16:14		LINE CHANGE	2.883	0.000
16:14-21:44		SHOOTING MXT90-R1	5.500	0.000
21:44-24:00		LINE CHANGE	2.267	0.000
** Subtotal **			24.000	0.000
*** Total ***			24.000	0.000

10.1.5

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
		DATE 03/12/90		
00:00	00:07	LINE CHANGE	0.117	0.000
00:07	03:53	SHOOTING MXT90-R2	3.767	0.000
03:53	06:16	CIRCLE FOR STREAMER FAILURE	2.383	0.000
06:16	06:30	SHOOTING MXT90-R2A	0.233	0.000
06:30	07:30	RETRIEVING GUNS	1.000	0.000
07:30	10:12	RETRIEVING STREAMER	2.700	0.000
10:12	12:45	TRAVEL TO SCOUT DEPTHS ON MXT90-7	2.550	0.000
12:45	14:20	DEPLOY CABLE FOR RESHOOT MXT90-19	1.583	0.000
14:20	17:51	SCOUT DEPTHS ON MXT90-7	3.517	0.000
17:51	19:39	LINE CHANGE TO RESHOOT	1.800	0.000
19:39	23:10	SHOOTING MXT90-19	3.517	0.000
23:10	24:00	RETRIEVING SOURCE ARRAY	0.833	0.000
** Subtotal **			24.000	0.000
*** Total ***			24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
		DATE 04/12/90		
00:00	00:06	RETRIEVING GUNS	0.100	0.000
00:06	03:00	RETRIEVING STREAMER	2.900	0.000
03:00	07:51	CUTTING SYLEDIS BASELINES	4.850	0.000
07:51	24:00	UNDER WAY TO PORT	16.150	0.000
** Subtotal **			24.000	0.000
*** Total ***			24.000	0.000

SURVEY ACTIVITY DETAILS

FROM	TO	ACTIVITY	TOTAL	CHARGE
		DATE 05/12/90		
00:00	13:30	TRAVEL TO PORT	13.500	0.000
13:30	20:15	GRAVITY CALIBRATIONS	6.750	6.750
20:15	24:00	SURVEY PERIOD OVER	3.750	0.000
** Subtotal **			24.000	6.750
*** Total ***			24.000	6.750

10.2

LINE ANALYSIS

LINE No.	HDG. DEG.	FSP LSP	REEL REEL	FILE FILE	LINE KMS	ACCUM KMS	DATE	TIME TIME
MXT90-10	064	100	11300	100			28/11	0007
		1266	11313	1266	29.175			0312
MXT90-8	244	1143	11314	100				0416
		25	11327	1218	27.975			0707
MXT90-6	064	100	11328	100				0820
		1302	11342	1302	30.075			1134
MXT90-4	244	1117	11343	100				1244
		25	11356	1191	27.325			1542
MXT90-2	064	100	11357	100				1709
		1265	11371	1265	29.150			2020
MXT90-1	152	100	11372	100				2235
		640	11378	640	13.525	157.225		2400
		641	11378	641			29/11	0000
		1054	11383	1054	10.350			0106
MXT90-26	244	580	11384	100				0217
		25	11390	655	13.900			0346
MXT90-24	064	100	11391	100				0518
		1134	11403	1134	25.875			0805
MXT90-22	244	1040	11404	100				0946
		25	11416	1115	25.400			1228
MXT90-20	064	100	11417	100				1343
		998	11428	998	22.475			1610
MXT90-18	244	950	11429	100				1733
		25	11440	1025	23.150			2002
MXT90-16	064	100	11441	100				2121
		1058	11452	1058	23.975	302.350		2356
MXT90-14	244	1019	11453	100			30/11	0109
		25	11464	1094	24.875			0348
MXT90-12	064	100	11465	100				0501
		1170	11477	1170	26.775			0754
MXT90-28	270	1643	11478	100				0924
		24	11497	1718	40.500			1344
MXT90-21	152	100	11498	100				1610
		1613	11518	1613	37.850			2002
MXT90-17	331	1317	11519	100				2136
		420	11529	997	22.450	454.800		2400
		419	11529	998			01/12	0000
		25	11534	1392	9.875			0103
MXT90-13	151	100	11535	100				0221
		1414	11550	1414	32.875			0536
MXT90-9	331	1242	11551	100				0641
		25	11567	1317	30.450			0942
MXT90-5	152	100	11568	100				1108
		1357	11580	1357	31.450			1419
MXT90-3	331	1082	11569	100				1524
		26	11593	1156	26.425			1808
MXT90-7	152	100	11595	100				1928
		1338	11609	1338	30.975	616.850		2234

10.2.2

LINE ANALYSIS

LINE No.	HDG. DEG.	FSP LSP	REEL REEL	FILE FILE	LINE KMS	ACCUM KMS	DATE	TIME TIME
MXT90-11	331	1302	11610	100		616.850	02/12	0004
		26	11625	1376	31.925			0317
MXT90-15	331	100	11626	100				0444
		1478	11642	1478	34.475			0810
MXT90-19	343	1314	11643	100				1009
		24	11658	1388	----	(RESHOOT REQD.)		1321
MXT90-R1	334	2213	11659	100				1614
		24	11684	2284	54.750	738.000		2144
MXT90-R2	090	100	11685	100			03/12	0007
		1483	11701	1483	34.600			0317
MXT90-R2A	090	1400	11702	1400				0602
		1576	11704	1576	2.325			0630
MXT90-19A	332	1419	11705	100		809.775		1939

SURVEY COMPLETED

10.2.3

SURVEY PRODUCTION DETAILS

LINE	DIR.	FIRST SP#	LAST SP#	TOTAL SPS	TOTAL KMS	FIRST CHG SP#	LAST CHG SP#	TOTAL CHGSP	TOTAL CHARGE KMS	LINE STATUS
** DATE 30/11/90										
MXT90-14	244	1019	25	995	24.875	1019	25	995	24.875	COMP
MXT90-12	064	100	1170	1071	26.775	100	1170	1071	26.775	COMP
MXT90-28	270	1643	24	1620	40.500	1643	24	1620	40.500	COMP
MXT90-21	152	100	1613	1514	37.850	100	1613	1514	37.850	COMP
MXT90-17	331	1317	420	898	22.450	1317	420	898	22.450	TBC
** Subtotal **								6098	152.450	
*** Total ***								6098	152.450	

SURVEY PRODUCTION DETAILS

LINE	DIR.	FIRST SP#	LAST SP#	TOTAL SPS	TOTAL KMS	FIRST CHG SP#	LAST CHG SP#	TOTAL CHGSP	TOTAL CHARGE KMS	LINE STATUS
** DATE 01/12/90										
MXT90-17	331	419	25	395	9.875	419	25	395	9.875	COMP
MXT90-13	151	100	1414	1315	32.875	100	1414	1315	32.875	COMP
MXT90-9	331	1242	25	1218	30.450	1242	25	1218	30.450	COMP
MXT90-5	152	100	1357	1258	31.450	100	1357	1258	31.450	COMP
MXT90-3	332	1082	26	1057	26.425	1082	26	1057	26.425	COMP
MXT90-7	152	100	1338	1239	30.975	100	1338	1239	30.975	COMP
** Subtotal **								6482	162.050	
*** Total ***								6482	162.050	

10.2.4

SURVEY PRODUCTION DETAILS

LINE	DIR.	FIRST SP#	LAST SP#	TOTAL SPS	TOTAL KMS	FIRST CHG SP#	LAST CHG SP#	TOTAL CHGSP	TOTAL CHARGE KMS	LINE STATUS
** DATE 02/12/90										
MXT90-11	331	1302	26	1277	31.925	1302	26	1277	31.925	COMP
MXT90-15	151	100	1478	1379	34.475	100	1478	1379	34.475	COMP
MXT90-R1	334	2213	24	2190	54.750	2213	24	2190	54.750	COMP
** Subtotal **								4846	121.150	
*** Total ***								4846	121.150	

SURVEY PRODUCTION DETAILS

LINE	DIR.	FIRST SP#	LAST SP#	TOTAL SPS	TOTAL KMS	FIRST CHG SP#	LAST CHG SP#	TOTAL CHGSP	TOTAL CHARGE KMS	LINE STATUS
** DATE 03/12/90										
MXT90-R2	090	100	1499	1400	35.000	100	1483	1384	34.600	TBC
MXT90-R2A	090	1400	1576	177	4.425	1484	1576	93	2.325	COMP
MXT90-19	332	1419	26	1394	34.850	1419	26	1394	34.850	COMP
** Subtotal **								2871	71.775	
*** Total ***								2871	71.775	

10.2.5

SURVEY PRODUCTION DETAILS

LINE	DIR.	FIRST SP#	LAST SP#	TOTAL SPS	TOTAL KMS	FIRST CHG SP#	LAST CHG SP#	TOTAL CHGSP	TOTAL CHARGE KMS	LINE STATUS
** DATE 28/11/90										
MXT90-10	064	100	1266	1167	29.175	100	1266	1167	29.175	COMP
MXT90-8	244	1143	25	1119	27.975	1143	25	1119	27.975	COMP
MXT90-6	064	100	1302	1203	30.075	100	1302	1203	30.075	COMP
MXT90-4	244	1117	25	1093	27.325	1117	25	1093	27.325	COMP
MXT90-2	064	100	1265	1166	29.150	100	1265	1166	29.150	COMP
MXT90-1	152	100	640	541	13.525	100	640	541	13.525	TBC
** Subtotal **								6289	157.225	
*** Total ***								6289	157.225	

SURVEY PRODUCTION DETAILS

LINE	DIR.	FIRST SP#	LAST SP#	TOTAL SPS	TOTAL KMS	FIRST CHG SP#	LAST CHG SP#	TOTAL CHGSP	TOTAL CHARGE KMS	LINE STATUS
** DATE 29/11/90										
MXT90-1	152	641	1054	414	10.350	641	1054	414	10.350	COMP
MXT90-26	244	580	25	556	13.900	580	25	556	13.900	COMP
MXT90-24	064	100	1134	1035	25.875	100	1134	1035	25.875	COMP
MXT90-22	244	1040	25	1016	25.400	1040	25	1016	25.400	COMP
MXT90-20	064	100	998	899	22.475	100	998	899	22.475	COMP
MXT90-18	244	950	25	926	23.150	950	25	926	23.150	COMP
MXT90-16	064	100	1058	959	23.975	100	1058	959	23.975	COMP
** Subtotal **								5805	145.125	
*** Total ***								5805	145.125	

Included overleaf are tables showing a breakdown of time disposed on the survey from 22 November, the date of the vessel's availability to Maxus, and 24 November, the date on which the vessel sailed. Both periods end at 2015 hrs on December 5, the time of completion of the final gravity survey tie.

There were two periods for which HGS wished to charge at the Standby rate in the contract. The first was for the initial port check (still readings) for the gravity system. That was not conceded at the time as that procedure is routine and the Contractor could not offer to carry out a gravity survey without taking still readings. In fact, the weather was very bad at the time and the Party Chief also wanted to delay sailing until daylight so that the boat would arrive on the prospect at daylight. It was intended to scout for fish traps, lobster pots etc on arrival. The overnight delay, therefore is considered to be non-chargeable weather downtime, rather than "gravity calibrations".

The second incident involved the damage sustained to the streamer prior to starting the first line of the survey. It was probably caused by a shark bite but liability is not usually conceded until the Contractor is ready to proceed with the survey with all systems operational, i.e., according to the specs agreed between Client and Contractor. In the past this has been taken to mean from the time of the first valid shotpoint.

Agreement to disagree on both of these matters was quite amicable and the times were noted to enable further discussion by the principals.

10.3.2

STATISTICS FOR PERIOD : 22/11/90 TO 05/12/90

ACTIVITY DESCRIPTION	HOURS	% OF TOTAL
RECORDING	84.564	25.45%
LINE CHANGE	39.870	12.00%
TRAVEL	53.650	16.15%
CREW CHANGE/RESUPPLY	54.200	16.31%
STREAMER FAILURE	2.383	0.72%
STREAMER HANDLING	32.017	9.64%
NAVIGATION SET UP/CALIBRATION	31.433	9.46%
GRAVITY SYSTEM CALIBRATION	6.750	2.03%
SCOUTING	4.500	1.35%
ANCILLARY INSTRUMENT FAILURE	6.067	1.83%
STANDBY/OTHER	10.133	3.05%
STREAMER DAMAGE/LOSS	3.250	0.98%
SOURCE HANDLING	3.433	1.03%

TOTAL	332.250	

TOTAL CHARGEABLE KM	=	809.775
AVERAGE KM/DAY	=	58.674
TOTAL CHARGEABLE HRS	=	11.250
TOTAL WEATHER HOURS	=	0.000
TOTAL 2D	=	809.775

STATISTICS FOR PERIOD : 24/11/90 TO 05/12/90

ACTIVITY DESCRIPTION	HOURS	% OF TOTAL
RECORDING	84.564	29.75%
LINE CHANGE	39.870	14.03%
TRAVEL	53.650	18.87%
CREW CHANGE/RESUPPLY	6.200	2.18%
STREAMER FAILURE	2.383	0.84%
STREAMER HANDLING	32.017	11.26%
NAVIGATION SET UP/CALIBRATION	31.433	11.06%
GRAVITY SYSTEM CALIBRATION	6.750	2.37%
SCOUTING	4.500	1.58%
ANCILLARY INSTRUMENT FAILURE	6.067	2.13%
STANDBY/OTHER	10.133	3.56%
STREAMER DAMAGE/LOSS	3.250	1.14%
SOURCE HANDLING	3.433	1.21%

TOTAL	284.250	

TOTAL CHARGEABLE KM	=	809.775
AVERAGE KM/DAY	=	68.583
TOTAL CHARGEABLE HRS	=	11.250
TOTAL WEATHER HOURS	=	0.000
TOTAL 2D	=	809.775

=====

LINE: MXT90-1 AZIMUTH: 152 STATUS: COMP DATE: 29/11/90

START: 22:35 HRS FSP: 100 FCSP: 100 TOTAL SP: 955 TOTAL KM: 23.875
 END: 01:06 HRS LSP: 1054 LCSP: 1054 TOTAL CSP: 955 TOTAL CKM: 23.875

FSP LAT: 42 01 15.89 S FSP LON: 144 56 51.90 E FSP WATER DEPTH: 99.0
 LSP LAT: 42 12 38.72 S LSP LON: 145 04 59.83 E LSP WATER DEPTH: 100.0

OFFSET (M): 150.0 WIND: SW 3 SEA: SLIGHT SWELL (M): 3

STREAMER:- DEPTHS (M):10-11 FEATHERING : 0.3 - 5.0 - 0.2 STBD
 SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 4 - 7 uBAR
 EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 10 uBAR
 STATUS: ALL O.K. ALMOST NO SWELL NOISE ON THIS LINE HEADING.
 GRAVITY/ MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2 (TRIAL HARBOUR);
 PERFORMANCE: 3 (YARRANA HILL); 4 (WATTS HILL). 5 (HIBBS PYRAMID) RANGES LOGGED
 BUT NOT USED IN FIXING. SIGNALS STABLE : CEP 0 - 1m

COMMENTS: NO EVIDENCE ON FATHOMETER STRIP CHART OF C SORELL 1 WELLHEAD.

=====

LINE: MXT90-2 AZIMUTH: 064 STATUS: COMP DATE: 28/11/90

START: 17:09 HRS FSP: 100 FCSP: 100 TOTAL SP: 1166 TOTAL KM: 29.150
 END: 20:20 HRS LSP: 1265 LCSP: 1265 TOTAL CSP: 1166 TOTAL CKM: 29.150

FSP LAT: 42 08 27.42 S FSP LON: 144 43 42.73 E FSP WATER DEPTH: 373.0
 LSP LAT: 42 01 25.03 S LSP LON: 145 02 36.36 E LSP WATER DEPTH: 81.0

OFFSET (M): 153.0 WIND: SW 4 SEA: SLIGHT SWELL (M): 3

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 3.4 STBD - 3.3 PORT
 SOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 10 uBAR
 EOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 5 - 12 uBAR
 STATUS: ALL TRACES O.K. RANDOM SWELL NOISE THROUGHOUT
 GRAVITY & MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: SP 146 # 60 OFF (A/L) = 2140 cu.in.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2,3,4.
 PERFORMANCE: SLIGHT EVENING SKYWAVE EFFECT: SIGS GENERALLY STABLE: CEP = 1 - 3m

COMMENTS: SP 145 A/F; SP 668,669,670, 716,717,718, 832,833,834,835 B/R

=====

LINE: MXT90-3 AZIMUTH: 332 STATUS: COMP DATE: 01/12/90

START: 15:24 HRS FSP: 1082 FCSP: 1082 TOTAL SP: 1057 TOTAL KM: 26.425
 END: 18:08 HRS LSP: 26 LCSP: 26 TOTAL CSP: 1057 TOTAL CKM: 26.425

FSP LAT: 42 13 15.06 S FSP LON: 145 03 50.29 E FSP WATER DEPTH: 102.0
 LSP LAT: 42 00 41.23 S LSP LON: 144 54 45.05 E LSP WATER DEPTH: 113.0

OFFSET (M): 153.0 WIND: SSW 3 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/- 1 FEATHERING : 4.6 - 0.6 STBD
 SOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 10 uBAR
 EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 8 uBAR
 STATUS: # 236, 86 SPIKING OCCASIONALLY; # 289 WEAK.
 GRAVITY/ MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 1950
 PERFORMANCE: A.DG.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS SLIGHTLY NOISY : CEP = 2 - 3m

COMMENTS: OCCASIONAL SLIGHT SWELL NOISE.

=====

LINE: MXT90-4 AZIMUTH: 244 STATUS: COMP DATE: 28/11/90

START: 12:44 HRS FSP: 1117 FCSP: 1117 TOTAL SP: 1093 TOTAL KM: 27.325
 END: 15:42 HRS LSP: 25 LCSP: 25 TOTAL CSP: 1093 TOTAL CKM: 27.325

FSP LAT: 42 02 59.49 S FSP LON: 145 01 47.79 E FSP WATER DEPTH: 91.0
 LSP LAT: 42 09 34.53 S LSP LON: 144 43 57.38 E LSP WATER DEPTH: 390.0

OFFSET (M): 153.0 WIND: W 2 - 3 SEA: SLIGHT SWELL (M): 3

STREAMER:- DEPTHS (M):9.5+/-1 FEATHERING : 0.7 - 4.8 PORT
 SOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 5 - 12 uBAR
 EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 5 - 10 uBAR
 STATUS: ALL O.K. RANDOM SWELL NOISE THROUGHOUT
 GRAVITY & MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE : CEP = 0 - 1 m

COMMENTS: SP 619 NDR

=====

=====

LINE: MXT90-6 AZIMUTH: 064 STATUS: COMP DATE: 28/11/90

START: 08:20 HRS FSP: 100 FCSP: 100 TOTAL SP: 1203 TOTAL KM: 30.075
 END: 11:34 HRS LSP: 1302 LCSP: 1302 TOTAL CSP: 1203 TOTAL CKM: 30.075

FSP LAT: 42 10 21.78 S FSP LON: 144 46 27.07 E FSP WATER DEPTH: 170.0
 LSP LAT: 42 03 11.39 S LSP LON: 145 06 00.64 E LSP WATER DEPTH: 67.0

OFFSET (M): 153.0 WIND: W 2 - 3 SEA: SLIGHT SWELL (M): 2.5

STREAMER:- DEPTHS (M):153 FEATHERING : 6 STBD - 0 DEG
 SOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 5 - 10 uBAR
 EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 5 - 10 uBAR
 STATUS: ALL O.K. RANDOM SWELL NOISE BURSTS
 GRAVITY & MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: ALL O.K.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE : CEP = 0 - 2 m *
 * BRIEF NOISE BURST SP 950 - 1010 : CEP 3 - 6 m AT TIMES.

COMMENTS: SP 701 - 710 LOW CUT FILTER OUT ON SEM # 20 (TRACES 229 - 240) :8HZ
 FILTER CAN BE APPLIED IN PROCESSING OR FILES EDITED. LINE ACCEPTED.

=====

LINE: MXT90-5 AZIMUTH: 152 STATUS: COMP DATE: 01/12/90

START: 11:08 HRS FSP: 100 FCSP: 100 TOTAL SP: 1258 TOTAL KM: 31.450
 END: 14:19 HRS LSP: 1357 LCSP: 1357 TOTAL CSP: 1258 TOTAL CKM: 31.450

FSP LAT: 42 01 42.03 S FSP LON: 144 53 52.44 E FSP WATER DEPTH: 124.0
 LSP LAT: 42 16 39.96 S LSP LON: 145 04 38.56 E LSP WATER DEPTH: 105.0

OFFSET (M): 153.0 WIND: SSW 3 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/- 1 FEATHERING : 0 - 3.0 PORT
 SOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR
 EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 6 uBAR
 STATUS: # 236 OCCASIONAL SPIKING; # 289 WEAK.
 GRAVITY/ MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE : CEP = 0 - 1m

COMMENTS: OCCASIONAL SLIGHT SWELL NOISE

=====

10.4.4

483102

LINE: MXT90-7 AZIMUTH: 152 STATUS: COMP DATE: 01/12/90

START: 19:28 HRS FSP: 100 FCSP: 100 TOTAL SP: 1239 TOTAL KM: 30.975
END: 22:35 HRS LSP: 1338 LCSP: 1338 TOTAL CSP: 1239 TOTAL CKM: 30.975

FSP LAT: 42 02 23.99 S FSP LON: 144 52 43.52 E FSP WATER DEPTH: 136.0
LSP LAT: 42 17 06.44 S LSP LON: 145 03 24.67 E LSP WATER DEPTH: 0.0

OFFSET (M): 153.0 WIND: SSW 2 SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M):10 FEATHERING : 0 - 2.6 PORT
SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR
EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR
STATUS: # 236 SPIKING; 289 WEAK.
GRAVITY/MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9# PRESSURE (psi): 2000
PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
PERFORMANCE: SIGNALS STABLE ; CEP 0 - 1 m

COMMENTS: NO FATHOMETER RECORDING FROM SP 10 ; LINE WILL BE SCOUTED FOR WATER DEPTHS AT END OF SURVEY.

=====

LINE: MXT90-8 AZIMUTH: 244 STATUS: COMP DATE: 28/11/90

START: 04:16 HRS FSP: 1143 FCSP: 1143 TOTAL SP: 1119 TOTAL KM: 27.975
END: 07:07 HRS LSP: 25 LCSP: 25 TOTAL CSP: 1119 TOTAL CKM: 27.975

FSP LAT: 42 05 59.60 S FSP LON: 145 03 17.27 E FSP WATER DEPTH: 91.0
LSP LAT: 42 12 39.34 S LSP LON: 144 45 06.59 E LSP WATER DEPTH: 500.0

OFFSET (M): 150.0 WIND: NW 2 SEA: SLIGHT SWELL (M): 2.5

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 0 - 3.4 PORT
SOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 10 uBAR
EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 10 uBAR
STATUS: ALL O.K. RANDOM SWELL NOISE

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
PERFORMANCE: SP 444 # 15 OFF (A/L) = 2170 cu.in.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
PERFORMANCE: SLIGHT DAWN SKYWAVE EFFECT BUT SIGNALS STABLE : CEP = 0 - 3 m

COMMENTS: GRAVITY & MAG. O.K.

=====

10.4.5

=====

LINE: MXT90-9 AZIMUTH: 331 STATUS: COMP DATE: 01/12/90

START: 06:41 HRS FSP: 1242 FCSP: 1242 TOTAL SP: 1218 TOTAL KM: 30.450
 END: 09:42 HRS LSP: 25 LCSP: 25 TOTAL CSP: 1218 TOTAL CKM: 30.450

FSP LAT: 42 15 18.04 S FSP LON: 145 01 17.22 E FSP WATER DEPTH: 126.0
 LSP LAT: 42 00 50.18 S LSP LON: 144 50 46.85 E LSP WATER DEPTH: 140.0

OFFSET (M): 152.0 WIND: SSW 2 SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/- 1 FEATHERING : 0 - 3.2 STBD
 SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR
 EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 8 uBAR
 STATUS: # 236 SPIKING; # 289 WEAK. OCCASIONAL SLIGHT SWELL NOISE
 GRAVITY & MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 1950
 PERFORMANCE: SP 767 GUN # 47 OFF = 2170 cu. in.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE ; CEP = 2 m

COMMENTS:

=====

LINE: MXT90-10 AZIMUTH: 064 STATUS: COMP DATE: 28/11/90

START: 00:07 HRS FSP: 100 FCSP: 100 TOTAL SP: 1167 TOTAL KM: 29.175
 END: 03:12 HRS LSP: 1266 LCSP: 1266 TOTAL CSP: 1167 TOTAL CKM: 29.175

FSP LAT: 42 12 39.47 S FSP LON: 144 48 18.87 E FSP WATER DEPTH: 210.0
 LSP LAT: 42 05 39.23 S LSP LON: 145 07 16.19 E LSP WATER DEPTH: 65.0

OFFSET (M): 150.0 WIND: WNW 3 SEA: SLIGHT SWELL (M): 2.5

STREAMER:- DEPTHS (M):9.5+-1 FEATHERING : 2.3 STBD - 1.8 PORT
 SOL NOISE: 2 - 5 uBAR NEAR/BIRD GROUPS: 6 - 12 uBAR
 EOL NOISE: 2 - 5 uBAR NEAR/BIRD GROUPS: 6 - 12 uBAR
 STATUS: ALL TRACES GOOD. RANDOM SWELL NOISE THROUGHOUT.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2,3,4.
 PERFORMANCE: SIGNALS STABLE : CEP 0 - 2m

COMMENTS: NO MAGNETOMETER RECORDING ON LINE
 SP 506, 1068 BAD RECORDS.

=====

LINE: MXT90-11 AZIMUTH: 331 STATUS: COMP DATE: 02/12/90

START: 00:04 HRS FSP: 1302 FCSP: 1302 TOTAL SP: 1277 TOTAL KM: 31.925
 END: 03:17 HRS LSP: 26 LCSP: 26 TOTAL CSP: 1277 TOTAL CKM: 31.925

FSP LAT: 42 16 29.98 S FSP LON: 145 01 22.47 E FSP WATER DEPTH: 120.0
 LSP LAT: 42 01 22.38 S LSP LON: 144 50 15.37 E LSP WATER DEPTH: 147.0

OFFSET (M): 152.0 WIND: S 2 - 3 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/- 1 FEATHERING : 1.7 STBD - 2.1 PORT
 SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 6 uBAR
 EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR
 STATUS: # 86, 289 SPIKING INTYERMITTENTLY
 GRAVITY/ MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 1950
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE ; CEP 1 - 2 m

COMMENTS:

=====

LINE: MXT90-12 AZIMUTH: 064 STATUS: COMP DATE: 30/11/90

START: 05:01 HRS FSP: 100 FCSP: 100 TOTAL SP: 1071 TOTAL KM: 26.775
 END: 07:54 HRS LSP: 1170 LCSP: 1170 TOTAL CSP: 1071 TOTAL CKM: 26.775

FSP LAT: 42 13 46.57 S FSP LON: 144 48 40.85 E FSP WATER DEPTH: 181.0
 LSP LAT: 42 06 59.71 S LSP LON: 145 05 50.24 E LSP WATER DEPTH: 77.5

OFFSET (M): 151.0 WIND: SW 2 SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 1.2 STBD - 3.1 PORT
 SOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 5 - 10 uBAR
 EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 12 uBAR
 STATUS: ALL O.K. RANDOM SWELL NOISE THROUGHOUT
 GRAVITY/MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 1950
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SLIGHT INSTABLITY DURING DAWN SKYWAVE PERIOD: CEP = 0 - 3 m.

COMMENTS:

=====

=====

LINE: MXT90-13 AZIMUTH: 151 STATUS: COMP DATE: 01/12/90

START: 02:21 HRS FSP: 100 FCSP: 100 TOTAL SP: 1315 TOTAL KM: 32.875
 END: 05:36 HRS LSP: 1414 LCSP: 1414 TOTAL CSP: 1315 TOTAL CKM: 32.875

FSP LAT: 42 02 28.07 S FSP LON: 144 49 29.52 E FSP WATER DEPTH: 150.0
 LSP LAT: 42 18 00.64 S LSP LON: 145 00 59.62 E LSP WATER DEPTH: 120.0

OFFSET (M): 152.0 WIND: SSW 2 SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/- 1 FEATHERING : 0 - 2.0 STBD
 SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 5 uBAR
 EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR
 STATUS: # 236 INTERMITTENT SPKING. VERY OCCASIONAL SWELL NOISE.
 GRAVITY/MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE : CEP 0 - 1 m.

COMMENTS:

=====

LINE: MXT90-14 AZIMUTH: 244 STATUS: COMP DATE: 30/11/90

START: 01:09 HRS FSP: 1019 FCSP: 1019 TOTAL SP: 995 TOTAL KM: 24.875
 END: 03:48 HRS LSP: 25 LCSP: 25 TOTAL CSP: 995 TOTAL CKM: 24.875

FSP LAT: 42 09 17.65 S FSP LON: 145 04 05.22 E FSP WATER DEPTH: 95.0
 LSP LAT: 42 15 14.86 S LSP LON: 144 47 54.11 E LSP WATER DEPTH: 208.0

OFFSET (M): 151.0 WIND: SW 2 - 3 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 2.4 STBD - 1.4 PORT
 SOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 5 - 12 uBAR
 EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 5 - 10 uBAR
 STATUS: ALL TRACES GOOD. RANDOM SWELL NOISE THROUGHOUT.
 GRAVITY/MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 1950
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE : CEP 0 - 2 m

COMMENTS:

=====

LINE: MXT90-15 AZIMUTH: 151 STATUS: COMP DATE: 02/12/90

START: 04:44 HRS FSP: 100 FCSP: 100 TOTAL SP: 1379 TOTAL KM: 34.475
 END: 08:10 HRS LSP: 1478 LCSP: 1478 TOTAL CSP: 1379 TOTAL CKM: 34.475

FSP LAT: 42 02 01.87 S FSP LON: 144 48 22.89 E FSP WATER DEPTH: 155.0
 LSP LAT: 42 18 21.63 S LSP LON: 145 00 22.36 E LSP WATER DEPTH: 124.0

OFFSET (M): 153.0 WIND: S 2 SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M):10 +/-1 FEATHERING : 1.4 STBD - 1.9 PORT
 SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 6 uBAR
 EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 8 uBAR
 STATUS: # 289 BAD. OCCASIONAL SLIGHT SWELL NOISE
 GRAVITY/ MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE ; CEP = 0 - 1 m

COMMENTS: SP 928 B/R

=====

LINE: MXT90-16 AZIMUTH: 064 STATUS: COMP DATE: 29/11/90

START: 21:21 HRS FSP: 100 FCSP: 100 TOTAL SP: 959 TOTAL KM: 23.975
 END: 23:56 HRS LSP: 1058 LCSP: 1058 TOTAL CSP: 959 TOTAL CKM: 23.975

FSP LAT: 42 14 29.19 S FSP LON: 144 51 31.65 E FSP WATER DEPTH: 165.0
 LSP LAT: 42 08 46.57 S LSP LON: 145 07 08.56 E LSP WATER DEPTH: 73.0

OFFSET (M): 152.0 WIND: SW 2 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M):10 FEATHERING : 1.8 PORT - 3.5 STBD
 SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 8 uBAR
 EOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 5 - 12 uBAR
 STATUS: ALL TRACES GOOD. RANDOM SWELL NOISE THROUGHOUT.
 GRAVITY & MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 8 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE - SLIGHT "NIGHT EFFECT" : CEP = 1 - 2 m.

COMMENTS:

=====

10.4.9

=====

LINE: MXT90-17 AZIMUTH: 331 STATUS: COMP DATE: 01/12/90

START: 21:36 HRS FSP: 1317 FCSP: 1317 TOTAL SP: 2191 TOTAL KM: 54.775

END: 01:03 HRS LSP: 25 LCSP: 25 TOTAL CSP: 2191 TOTAL CKM: 54.775

32.325

FSP LAT: 42 17 20.95 S FSP LON: 144 58 46.72 E FSP WATER DEPTH: 134.0

LSP LAT: 42 02 02.23 S LSP LON: 144 47 31.05 E LSP WATER DEPTH: 150.0

OFFSET (M): 153.0 WIND: SSW 2 SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/- 1 FEATHERING : 2.5 STBD - 0.5 PORT

SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 6 uBAR

EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 6 uBAR

STATUS: # 236 INTERMITTENT SPIKING. VERY OCCASIONAL SLIGHT SWELL NOISE.

GRAV/MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000

PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.

PERFORMANCE: SIGNALS STABLE : CEP = 1 - 2 m.

COMMENTS: MIDNIGHT SP 420.

=====

LINE: MXT90-18 AZIMUTH: 244 STATUS: COMP DATE: 29/11/90

START: 17:33 HRS FSP: 950 FCSP: 950 TOTAL SP: 926 TOTAL KM: 23.150

END: 20:02 HRS LSP: 25 LCSP: 25 TOTAL CSP: 926 TOTAL CKM: 23.150

FSP LAT: 42 10 35.53 S FSP LON: 145 03 53.19 E FSP WATER DEPTH: 99.0

LSP LAT: 42 16 07.51 S LSP LON: 144 48 48.89 E LSP WATER DEPTH: 260.0

OFFSET (M): 153.0 WIND: LIGHT AIRS SEA: CALM SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/-12 FEATHERING : .4 STBD - 3.1 PORT

SOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 5 - 12 uBAR

EOL NOISE: 2 - 4 uBAR NEAR/BIRD GROUPS: 4 - 9 uBAR

STATUS: ALL O.K. RANDOM SWELL NOISE THROUGHOUT

GRAV/MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000

PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.

PERFORMANCE: SIGNALS STABLE CEP = 0 - 1 m

10.4.10

=====

LINE: MXT90-19 ^f AZIMUTH: 332 STATUS: COMP DATE: 03/12/90

START: 19:39 HRS FSP: 1419 FCSP: 1419 TOTAL SP: 1394 TOTAL KM: 34.850
 END: 23:10 HRS LSP: 26 LCSP: 26 TOTAL CSP: 1394 TOTAL CKM: 34.850

FSP LAT: 42 19 51.98 S FSP LON: 144 57 46.42 E FSP WATER DEPTH: 137.0
 LSP LAT: 42 03 14.81 S LSP LON: 144 45 52.45 E LSP WATER DEPTH: 157.0

OFFSET (M): 153.0 WIND: SE 4 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M):9 - 10 FEATHERING : 0.8 - 6.8 PORT

SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR

EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR

STATUS: # 289 BAD. OCCASIONAL SWELL NOISE

GRAVITY/ MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 21408 DEPTH (M): 9 PRESSURE (psi): 1950

PERFORMANCE: GUN # 45 OFF FROM SOL. (A/L)

NAVIGATION:- SYSTEM: SYLEDIS

STATIONS IN USE: 2, 3, 4.

PERFORMANCE: SIGNALS STABLE : CEP = 0 - 2m

COMMENTS:

LAST LINE OF SURVEY.

=====

LINE: MXT90-20 AZIMUTH: 064 STATUS: COMP DATE: 29/11/90

START: 13:43 HRS FSP: 100 FCSP: 100 TOTAL SP: 899 TOTAL KM: 22.475
 END: 16:10 HRS LSP: 998 LCSP: 998 TOTAL CSP: 899 TOTAL CKM: 22.475

FSP LAT: 42 16 46.36 S FSP LON: 144 50 47.71 E FSP WATER DEPTH: 165.0
 LSP LAT: 42 11 24.50 S LSP LON: 145 05 26.59 E LSP WATER DEPTH: 91.0

OFFSET (M): 157.0 WIND: LIGHT AIRS SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 1.6 STBD - 5.9 PORT

SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 4 - 12 uBAR

EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 4 - 9 uBAR

STATUS: ALL O.K. RANDOM SWELL NOISE THROUGHOUT

GRAV/MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000

PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS

STATIONS IN USE: 2, 3, 4.

PERFORMANCE: STABLE : CEP = 0 - 2 m

COMMENTS:

=====

10.4.11

=====

LINE: MXT90-22 AZIMUTH: 244 STATUS: COMP DATE: 29/11/90

START: 09:46 HRS FSP: 1040 FCSP: 1040 TOTAL SP: 1016 TOTAL KM: 25.400
 END: 12:28 HRS LSP: 25 LCSP: 25 TOTAL CSP: 1016 TOTAL CKM: 25.400

FSP LAT: 42 12 25.47 S FSP LON: 145 04 51.18 E FSP WATER DEPTH: 100.0
 LSP LAT: 42 18 29.73 S LSP LON: 144 48 18.71 E LSP WATER DEPTH: 345.0

OFFSET (M): 158.0 WIND: SW 1 - 2 SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 2.2 STBD - 1.1 PORT

SOL NOISE: 2 - 5 uBAR NEAR/BIRD GROUPS: 6 - 12 uBAR

EOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 5 - 12 uBAR

STATUS: ALL O.K. RANDOM SWELL NOISE THROUGHOUT

GRAVITY/ MAG. OK.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.

PERFORMANCE: SIGNALS STABLE : CEP = 0 - 1 m

COMMENTS:

=====

LINE: MXT90-21 AZIMUTH: 152 STATUS: COMP DATE: 30/11/90

START: 16:10 HRS FSP: 100 FCSP: 100 TOTAL SP: 1514 TOTAL KM: 37.850
 END: 20:08 HRS LSP: 1613 LCSP: 1613 TOTAL CSP: 1514 TOTAL CKM: 37.850

FSP LAT: 42 03 22.08 S FSP LON: 144 42 26.37 E FSP WATER DEPTH: 195.0
 LSP LAT: 42 21 25.69 S LSP LON: 144 55 16.98 E LSP WATER DEPTH: 147.0

OFFSET (M): 153.0 WIND: SW 3 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 4.9 STBD - 2.0 PORT

SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 6 uBAR

EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR

STATUS: TRACE 236 SPIKING INTERMITTENTLY. OCCASIONAL SLIGHT SWELL NOISE.

GRAVITY/MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 1950
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.

PERFORMANCE: SYLEDIS STABLE : CEP = 0 - 1 m.

COMMENTS: FILES 206,290, B/R.

=====

10.4.12

=====

LINE: MXT90-24 AZIMUTH: 064 STATUS: COMP DATE: 29/11/90

START: 05:18 HRS FSP: 100 FCSP: 100 TOTAL SP: 1035 TOTAL KM: 25.875
 END: 08:05 HRS LSP: 1134 LCSP: 1134 TOTAL CSP: 1035 TOTAL CKM: 25.875

FSP LAT: 42 19 08.51 S FSP LON: 144 50 37.92 E FSP WATER DEPTH: 166.0
 LSP LAT: 42 13 02.59 S LSP LON: 145 07 32.82 E LSP WATER DEPTH: 57.0

OFFSET (M): 151.0 WIND: SW 2 SEA: SLIGHT SWELL (M): 3

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 5.6 STBD - 0.6 PORT
 SOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 4 - 10 uBAR
 EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 10 uBAR
 STATUS: ALL TRACES GOOD. RANDOM SWELL NOISE THROUGHOUT
 GRAV/MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE : CEP = 0 - 1m
 VESSEL OFFLINE 20 - 28m @ SP 462 - 480 (STEERING ERROR)

COMMENTS: SP 182, 331, 332, 333, 334, B/R (GROUND FAULT)

=====

LINE: MXT90-26 AZIMUTH: 244 STATUS: COMP DATE: 29/11/90

START: 02:17 HRS FSP: 580 FCSP: 580 TOTAL SP: 556 TOTAL KM: 13.900
 END: 03:46 HRS LSP: 25 LCSP: 25 TOTAL CSP: 556 TOTAL CKM: 13.900

FSP LAT: 42 16 30.59 S FSP LON: 145 00 17.16 E FSP WATER DEPTH: 127.0
 LSP LAT: 42 19 45.95 S LSP LON: 144 51 11.07 E LSP WATER DEPTH: 163.0

OFFSET (M): 149.0 WIND: SW 3 SEA: SLIGHT SWELL (M): 3

STREAMER:- DEPTHS (M):10+/-1 FEATHERING : 0 - 4.2 PORT
 SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 4 - 8 uBAR
 EOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 5 - 12 uBAR
 STATUS: ALL TRACES GOOD. RANDOM SWELL NOISE THROUGHOUT
 GRAV/MAG O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE : CEP = 0 - 1 m

COMMENTS: FILE # 239,240,241,242,243 B/R. LOW CUT FILTER OUT TRACES 229 - 240
 FILES 253,254. FILE 349 B/R.

10.4.13

LINE: MXT90-28 AZIMUTH: 270 STATUS: COMP DATE: 30/11/90

START: 09:24 HRS FSP: 1643 FCSP: 1643 TOTAL SP: 1620 TOTAL KM: 40.500
 END: 13:44 HRS LSP: 24 LCSP: 24 TOTAL CSP: 1620 TOTAL CKM: 40.500

FSP LAT: 42 08 09.32 S FSP LON: 145 06 03.38 E FSP WATER DEPTH: 80.0
 LSP LAT: 42 08 09.88 S LSP LON: 144 36 40.99 E LSP WATER DEPTH: 1068.0

OFFSET (M): 156.0 WIND: LIGHT AIRS SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M): 10+/-1 FEATHERING : 3.5 STBD - 1.8 PORT
 SOL NOISE: 1 - 6 uBAR NEAR/BIRD GROUPS: 4 - 12 uBAR
 EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 12 uBAR
 STATUS: ALL O.K. RANDOM SWELL NOISE THROUGHOUT.
 GRAVITY/MAG. O.K. WELLHEAD C.SORELL-1 SEEN ON MAG @ SP 1403.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 1950
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS SLIGHTLY AFFECTED BY RAIN SQUALLS: SOL CEP = 2 - 3 m ;
 FROM SP 1440 CEP = 0 - 2 m

COMMENTS: FILES 668,669, 972,973,974, 1023, 1094,1426,1427,1428, 1465 B/R.
 SP 769 NDR.

=====

LINE: MXT90-R1 AZIMUTH: 334 STATUS: COMP DATE: 02/12/90

START: 16:14 HRS FSP: 2213 FCSP: 2213 TOTAL SP: 2190 TOTAL KM: 54.750
 END: 21:44 HRS LSP: 24 LCSP: 24 TOTAL CSP: 2190 TOTAL CKM: 54.750

FSP LAT: 42 09 05.81 S FSP LON: 144 40 06.82 E FSP WATER DEPTH: 773.0
 LSP LAT: 44 21 29.13 S LSP LON: 144 22 54.47 E LSP WATER DEPTH: 1000.0

OFFSET (M): 154.0 WIND: S 2 SEA: RIPPLED SWELL (M): 3.0

STREAMER:- DEPTHS (M): 10+/-1 FEATHERING : 2.6 STBD - 5.0 PORT
 SOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 3 - 7 uBAR
 EOL NOISE: 1 - 3 uBAR NEAR/BIRD GROUPS: 4 - 10 uBAR
 STATUS: # 289 WEAK, # 86 SPIKING. OCCASIONAL SLIGHT SWELL NOISE
 GRAVITY/ MAG O.K. ; NO DATA ON TAPE (STRIP CHARTS ONLY) SP 695 - 615 APPROX.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 1950
 PERFORMANCE: SP 1674 # 53 OFF (N/F) = 2100 cu.in.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS NOISY AT TIMES WITH INCREASED RANGES & SKYWAVE PERIOD NEAR
 EOL : UNTIL SP 300 CEP = 0 - 2 m; SP 300 - EOL CEP = 0 - 5m.

COMMENTS: SP 297, 225, 51, 44 MISSED (NDR) : NAVIGATION JUMP.
 0.5 SEC RECORDING DELAY INTRODUCED FROM SP 1425 BECAUSE OF WATER DEPTH.

=====

=====

LINE: MXT90-R2 AZIMUTH: 090 STATUS: TBC DATE: 03/12/90

START: 00:07 HRS FSP: 100 FCSP: 100 TOTAL SP: 1400 TOTAL KM: 35.000
 END: 03:53 HRS LSP: 1499 LCSP: 1483 TOTAL CSP: 1384 TOTAL CKM: 34.600

FSP LAT: 41 45 02.26 S FSP LON: 144 17 45.52 E FSP WATER DEPTH: 1680.0
 LSP LAT: 41 45 08.17 S LSP LON: 144 42 51.86 E LSP WATER DEPTH: 112.0

OFFSET (M): 153.0 WIND: S 4 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M): 9.5+/-1 FEATHERING : 0 - 7.7 STBD
 SOL NOISE: 1.5 - 4uBAR NEAR/BIRD GROUPS: 4 - 11 uBAR
 EOL NOISE: 1 - 5 uBAR NEAR/BIRD GROUPS: 5 - 10 uBAR
 STATUS: # 289 WEAK. 0.5 SEC RECORDING DELAY UNTIL SP 767.
 RANDOM SWELL NOISE THROUGHOUT. GRAVITY/MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2180 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: A.G.F.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4 & 2. 3. 5
 PERFORMANCE: SP 1361 STN 4 ON FOR STN 5 : POOR SIGS DUE TO LONG RANGES REQD.
 2, 3, 4 CEP = 0 - 3; 2, 3, 5 CEP = 0m. NOISE BURSTS AT SOL.

COMMENTS: LINE STOPPED FOR STREAMER POWER FAILURE LGSP 1483. SP 260-267 BAD
 RECORDS (TE). WATER DEPTHS APPROX UNTIL 1295m : FATHOMETER NOT TRACKING

=====

LINE: MXT90-R2A AZIMUTH: 090 STATUS: COMP DATE: 03/12/90

START: 06:16 HRS FSP: 1400 FCSP: 1484 TOTAL SP: 177 TOTAL KM: 4.425
 END: 06:30 HRS LSP: 1576 LCSP: 1576 TOTAL CSP: 93 TOTAL CKM: 2.325

FSP LAT: 41 45 07.30 S FSP LON: 144 41 03.84 E FSP WATER DEPTH: 124.0
 LSP LAT: 41 45 08.60 S LSP LON: 144 44 15.15 E LSP WATER DEPTH: 110.0

OFFSET (M): 150.0 WIND: SE 4 SEA: SLIGHT SWELL (M): 3.0

STREAMER:- DEPTHS (M): 10+/- 1 FEATHERING : 6.5 - 4.4 STBD
 SOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 4 - 8 uBAR
 EOL NOISE: 1 - 4 uBAR NEAR/BIRD GROUPS: 5 - 11 uBAR
 STATUS: # 289 WEAK. RANDOM SWELL NOISE THROUGHOUT.
 GRAVITY/ MAG. O.K.

ENERGY SOURCE:- CAPACITY (in3): 2140 DEPTH (M): 9 PRESSURE (psi): 2000
 PERFORMANCE: GUN # 53 OFF AT SOL. SP 1535 # 45 OFF (A/L) = 2120 cu.in.

NAVIGATION:- SYSTEM: SYLEDIS STATIONS IN USE: 2, 3, 4.
 PERFORMANCE: SIGNALS STABLE : CEP = 0 - 2 m.

COMMENTS: 84 x SP OVERLAP AT SOL NON-CHARGEABLE.

=====

APPENDIX A : GRAVITY SURVEY

EQUIPMENT

LaCoste & Romberg Air-Sea Gravity meter S/N S 31.
LaCoste & Romberg Control Box
Console Junction Box Auto reader Strip chart
Recorder
Kennedy Model 9800 Tape transports (dual).

The gravimeter used consisted of a highly overdamped, spring type gravity sensor, mounted on a gyro stabilised platform with associated electronics for obtaining gravity readings and for recording results on stripchart and magnetic tape records.

This LaCoste & Romberg model has a range without re-setting of 12,000 milligals and a static accuracy of better than 0.01 mgal but readings are recorded only to the nearest tenth milligal. Laboratory acceleration tests show no errors greater than ± 0.25 mgal.

The operational theory is that the gravimeter is basically a spring balance carrying a constant mass. Any variation in the weight of the mass, caused by variations in the gravity, cause the length of the spring to vary and produce a measure of the change in gravity. The unit is mounted on a gyro-stabilised platform which eliminates horizontal acceleration caused by wave motion, yawing, changes in ship's speed and heading. External vertical accelerations resulting from wave motion are diminished by highly damping the suspension system and averaging the readings taken over an interval greater than the cycle of movement. Further meter oscillations in the vertical plane caused by the turning force associated with any horizontal acceleration, produce a systematic error in the beam position. This effect is known as "cross-coupling" and its magnitude is dependent on the damping characteristics of the meter and the amplitude and phase relationships of the vertical and horizontal motion. Cross-coupling errors are corrected directly from the output of the two horizontal accelerometers mounted on the stabilised platform.

Shotpoint interval event marks were relayed to both the magnetic tape recording system and the strip chart records. Ship's speed, gyro heading and water depths were logged at regular intervals. Total cross-coupling error figures were also logged and recorded to tape.

Gravity data was obtained on all lines of the prospect, in-port still readings and K-checks were made at the start and end of the survey and the bench marks used alongside the dock were referenced to a base gravity station.

APPENDIX B : MAGNETOMETER SURVEY

PROTON MAGNETOMETER

Model	Geometrics G-801 S/N 4191
Primary power	22-32v dc at 10a max.
Sensitivity & repetition	1.00 gamma : 6.0 sec.
Range: overall	20,000 to 100,000 gammas
: Single position	+/- 10 % of ambient field
Analog outputs (in pairs)	100 & 1000 gammas

Note : the most sensitive full scale analog output will resolve a 1 % full scale change in magnetic field while the least sensitive full scale output will resolve a 0.1 % of full scale change.

Potentiometric recorder	Calibrated for 100 mv full scale, max load, 20k ohms
Digital outputs	BCD 1248 logic "0" state 0.0 - 0.5 vdc "1" state 2.6 - 5.0 vdc
Control system	Monolabs Systems Inc 9400. LED display & printer
Strip Chart Recorder	HP 713A
Tape Transports	Kennedy Model 9800

OPERATIONAL THEORY

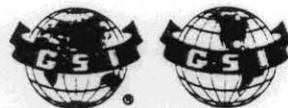
The sensing device of the Proton Magnetometer is a cannister containing a liquid rich in Hydrogen atoms (Kerosene), surrounded by a coil. The Hydrogen atoms act as small dipoles and normally align parallel to the magnetic field. A current is passed through the coil to generate a magnetic field fifty to one hundred times larger than the geomagnetic field and in a different direction, causing the protons to re-align in the new direction. The current is then switched off so that the polarising field is rapidly removed. The protons return to their original alignment with the ambient geomagnetic field by spiralling, or precessing, in phase around this direction with a period of about 0.5 m, taking some 1 - 3 seconds to achieve their original orientation. Measurement of the frequency of this precession provides a very accurate measurement of the strength of the total geometric field.

Magnetic data was recorded on all lines of the survey except for the first. Sea conditions at times made recording noisier than usual.



TABLE OF CONTENTS

SECTION	TITLE	PAGE
A	Introduction	1
B	Survey Discussion	5
C	Theory of Navigation SYLEDIS discussion	7
D	Calibration Procedure & Results	10
E	Field Navigation Operation Summary	25
F	Base Station Descriptions	28
G	Mapping Parameters	51



PERSONNEL

Navigation Supervisor : Bryan Field

Navigation Administrator: Bruce Tuck

Client Representative : Ken Fee

Boat Manager : Ian Taylor

Party Manager : Allan Welfare



-1-

SECTION A
INTRODUCTION



-2-

Halliburton Geophysical Services, Inc. provided a SYLEDIS radio positioning system to conduct a survey for the Maxus Energy Corporation of Australia in permit area T/24P, in the West Tasmanian region of Australia.

Aboard M/V Pacific Titan the SYLEDIS was interfaced to the CMS III (Configurable Marine System). The CMS is a fully integrated, real time instrumentation system for controlling and monitoring the navigation and survey functions necessary to meet the high accuracy requirements of marine geophysical exploration needs. The CMS was specifically designed by Geophysical Services Inc. to meet these needs. The CMS III is designed around Texas Instruments model 980 and 990 microcomputers. One of the major responsibilities of the CMS is to provide an integrated navigation capability for seismic line control. The real-time multisensor navigation function, incorporated in the CMS, derives positional data from a variety of sources; including satellite, sonar, gyro-compass, range/range and hyperbolic radio positioning systems interfaced directly to the CMS hardware.

As well as providing for the magnetic tape recording of data for off-line post processing, the system performs automatic line and shot control based on distance measured equal shotpoint spacing along the great circle path between the required endpoints of a seismic line. In addition to the navigation function of the CMS, the system also includes the capabilities related to streamer tracking, airgun array monitoring and control as well as automatic data logging.

The basic vessel navigation subsystems functions of the CMS include integrated multirange radio positioning system navigation and a GEONAV (GEOdetic NAVigation) integrated satellite navigation system capability.

The integrated multi-range radio positioning system function of the CMS allows for the integration of up to a maximum of 12 multi-system range/range and/or hyperbolic range readings. Raw range readings are recorded on tape for each shotpoint for application in post processing. In addition, vessel velocity component computations, based on the rate of change of range readings are calculated and applied to the continuous line and shot control of the CMS for accurate steering of the vessel and on the desired seismic line.



-3-

In order to maintain continuous positional accurate quality control, the CMS automatically performs absolute multi-range position fixes at operator selective intervals of up to a maximum of 99 seconds to ensure that the inherent real-time accuracy of the primary radio navigation system(s) configuration is maintained.

The GEONAV integrated satellite navigation function periodically establishes its absolute geographical location from information transmitted by satellites of the U.S. Navy Navigation Satellite System (TRANSIT). The continuous path of travel of the vessel, between satellite fixes, is computed by a dead reckoning system consisting of a velocity measurement system (VMS). The VMS can derive its velocity information from either an integrated radio positioning system or from a four beam doppler sonar compensated for the pitch and roll of the vessel and for variations in the propagation velocity of sound in water. The VMS consists of a gyrocompass externally compensated for the location and dynamics of the vessel.

The CMS is capable of providing a continuous primary system position derived from any available combination of fix, velocity and azimuth systems as well as a secondary system derived from satellite fixes combined with the primary system dead reckoning inputs. The designated primary inputs serve as navigation inputs to the line control routines. The primary and secondary system positions are output to magnetic tape at each shotpoint, along with the raw navigation data from all initialised systems. All of the navigation calculations are performed using a geodetic co-ordinate system defined in terms of latitudes and longitudes.

The actual spheroid and datum employed by the line control program is under operator control. Co-ordinate transformations from a satellite datum position to the local datum is performed automatically.



-4-

The CMS provides for Automatic Data Logging (ADL) on magnetic tape of the survey parameters required to process the seismic data, thereby eliminating human error. The ADL data is recorded on magnetic tape at the shotpoint interval. An interface between the CMS and the seismic recording system allows the CMS system to read and record the seismic record, reel number and tape at the shotpoint interval along with related navigation data and additional data from auxiliary equipment such as gravity, magnetics, streamer tracking and fathometer systems. An extender header device allows the CMS system to transfer the shotpoint number, Greenwich Mean Time (GMT), and Julian date for recording in the extended header of the seismic record thereby providing for a redundant cross check in data processing between the seismic and navigation data.



-5-

SECTION B
SURVEY DISCUSSION



-6-

A SYLEDIS system comprising 2 mobiles and 4 beacons was calibrated over a short baseline between Beechford 341/050 and Stony Head ST868 in the presence of an Austral client representative, confirming the short baseline results. The Magnificent Creek performed baseline crossings on prospect to further confirm these results.

Four stations were deployed to give coverage for this survey, three on shore and one on an island, all were powered by batteries, being kept charged by thermo-electric generators employing bottled gas.

A navigation manager, was provided by Halliburton Geophysical Services to deploy and maintain the shore stations for the duration of the survey. The SYLEDIS equipment performed very well for the survey and a daily log is contained in this report.



-7-

SECTION C

THEORY OF SYLEDIS NAVIGATION DISCUSSION



-8-

The title SYLEDIS is derived from "SYstem LEger de mesure de DISTances", a system manufactured in France by Sercel S.A. SYLEDIS is a multi-user, range/range or hyperbolic geometry, pulse navigation and positioning system utilising a mobile interrogator and two or more beacon stations at known fixed locations. The system determines distances from each fixed beacon station to the mobile unit by conversion of transmission time of an R.F.pulse at a given frequency into metres. The operating frequency for SYLEDIS is selected from the 420-450 Mhz frequency band. With its filter, 99% of the energy generated is within a 2.5 Mhz (+/- 1.25) bandwidth. Making use of pulse compression, the SYLEDIS can radiate a high energy at low peak power. For practical application, the SYLEDIS carrier frequency is phase modulated according to a (time limited) pseudo-random code, as follows:-

- number of elements of the pseudo-random series:

7

N=2⁻¹-127

-interval between elements (short pulse equivalent):

T=0.52 sec.

-digit/phase equivalent:

0/0,1/11

-duration of the pseudo-random series:

T=127x0.52=66.666 microseconds

-distance equivalent:

10km

-number of random series transmitted:

40,80 or 160

-total pulse length:

2.66,5.33 or 10.66 microseconds



-9-

The advantages of short pulses exist in this pseudo-random code. Pulse compression affords an increased energy content and hence, an increased range for a limited peak power. Ranges that can be expected from the system are 80-100 km for detailed work or close grid and up to 200 km for large grid programs, dependant on weather and other conditions affecting propagation. Network precision of SYLEDIS is +/- 5 metres out to ranges of 80-100 km, after which it degrades somewhat as the range increases. Optimum system performance is dependant on proper selection of station sites, antennas and network geometry. Station sites should be adjacent to the shore. Transmission over dense foliage will degrade signal strength thus reducing range and accuracy.

SYLEDIS works in a time sharing mode. Each beacon or mobile of a network, in turn, uses the same transmitting frequency and the same receiving frequency. One time slot lasts 5.33 milliseconds and there can be up to 30 slots. One of the transmitters must synchronise all the internal clocks of all other elements of the network. As they need not be accurate, the synchronisation pulse is a mere carrier with the same shape as the coded pulses. Such a time sharing system is very flexible. The sync. signal can be transmitted by any mobile or beacon according to the decision of the manager of the network. In the range/range mode of operation the SYLEDIS network can be utilised with 4 separate mobile units.

The SYLEDIS fixed station consists of a SYLEDIS beacon with power supply and antennae as required for ranges or pattern of the program (see illustration for SYLEDIS system). Mobile installation of SYLEDIS is an interrogator which consists of the transmission and receiving sections plus electronics providing readouts, data access and capability for setting calibration.



-10-

SECTION D

CALIBRATION PROCEDURE AND RESULTS



-11-

SYLEDIS is a distance measuring device which calculates the delay created by propagation of a signal, from a transmitter to a receiver and back, this delay being directly proportional to the distance travelled.

Incorporated in this value are the delays incurred while the signals travel through system components and is processed within the system. To eliminate these, a calibration procedure is performed to evaluate their magnitude and compensate for them in order to display and output exact range readings.

Within the SYLEDIS mobile the time measurement card is responsible for compensation of this delay. Located on the card are rotary switches which may be set to an equivalent delay. Alternatively, an equal distance may be entered into the onboard navigation computer which will be subtracted from the range read out of the unit. This latter method is utilised for a better monitoring of values used. These delays are considered constant for a calibrated signal.

The suggested calibration procedure is to choose a range of approximately 3-10 km, ie. short enough that the propagation velocity variations may be considered negligible. The systematic delays are calculated and compensated for accordingly.

After installation of base stations a mobile may be placed at a convenient base station and the in situ baselines measured. This method has the added benefit of confirming base station co-ordinates. Alternatively baselines may be crossed by the vessel to check distances.

For both cases any errors between calculated and observed distances may be categorised as a random error.



-12-

BEECHFORD CALIBRATION RANGE

A SYLEDIS chain was calibrated on 3 November 1990 in the Beechford area over a known distance (7403.504 metres) between Beechford 341/050 and a 1.46m offset from Stony Head STB68 and repeated on 8 November 1990. A clear line of sight near water exists between these points.

7 metre towers were erected at each point, with mobiles installed at Beechford 341/050 and beacons at Stony Head STB68.

No permission was obtained to use the marker at Beechford as it is on public land and permission to occupy Stony Head was obtained from Major Ian Steele of 6th Military Barracks, Anglesea Barracks, Hobart, 7001.



-13-

SHORT BASELINE CALIBRATION RANGE

GEOPHYSICAL SERVICE INC

INVERSE GEODETIC COMPUTATION AUSTRALIAN SPHEROID

	LATITUDE		LONGITUDE
STANDPOINT: Beechford 050	41 01 46.7298 S		146 57 11.6711 E
FOREPOINT : Stony Head	40 59 06.1657 S		147 01 07.2254 E
DISTANCE IN METRES :	7404.964	-1.46	= 7403.504
FORWARD AZIMUTH FROM NORTH :	48 02 22.2599		
BACK AZIMUTH FROM NORTH :	227 59 47.6995		

INVERSE GEODETIC COMPUTATION AUSTRALIAN SPHEROID

	LATITUDE		LONGITUDE
STANDPOINT: Beechford 050	41 01 46.7298 S		146 57 11.6711 E
FOREPOINT : East Sandy	40 57 38.0543 S		147 20 20.2060 E
DISTANCE IN METRES :	33348.093		
FORWARD AZIMUTH FROM NORTH :	76 49 38.7180		
BACK AZIMUTH FROM NORTH :	256 34 27.8445		



-14-

SHORT BASELINE CALIBRATION RANGE

GEOPHYSICAL SERVICE INC

INVERSE GEODETIC COMPUTATION AUSTRALIAN SPHEROID

	LATITUDE	LONGITUDE
STANDPOINT: Beechford 050	41 01 46.7298 S	146 57 11.6711 E
FOREPOINT : Hardwick Off	40 52 01.5140 S	147 37 41.8541 E
DISTANCE IN METRES :	59637.827	
FORWARD AZIMUTH FROM NORTH :	72 36 04.2075	
BACK AZIMUTH FROM NORTH :	252 09 31.5053	

INVERSE GEODETIC COMPUTATION AUSTRALIAN SPHEROID

	LATITUDE	LONGITUDE
STANDPOINT: Beechford 050	41 01 46.7298 S	146 57 11.6711 E
FOREPOINT : Charmouth Off	40 45 18.1397 S	147 58 09.1601 E
DISTANCE IN METRES :	90886.256	
FORWARD AZIMUTH FROM NORTH :	70 43 40.4248	
BACK AZIMUTH FROM NORTH :	250 03 46.0441	



-15-

STATION NAME: Beechford 341/050

LATITUDE : 41 deg 01 min 46.7098 sec S
LONGITUDE : 146 deg 57 min 11.6711 sec E
NORTHING : 545 7934.949 Metres
EASTING : 496069.326 Metres
ELEVATION : 18.81 Metres

PROJECTION: Zone 55
Central Meridian 147 deg East
UTM Projection
Australian Geodetic Datum 66
Australian National Spheroid



-16-

STATION NAME: Beechford 341/050

LOCATION: Approximately 20km east of Georgetown, in a small hamlet, alongside Geale Street, on a grassy verge.

ACCESS : From Georgetown, proceed east to Beechford, turn right on Geale St and proceed to where the road drops away and becomes a track. The mark is 10m further, on the right, 5m from the house to the right.

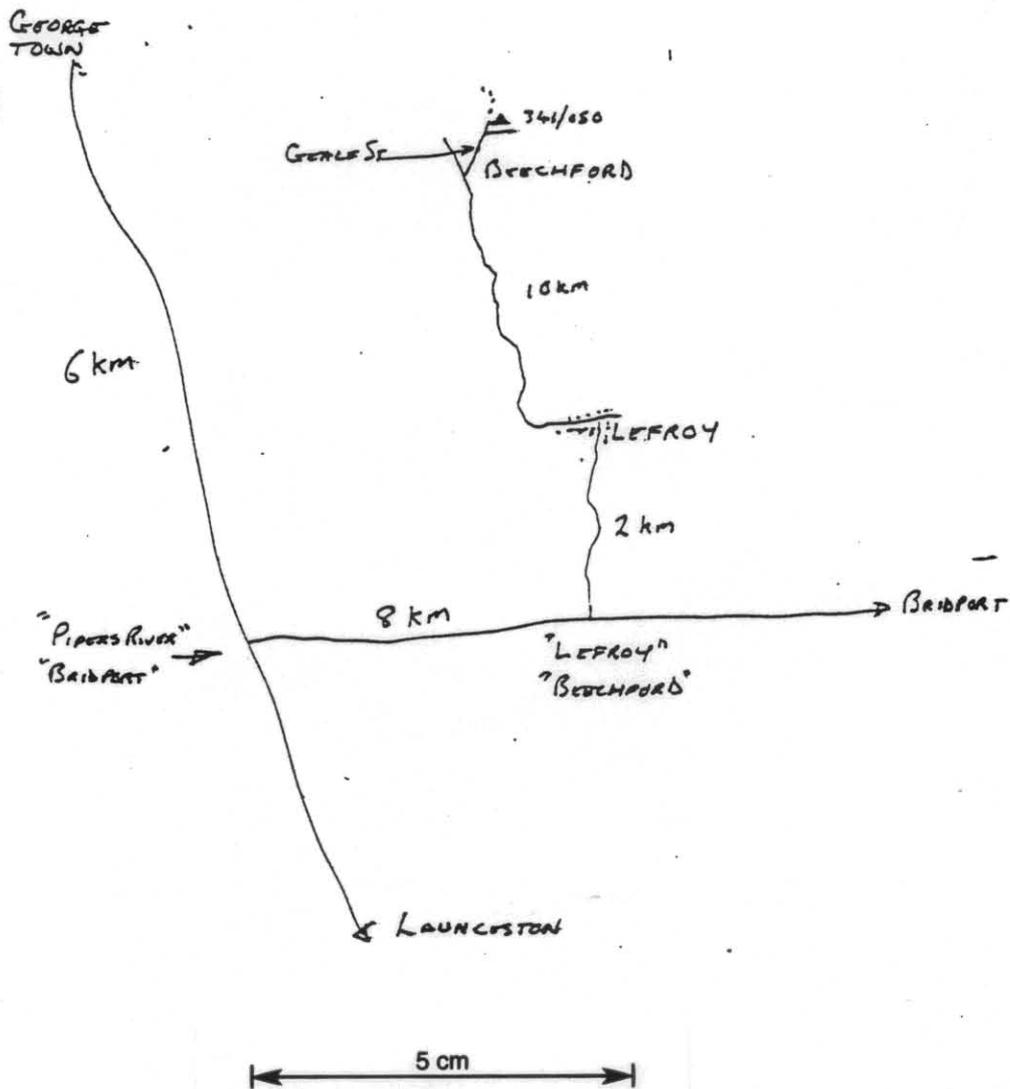
MARKER : A brass lands disc, at ground level, set in concrete, unmarked. A steel star picket with a lands tag stamped "341" and "050" is used as a witness post.

GENERAL : Permission to occupy this site is unnecessary as it is sited on public land.

This mark is useful for short baseline calibration only, a restricted vista and easy access make it unsuitable as a base station.



BEECHFORD 341/050 STATION DESCRIPTION



GSI-709

LANDS DEPARTMENT TASMANIA

Station Number and Name: 341/050 BEECHFORD

Original Station Established by: Lands Dept: Tasmania Date: 25.9.1982
 Station Station Placed by: Lands Dept: Tasmania Date: 12.5.1983
 Reference to other Stations: Lands: 8541;

Map Name: NORTH EAST TAS LIMPETCHEE TAS Map Number: 37 55-4 Scale: 250,000
 Map Name: TARI Map Number: 8715 Scale: 100,000

Control Location: Tasmania Land District: Dorset

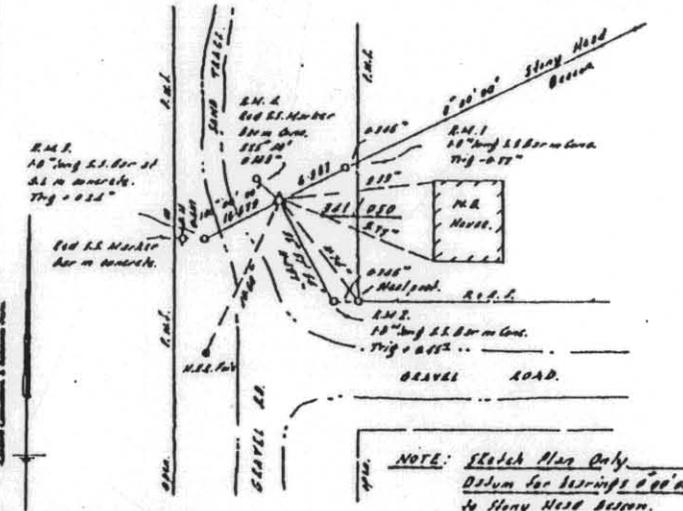
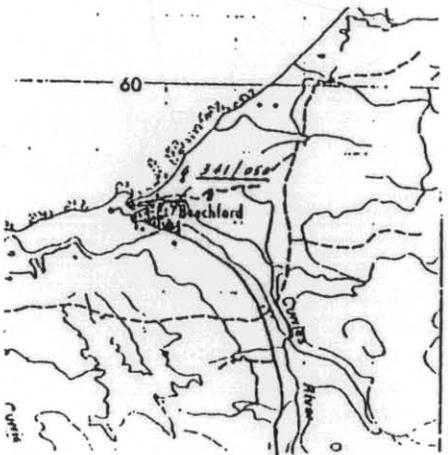
ACTING QUARTER COORDINATES: In Meters on the Australian Map Grid DATE: Australian Standard Datum 1984 Order: FOURTH
 GRID MARRIAGE - ADJ AZIMUTH & CONVERGENCE HEIGHTS: In Meters on the Australian Height Datum (Flammarion) Order: TRIG
 BEECHFORD 341/050 SECTION 8 341 SERIAL 3

Station Mark: Brass Lands Disc at ground level in concrete sub-surface mark is 1.1m long steel star bar 0.38m below brass disc. Above mark replaces original steel star placed on 25.9.1982 and is 0.06m higher than original steel star bar.

SOUTH LATITUDE	EAST LONGITUDE	ZONE EASTING	NORTHING	CONVERGENCE	HEIGHT
41 01 46.7298	146 57 11.6711	55	496049.324	5457934.949	-6 01 50.50 18.81

TO	SERIAL	ADJ AZIMUTH	ADJ LENGTH
TO STONEY HEAD	87 86	48 02 22.23	7194.949
	341/300	206 36 45.44	373.741

- RECORD: Nil
- REFERENCE MARKS: (1) Three 1.0m long steel star bars in concrete at ground level.
 (2) Red steel star marker bar in concrete.
- ACCESS: Drive on access by 2/44.D. vehicle. See map section below.



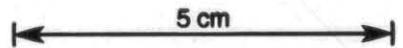
NOTE: Sketch Plan Only. Datum for bearings 800m to Stony Head Beacon.

STATION LAST VISITED 12.5.83

From Measurements: 364, BEECHFORD, RUN 2, 9-20, 112700G, 27.1.83

SPECIAL TEXT FOR PHOTOGRAPHIC SURVEYS.

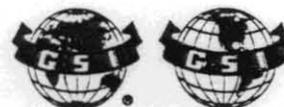
Covered Area of Stationary Survey	A.R.	Date	1	2	3	4	5	6
		11.5.83						



-10-



483135



-19-

STATION NAME: Stony Head

LATITUDE : 40 deg 59 min 06.1657 sec S

LONGITUDE : 147 deg 01 min 07.2254 sec E

NORTHING : 5462887.008 Metres

EASTING : 501570.850 Metres

ELEVATION : 89.91 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid



-20-

STATION NAME: Stony Head ST868

LOCATION: Approximately 4.5km WNW of Lullworth (20km ENE of George Town on a rocky prominent headland, within the boundaries of the 6th Military District firing range.

ACCESS : From the East Tamar Hwy, take the Bridport turnoff and proceed east for 22km. Turn left at the Lullworth and Weymouth turnoff (700m past Pipers River Roadhouse) and follow the road for 9.2km to a left turn, marked Lullworth. Take this road for 5km to Lullworth, turning right at the T junction and left 100m downhill, at the beach.

Follow the dirt road around the beach for 500m to a launching ramp and parking area, at this area turn 120deg left uphill on the left one of two tracks. Follow this track due west for 3.5 to 4km, using any side tracks past mud and sand bogs until an old fence is encountered near the base of Stony Head. Turn right and proceed 100m to where a large bog across the track is visible. Stop here and circle the bog to the east, keeping at least 50m from the mud crossing. From here follow the track up Stony Head for 1km to the steel quad beacon.

MARKER : A green brass ST plaque, stamped ST868, set in concrete.
A black steel quad beacon is sited directly over the mark.

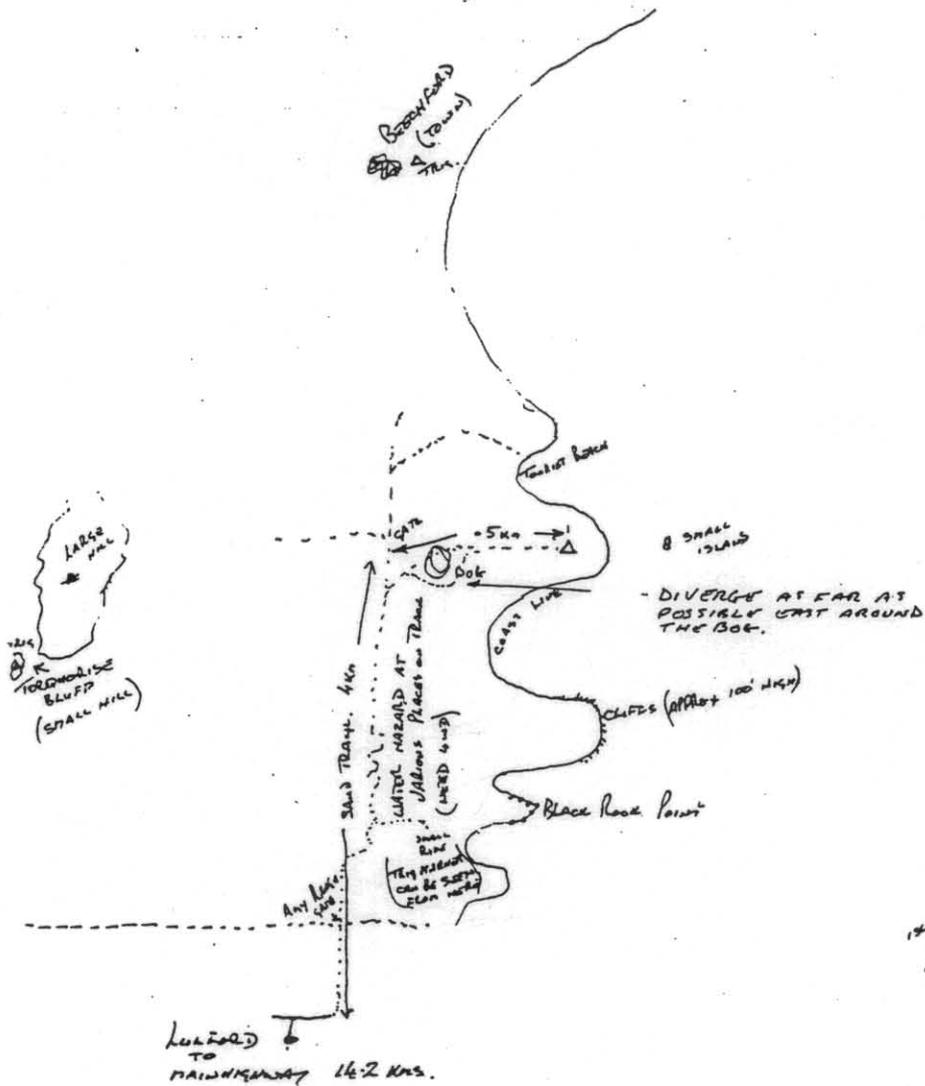
GENERAL : Permission to occupy this site was obtained, in writing from:- Major Ian Steele
6th Military Barracks
Anglesea Barracks
Hobart 7001
Ph 002 212216



5 cm

STONY HEAD ST868 STATION DESCRIPTION

Approx Dist. From Lullford - Tars 4.5 K
From Bedford - Tars 7 K.



STATION SUMMARY

CATALOGUE A

LANDS DEPARTMENT TASMANIA

Station Number and Name: S.T. 868 STORY HEAD

Original Station Established by: Lands Dept: Tasmania Date: Jan 1960
 Existing Station Marked by: Lands Dept: Tasmania Date: 16.9.1976
 Reference Beaker: Lands: A12/37; A13/58; A21/53; T39/40; M8/46; K24/37; S004B; S276; S341;

Map Name: NORTH EAST, TAS LAUNCESTON, TAS Map Number: SE 55-4 Scale: 250,000
 Map Name: WESTERN ISLANDS, TAS Map Number: 8716 Scale: 100,000

RECTANGULAR COORDINATES: In Feet on the Australian Map Grid DATUM: Australian Geodesic Datum 1966 Order: THIRD

GRID BEARING = AZIMUTH + CONVERGENCE HEIGHTS: In Feet on the Australian Height Datum (Truncated) Order: TRIG

STORY HEAD ST 868 SECTION TAS 82 SERIAL 52

SOUTH LATITUDE 40 59 06.1657 EAST LONGITUDE 147 01 07.2254 ZONE EASTING 501570.450 NORTHING 5462287.008 CONVERGENCE +0 00 44.09 HEIGHT 89.91

Coloured Location: State: Tasmania Land District: Dorset

Name: Adjustment/Station

Address and Locality Details: Particulars of station marking and beacon

STATION MARK: Brass ST mark (numbered 868) in concrete block. New mark is 0.05m. above old mark.

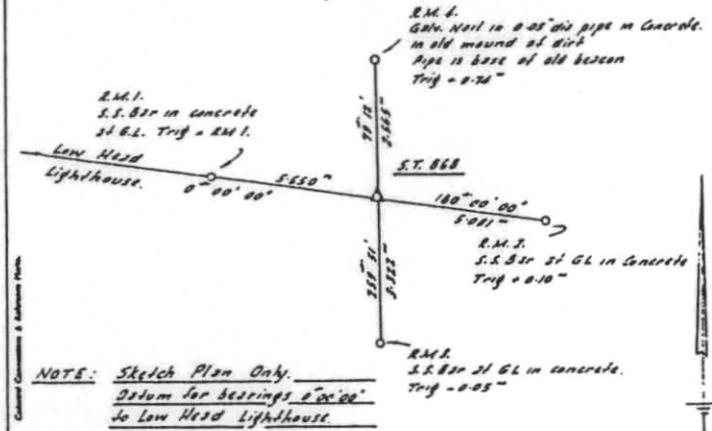
BEACON: Galvanized iron quad and black discs beacon. Base of discs are 2.876m. above new ST mark. Centre of discs are 3.29m. above mark.

REFERENCE MARKS:
 (1) Three steel star bars at ground level in concrete.
 (2) Galvanized nail in concrete in centre of pipe in concrete at ground level on top of old dirt mound. The galvanized pipe is the bottom section of old eccentric pipe and discs beacon, now destroyed.

ACCESS: Drive on access by 4WD vehicle. See map section below.

NOTE: This station is located on the Eastern side of the Story Head Army Firing Range. Permission to enter should be obtained from the Department of Army prior to entry and caution exercised whilst in the trig station area.

SEE ANNEXURE FOR INFORMATION FROM S.T.868

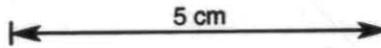


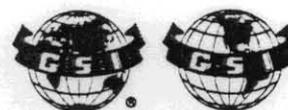
-22-

S.T. 868

Station last visited: 16-8-02

Year	1976	1977	1978	1979	1980	1981	1982	1983	1984
Checked by									





-23-

DATE 08/11/90

CLIENT: Maxus

PROSPECT: T/24P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CAL. RANGE: 341/050-ST868 RANGE DISTANCE: 7403.504m
 MOBILE SERIAL NUMBER: 552 INTERROGATE SLOT: 1
 ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427061.2 khz
 CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3	4	5
SERIAL NO	436	868	871	893
ANT. TYPE	Omni	Omni	Omni	Omni
CABLE	30mFSJ4-50	30mFSJ4-50	30mFSJ4-50	30mFSJ4-50
COLOUR CODE	Yellow	Orange	Green	Blue
AGC LEVEL	7.5	7.8	8.0	7.8

READINGS 1	7637.6	7636.6	7637.6	7638.3
2	7.0	6.2	7.3	8.2
3	7.3	6.3	7.3	8.2
4	7.5	6.4	7.9	8.4
5	7.1	6.2	7.5	8.3
6	6.9	6.2	7.7	8.1
7	7.6	6.3	7.5	8.0
8	7.6	6.6	7.6	8.1
9	7.5	6.3	7.7	8.3
10	7.2	6.2	7.5	8.2
11	7.8	6.5	7.5	8.2
12	7.6	6.7	7.7	8.1
13	7.6	6.6	7.6	8.1
14	7.5	6.5	7.6	8.1
15	7.8	6.6	7.9	8.2
16	7.2	6.4	7.7	8.2
17	7.9	6.6	7.8	8.1
18	7.8	6.3	7.6	8.1
19	7.6	6.1	7.4	8.2
20	7.8	6.4	7.5	8.3

AVERAGE	7637.5	7636.4	7637.6	7638.19
RANGE DIST.	7403.5	7403.5	7403.5	7403.5
DELAY	234.0	232.9	234.1	234.7

PERSONNEL PRESENT : F.Renton (client), B.Tuck, A.Edwards,
 L.Ha, L.Williams, P.Wright (HGS)

WEATHER CONDITIONS: Fine, Light Wind

COMMENTS :



-24-

DATE 08/11/90

CLIENT: Maxus

PROSPECT: T/24P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CAL. RANGE: 341/050-ST868 RANGE DISTANCE: 7403.504m
 MOBILE SERIAL NUMBER: 398 INTERROGATE SLOT: 1
 ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427061.2 khz
 CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3	4	5
SERIAL NO	436	868	871	893
ANT. TYPE	Omni	Omni	Omni	Omni
CABLE	30mFSJ4-50	30mFSJ4-50	30mFSJ4-50	30mFSJ4-50
COLOUR CODE	Yellow	Orange	Green	Blue
AGC LEVEL	8.0	7.8	8.3	8.8

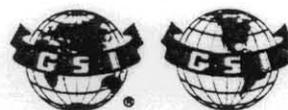
READINGS	1	2	3	4	5
	7631.6	7632.1	7632.1	7631.0	7631.8
2	1.6	2.3	2.3	0.7	2.0
3	1.1	2.2	2.2	1.0	2.2
4	1.6	2.1	2.1	1.0	2.2
5	1.4	2.4	2.4	1.0	2.4
6	1.6	2.1	2.1	1.1	2.5
7	1.4	2.0	2.0	1.1	2.2
8	1.4	2.0	2.0	1.2	2.2
9	1.4	2.3	2.3	1.1	2.4
10	1.2	2.3	2.3	1.2	2.2
11	1.7	2.0	2.0	1.1	2.2
12	1.7	2.4	2.4	1.1	2.2
13	1.6	2.4	2.4	1.1	2.2
14	1.2	2.7	2.7	1.1	2.2
15	1.6	2.2	2.2	1.1	2.1
16	1.6	2.5	2.5	1.1	2.4
17	1.4	2.4	2.4	1.2	1.6
18	1.6	2.4	2.4	1.4	2.4
19	1.2	2.4	2.4	1.1	1.7
20	1.2	2.3	2.3	1.1	2.6

AVERAGE	7631.5	7632.28	7631.11	7632.19
RANGE DIST.	7403.5	7403.5	7403.5	7403.5
DELAY	228.0	228.8	227.9	228.7

PERSONNEL PRESENT : F.Renton (client), B.Tuck, A.Edwards,
 L.Ha, L.Williams, P.Wright (HGS)

WEATHER CONDITIONS: Fine, Light Wind

COMMENTS :



-25-

SECTION E

FIELD NAVIGATION OPERATION SUMMARY



-26-

- 8-11 Performed short baseline calibration.
- 9-11 Installed mobiles on Magnificent Creek.
- 10-11 to 21-11 chain in use for Bridge Oil T/15P.
- 22-11 Installed beacon 5 at Hibbs Pyramid and beacon 4 at Watts Hill.
- 23-11 Installed beacon 3, with gas, at Trial Harbour and beacon 2, with gas, at Yarrana Hill.
- 24-11 Flight delayed by broken exhaust clamp, installed gas at Watts Hill and carried gas to Hibbs Bay, another broken exhaust clamp made slinging of gas to Hibbs Pyramid too dangerous.
- 25-11 Flight delayed by fog and repairs to the helicopter. Installed gas at Hibbs Pyramid, thermal generator difficult to get operating properly but forced to return to Strahan by dusk.
- Magnificent Creek reports a large bust to Trial Harbour.
- 26-11 Recieved new copies of station co-ordinates, showing some discrepancies caused by bad copying and passed them on to Magnificent Creek
- 27-11 Beacon 5 off air, flew to Hibbs Pyramid in poor conditions and performed a total rebuild of the thermal generator - charging properly.
- 28-11 Vessel on prospect, navigation performing well.
- 29-11 Vessel on prospect, navigation performing well.
- 30-11 Vessel on prospect, navigation performing well.
- 1-12 Vessel on prospect, navigation performing well.
- 2-12 Vessel on prospect, navigation performing well.



-27-

- 3-12 End of prospect, vessel will reshoot line 19 on the 4th. Helicopter Resources reports that no Jetranger is available, will use a Squirrel.
- 4-12 0745-end of survey. Flew to Hibbs Pyramid, demobilised beacon 5 and returned to Strahan, experiencing an engine failure and forced landing near the airport.
- 5-12 Recieved replacement helicopter and pilot. Demobilised beacons 2, 3 and 4.
- 6-12 Depart to Bell Bay.



-28-

SECTION F

BASE STATION DESCRIPTIONS



-29-

BASE STATIONS

STATION NAME : Trial Harbour 288/100
Antenna type : Celwave Omnidirectional
Cable : 1 x 30m FSJ4-50 "Superflex"
Other : 10m "Texas" tower

STATION NAME : Yarrana Hill ST414
Antenna type : Celwave Omnidirectional
Cable : 1 x 30m FSJ4-50 "Superflex"
Other : 7m "Texas" tower

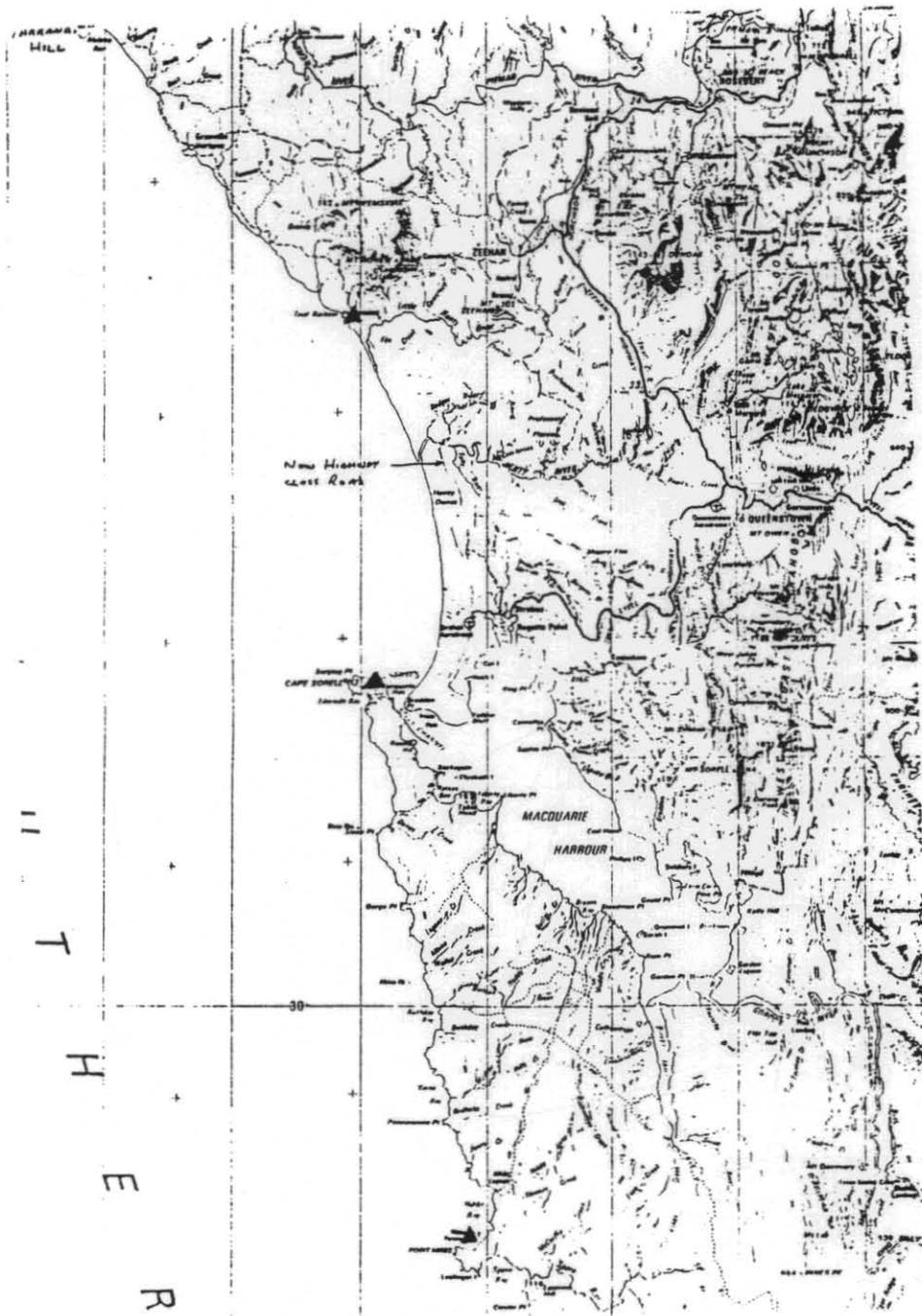
STATION NAME : Watts Hill ST442
Antenna Type : Celwave Omnidirectional
Cable : 1 x 30m FSJ4-50 "Superflex"
Other : 10m "Texas" tower

STATION NAME : Hibbs Pyramid ST967
Antenna Type : Celwave Omnidirectional
Cable : 1 x 30m FSJ4-50 "Superflex"
Other : 7m "Texas" tower



BASE STATIONS

-30-



5 cm



-31-

STATION NAME: Trial Harbour 288/100

LATITUDE : 41 deg 55 min 52.9194 sec S

LONGITUDE : 145 deg 10 min 43.8548 sec E

NORTHING : 5356224.071 Metres

EASTING : 349011.290 Metres

ELEVATION : 88.95 Metres

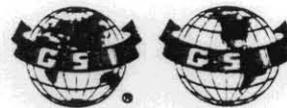
PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid



-32-

STATION NAME: Trial Harbour

LOCATION: On the North West end of a sharp spur 500m South East of trial harbour, overlooking trial harbour, 22km North North West of Strahan, on the West Coast of Tasmania
A walking track runs along this ridge.

ACCESS : Access was by helicopter to a point 30m South East of the mark.

Fly North 22km from Strahan to trail harbour and pick a thin ridge on the South East side of the town. Land 30 m from the end of the ridge, or in strong wind, 100m from the end.

A walking trail leads to the mark.

Alternatively access may be gained by four wheel drive to Trial Harbour via Zeehan and drive south through town, turning left at what looks like a rubbish dump. Ascend the hill and turn left onto the ridge, driving possibly to the mark.

MARKER : A small rectangular brass plate, nailed to a drill hole in the rock. A small pile of stones over mark, restacked 23.11.90.

An offset of 4.37m at 210 degrees magnetic was necessary to enable the correct angle for tower ropes.

The mark is at the North West end of a small rock ridge on the Northern side of the main ridge approximately 15m from the Trial Harbour end.

RM2 was found 9m at 260 degree from the mark and used to find the mark.

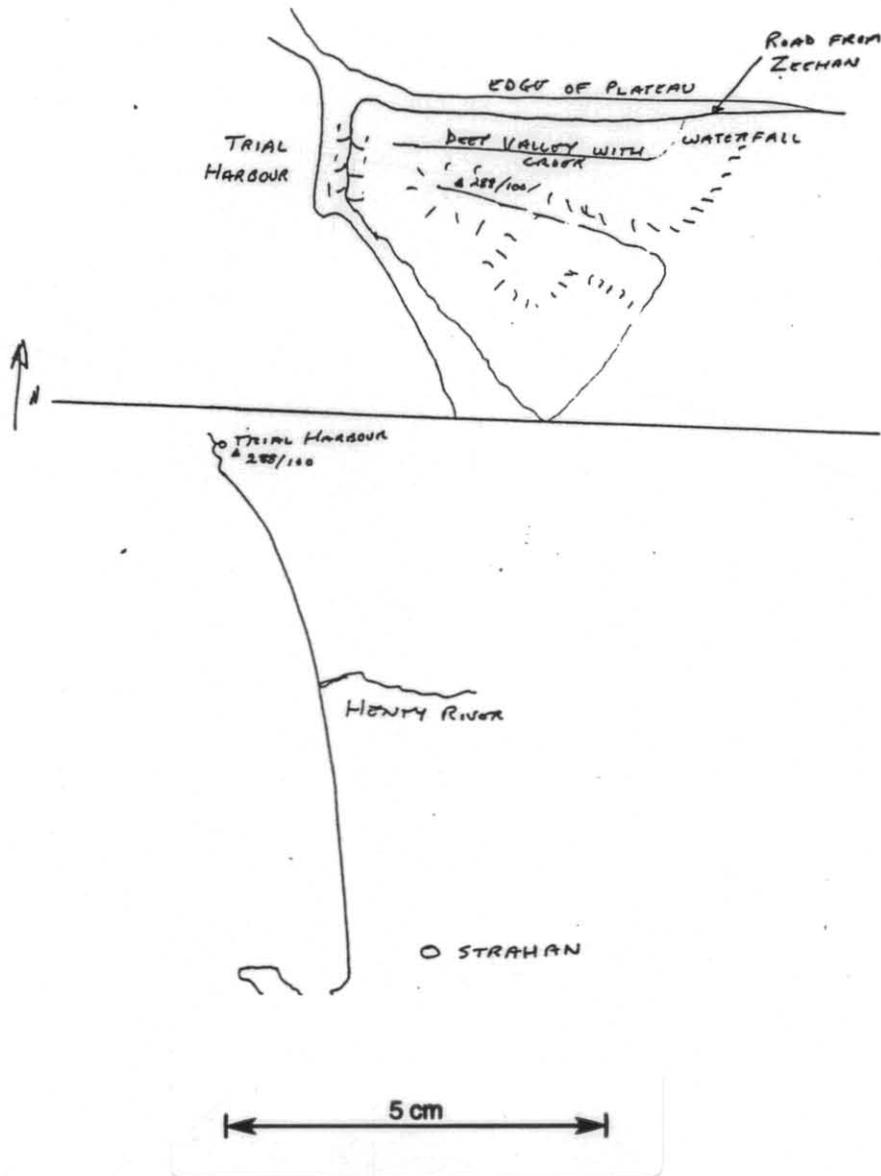
GENERAL : An offset of 4.37m at 210deg magnetic was used.

Gas to power, the termo generator was purchased from Tim Tyler, Top of Vivian Street, Strahan.

Permission to occupy the site was obtained from :-
Department of Resources and Energy
Gordons Hill Road
Rosny Park Tasmania 7018
Ph 002 308333



TRIAL HARBOUR STATION DESCRIPTION



NATIONAL TRIANGULAR CONTROL OF AUSTRALIA
STATION SUMMARY

CATEGORY 4

LANDS DEPARTMENT TASMANIA

Station Number and Name: 786/100 TRIAL HARBOUR

Original Station Established by: Lands Department, Tasmania	Date: 21.7.1960	Mag Name: GORENSTOWN; TAB	Mag Number: SX 95-5	Scale: 250,000
Being Surveyed by: Lands Department, Tasmania	Date: 21.7.1980	Mag Name: FIDELIS; TAI	Mag Number: 7914	Scale: 100,000
Reference Scale: Lands: NZMS		RECTANGULAR COORDINATES: In Places on the Australian Mag Grid		Order: TRIG
		EARTH MEASUREMENTS: ADJAZENTS + CONVERGENCE		Order: TRIG
		HEIGHTS: In Places on the Australian Height Datum (Tasmania)		

Control Location	Zone	Tasmania	Land District	Montage	TRIAL HARBOUR 288/100	SECTION 145 109	SERIAL 40
SOUTH LATITUDE					41 35 52.9194	145 10	43.8548
EAST LONGITUDE					149 01 29.011290	5354224.071	-1 13 01.90
ZONE EASTING					5354224.071	-1 13 01.90	88.95
NORTHING							
CONVERGENCE							
HEIGHT							

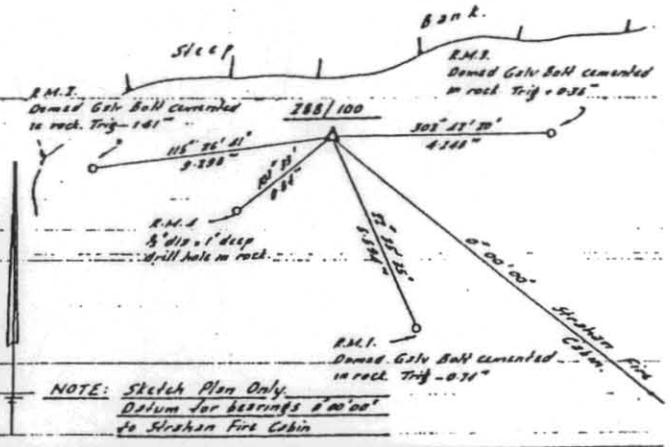
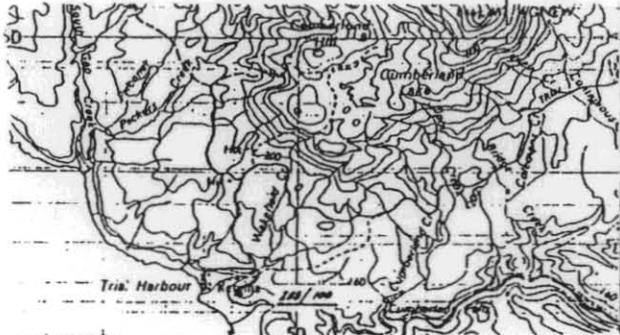
STATION MARK: Brass Lands Department disc cemented into 5/8" dia drill hole in rock. Stone pile over.

BEACON: Nil.

REFERENCE MARKS: (1) Three galvanised domed head 5/8" dia bolts cemented into drill holes in rock.
(2) 1/2" dia x 1" deep drill hole in rock.

ACCESS: 10 min. walk from Trial Harbour Road. See map section below.

TO	SERIAL	ADJ AZ.	IN	ADJ LENGTH
STRAHAN FC	ST 408	39	149 47 50.19	19819.128
CAPE SJRELL LN	ST 700	45	181 44 04.87	29782.800
FEDERATION MINE	231/1	41	21 04 39.47	2869.295
ABHEU	ST 394	29	43 47 38.34	5592.444

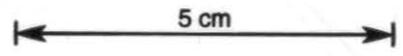


NOTE: Sketch Plan Only.
Datum for bearings 8'00'00" to Strahan Fore Cabin

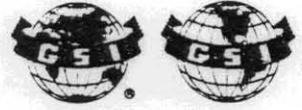
Photo Measurement: NS4 TRIAL HARBOUR, 819-152; NSW 1, 1:5,000; 18.7.1980.
AREA LIMIT ONLY: NOT FOR PHOTOGRAMMETRIC PURPOSES.

TRIAL HARBOUR

-34-

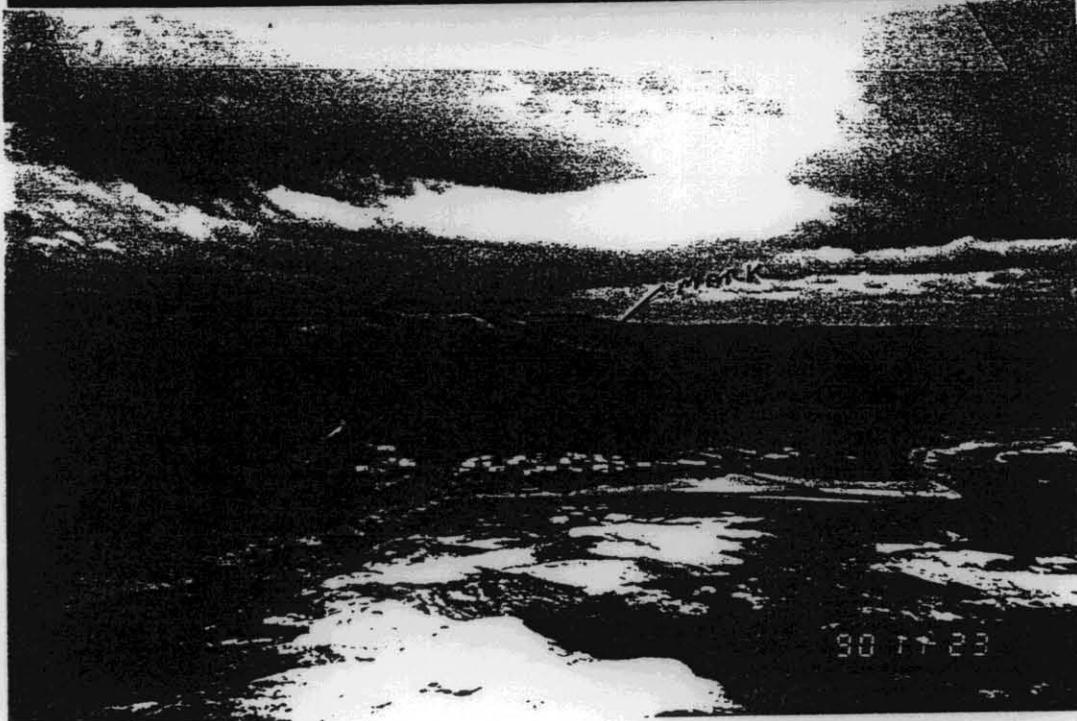


483151



TRIAL HARBOUR

-35-





-36-

STATION NAME: Yarrana Hill ST414

LATITUDE : 41 deg 41 min 49.0662 sec S

LONGITUDE : 144 deg 56 min 22.3774 sec E

NORTHING : 5381801.507 Metres

EASTING : 328546.207 Metres

ELEVATION : 93.068 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid



-37-

STATION NAME: Yarrana Hill

LOCATION: At the centre of, and the highest point of conical Rocks Point, 55 km North North East of Strahan on the West Coast of Tasmania. The hill (very gradual) is covered with grass only, so ST414 beacon is clearly visible from 10km.

ACCESS : By helicopter flying North along the coast from Strahan, pass over Trial Harbour at 22 km and Granville Harbour at 40km. From here Conical Rocks point is the next headland, 15km ahead, with ST414 at the highest point, directly ahead if following the beach to Ahrberg Bay.

The beacon is surrounded by a number of round flat rocks.

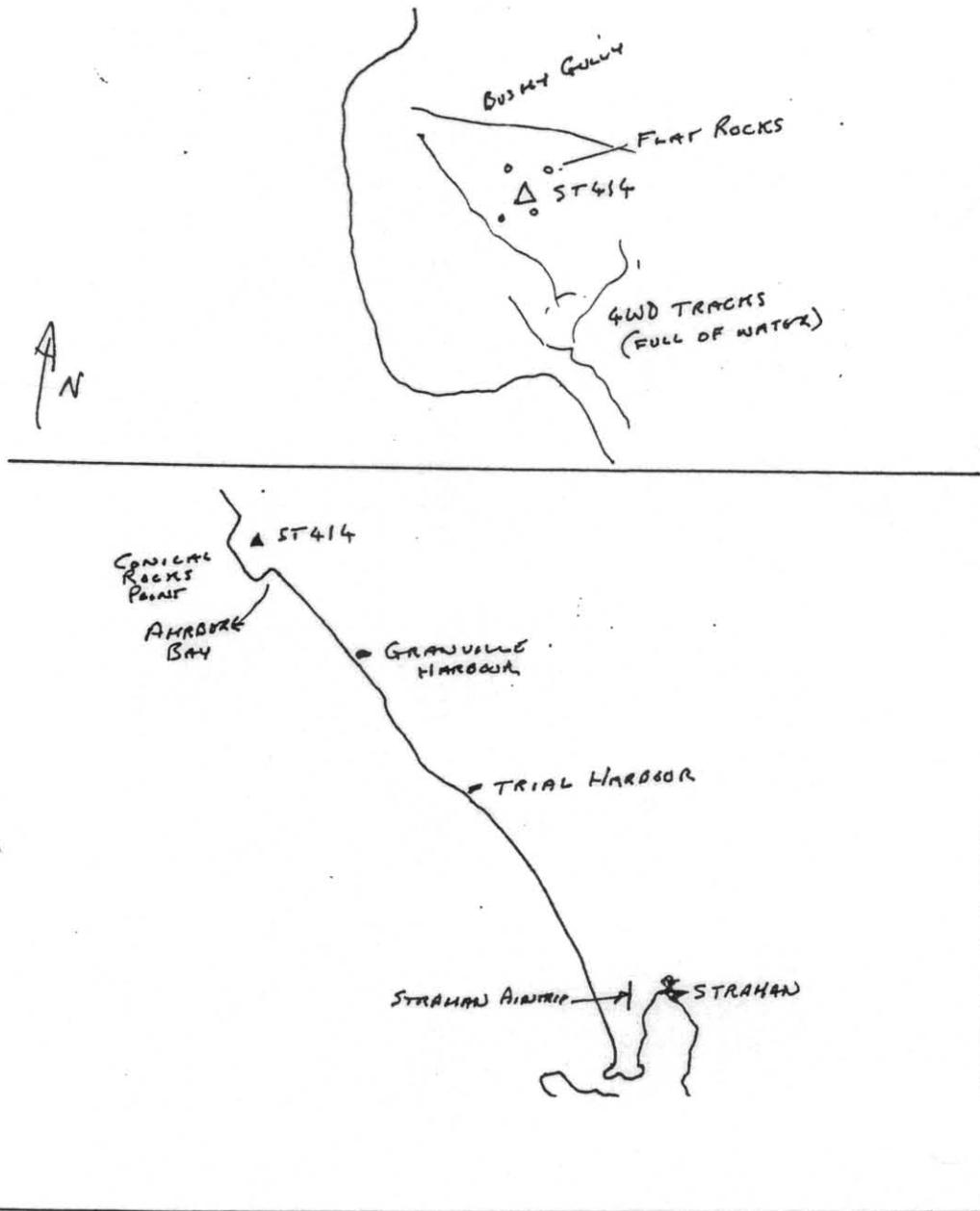
MARKER : A brass Standard Survey plaque, stamped ST414, set in concrete at ground level. A steel quadrapod and disc is directly over the mark.

GENERAL : Permission to occupy the site was obtained from :-
Department of Resources and Energy
Gordons Hill Road
Rosny Park
Tasmania 7018
Ph 002 308333



-38-

YARRANA Hill STATION DESCRIPTION



5 cm

SURVEY STATION SUMMARY

DEPARTMENT OF LANDS, PARKS AND WILDLIFE TASMANIA

Station Number and Name: **ST 414 YARRANA HILL**

of Survey Established by: **Lands and Surveys** Date: **28 May 1966**
 as Modified by: **Department of Lands** Date: **7 May 1976**

Map Name: **CONICAL ROCKS** Map Number: **7814** Scale: **100,000**
 Map Name: **YARRANA HILL** Map Number: **ST 414** Scale: **100,000**

RK: Brass mushroom ST 414 in concrete block at G.L.

ACON: Galvanized Quad with black discs. Beacon is placed in position over ST 414 mark. Base of discs is 2.645m above ST 414 mark. Centre of discs is 3.10m above ST mark.

REFERENCE RKS: RRs 1 and 3 are galvanized bolts in drill holes in rock.
 RR2 RR 4004, is a brass mushroom HEC RR mark, cemented in rock.
 Refer to FB 5004h for monumentation details.

CALITY: On Yarrana Hill.

CESS: By Helicopter to point adjacent trig station. See map section below.

HEIGHT INFORMATION: ST 414 YARRANA HILL. **HEIGHT: 93.068**
 DATUM: Aust Height Datum (Tau) 1983
 DETERMINED BY: Third order levelling
 DERIVED FROM: Primary Adjustment 1983, Lands.

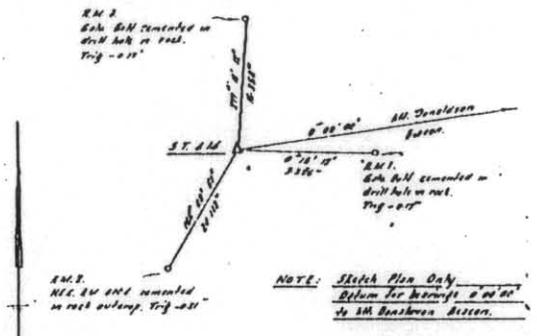
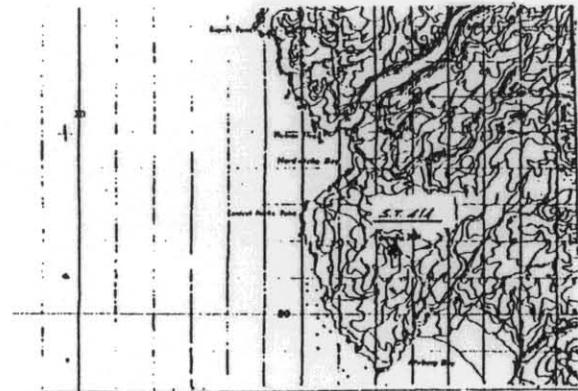
HORIZONTAL INFORMATION: ST 414 YARRANA HILL.
 SOUTH LATITUDE EAST LONGITUDE ZONE EASTING NORTHING CONVERGENCE
 41 41 49.0662 144 56 22.3774 55 328546.207 5381801.507 -1 22 15.33

DATUM: Australian Geodetic Datum 1966
 Rectangular coordinates are metres on the Australian Map Grid 1966
 DETERMINED BY: Triangulation/Triilateration
 DERIVED FROM: Least squares adjustment, Lands T&S.
 ORDER: Second

AZIMUTH AND DISTANCE INFORMATION: ST 414 YARRANA HILL.

To Name	Number	Target	Azimuth	Sph. Dist
SANDY CAPE LT	ST 405	LT	332 01 31.01	34599.673
NORFOLK MT	ST 395	BCN	67 57 48.18	69799.291
SEDGWICK MT	ST 389	BCN	121 31 12.71	65676.048
GAP CREEK	ST 380	BCN	111 54 01.28	21086.610

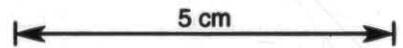
SEE ANNEXURE FOR ADDITIONAL INFORMATION YES NO



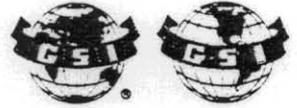
Project File Number (Number)	Survey District Name	11583P
Control Station Name	UTM Zone Number Easting	55 328546.207
Control Station Name	UTM Zone Number Northing	5381801.507
Control Station Name	UTM Zone Convergence	-1 22 15.33
Control Station Name	UTM Zone Datum	1966
Control Station Name	UTM Zone Order	Second
Control Station Name	UTM Zone Datum	1966
Control Station Name	UTM Zone Order	Second
Control Station Name	UTM Zone Datum	1966
Control Station Name	UTM Zone Order	Second

YARRANA HILL

483156



483157

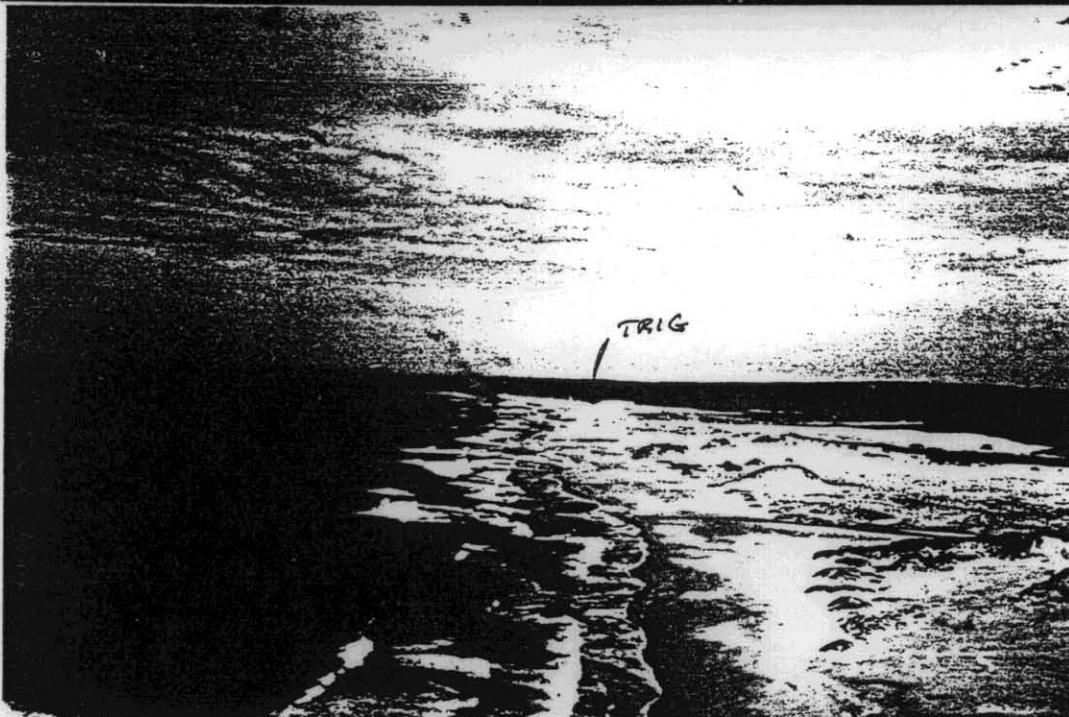


YARRANA HILL

--40--



30 11 23





-41-

STATION NAME: Watts Hill ST442

LATITUDE : 42 deg 12 min 03.2943 sec S

LONGITUDE : 145 deg 11 min 40.3244 sec E

NORTHING : 5326321.917 Metres

EASTING : 350943.929 Metres

ELEVATION : 57.02 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid



-42-

STATION NAME: Watts Hill

LOCATION: Atop a Stony Knob at the North East most point of Cape Sorell, just outside the entrance to Macquarie Harbour, 12.5km West South West of Strahan on the West Coast of Tasmania.

ACCESS : By helicopter, from Stahan to a point 600m South West of the mark and walk to the crest of the knob.

Equipment access is by sling to a point 12m North North East of the mark and 5m below it, where a small (3m x 3m) flat area exists. The equipment was set up here, with the antenna cable leading to the crest.

MARKER : A brass Standard Survey plaque, at ground level stamped 4766, set in concrete. A stone cairn, with a 2m water pipe projecting from its centre is adjacent to the mark.

Tower was erected 1m at 290 degree magnetic offset to gain a flat section of rock.

GENERAL : An offset of 1.00m at 290 degree magnetic was used.

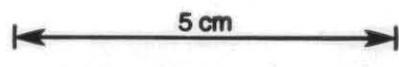
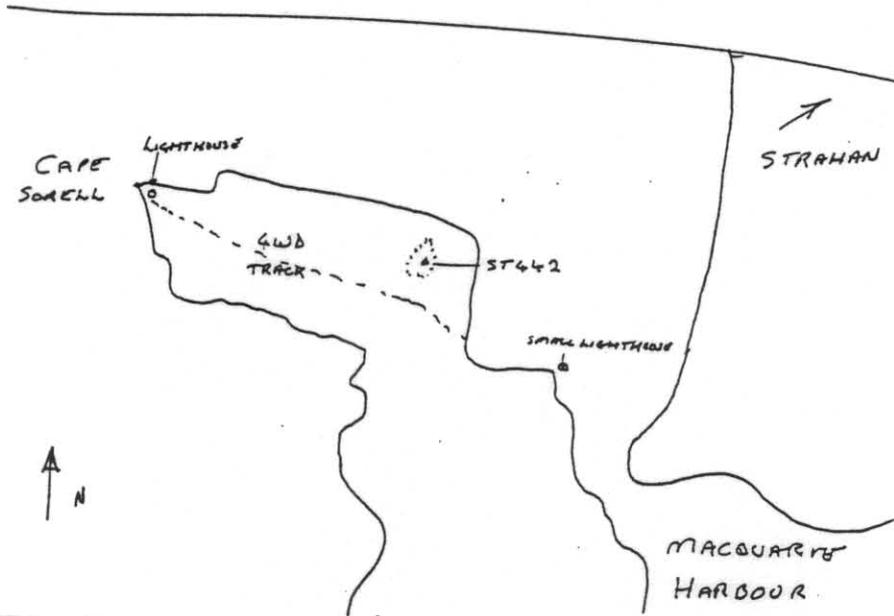
The crest of Watts Hill is very small. The tower was assembled with ropes antenna and cable before being attached to the base plate due to lack of room and steep sides of the rock. Two people were needed to raise tower.

Permission to occupy the site was obtained from :-
Department of Resources and Energy
Gordons Hill Road
Rosny Park
Tasmania 7018
Ph 002 308333



-43-

WATTS HILL STATION DESCRIPTION





WATTS HILL

-44-

Map Name: CAPE SORELL	Map Number: 7913	Scale to: 100,000
Map Name: KELLY	Map Number: J432	Scale to: 25,000

HEIGHT INFORMATION: ST 442 WATTS HILL HEIGHT: 57.02

DATUM: State Datum
 DETERMINED BY: Trigonometric heighting
 DERIVED FROM: Provisional Adj, Lands HT42.

HORIZONTAL INFORMATION: ST 442 WATTS HILL

SOUTH LATITUDE EAST LONGITUDE ZONE EASTING NORTHING CONVERGENCE
 42 12 03.2943 145 11 40.3244 55 350943.929 5326321.917 -1 12 46.84

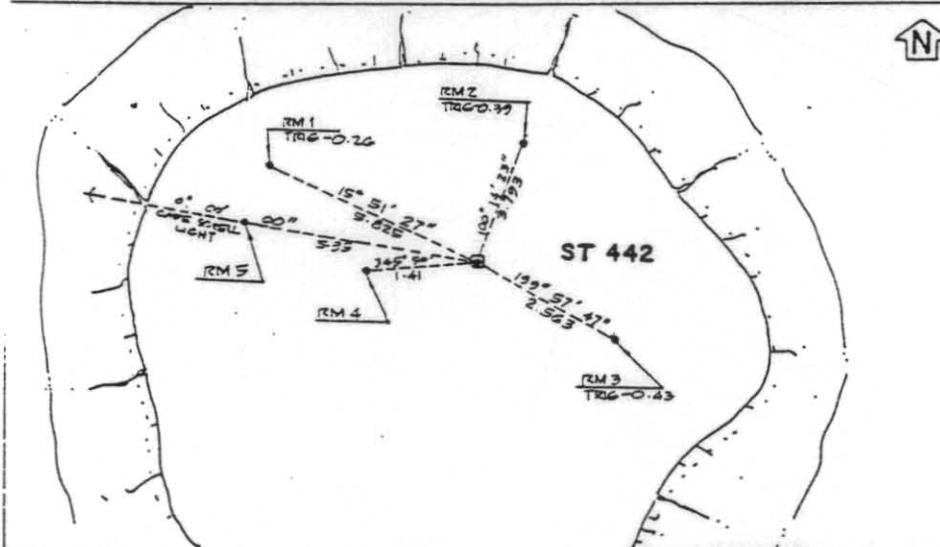
DATUM: Australian Geodetic Datum 1966
 Rectangular coordinates are metres on the Australian Map Grid 1966
 DETERMINED BY: Triangulation/Trilateration
 DERIVED FROM: Least squares adjustment, Lands TAS38.
 ORDER: Third

AZIMUTH AND DISTANCE INFORMATION: ST 442 WATTS HILL

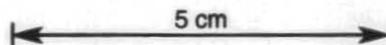
To Name	Number	Target	Azimuth	Sph. Dist
CAPE SORELL LH	ST 700	LH	274 26 29.67	2203.717
NAPIER HILLS	ST 359		146 41 10.95	2234.176

SEE ANNEXURE FOR ADDITIONAL INFORMATION

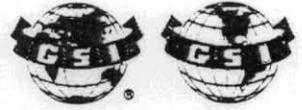
YES
 NO



Pristine Photo Identification: (if available)		Survey Control Data Base Unique Station Identifier Code Number: 11557K					
Certified Date of transcription error: P.A.M.	Trans. No. & Date: J-3-77	1 7-12-89	2 7-12-89	3 7-12-89	4 7-12-89	5 7-12-89	6 7-12-89
Approved: ASD [Signature]	Approved: ASD [Signature]						



483162



WATTS HILL

-45-





-46-

STATION NAME: Hibbs Pyramid ST967

LATITUDE : 42 deg 36 min 21.788 sec S

LONGITUDE : 145 deg 16 min 29.603 sec E

NORTHING : 5281472.07 Metres

EASTING : 358491.80 Metres

ELEVATION : 70.6 Metres

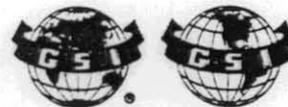
PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid



-47-

STATION NAME: Hibbs Pyramid

LOCATION: Atop an Island - Hibbs Pyramid, within Hibbs Bay, 55m South of Strahan, on the West Coast of Tasmania.

ACCESS : Access is by helicopter from Strahan. The equipment was carried in the Helicopter to the beach in Hibbs Bay and transferred to a sling on the beach. The sling being used to transfer the equipment to the crest of the hill. The helicopter must wait on the beach while the station is being erected as it cannot land on the hill.

MARKER : A brass Standard Survey plaque, stamped ST967 set in concrete to the level of surrounding rock.

RM2 was found at 279 degree from mark, 3.7m distant. RM2 is a copper pin (12mm) set in concrete in a large rock.

A steel stake with wooden crossbar was found but has no bearing on the station, indicating lives lost at sea adjacent to the pyramid. This stake is approximately 9m at 270 degree from the mark.

An offset of 10.85m at 323 degree magnetic was used to enable use of ropes for tower (trig at narrow neck of the crest).

GENERAL : An offset of 10.85m at 323deg magnetic was used.

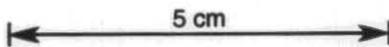
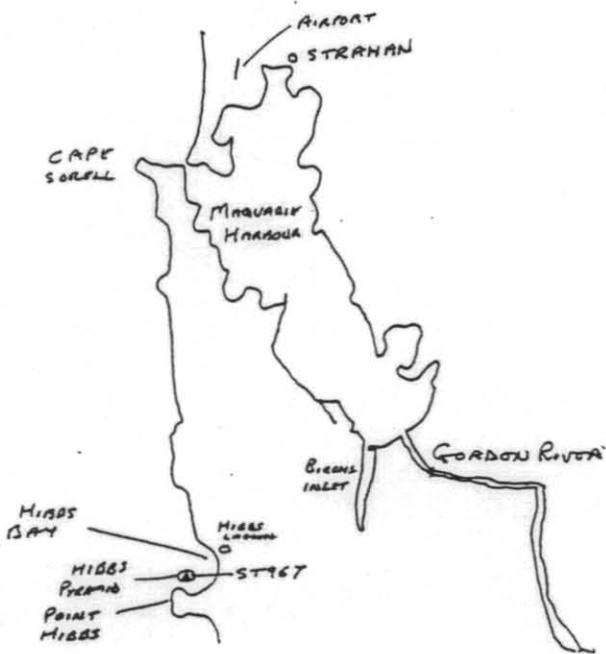
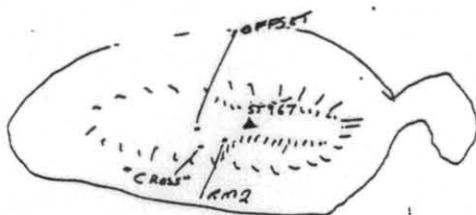
This station is dangerous to set, particularly in a strong wind. Extreme care should be taken when setting this station.

Permission to occupy the site was obtained from :-
Department of Resources and Energy
Gordons Hill Road
Rosny Park
Tasmania 7018
Ph 002 308333



-48-

Hibbs Pyramid STATION DESCRIPTION



NATIONAL MAPPING COUNCIL OF AUSTRALIA
STATION SUMMARY

Author by LANDS DEPARTMENT, TASMANIA Sheet No. _____

Station Number and Name: ST 967 HIBBS PYRAMID Order: THIRD

Original Station Established by: Lands Department, Tas. Date: Jan. 1962 Map Name: QUEENSTON, TAS. Map Number: SK 55-5 Scale: 1:250,000

Existing Station Marked by: Lands Department, Tas. Date: 5.5.1976 DATUM: Australian Geodetic Datum 1966 Spheroid: 7912 Scale: 1:100,000

Reference Books: A30, A37, T54, S-206, S-167 RECTANGULAR COORDINATES: Australian Map Grid in metres

Indicates Location: State: Tasmania County/District: Montgomery State Datum: HEIGHTS in metres on the AUSTRALIAN MAP GRID SYSTEM

Work/Method: Altimeter/Section/Pulse GRID IN METRES - ADJ AZIMUTH & CONVERGENCE

Access and Locality Sketch: Particulars of station marking and location

STATION MARKS: BRMS mushroom ST 967 cemented in rock.

BEACON: Kil.

REFERENCE MARKS: (1) Drill hole in rock.
(2) Copper pin set in concrete.

ACCESS: By boat or helicopter. See map section below.

GRID IN METRES - ADJ AZIMUTH & CONVERGENCE		HEIGHTS in metres on the AUSTRALIAN MAP GRID SYSTEM	
HIBBS PYRAMID ST 967		SECTION	SERIAL
SOUTH LATITUDE	EAST LONGITUDE	ZONE EASTING	NORTHING CONVERGENCE HEIGHT
42 36 21.7878	145 16 29.6227	55 358491.798	8201472.140 -1 18 4.65 79.6
TO	SERIAL	ADJ AZIMUTH	ADJ LENGTH
INNER PEAK	ST 833 1	97 50 17.86	8558.301
BIRTHDAY BAY	ST 966 3	351 57 23.80	19349.300
LOW ROCKY POINT	ST 968 84	336 81 48.50	45969.600

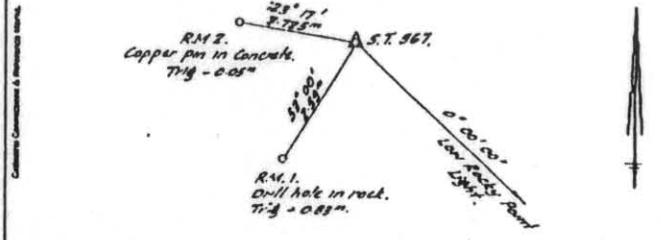


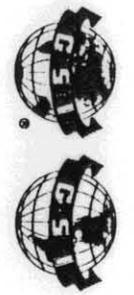
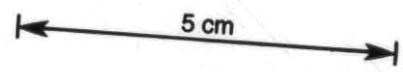
Photo Microfilm:

DATE:	TIME:	NO.:	NO.:	NO.:	NO.:	NO.:	NO.:
1976:	19-6-76	1-1-77	1-1-77	1-1-77	1-1-77	1-1-77	1-1-77

Approved by: La. Noel

HIBBS PYRAMID

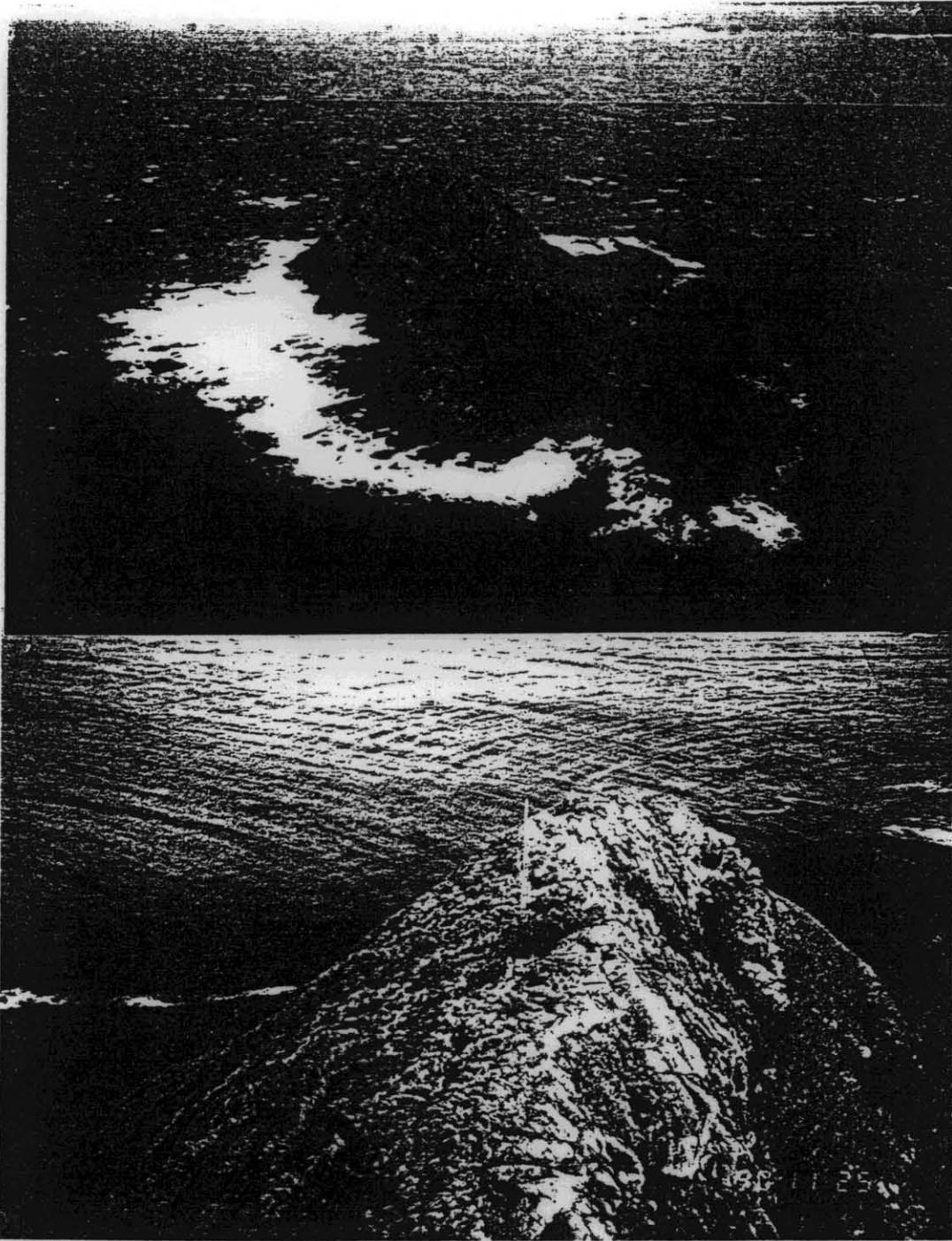
-49-





HIBBS PYRAMID

-50-





-51-

SECTION G
MAPPING PARAMETERS



-52-

Prospect : T/24P
Spheroid : Australian National Spheroid
Datum : Australian Geodetic Datum 66
Central Meridian : 147 Degrees East
Position Plotted : Airgun
Scale : 1:50,000
Plotting Frequency : Every 5th
Label Frequency : Every 10th
Navigation Data Processed: Halliburton Geophysical Services
Lam Soon Industrial Building
63 Hillview Avenue, #08-23
Singapore 2366