

243001

FINAL REPORT

OFFSHORE NAVIGATION (AUSTRALIA) PTY. LTD.

PROJECT 1676

HALLIBURTON GEOPHYSICAL SERVICE

SHELL (AUSTRALIA)

BASS STRAIT

T/18P and T/14P

TASMANIA

AUSTRALIA

15 FEBRUARY - 3 MARCH 1990

TPR
OR_0246A

243002

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I. INTRODUCTION

Offshore Navigation (Australia) Pty. Ltd. (ONA), under contract to Halliburton Geophysical Service (HGS), provided an ARGO Radiopositioning System to a marine seismic survey that was conducted off the coast of Tasmania, Australia, in the Bass Strait. The survey extended along the north coast of Tasmania from east of King Island and up to approximately 200km offshore. The survey was conducted for Shell (Australia) (SHELL) and designated as T/18P and T/14P.

ONA provided a Syledis Radiopositioning System and HGS provided its Configurable Marine System (CMS) to this survey. The ARGO mobile equipment was interfaced to the CMS. ARGO positioning data was recorded by CMS.

ARGO was the prime navigation system for this survey. The ARGO mobile equipment was provided with a digital printer and a strip chart recorder. Positioning data was recorded on the printer and recorded throughout the survey.

The ARGO mobile equipment was calibrated and updated to positions determined by the Syledis system. The ARGO lane count was checked to Syledis positions.

I. INTRODUCTION

The ONA base of operation for this survey was established at Devonport, Tasmania on 15 February 1990.

II. FIELD OPERATIONS RECAP (continued)

Geophysical operations began at 01:15 hours 22 February 1990, and were completed at 18:15 hours 3 March 1990.

The ARGO system was secured at 18:15 hours 3 March 1990 on completion of the survey.

Dismantling of the ARGO base stations began on 3 March 1990 and was completed 6 March 1990. The M/V PACIFIC TITAN arrived in Geelong, Victoria at 10:00 hours 5 March 1990 and the ARGO mobile equipment was dismantled and removed from the vessel. The ARGO base station equipment was packaged and shipped to ONA Perth, WA office by truck transport.

The ONA mobile operators were released from this survey on 5 March 1990. The ONA base operators were released on 8 March 1990.

III. NAVIGATION DISCUSSION

20/02/90	20:00 hours - 22:30 hours	Some small skywaves.
21/02/90	19:30 hours 20:35 hours 22:30 hours 24:00 hours	Start of skywaves. North Point and Point Sorell losing lock. Naracoopa now losing lanes. North Point now as relay to help lock to Point Sorell. Never seen skywaves as severe as this. Possibly some outside interference was responsible for most of the problems.
22/02/90	00:01 hours 20:05 hours	Signals still very noisy. Start of skywaves on all stations.
23/02/90	00:53 hours 20:10 hours	Abort run in (no signal, due to skywaves from Point Sorell). Start of skywaves, all stations.
24/02/90	00:02 hours 20:00 hours 22:50 hours	Lost lanes on Point Sorell and Naracoopa. Very severe skywaves on all stations. Naracoopa lost track.
25/02/90	00:01 hours 01:20 hours 12:55 hours 19:30 hours 21:01 hours 21:10 hours 22:34 hours	Lost lock on Naracoopa and North Point. Locked on Naracoopa and North Point. Point Sorell back on air and tracking. Start of skywaves on Naracoopa signal. Lost Naracoopa. Severe skywaves, lost Naracoopa signal. Naracoopa locked on.
26/02/90	19:15 hours 21:15 hours - 23:32 hours	Start of skywaves on Naracoopa. North Point and Naracoopa intermittently gaining and losing lock. Naracoopa and North Point lost lock and locked on at exactly one hour intervals. Convinced of outside interference.

III. NAVIGATION DISCUSSION (continued)

27/02/90 19:15 hours Start of skywaves (Naracoopa).
20:46 hours - Naracoopa lost lock several times.
23:15 hours

28/02/90 19:30 hours Start of skywaves
21:00 hours Skywaves all station (not as severe as
previous days).
21:43 hours Lost lock on Naracoopa.
22:45 hours Losing lanes on all stations.
23:10 hours Stations locked on with occasional
blinking.

01/03/90 19:30 hours Start of skywaves.
20:45 hours Lost Naracoopa.
21:15 hours Lost North Point.
21:35 hours Lost Point Sorell.
21:45 hours Point Sorell locked on.
23:22 hours North Point locked on.
23:30 hours Naracoopa locked on and calibrated to
Syledis.

02/03/90 19:33 hours Start of skywaves.
20:55 hours - All stations on and off over this period.
23:45 hours

03/03/90 00:01 hours All stations lost lock.
01:18 hours Naracoopa locked on.
01:25 hours North Point locked on.
01:27 hours Point Sorell locked on.

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**OFFSHORE NAVIGATION INC.
MAXIRAN/ARGO DAILY OPERATIONS LOG**

Project Number 1676 Date 18 FEB 90 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT Stepback _____ Shot Point Interval _____

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM

MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	<u>1620</u>	<u>056</u>	<u>008</u>	<u>021</u>	<u>R/B.</u>

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
<u>PORT SORELL</u>	<u>B. HOWARD</u>		<u>064</u>	<u>069</u>	<u>SLAVE</u>	<u>FIXED 1</u>
<u>NORTH POINT</u>	<u>J. WOODS</u>		<u>025</u>	<u>033</u>	<u>SLAVE</u>	<u>FIXED 2</u>
<u>NARRACOOPA</u>	<u>G. WELLS</u>					

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
				<u>SEISMIC SURVEY</u>

O/T Requested By: _____ Total System - Hours Operation for Client 0

LOST TIME				
From	To	Hours Lost	System	Reason(s)

Brief Operations Log & Remarks INSTALLATION ON BOARD PACIFIC TITAN (B. VINEY)
1900 - P. WAARMKE ARRIVES
2000 - DEPART FOR PROSPECT

SETTING STATIONS

Continued Overleaf

Mobile Operators P. WAARMKE
B. VINEY Party Chief D. RUSSEL

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OFFSHORE NAVIGATION INC.

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 19 FEB 90 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company H.G.S. Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT Stepback Shot Point Interval

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM

MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	1620	035	008	021	R/B

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
PORT SOBELL	B. HOWARD		064	069	SLAVE	FIXED 1
NORTH POINT	J. WOODS		025	033	SLAVE	FIXED 2
NARACOOTA	G. WELLS					

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
1930	2400		ARGO	SEISMIC SURVEY
O/T Requested By:			Total System - Hours Operation for Client	4 Hrs. 30 min.

LOST TIME				
From	To	Hours Lost	System	Reason(s)

Brief Operations Log & Remarks 0001 - ENROUTE TO CUT BASELINES,
 1830 - CHANGED MOBILE RPU to 035 - 056 WEAK XMTR. CHANGING ALU ON NORTH Pt
 1930 - ALL EQUIPMENT AND 2 STATIONS OPERATIONAL
 STAT. PORT SOBELL = 55500 MTR AGC 64 MOBILE ANT. TUNE = 55
 STAT. NORTH POINT = 75800 MTR AGC 59

Continued Overleaf

2400 - LAYING CABLE

Mobile Operators

P. WARMKE
B. VINEY

Party Chief

J. RUSSEZ

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 20 FEB 90 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT Stepback Shot Point Interval

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM
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MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	1620	035	008	021	R/R

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
PORT SORELL	B. HOWARD	0	064	069	SLAVE	FIXED 1
NORTH POINT	J. WOODS	0	025	033	SLAVE	FIXED 2
NARRACOOKA	G. WELLS	0	023	031	SLAVE	FIXED 3

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
0001	2400	E. PICKSTONE	ARGO	SEISMIC SURVEY
O/T Requested By:			Total System - Hours Operation for Client	24 Hrs

LOST TIME				
From	To	Hours Lost	System	Reason(s)

Brief Operations Log & Remarks ... LANE WIDTH 92.49043 (WILL CONFIRM WITH PERTH)
 1105 - START SYLONIS BASELINE XINGS NORTH POINT - PORT SORELL
 1st XING 200° = 116206.1, 2nd XING 022° = 116205.1, 3rd XING 200° = 116206.6
 4th XING 022° = 116208.5, COMPUTED = 116205.3

1600 - KING ISLAND (NARRACOOKA) WILL BE UP TOMORROW NOON Continued Overleaf

Mobile Operators P. WAARMKE
 B. VINEY Party Chief D. RUSSEL

1655 - START CALIBRATING PORT SOREL ON HEADINGS 138°, 228°, 318, 048°
 FIX 1 = AGC 64 AT 613 LINES
 FIX 2 = AGC 63 AT 748 LINES MOBILE ANT. TUNE = 55

1845 - COMPLETE PORT SOREL CALIBRATION. HEADING 10KM CLOSER TO NORTH POINT

2000 - START CALIBRATING NORTH POINT ON HEADINGS 265°, 085°, 175°, 355°
 FIX 1 - AGC 64 AT 725 LINES
 FIX 2 - AGC 64 AT 686 LINES MOBILE ANT. TUNE = 55

2213 - COMPLETE CALIBRATION ON NORTH POINT.
 SOME SMALL SKY WAVES FROM 2000 TO 2230 HRS.

START LAYING CABLE AND HEADING TO NARRACOOTA CALIBRATION POINT.

NOTE: NO Δ VALUES PUT INTO CPU, ALL PARAMETERS ENTERED INTO CM:
 P. SOREL = 40MTR (+) NORTH POINT = 30MTR (+)

INSTRUCTIONS

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2. It is intended to provide a concise but complete log of one day's activity on an operating radiopositioning crew. Completeness is more important than brevity.
3. If more space is needed in order to make a complete report, use supplemental sheets.
4. In addition to providing an operational log, it also provides information required for billing purposes, particularly as it lists operating days, lost time, overtime, etc.
5. It has been specifically modified from previous forms to provide (under Operating Time) for a notation as to what the system is being used for during a specific period. This is particularly important (1) in case of overtime operations; (2) when the system is being used for other than the client's normal, day to day, operations; and (3) when the system is kept on the air but no production is being realized.
6. Under "Operating Time", the name of the client's representative requesting that the system be turned on or off or requesting over time (O/T) operations should be noted. Notations such as "Client" or "Client Rep." are not sufficient.
7. Mobile operators should ascertain from their Party Chief if overtime charges are applicable on a particular operation (Party Chief are normally furnished with a copy of the applicable contract). If overtime is applicable to the operation, it should not be incurred without the client representative being fully aware of it and specifically authorizing it. In brief, if the system is not required, it should be turned off. If the client will not permit its being turned off to eliminate unnecessary overtime, that should be noted on this form, including all pertinent particulars.
8. The client, or his representative, always has the final decision as to whether the system should be turned on or off.

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 21 Feb 1990 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company Shell Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT T/18P Stepback Shot Point Interval 25 MTR

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM
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MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	<u>1620</u>	<u>035</u>	<u>008</u>	<u>021</u>	<u>R/R.</u>

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
<u>PORT SORREL</u>	<u>B. HOWARD</u>	<u>40MTR</u>	<u>064</u>	<u>069</u>	<u>SLAVE</u>	<u>Fixed 1</u>
<u>NORTH POINT</u>	<u>J. WOODS</u>	<u>30MTR</u>	<u>025</u>	<u>033</u>	<u>SLAVE</u>	<u>Fixed 2</u>
<u>NARRACOOTA</u>	<u>G. WELLS</u>	<u>27MTR</u>	<u>023</u>	<u>031</u>	<u>SLAVE</u>	<u>Fixed 3</u>
		<u>IN CMS</u>				

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
<u>0001</u>	<u>2400</u>	<u>E. PICKSTONE</u>	<u>ARGO</u>	<u>SEISMIC SURVEY</u>
O/T Requested By:			Total System - Hours Operation for Client	<u>24 Hrs</u>

LOST TIME				
From	To	Hours Lost	System	Reason(s)
<u>2354</u>	<u>2400</u>	<u>6 MIN.</u>	<u>ARGO</u>	<u>NO SIGNALS - SKYWAVES</u>

Brief Operations Log & Remarks 0001 - LAYING CABLE
1030 - STA. NARRACOOTA ON AIR AGC 60 AT 900 KMHRS
1415 - STA CALIBRATION FOR NARRACOOTA ON HDS, 270°, 000°, 090°, 180°
1730 - COMPLETE CALIBRATION Δ IN CMS = 27MTR (+),
HEADING FOR PROSPECT T/18P

Continued Overleaf

Mobile Operators P. WARMKE
B. VINEY Party Chief D. RUSSEL

1930 - START OF SKYWAVES.

2035 - STATIONS NORTH POINT AND POINT SOREL LOSING LOCK.

MOBILE GOOD TUNING AND XMT O.K. TRIED CHANGING MASTER TO BASESTATIONS
BUT ALSO NO LUCK WITH LOCKING ON. CHANGED EQUIPMENT ON BOARD -
SAME RESULT. SWITCHING BACK TO ORIGINAL.

2230 - KING ISLAND NOW LOSING LINES.

2320 - USING 4 TIMESLOTS AND ABLE TO LOCK ON TO NARRACOOPA.

2330 - SWITCHING BACK TO 1 TIMESLOT - STILL LOCKED ON TO NARRACOOPA.

2400 - NORTH POINT NOW AS RELAY TO HELP LOCK ON AT POINT SOREL.

NOTE: HAVE NEVER SEEN SKYWAVES AS SEVERE AS THIS BEFORE. I THINK
THAT SOME OUTSIDE INTERFERENCE WAS RESPONSIBLE FOR MOST
OF THE PROBLEMS.

RANGES WHERE: POINT SOREL 1900 LINES

NORTH POINT 1100 LINES

NARRACOOPA 1200 LINES

2400 - HOPING FOR LINE WITH SYLWIS.

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6. Under "Operating Time", the name of the client's representative requesting that the system be turned on or off or requesting overtime (O/T) operations should be noted. Notations such as "Client" or "Client Rep." are not sufficient.
7. Mobile operators should ascertain from their Party Chief if overtime charges are applicable on a particular operation (Party Chiefs are normally furnished with a copy of the applicable contract). If overtime is applicable to the operation, it should not be incurred without the client representative being fully aware of it and specifically authorizing it. In brief, if the system is not required, it should be turned off. If the client will not permit its being turned off to eliminate unnecessary overtime, that should be noted on this form, including all pertinent particulars.
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243014

OFFSHORE NAVIGATION INC.
MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 22 FEB 90 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SITAL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT T/18P Stepback Shot Point Interval 25 MTR

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM

MAXIRAN BASE STATIONS

Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	1620	035	008	021	R/R.

ARGO BASE STATIONS

Position	Operator	ΔRange	RPU	ALU	Config.	Code
PORT SORELL	B. HOWARD	410 MTR	064	069	SLAVE	FIXED 1
NORTH POINT	J. WOODS	30 MTR	025	033	RELAY	FIXED 2
NAARALCOOPA	G. WALLS	27 MTR	023	031	SLAVE	FIXED 3
		IN CMS				

OPERATING TIME

Time On	Time Off	Requested By	System	System Used For:
0001	2400	E. PICKSTONE	ARGO	SEISMIC NAVIGATION

O/T Requested By:

Total System - Hours Operation for Client

24 Hrs

LOST TIME

From	To	Hours Lost	System	Reason(s)

Brief Operations Log & Remarks 0001 - SIGNALS STILL VERY NOISY
 0022 - LOCKED ON TO NORTH POINT - NORTH POINT NOW AS RELAY TO PICK UP P. SOR.
 0100 - POINT SORELL LOCKING ON (NOT SOLID YET)
 0115 - SMOOTHING 3 HEADINGS FOR LINE - TRACKING ALL STATIONS WITH SMALL EDGE

Continued Overleaf

Mobile Operators

P. WARMKE
B. VINEY

Party Chief

D. RUSSEL

Operations Log & Remarks (con'd.)

0421 - BOL BS90B-4 DIR. 325° FSP 1001 to LSP 2275 AT 0751,
CEP'S O to MTR.

1002 - BOL BS90B-15 DIR. 234° FSP 1001 to LSP 1581 AT 1129,
CEP'S O to MTR.

1306 - BOL BS90B-2 DIR. 145° FSP 1001 to LSP 1876 AT 1523,

1823 - BOL BS90B-1 DIR. 053° FSP 1001 to SP 1674 AT 2001,
TERMINATE FOR GROUND FAULT ON CABLE, PICKING UP GUNS AND
CABLE.

2005 - START OF SKYWAVES ON ALL STATIONS,

2320 - LOCKED ON TO NARRACOOPA + NORTH POINT

2400 - HEADING FOR LINE - HOPING THAT PAT. SOBELL WILL LOCK ON
BEFORE START OF LINE BS90B-3 DIR. 233°

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OFFSHORE NAVIGATION INC.

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 23 FEB 90 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SIBEL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT/18P Stepback Shot Point Interval 25MTR

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM
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MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	1620	035	008	021	R/R.

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
PORT SOBELL	B. HOWARD	40MTR.	064	069	SLAVE	FIXED 1
NORTH POINT	J. WOODS	30MTR.	025	033	RELAY	FIXED 2
NARRACOOPA	G. WELLS	27MTR	023	031	SLAVE	FIXED 3
		IN CMS				

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
0001	2400	E. PICKSTONE	ARGO	SEISMIC NAVIGATION

O/T Requested By: Total System - Hours Operation for Client 24 HRS.

LOST TIME				
From	To	Hours Lost	System	Reason(s)
0053	0327	2 HRS. 34 MIN	ARGO	SKYWAVES (NO THIRD STATION 2100 HRS)

Brief Operations Log & Remarks 0001 - HEADING FOR LINE WITH 2 STATIONS ONLY.
 0053 - ABOARD RUNIN (NO SIGNAL DUE TO SKYWAVES FROM PORT SOBELL)
 0327 - BOL 903-03 DIR 233° FSP 1001 to LSP 1999 AT 0607,
 0700 - CHECKING ALU AND CONNECTIONS ON SHIPMAST - ALL O.K.

Continued Overleaf

Mobile Operators PUARMKE
 B. VINEY Party Chief D. RUSSEL

0723 - BOL BS90B-01A DIR. 053° FSP 1001 to LSP 1857 AT 0939, COMPL.
 1115 - BOL BS90B-07 DIR. 233° FSP 1001 to SP 1737 AT 1306, TERMINA
 FOR TITAN.
 1510 - BOL BS90B-07A DIR. 233° FSP 1651 to LSP 1937 AT 1553, COMPL.
 CEP'S O-1MTA.
 1718 - BOL BS90B-13 DIR. 053° FSP 1001 to LSP 1757 AT 1907, COMPL.
 2010 - START OF SKYNAVES ALL STATIONS - HEAVY EDITING.
 2031 - BOL BS90B-09 DIR. 233° FSP 1001 to SP 1321 AT 2121, SMO4
 TERMINATE FOR TITAN PROBLEMS, HEAVY EDITING BUT NO LANELOSS
 2230 - CABLE PROBLEMS
 2300 - PICKING UP CABLE FOR STATION SECTION REPLACEMENT
 2400 - VERY HEAVY EDITING ON ALL STATIONS - WORKING ON CABLE

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MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 24 FEB. 1990 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT T/18P Stepback T/14P Shot Point Interval 25 MIA

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM
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MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	1620	035	008	021	R/R

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
PORT SORELL	B. HOWARD	40 MTR.	064	069	SLAVE	FIXED 1
NORTH POINT	J. WOODS	30 MTR.	025	033	RELAY	FIXED 2
NARRACOOKA	G. WELLS	27 MTR.	023	031	SLAVE	FIXED 3
		INCMS				

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
0001	2400	E. PICKSTONE	ARGO	SEISMIC NAVIGATION

O/T Requested By: _____ Total System - Hours Operation for Client 24 Hrs.

LOST TIME				
From	To	Hours Lost	System	Reason(s)
2310	2400	50 MIN.	ARGO	LOST STATION NARRACOOKA

Brief Operations Log & Remarks 0001 - WORKING ON CABLE
0002 - LOST LINES ON STA. PORT SORELL AND NARRACOOKA
0218 - BOL BS 90B - 9A DIR. 233° FSP 1231 to LSP 1573 M. 0311,
0437 - BOL BS 90B - 11 DIR. 054° FSP 1001 to LSP 1574 M. 0606,

Continued Overleaf

Mobile Operators P. WARMKE
B. VINEY Party Chief D. RUSSEZ

0744 - BOL BS90B - 05 DIR 233° FSP 1001 to LSP 1591 AT 0919,

END OF T/18P - WORKING ON CABLE ENROUTE TO T/14P.

1735 - BOL BS90A-12 DIR 112° FSP 1001 to LSP 2570 AT 2138,

2000 - START OF SKYWAVES ON ALL STATIONS, VERY SEVERE ON ALL STATIONS,
USING SMOOTHING 4, CEP'S 0-4MTR. ANT. TUNE 55
STRONG AGC ON ALL STATIONS,

2250 - KING ISLAND MOST LOCK

2310 - CIRCLE FOR NO SIGNAL NMAACOOPA - SIGNAL BACK WITH 2 hrs
BUT TOO WATE. OUT OF SPEC.

2400 - CIRCLING BACK TO LINE BS90A-16 DIR 292°

INSTRUCTIONS

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8. The client, or his representative, always has the final decision as to whether the system should be turned on or off.

243020

OFFSHORE NAVIGATION INC.

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 25 FEB 1990 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT T/14P Stepback Shot Point Interval 25MIB

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM

MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	1620	035	008	021	R/R

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
PORT SORELL	B. HOWARD	40MTR	064	069	SLAVE	Fixed 1
NORTH POINT	J. WOODS	30MTR	025	033	RELAY	Fixed 2
NARRACOOPA	G. WELLS	27MTR	023	031	SLAVE	Fixed 3
		INCMS				

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
0001	2400	E. PICKSTONE	ARGO	SEISMIC NAVIGATION
O/T Requested By:			Total System - Hours Operation for Client	24 HRS.

LOST TIME				
From	To	Hours Lost	System	Reason(s)
0001	0318	3 HRS. 18 MIN.	ARGO	LOST STATION NARRACOOPA (SKYWAVES)
1242	1453	2 HRS. 11 MIN.	ARGO	STATION PORT SORELL OFF AIR
2110	2400	2 HRS 50 MIN.	ARGO	LOST STATION NARRACOOPA (SKYWAVES)
	TOTAL	8 HRS. 19 MIN.		

Brief Operations Log & Remarks 0001 - LOST LOCK ON NARRACOOPA AND NORTH POINT.
 0120 - LOCKED ON NARRACOOPA AND NORTH POINT - HEADING FOR LINE,
 0318 - BOG BS90A-16 DIR. 292° FSP 1001 to LSP 1715 AT 0509,
 0650 - CABLE PROBLEMS - PULLING GUNS AND CABLE TO REPAIR.

Continued Overleaf

Mobile Operators P. WAAMKE
 B. VINEY Party Chief D. RUSSETT

- 1222 - BOL BS90A-14 DIR. 111° FSP 1001 to SP AT 1242,
 MAKING CIRCLE FOR NO SIGNAL FROM PORT SOBELL,
 CANNOT SHOOT WITHOUT 3rd STATION AS PER SHELL NAVIGATION CONTRACT
- 1255 - STATION PORT SOBELL BACK ON AIR AND TRACKING,
- 1453 - BOL BS90A-14A DIR. 111° FSP 1001 to LSP 1680 AT 1635,
- 1751 - BOL BS90A-10 DIR. 291° FSP 1001 to LSP 1747 AT 1939,
- 1930 - START OF SKYWAVES ON NARRACOOPA, 1900 LANES,
- 2101 - BOL BS90A-08 DIR. 111° FSP 1001 to SP AT 2110, ^{LOST NARRA}
- 2110 - MAKING CIRCLE - LOST NARRACOOPA SIGNAL - SEVERE SKYWAVES,
- 2234 - NARRACOOPA LOCKED ON - CHECKING SIGNAL QUALITY,
- 2300 - START HEADING FOR LINE BS90A-08A DIR. 111°
- 2335 - PICKING UP GUNS AND STATIONS - PROBLEMS WITH SHIPS POWER.
- 2400 - HEADING FOR LINE?

INSTRUCTIONS

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8. The client, or his representative, always has the final decision as to whether the system should be turned on or off.

**OFFSHORE NAVIGATION INC.
MAXIRAN/ARGO DAILY OPERATIONS LOG**

Project Number 1676 Date 26 FEB. 1990 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT I/14P Stepback _____ Shot Point Interval 25MTR

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM

MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	<u>1620</u>	<u>035</u>	<u>008</u>	<u>021</u>	<u>R/R</u>

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
<u>PORT SORELL</u>	<u>B. HOWARD</u>	<u>40MTR</u>	<u>064</u>	<u>069</u>	<u>SLAVE</u>	<u>FIXED 1</u>
<u>NORTH POINT</u>	<u>J. WOODS</u>	<u>30MTR</u>	<u>025</u>	<u>033</u>	<u>RELAY</u>	<u>FIXED 2</u>
<u>NARRACOOPA</u>	<u>G. WELLS</u>	<u>27MTR</u>	<u>023</u>	<u>031</u>	<u>SLAVE</u>	<u>FIXED 3</u>
		<u>INCMS</u>				

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
<u>0001</u>	<u>2400</u>	<u>E. PICKSTONE</u>	<u>ARGO</u>	<u>SEISMIC NAVIGATION</u>

O/T Requested By: _____ Total System - Hours Operation for Client 24 HRS.

LOST TIME				
From	To	Hours Lost	System	Reason(s)
<u>0005</u>	<u>2400</u>	<u>2HRS 45MIN</u>	<u>ARGO</u>	<u>NARRACOOPA (SKYWAVES)</u>

Brief Operations Log & Remarks 0001 - WORKING ON CABLE - SIGNALS STABLE,
0405 - BOL 90A-08A DIR. 112° FSP 1001 to LSP 2233 AT 0717,
1012 - BOL BS90A-06 DIR. 292° FSP 1001 to LSP 1673 AT 1155,
1333 - BOL BS90A-04 DIR. 112° FSP 1001 to LSP 2602 AT 1733,

Continued Overleaf

Mobile Operators P. WAAMKE
B. VINEY Party Chief D. RUSSET

1912 - BOL BS90A-02 DIR. 292° FSP 1001 to SP 1845 AT 2115

1915 - START OF SKYWAVES ON NARRACOOPA, SMO 4 AT 2200 LINES

2115 - LOST LOCK ON NARRACOOPA (2000 LINES) MAKING CIRCLE (SKYWAVES)

2135 - LOCKED ON NARRACOOPA,

2137 - LOST LOCK ---

2230 - LOCKED ON NARRACOOPA,

2237 - LOST LOCK "

2245 - LOST LOCK ON NORTH POINT,

2329 - LOCKED ON NORTH POINT

2332 - LOCKED ON NARRACOOPA

2400 - HEADING FOR LINE BS90A-02A DIR. 292°

NOTE: SIGNALS FROM NARRACOOPA AND NORTH POINT LOST LOCK AND LOCKED ON AN EXACTLY 1 HR. INTERVALS. I AM CONVINCED THAT WE HAVE SOME OUTSIDE INTERFERENCE IN THIS AREA

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8. The client, or his representative, always has the final decision as to whether the system should be turned on or off.

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 27 FEB 1990 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT T/14P Stepback Shot Point Interval 25 MTA

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM
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MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	<u>1620</u>	<u>035</u>	<u>008</u>	<u>021</u>	<u>R/R</u>

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
<u>PORT SOREL</u>	<u>B. HOWARD</u>	<u>40MTR</u>	<u>064</u>	<u>069</u>	<u>SLAVE</u>	<u>FIXED 1</u>
<u>NORTH POINT</u>	<u>J. WOODS</u>	<u>30MTR</u>	<u>025</u>	<u>033</u>	<u>BELAY</u>	<u>FIXED 2</u>
<u>NARRACOOPA</u>	<u>G. WELLS</u>	<u>27MTR</u>	<u>023</u>	<u>031</u>	<u>SLAVE</u>	<u>FIXED 3</u>
		<u>IN CMS</u>				

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
<u>0001</u>	<u>2400</u>	<u>E. PICKSTONE</u>	<u>ARGO</u>	<u>SEISMIC NAVIGATION</u>

O/T Requested By: Total System - Hours Operation for Client 24 HRS.

LOST TIME				
From	To	Hours Lost	System	Reason(s)
<u>0001</u>	<u>0108</u>	<u>1HR 08MIN.</u>	<u>ARGO</u>	<u>LOST LOCK ON STATIONS 1+2 (SKYWAVES)</u>
<u>2046</u>	<u>2331</u>	<u>2HRS 45MIN</u>	<u>"</u>	<u>LOST LOCK ON NARRACOOPA (SKYWAVES)</u>
	<u>TOTAL</u>	<u>3HRS 53MIN</u>		

Brief Operations Log & Remarks 0001 - HEADING FOR LINE BS90A-02A DIR. 292°
0108 - BOL BS90A-02A DIR 292° FSP 1761 to SP 2242 AT 0216, TERMINATE FOR CABLE,
0511 - BOL BS90A-02B DIR 292° FSP 2141 to SP 2190 AT 0519, TERMINATE FOR TITAN,
0710 - BOL BS90A-02C DIR 292° FSP 2141 to LSP 2572 AT 0813, COMPLETE

Continued Overleaf

Mobile Operators P. WARMKE
B. VINEY Party Chief D. RUSSEL

0959 - BOL BS90A-09 DIR. 022° FSP 1001 to LSP 1555 AT 1128, COMPLETE
 1239 - BOL BS90A-01 DIR. 202° FSP 1001 to LSP 1391 AT 1335, COMPLETE
 1521 - BOL BS90A-13 DIR. 022° FSP 1001 to LSP 1476 AT 1632, "
 1757 - BOL BS90A-05 DIR. 201° FSP 1001 to LSP 1462 AT 1905, "
 1915 - START OF SKYWAVES (NARRACOOPA)
 2033 - BOL BS90A-15 DIR. 023° FSP 1001 to SP AT 2046, CIRCLE
 2046 - LOST LOCK ON NARRACOOPA
 2150 - LOCKED ON NARRACOOPA
 2237 - LOST LOCK ON NARRACOOPA
 2245 - LOCKED ON NARRACOOPA
 2315 - ALL STATIONS WITH NO EDITS SMO 3
 2331 - BOL BS90A-15A DIR. 023° FSP 1001 to SP AT

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OFFSHORE NAVIGATION INC.
MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 28 FEB 1990 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.57840
 Country AUSTRALIA Area/Prospect BASS STRAIT T/14P Stepback Shot Point Interval 25MTR

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM

MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	<u>1620</u>	<u>035</u>	<u>008</u>	<u>021</u>	<u>R/R</u>

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
<u>PORT SORELL</u>	<u>B. HOWARD</u>	<u>40MTR</u>	<u>064</u>	<u>069</u>	<u>SLAVE</u>	<u>FIXED 1</u>
<u>NORTH POINT</u>	<u>J. WOODS</u>	<u>30MTR</u>	<u>025</u>	<u>033</u>	<u>RELAY</u>	<u>FIXED 2</u>
<u>NARRACOOPA</u>	<u>G. WELLS</u>	<u>27MTR</u>	<u>023</u>	<u>031</u>	<u>SLAVE</u>	<u>FIXED 3</u>
		<u>IN CMS</u>				

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
<u>0001</u>	<u>2400</u>	<u>E. PICKSTONE</u>	<u>ARGO</u>	<u>SEISMIC NAVIGATION</u>
O/T Requested By:			Total System - Hours Operation for Client	<u>24 Hrs</u>

LOST TIME				
From	To	Hours Lost	System	Reason(s)
<u>2143</u>	<u>2400</u>	<u>2 Hrs 17 MIN.</u>	<u>ARGO</u>	<u>LOST LOCK ON NARRACOOPA (SKYWAVES)</u>

Brief Operations Log & Remarks 0001 - SHOOTING ON LINE BS90A-15A DIR. 023° to LSP 1477 AT 0044
0203 - BOL BS90A-07 DIR. 201° FSP 1001 to LSP 1476 AT 0314,
0440 - BOL BS90A-19 DIR. 023° FSP 1001 to LSP 1492 AT 0548,
0709 - BOL BS90A-17 DIR. 203° FSP 1001 to LSP 2054 AT 0939,
1110 - BOL BS90A-03 DIR. 021° FSP 1001 to LSP 2503 AT 1503, Continued Overleaf

Mobile Operators P. WARMKE
B. VINEY Party Chief D. RUSSER

Operations Log & Remarks (con'd.)

1617 - BOL BS90A-11 JIB. 202° FSP 1001 to LSP 2340 AT 1942 ,

1930 - START OF SKYWAVES

2100 - SEVERE SKYWAVES ON ALL STATIONS - BUT IT APPEARS TO BE LESS THAN PREVIOUS DAYS.

2129 - BOL BS90A-27 JIB. 023° FSP 1001 to SP AT 2143, C1922

2143 - LOST LOCK ON NARRACOOPA (2000 LINES)

2245 - LOSING LINES ON ALL STATIONS

2250 - PICKING UP GUNS - SHPS ENGINE ROOM PROBLEMS,

2310 - STATIONS LOCKED ON WITH OCCASIONAL BLINKING - HEARING FOR LINES

2400 - ON RUN IN LINE BS90A-27A JIB. 023° ,

NOTE: NOTICED RADIO STATION ON 1620 KHZ STARTING AT NIGHT. (COMMERC)

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243028

OFFSHORE NAVIGATION INC.

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 1. March 1990 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT T/HP Stepback Shot Point Interval 25MTR.

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM
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MAXIRAN BASE STATIONS

Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	1620	035	008	021	R/R

ARGO BASE STATIONS

Position	Operator	ΔRange	RPU	ALU	Config.	Code
PORT SORREL	B. HOWARD	40MTR	064	069	SLAVE	Fixed 1
NORTH POINT	J. WOODS	30MTR	025	033	RELAY	Fixed 2
NARRACOOPA	G. WALLS	27MTR	023	031	SLAVE	Fixed 3
		IN CMS				

OPERATING TIME

Time On	Time Off	Requested By	System	System Used For:
0001	2400	E. PICKSTONE	ARGO	SEISMIC NAVIGATION

O/T Requested By:

Total System - Hours Operation for Client

24 HRS.

LOST TIME

From	To	Hours Lost	System	Reason(s)
0001	0021	21min.	ARGO	LOST LOCK NARRACOOPA (SKYWAVES)

Brief Operations Log & Remarks

0021 - BOL BS90A - 27A DIR. 023° FSP 1001 to LSP 1999 AT 0249,
 0351 - BOL BS90A - 23 DIR. 202° FSP 1001 to LSP 1379 AT 0556,
 0707 - BOL BS90A - 29 DIR. 023° FSP 1001 to LSP 2003 AT 0928.

Continued Overleaf

Mobile Operators

P. WARRKE
B. VINNEY

Party Chief

D. RUSSEL

1023 - BOL BS90A - 25 DIR. 203° FSP 1001 to LSP 1854 AT 1229,

1350 - BOL BS90A - 31 DIR. 023° FSP 1001 to LSP 2604 AT 1747,

PICKING UP GUNS AND CABLE FOR REPAIR,

1930 - START OF SKYWAVES ON ALL STATIONS,

2045 - LOST LOCK ON NARRACOOPA

2115 - LOST LOCK ON NORTH POINT

2135 - LOST LOCK ON POINT SORREL

2145 - POINT SORREL LOCKED ON

2322 - NORTH POINT LOCKED ON

2330 - NARRACOOPA LOCKED ON - CAL. TO SYLEVIS - EDITS STOPPED

2400 - WORKING ON CABLE

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8. The client, or his representative, always has the final decision as to whether the system should be turned on or off.

243030

OFFSHORE NAVIGATION INC.

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 2 MARCH 1990 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT T/14P Stepback Shot Point Interval 25 MTR.

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM
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MAXIRAN BASE STATIONS

Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	1620	035	008	021	R/R

ARGO BASE STATIONS.

Position	Operator	ΔRange	RPU	ALU	Config.	Code
PORT SOBELL	B. HOWARD	40MTR	064	069	SLAVE	FIXED 1
NORTH POINT	J. WOODS	30MTR	025	033	RELAY	FIXED 2
NARRACOOPA	G. WALLS	27MTR	023	031	SLAVE	FIXED 3
		IN CMS				

OPERATING TIME

Time On	Time Off	Requested By	System	System Used For:
0001	2400	E. PICKSTONE	ARGO	SEISMIC NAVIGATION

O/T Requested By:

Total System - Hours Operation for Client

24 HRS.

LOST TIME

From	To	Hours Lost	System	Reason(s)

Brief Operations Log & Remarks 0001 - WORKING ON CABLE

0627 - BOL BS90A-21 DIR. 203° FSP 1001 to LSP 2471 AT 1015,
 1149 - BOL BS90A-33 DIR. 022° FSP 1001 to LSP 2007 AT 1426,
 1535 - BOL BS90A-39 DIR. 203° FSP 1001 to LSP 2047 AT 1813,

Continued Overleaf

Mobile Operators

P. WARMKE
B. VINEY

Party Chief

D. RUSSEL

1918 - BOL BSAOA-25 DIR. 023° FSP 1001 to SP1426 AT 2035, CIRCLE
LAST GSP 1418,

1933 - START OF SKYWAVES - SMO 4

2035 - CIRCLE FOR CABLE GROUNDFAULT - PICKING UP CABLE

2055 - LOST LOCK ON NARRACOOKA,

2125 - LOST LOCK ON NORTH POINT,

2300 - LOST LOCK POINT SORRELL

2330 - NORTH POINT + POINT SORRELL LOCKED ON,

2345 - LOST LOCK NORTH POINT + POINT SORRELL,

2400 - HEADING FOR LINE ON SYLENS - CABLE IS READY TO GO.

INSTRUCTIONS

1. This form is to be filled out completely for each day that the crew, or any member thereof, is in a work status.
2. It is intended to provide a concise but complete log of one day's activity on an operating radiopositioning crew. Completeness more important than brevity.
3. If more space is needed in order to make a complete report, use supplemental sheets.
4. In addition to providing an operational log, it also provides information required for billing purposes, particularly as it lists operating days, lost time, overtime, etc.
5. It has been specifically modified from previous forms to provide (under Operating Time) for a notation as to what the system being used for during a specific period. This is particularly important (1) in case of overtime operations; (2) when the system being used for other than the client's normal, day to day, operations; and (3) when the system is kept on the air but no production is being realized.
6. Under "Operating Time", the name of the client's representative requesting that the system be turned on or off or requesting overtime (O/T) operations should be noted. Notations such as "Client" or "Client Rep." are not sufficient.
7. Mobile operators should ascertain from their Party Chief if overtime charges are applicable on a particular operation (Party Chiefs are normally furnished with a copy of the applicable contract). If overtime is applicable to the operation, it should not be incurred without the client representative being fully aware of it and specifically authorizing it. In brief, if the system is not required, it should be turned off. If the client will not permit its being turned off to eliminate unnecessary overtime, that should be noted on this form, including all pertinent particulars.
8. The client, or his representative, always has the final decision as to whether the system should be turned on or off.

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 3 MARCH 80 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency 4637.5, 7840
 Country AUSTRALIA Area/Prospect BASS STRAIT / MP Stepback _____ Shot Point Interval 25MTR.

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM

MAXIRAN BASE STATIONS

Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
	<u>1620</u>	<u>035</u>	<u>008</u>	<u>021</u>	<u>R/R</u>

ARGO BASE STATIONS

Position	Operator	ΔRange	RPU	ALU	Config.	Code
<u>PORT SORELL</u>	<u>B. HOWARD</u>	<u>40MTR</u>	<u>064</u>	<u>069</u>	<u>SLAVE</u>	<u>FIXED 1</u>
<u>NORTH POINT</u>	<u>J. WOODS</u>	<u>30MTR</u>	<u>025</u>	<u>033</u>	<u>RELAY</u>	<u>FIXED 2</u>
<u>NARRACOOPA</u>	<u>G. WOODS</u>	<u>27MTR</u>	<u>023</u>	<u>031</u>	<u>SLAVE</u>	<u>FIXED 3</u>
		<u>IN CMS</u>				

OPERATING TIME

Time On	Time Off	Requested By	System	System Used For:
<u>0001</u>	<u>1815</u>	<u>E. PICKSTONE</u>	<u>ARGO</u>	<u>SEISMIC NAVIGATION</u>
O/T Requested By:			Total System - Hours Operation for Client	<u>18 HRS 15 MIN.</u>

LOST TIME

From	To	Hours Lost	System	Reason(s)
<u>0130</u>	<u>0306</u>	<u>1 HR. 36 MIN</u>	<u>ARGO</u>	<u>SKYWIVES ALL STATIONS (INTERFERENCE)</u>

Brief Operations Log & Remarks 0001 - ALL STATIONS LOST LOCK
0118 - NARRACOOPA LOCKED ON
0125 - NORTH POINT LOCKED ON
0127 - PORT SORELL LOCKED ON - HEADING FOR LINE

Continued Overleaf

Mobile Operators P. WARMKE
B. VINEY Party Chief D. RUSSEL

OFFSHORE NAVIGATION INC.
MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 4. MARCH 90 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company SHELL Radio Frequency
 Country AUSTRALIA Area/Prospect BASS STRAIT Stepback Shot Point Interval

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM

MAXIRAN BASE STATIONS						
Position	Operator	Frequency	Beacon	Amplifier	Code	Delay

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration

ARGO BASE STATIONS						
Position	Operator	ΔRange	RPU	ALU	Config.	Code
POAT SORREL	B. HOWARD					
NORTH POINT	J. WOODS					
NARRACOOPA	G. WELLS					

OPERATING TIME				
Time On	Time Off	Requested By	System	System Used For:
				DEMOS
O/T Requested By:			Total System - Hours Operation for Client	

LOST TIME				
From	To	Hours Lost	System	Reason(s)

Brief Operations Log & Remarks 0001 to 2400 - ENROUTE TO GEELONG
DISMANTLING MOBILE INSTALLATION AND PACKING FOR
SHIPMENT TO PERTH

Continued Overleaf

Mobile Operators P. WARMKE
B. VINEY Party Chief J. RUSSEL

MAXIRAN/ARGO DAILY OPERATIONS LOG

Project Number 1676 Date 5 March 90 Boat PACIFIC TITAN Client Party Number 2931
 Geophysical Company HGS Oil Company STEEL Radio Frequency
 Country AUSTRALIA Area/Prospect BASS STRAIT Stepback Shot Point Interval

Mobile Station	FREQUENCY	INTERROGATOR	MONITOR	AMPLIFIER	ANTENNA SYSTEM
----------------	-----------	--------------	---------	-----------	----------------

MAXIRAN BASE STATIONS

Position	Operator	Frequency	Beacon	Amplifier	Code	Delay
----------	----------	-----------	--------	-----------	------	-------

Argo Mobile	Frequency	RPU	CDU	ALU	Configuration
-------------	-----------	-----	-----	-----	---------------

ARGO BASE STATIONS

Position	Operator	ΔRange	RPU	ALU	Config.	Code
POINT SOBEL	B. HOWARD					
NORTH POINT	J. WOODS					
NARACOOPA	G. WELLS					

OPERATING TIME

Time On	Time Off	Requested By	System	System Used For:
				DEMOR

O/T Requested By:

Total System - Hours Operation for Client

LOST TIME

From	To	Hours Lost	System	Reason(s)
------	----	------------	--------	-----------

Brief Operations Log & Remarks 0001 - ENROUTE TO GEORONG
 0600 - PICKING UP PILOT
 1000 - ALONGSIDE CUNNINGHAM DOCK
 WARMKE + VINNEY FOR HOME LEAVE

Continued Overleaf

Mobile Operators

P. WARMKE
 B. VINNEY

Party Chief

D. RUSSER

IV. GENERAL INFORMATION

A. ARGO frequency used was:

Ranging Frequency	1620 KHz
Lane Identification	1773 KHz

B. Satisfactory radiotelephone communications between the mobile and base installations were maintained on the frequencies of 7840.0 and 4637.5 (SSB) kilocycles.

C. Three ARGO base station installation were provided by ONA for this survey.

D. Three Syledis base station installations were provided by ONA for this survey. This equipment was installed at the three sites occupied by the ARGO base equipment.

E. Three ARGO base station sites were occupied during this operation. They were:

STATION NARACOOPA
STATION POINT SORELL
STATION NORTH POINT

V. PREPLOTING AND DATA ACQUISITION

ARGO preplots of the survey were provided to the field operations by HGS. The interval between shotpoint locations was constant at 25 meters.

No final mapping was accomplished by ONA on this survey. All ARGO positioning data accumulated during this survey was recorded by HGS on CMS tape.

VI. BASIC CONTROL

Coordinates of the Station Point Sorell was obtained from a Lands Department, Tasmania, Division of National Mapping summary sheet. Coordinates of Station North Point were provided to ONA by HGS. Coordinates of Station Naracoopa were obtained from ONA.

Universal Transverse Mercator Projection
Australian National Spheroid
Zone 55
Central Meridian 147° East
AUSTRALIAN GEODETIC DATUM

STATON NARACOOPA:

MARKER (281/150) COORDINATES

Latitude 039°55'27".64 S N = 5,576,663 meters
Longitude 144°07'26".23 E E = 254,211 meters

The ARGO tower was erected 307.051 meters, at an adjusted azimuth of 98.1204805552° from the marker.

ARGO TOWER OFFSET COORDINATES

Latitude 039°55'29".05 S N = 5,576,630 meters
Longitude 144°07'39".03 E E = 254,517 meters

The Syledis tower was erected 29.609 metres, at an adjusted azimuth of 159.055202777° from the ARGO tower.

SYLEDIS TOWER OFFSET COORDINATES

Latitude 039°55'29".29 S N = 5,576,603 meters
Longitude 144°07'39".47 E E = 254,528 meters

VI. BASIC CONTROL (continued)STATION NORTH POINT:

MAIN TRIG COORDINATES

Latitude	040°42'50".472	S	N = 5,491,514.85 meters
Longitude	145°15'31".329	E	E = 352,919.11 meters
Elevation	5.5 meters		

ARGO COORDINATES

Latitude	040°42'52".146	S	N = 5,491,462.76 meters
Longitude	145°15'30".276	E	E = 352,895.49 meters
Elevation	5.5 meters		

SYLEDIS COORDINATES

Latitude	040°42'51".396	S	N = 5,491,486.36 meters
Longitude	145°15'31".313	E	E = 352,919.30 meters
Elevation	5.5 meters		

STATION POINT SORELL (ST 517):

MARKER COORDINATES

Latitude	040°07'24".69	S	N = 5,447,407 meters
Longitude	146°31'41".88	E	E = 460,403 meters
Elevation	30 meters		

The ARGO tower was erected 34.4 meters, at a bearing of 005° Magnetic, from the station marker.

ARGO TOWER OFFSET COORDINATES

Latitude	041°07'23".63	S	N = 5,447,440 meters
Longitude	146°31'42".34	E	E = 460,414 meters
Elevation	30 meters		

VII. PERSONNEL

<u>NAME</u>	<u>POSITION</u>
Russell, D.	Party Chief
Warmke, P.	Mobile Operator
Viney, B.	Mobile Operator
Howard, B.	Base Operator
Wells, G.	Base Operator
Woods, J.	Base Operator

VII. DISTRIBUTION

Halliburton Geophysical Service 64 Buckingham Drive Wangara WEST AUSTRALIA 6065	Five Copies
Offshore Navigation (Australia) Pty Ltd. Post Office Box 291 Cloverdale WEST AUSTRALIA 6105	Two Copies
Offshore Navigation, Inc. Post Office Box 23504 Harahan, Louisiana UNITED STATES OF AMERICA 70183	One Copy

BASE STATION DESCRIPTIONS & PLATES

39.

STATION: NARACOOPA

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

The ground plain is grassy but very rough and uneven. To the right of the ARGO and Syledis markers there is bush and trees approximately 50 feet high. Looking from the station you can see straight out into the open sea. You can also look down on Mobil's Oil Tanks and jetty. Below the station to the right is George Wettsens' (property owner) house.

ACCESS: Fraser Bluff is in the village of Naracoopa approximately 20 km from the main town of Curry. As you enter the village there is an intersection with a sign post to the right towards Mill Brook. Turn into the Mill Brook road and drive 0.8 km to a turn off and gate to the left. Go through the gate and drive right past a small dam. Then once past the dam drive through the paddock to the ridge overlooking the Mobil fuel tanks and jetty. You will also spot a TV aerial on top of a fence post, you cannot miss the station if you do. You will end up over a 800 foot high cliff overlooking the Mobil fuel tanks and jetty or you will end up on the road that will take you to George Wettsens' house. It is a very high drop from the station itself.

Mr. Wettsens has a tractor during winter months which can be used to transport equipment onto the station, or at anytime required.

STATION
MARKER: There is no actual station marker, but for reference purposes the TV aerial on the fence will do.

SYLEDIS
MARKER: The Syledis marker is a star picket approximately 4 feet out of the ground. A brass plaque embedded in cement, inscribed "GSI SYLEDIS 1984" is alongside the marker. The TV aerial is 60° and 22 meters from the Syledis marker.

STATION: NARACOOPA (continued)

ARGO

MARKER: The ARGO marker is a star picket approximately 4 feet out of the ground. Alongside there is a brass plaque embedded in cement at ground level, inscribed on this is "ONI ARGO 1984". The TV aerial is 120° and 43 meters from the ARGO marker. The distance from the ARGO marker to the Syledis marker is 29.609 meters at a bearing of 157°, 12 minutes and 30 seconds.

GENERAL: Permission to occupy the site must be obtained from Mr. George Wettsens (004 611103). The site may be occupied for a fee of A\$ 25.00 per day.

Food supplies can be bought in Curry. Water can be obtained from George Wettsens' farm house at the bottom of the hill below the station depending on how long the job is for. A meal allowance was paid to Mrs. Wettsens who provided meals morning and evenings. This saved a lot of running around buying base station food. They are very nice people and look after you well. Don't spoil a good thing, especially on a short job. You will have to discuss this with both Mr. and Mrs Wettsens'. Mr. Wettsens provided labour and transport to the site. Again this has to be worked out between both parties. Fuel and oil for the generator can be obtained through Mr. Wettsens. There is also a Mobil garage in Curry. A caravan can be hired from Mrs. B. Crack (Mr. Wettsens has her contact number).

Everything above can be easily arranged before arriving on King Island by ringing Mr George Wettsens at this number: (004) 611 103 Naracoopa. They are more than willing to be of assistance to you at anytime. Caravans are very hard to hire on King Island. George Wettsens has all the contacts for everything you need to set up station.

SKETCH: See Page No's 42 and 43.

STATION: NARACOOKA (continued)

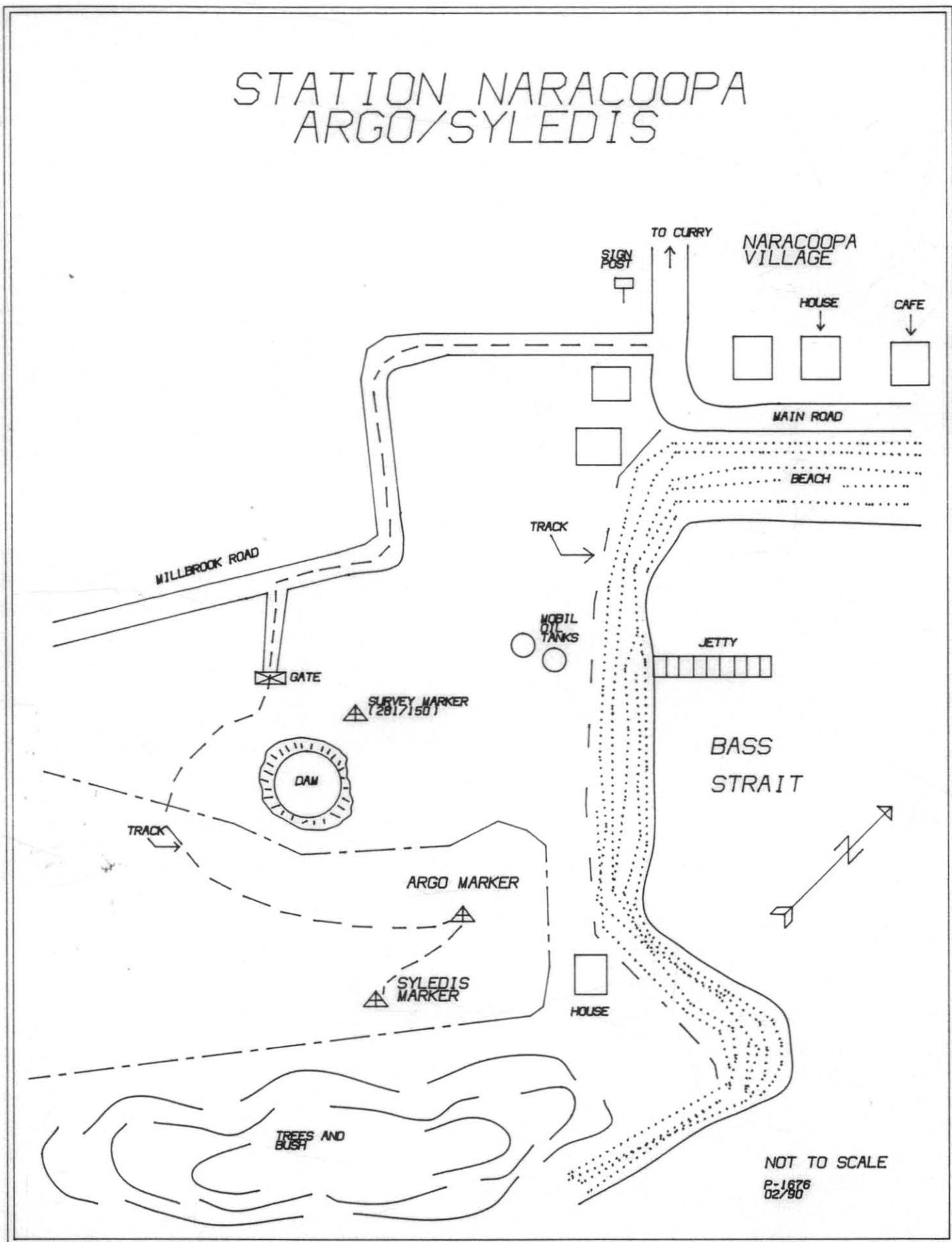
COORDINATES: The coordinates were obtained from O.N.A.

UTM PROJECTION, AUSTRALIAN NATIONAL SPHEROID ZONE 55, C.M.
147 DEGREES EAST -- A.G.D.

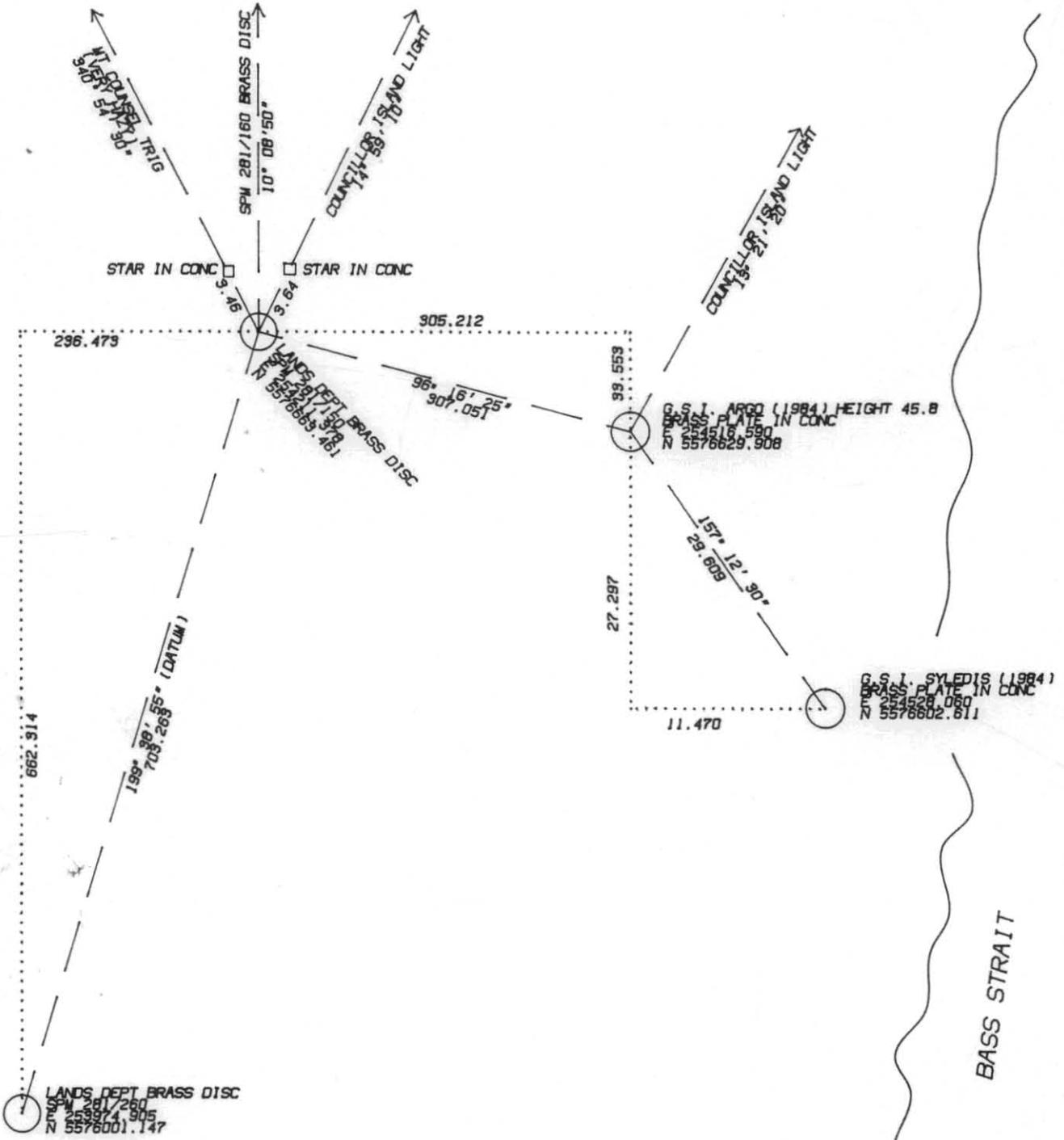
SYLEDIS COORDINATES

Latitude	039°55'29".95	S	N = 5,576,603 meters
Longitude	144°07'39".47	E	E = 254,528 meters
Elevation	56 meters		

STATION NARACOOPA ARGO/SYLEDIS



NARACOOPA - SITE PLAN



P-1676
02/90
(NOT TO SCALE)

STATION: NORTH POINT

LOCATED: The station is located near the township of Stanley, Circular Head, Tasmania, Southern Australia. There is water to the east, north and west with shingle beaches. There is a navigation light approximately 250 meters offshore bearing of 60° from Main Trig (rock cairn).

There is a shingle ridge at the top of the beach to the east of the station site approximately 40 meters away. The land at the station site slopes south-east away from the nearest beach.

ACCESS: From Devonport head west along Bass Highway for approximately 2 hours. Turn right towards Stanley and head towards the township of Stanley, turn left 50 meters before the BP Garage, then left again at the Union Hotel. Follow this road along the coast, towards the lighthouse. There is only one access track to the station. Use the diagram from here. From the Union Hotel the distance to the station is 8.6 km.

Access can be made by 2-wheel drive vehicles for most of the year except after heavy rain. Contact with the owner will assist in this. Owner may guide operator to actual site.

MAIN TRIG
MARKER:

The station marker is a rock cairn approximately 40 cm above ground level. The marker is 8 meters from bushes on the beach edge at the northerly point of land. A navigation light is approximately 250 meters and 60° offshore from the rock cairn.

SYLEDIS
MARKER:

The Syledis marker is 166° from the cairn. It is a grey concrete block 240mm square, inscribed "GEOMEX 10/85", at ground level.

ARGO
MARKER:

The Argo marker is 195° from the cairn and 218° from the Syledis marker. It is a grey concrete block 270 mm square, inscribed "GEOMEX 10/85", at ground level.

STATION: NORTH POINT (continued)

GENERAL: Permission to occupy the site must be obtained from Mr. David Bruce (telephone: 004-581321). The fee for the use of this site is A\$ 200.00 per week. The local ranger, Mr. Brian Carson (telephone: 004-581320) has proved very useful for general assistance.

Food, fuel and water etc., may be obtained from Stanley if required. Fuel - Caltex Depot - Roberts Pty. Ltd. Labour may be supplied by David Bruce's son and someone he knows, or through the local ranger. A caravan is recommended for this site - especially in winter.

SKETCH: See next page.

COORDINATES: The coordinates were obtained from H.G.S.

UTM PROJECTION, AUSTRALIAN NATIONAL SPHEROID ZONE 55,
C.M. 147° EAST -- A.G.D.

SYLEDIS COORDINATES

Latitude	040°42'51".396	S	N = 5,491,486.36 meters
Longitude	145°15'31".313	E	E = 352,919.30 meters
Elevation	5.5 meters		

ARGO COORDINATES

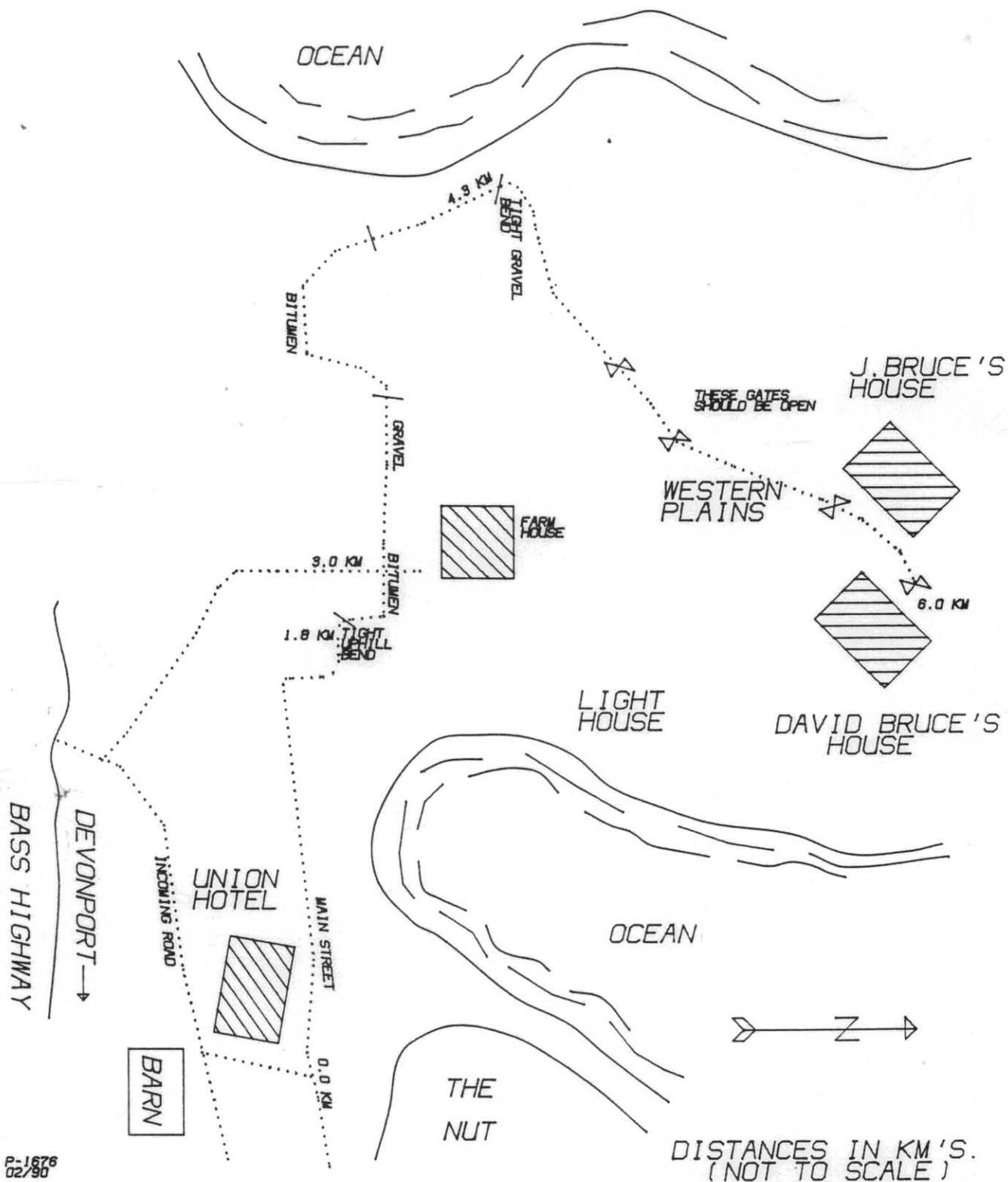
Latitude	040°42'52".146	S	N = 5,491,462.76 meters
Longitude	145°15'30".279	E	E = 352,895.49 meters
Elevation	5.5 meters		

MAIN TRIG COORDINATES

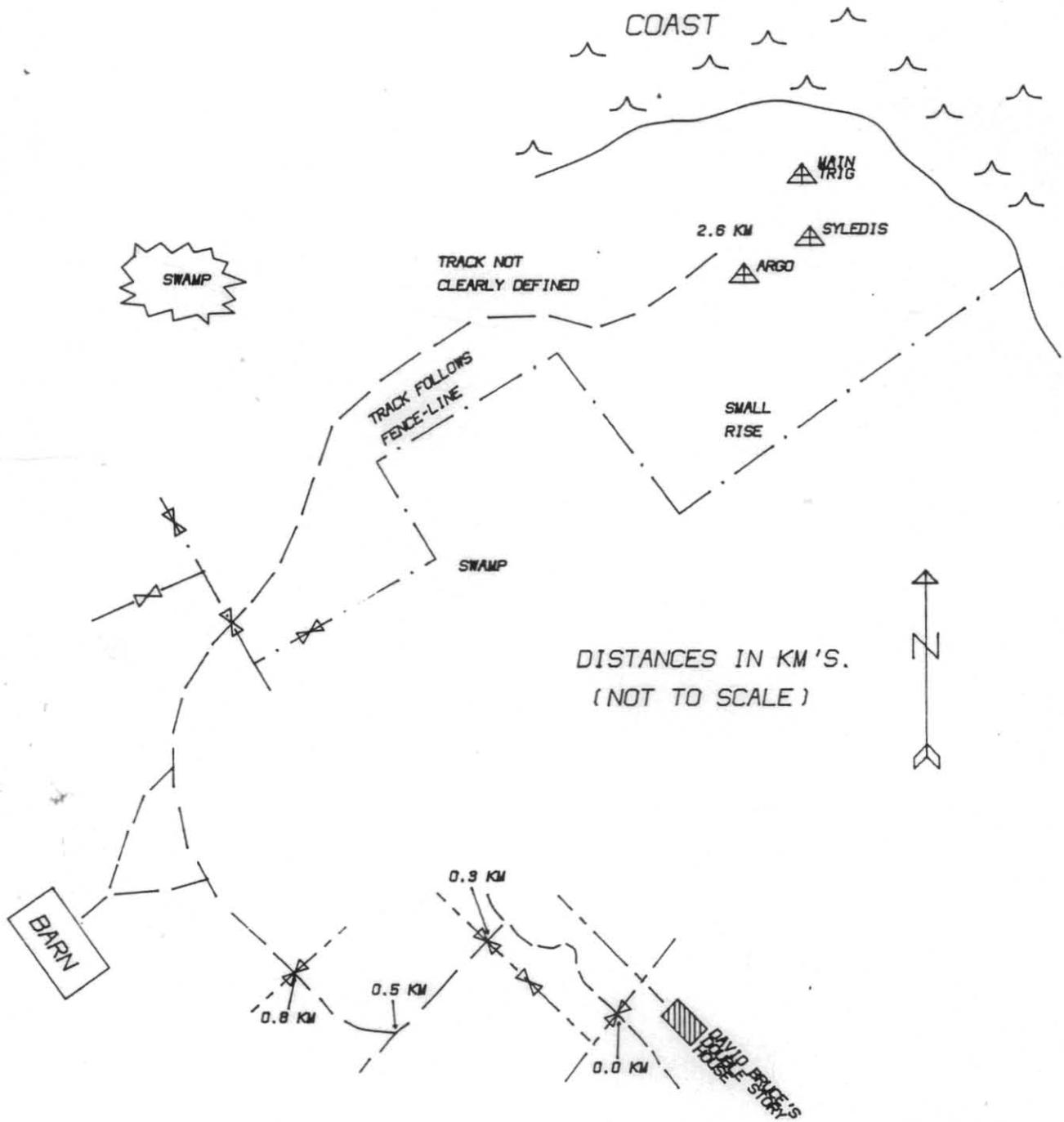
Latitude	040°42'50".472	S	N = 5,491,514.85 meters
Longitude	145°15'31".329	E	E = 352,919.11 meters
Elevation	5.5 meters		

NORTH POINT - TASMANIA

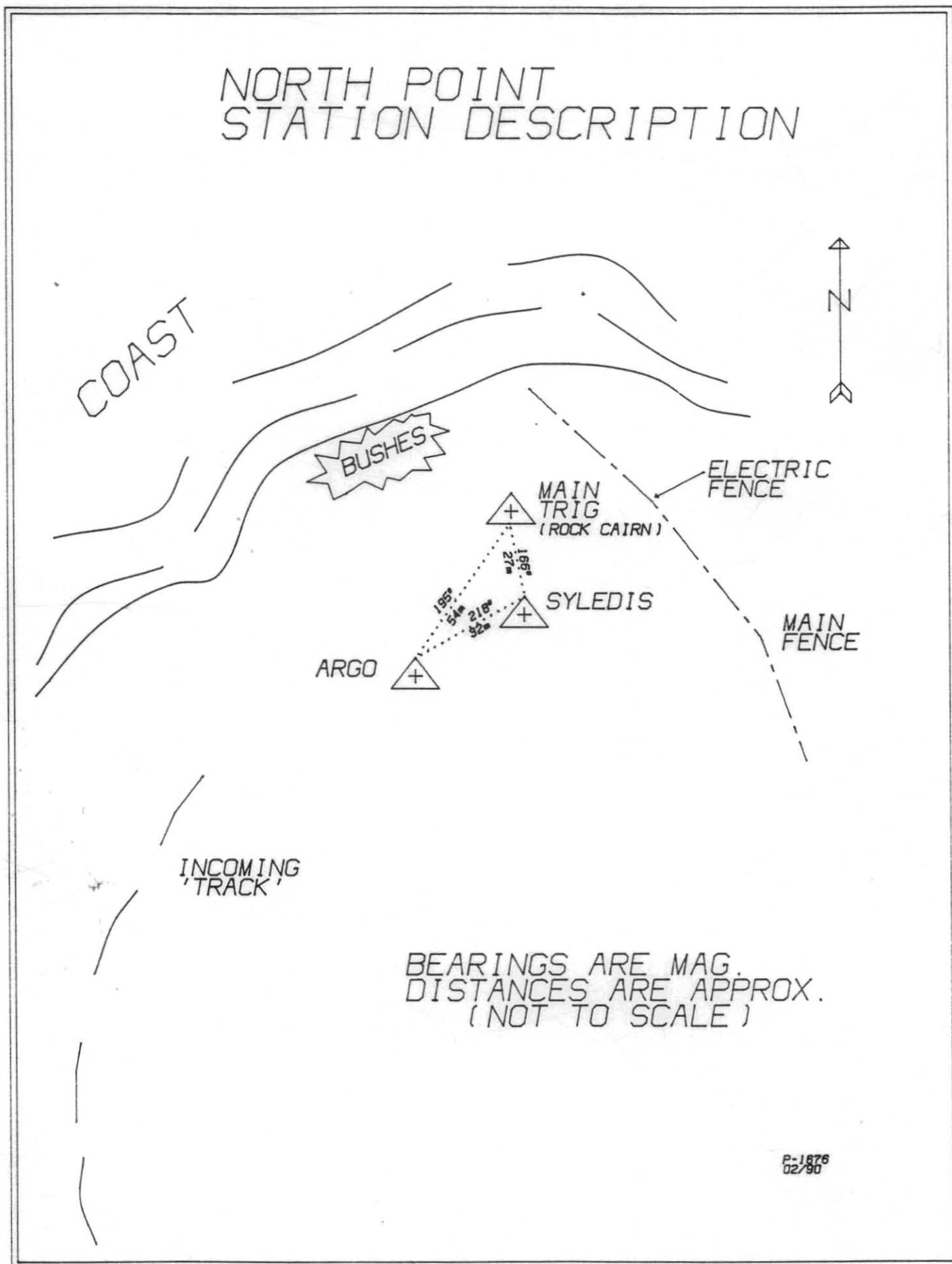
ARGO/SYLEDIS



NORTH POINT STATION ACCESS DIAGRAM



NORTH POINT STATION DESCRIPTION



STATION: POINT SORELL (ST 517)

LOCATED: This station is located on the highest point of Point Sorell, Tasmania, Australia which is 4.8 km from Hawley Beach, 1 km from Port Sorell and approximately 26 km by road east of the city of Devonport. On a clear day Badger Head, on the eastern entrance of Port Sorell, is visible from the station.

Rocks lay about the station. Some of the rocks extend up to 1 foot above ground level. Vegetation in the area is mainly green grass and patches of Tussock up to 1 meter high. On the landward side the point slopes gradually, with black soil pasture riddled with Mutton Bird burrows. Once on the flats, which are very wet during winter, vegetation ranges from scattered trees to patches of dense woods.

On a clear day the city of Devonport can be seen 32 km away, at a bearing of 260°. Beach areas, are separated by rocks, are located 900m from the station at a bearing of 200°. Small patches of trees are located 500 meters from the station at a bearing of 80°. An 80 meter by 30 meter island is located offshore, approximately 800 meters and 60° from the station.

ACCESS: In dry weather a regular two-wheel drive vehicle may be used, but the grassy slopes on the approaches to the station site may become very slippery when wet and there are numerous boggy patches after heavy rains and a four-wheel drive vehicle is necessary.

If four-wheel drive vehicles are unavailable or it turns wt after the station is set, Roger Moncrieff has a tractor which is available to tow the vehicle to and from the station site. The tractor may also be required to tow even a four-wheel drive vehicle if it is heavily laden in extreme wet conditions.

From Devonport, drive on the Bass Highway towards Launceston for 2 km past the East Devonport turnoff, and turn left at the Exeter/Port Sorell turnoff (B19) near the top of the rise. Follow this road towards Port Sorell (the Exeter Road turns off to the right) for approximately 12 km to a road intersection, located approximately 2 km before entering Port Sorell. A wooden sign showing "Hawley Caravan Park" is on the left side of this intersection. Turn left at this intersection, and follow the road to Hawley Beach.

STATION: POINT SORELL (ST 517) (Continued)

Turn left at a "T" junction, located 50 meters before the Hawley Beach Store and Post Office. Just after making this left turn, a prominent sign to the right reads "Heavy Vehicles Only" (see sketch). Follow this sealed road to it's end at a "T" junction with a chlorine station facing you on the other side of the road. Turn left at this junction. A left turn takes you on a foreshore track. Follow this road (it turns to gravel half way along) for approximately 700 meters (passing a picnic spot and toilets on the right) to a white wooden gate. Immediately in front of the gate, the road veers to the right. A turn to the left is marked "LMS Private Road". Take this turn to the left (it is 3 km to the station from this point). Follow the road for approximately 100 meters and turn to the right. Straight ahead at this point is the residence of Mr. Roger Moncrieff, the son of the station site land owner. Drive for approximately 300 meters to a locked gate. At this gate, a track leads to the right to the residence of Mr Don. Moncrieff, the station site land owner, located approximately 100 meters from this gate. Obtain a key for this gate, or if opened follow the road straight ahead to double gates, near the council sewerage pond, which are usually open. The station marker will be visible from the double gates at a distance approximately 2 km to the marker. Seek the land owner's advice or follow the track shown on the sketch.

MARKER
(ST-517):

The station marker, located on a hill, consists of a brass mushroom S.P.M., which is not labelled. The station marker is geographically located on a point 150 meters from the water's edge (Bass Strait). The marker is embedded in concrete at ground level, with stones surrounding the marker. Directly over the top of ST-517 marker is positioned a Quadropod.

SYLEDIS
MARKER:

The Syledis marker, approximately 30cm in diameter is located on the outside edge of the quadropod erected on the station at bearing 270° and a distance of 2 meters from the centre of the quadropod and has the inscription "SYLEDIS, O.N.I. 1990". The marker has plastic tubing inserted vertically to a height of approximately 0.7 meters. Both marker and tubing are painted gold.

STATION: POINT SORELL (ST 517) (Continued)

ARGO

MARKER:

The Argo marker is located at a bearing of 5° and a distance of 34.4 meters from the Syledis marker. The marker is a cairn of stone 50 cm in diameter and has no inscription. The marker is gold covered PVC pipe inserted vertically to a height of approximately 0.7 meters.

GENERAL:

Labour can be provided by Mr. Roger Moncrieff. Labour can also be obtained in Devonport, approximately 22 km from the station, or Latrobe, approximately 19 km away. Fuel, oil, camping equipment and supplies are available at Devonport. Bulk fuel can be obtained from several depots located in Devonport. There is a service station in Port Sorell, and a reasonable selection of goods can be obtained at the Hawley Beach Store and Post Office. Drinking water can be obtained from the station property owner or his son.

A caravan with heater is highly recommended at this site. The winter months, June to September, can be very wet, windy and cold. Temperatures can range from several degrees below zero to a daily maximum of as low as 4 degrees celsius. Extra rope and star stakes should be taken for tying down during this period. Penguins are very frequent visitors to the station site, particularly at night.

Vehicles may be obtained from Hertz, Oldaker Street, Devonport (telephone 004-241013). Hertz representatives have been very helpful and can assist regarding fuel supplies from Mobil, Devonport if required.

Four-wheel drive vehicles may also be obtained from Regent Filling Station, 57 Marine Terrace, South Burnie. This is the Shell Service Station past the paper mill on the Bass Highway, as you approach Burnie from Devonport. The contact at this place is Mr. Wayne Cross. The service station telephone number is 004-312131.

A 20-foot tower was erected at this site, the minimum height required to clear surrounding obstructions. Clear vista is from 200° (through north) to 060°. Star stakes were used to secure the tower.

STATION: POINT SORELL (ST 517) (Continued)

Permission to occupy the station must be obtained from the land owner, Mr. Don Moncrieff, Hawley Beach via Latrobe 7307, Tasmania. His phone number is 004-286193. Mr. Moncrieff was paid a daily rental fee of A\$ 25.00 for the use of his land. If Mr. Don Moncrieff is absent, permission may be obtained from his son, Roger Moncrieff; telephone number 004-286587. Roger lives approximately 1 km from Don Moncrieff. See sketch.

SKETCH: See next pages.

COORDINATES: Coordinates of the station marker were obtained from a Lands Department, Tasmania, Division of National Mapping summary sheet.

UTM PROJECTION, AUSTRALIAN NATIONAL SPHEROID ZONE 55,
C.M. 147° EAST -- A.G.D.

MARKER COORDINATES:

Latitude	041°07'24".69 S	N = 5,447,407 meters
Longitude	146°31'41".88 E	E = 460,403 meters
Elevation	30 meters	

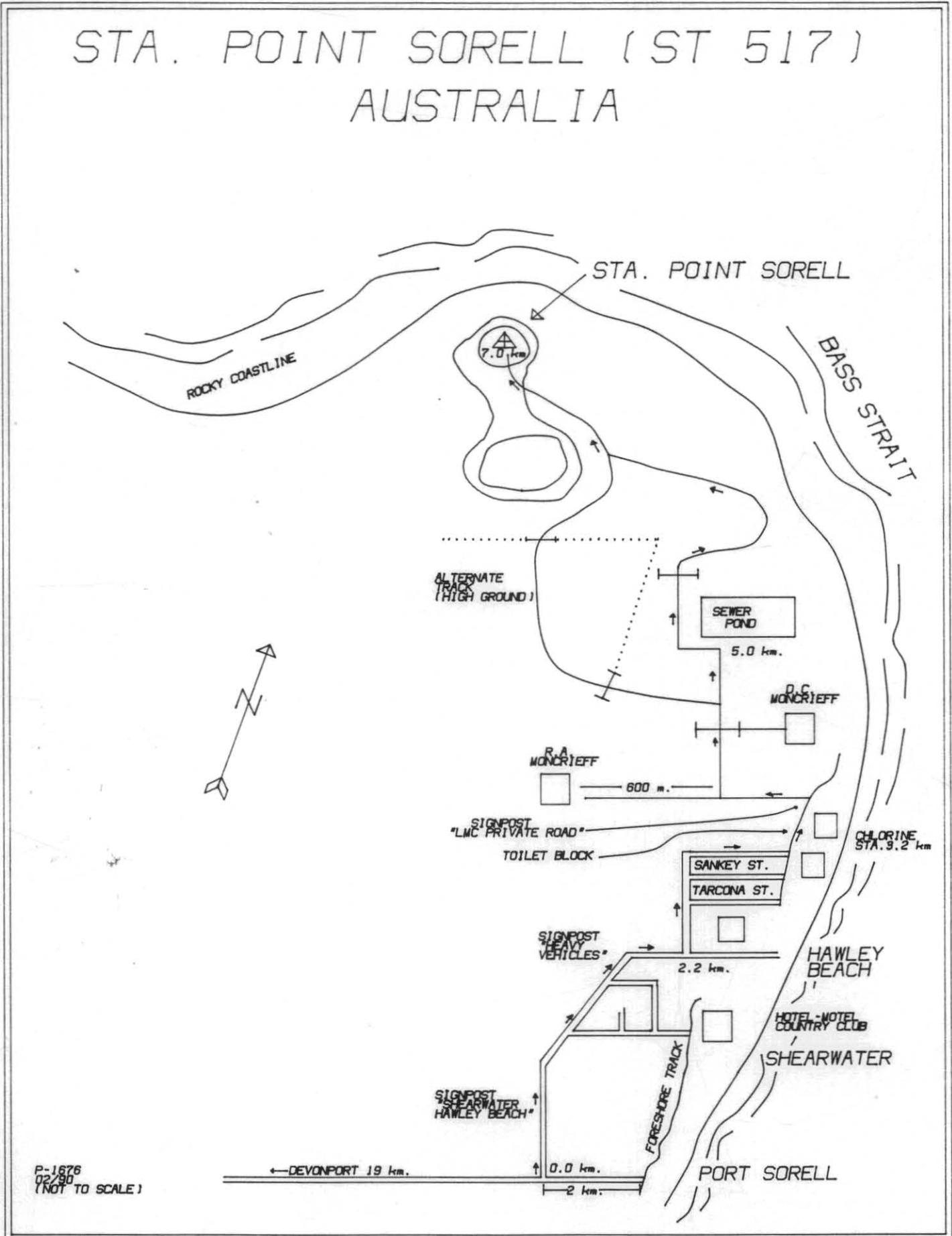
The Syledis tower was erected adjacent to the marker.

The Argo tower was erected 34.4 meters, at a bearing of 005° magnetic, from the station marker.

ARGO TOWER OFFSET COORDINATES:

Latitude	041°07'23".63 S	N = 5,447,440 meters
Longitude	146°31'42".34 E	E = 460,414 meters
Elevation	30 meters	

STA. POINT SORELL (ST 517) AUSTRALIA



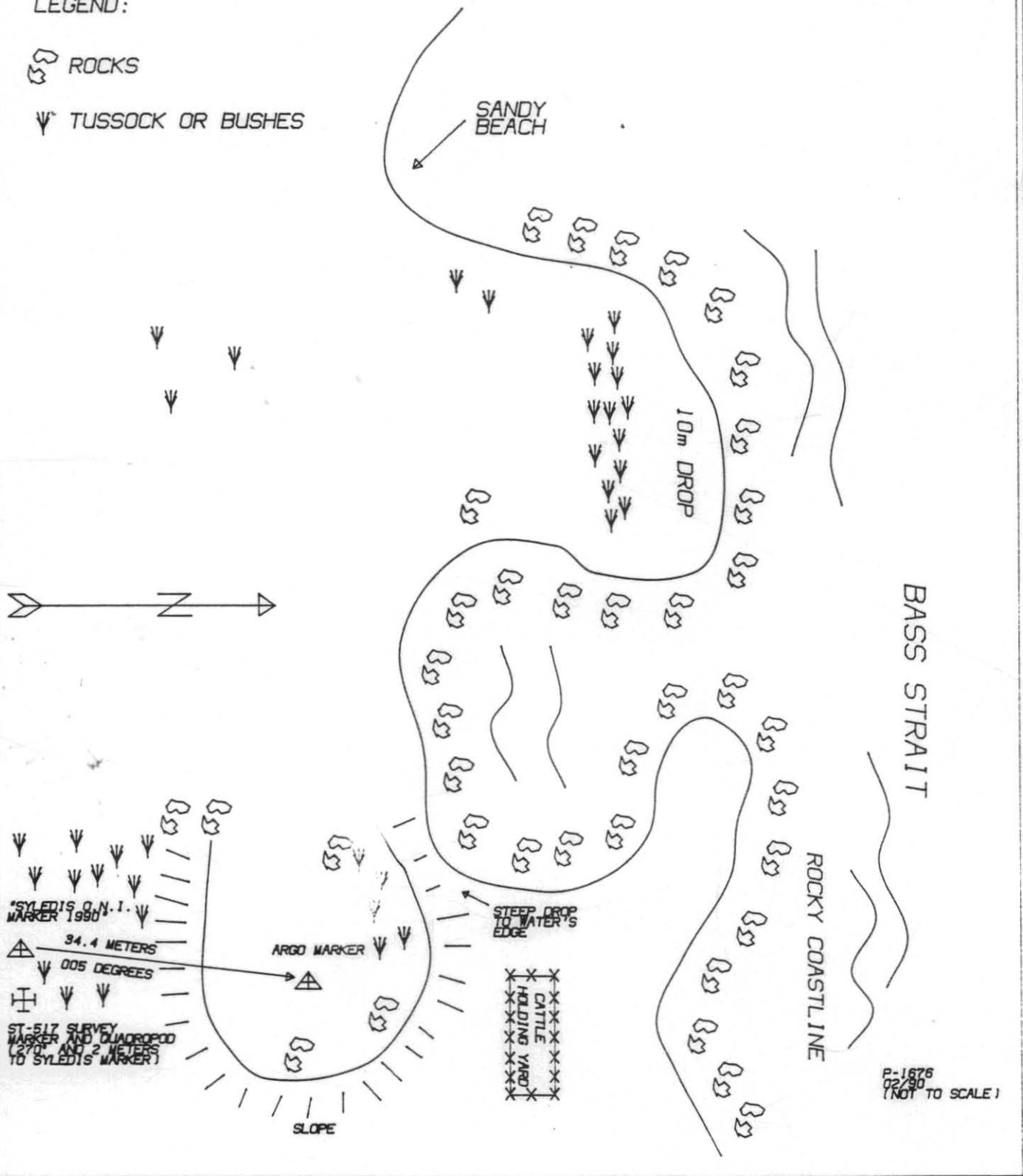
P-1676
02/80
(NOT TO SCALE)

POINT SORELL - STATION MAP (ST-517)

LEGEND:

 ROCKS

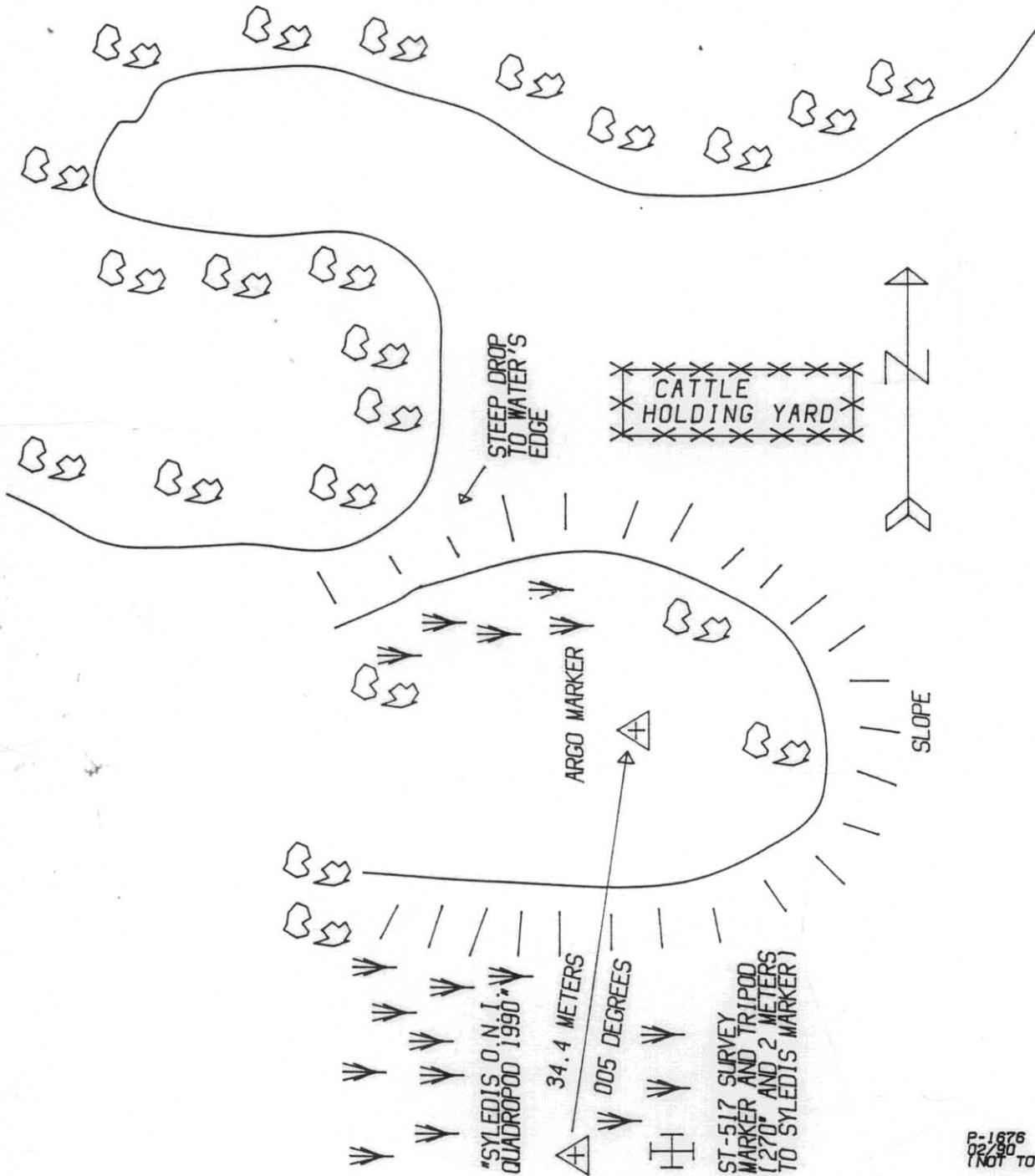
 TUSSOCK OR BUSHES



P-1676
02/90
(NOT TO SCALE)

POINT SORELL - DETAILED STATION DESCRIPTION

ROCKY COASTLINE



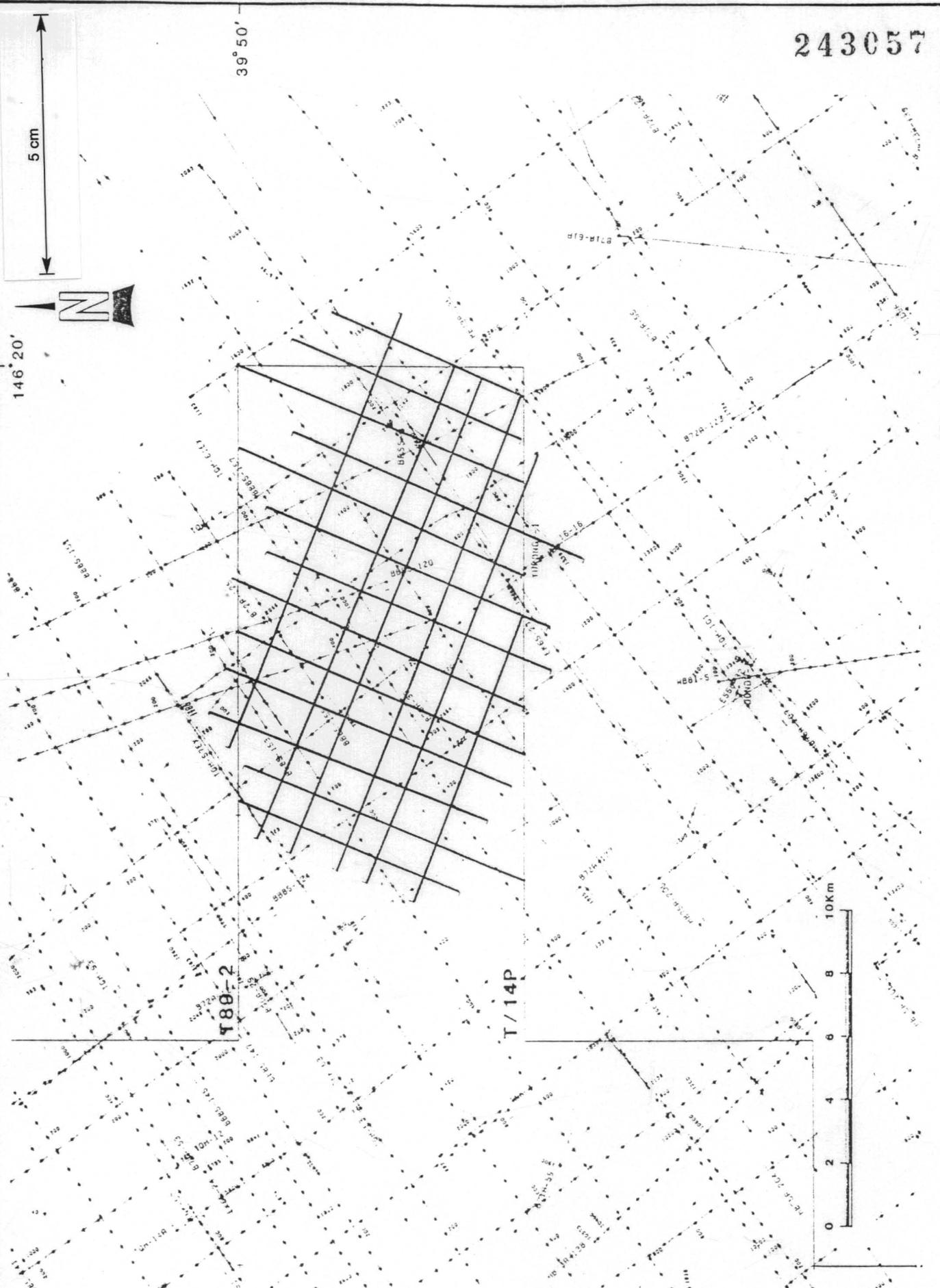
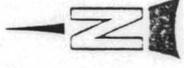
P-1876
02/90
(NOT TO SCALE)

243057

39° 50'

5 cm

146° 20'



T/14P

T/14P

FULL FOLD (213.6) KM
TOTAL LINE KM 231.6



SHELL-AUSTRALIA
E & P. OIL AND GAS

BASS BASIN

T/14P PROPOSED 1989 SEISMIC PROGRAMME (BS89A)

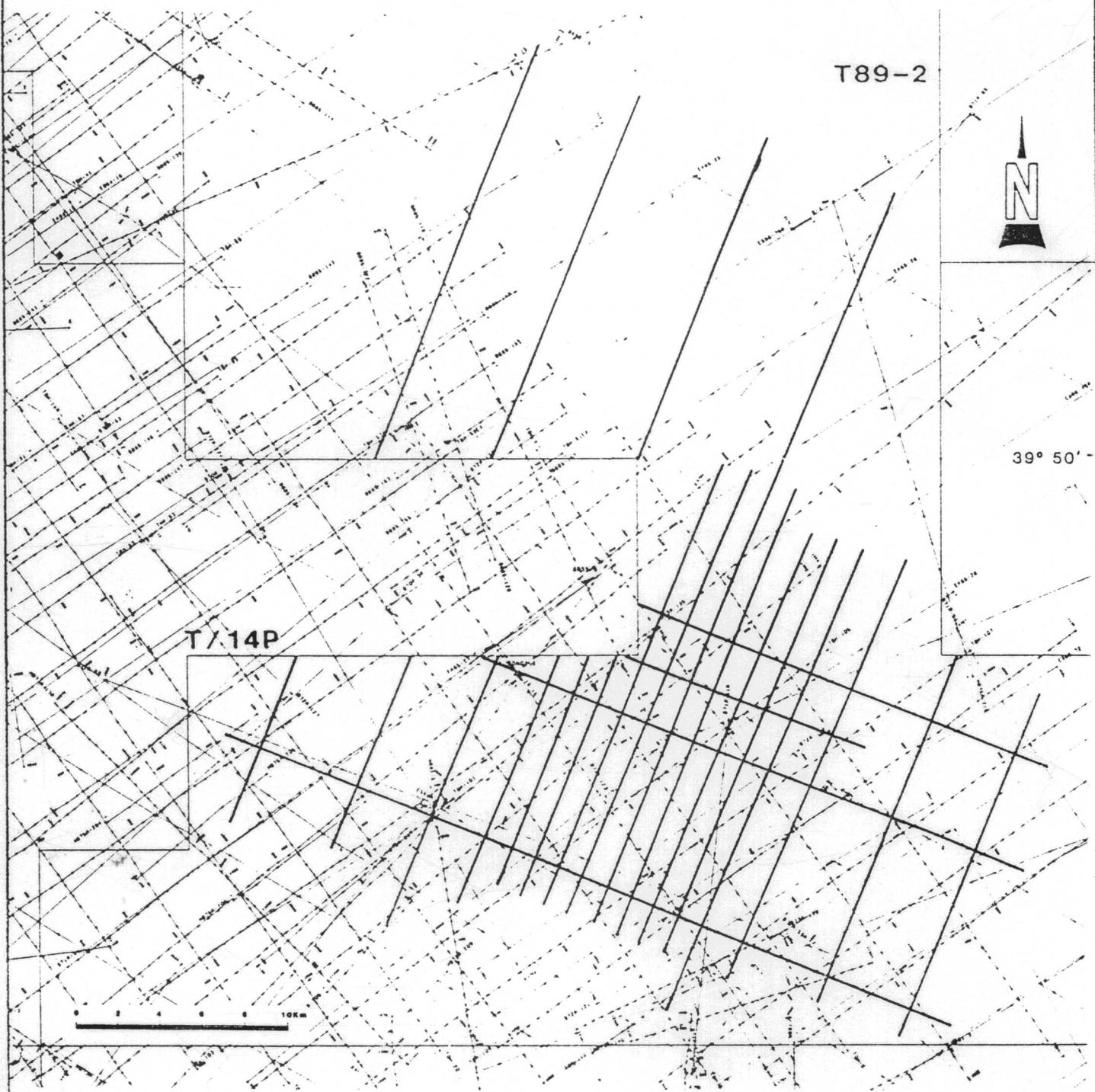
Author: EXO

Report No.:

Date: NOVEMBER 1989

Drawing No.: 25724

Figure



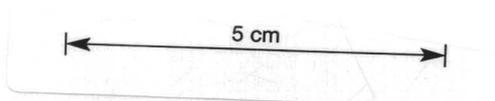
T89-2

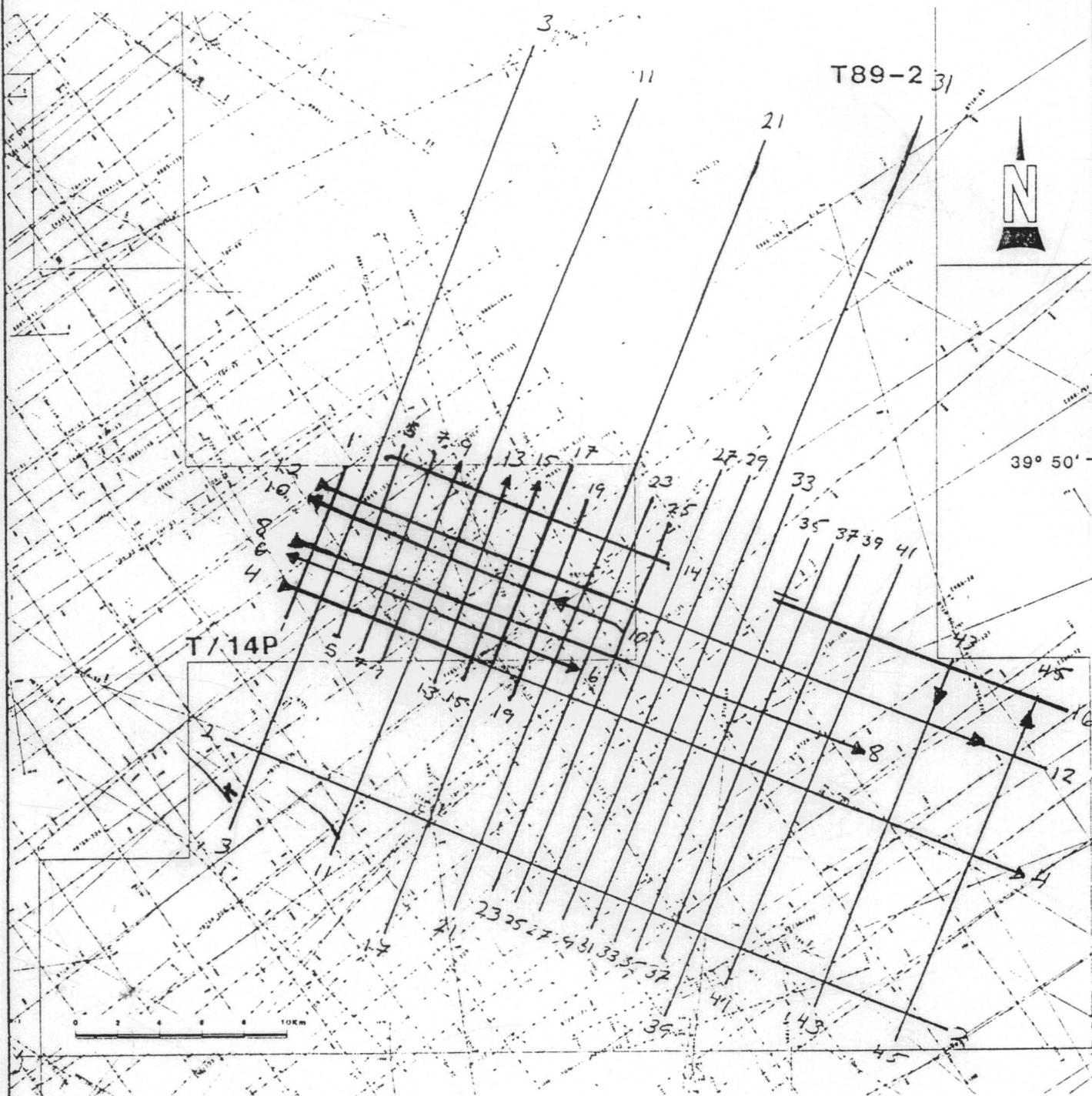
T714P

39° 50'

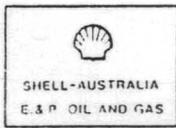
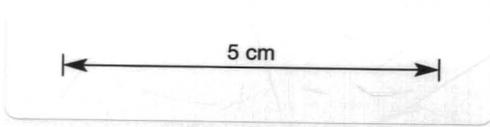


— FULL FOLD 470 KM
 TOTAL LINE KM 500.2

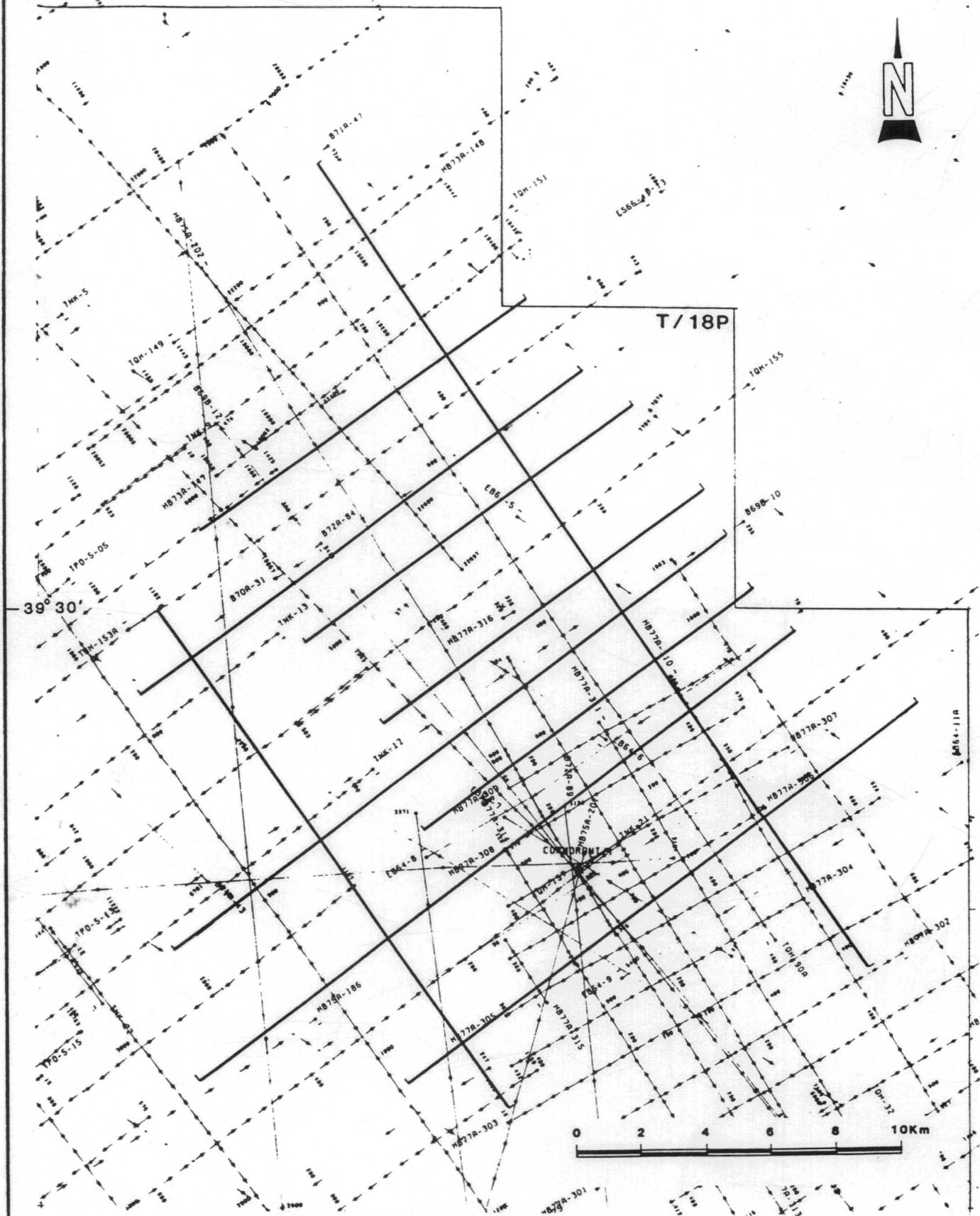




— FULL FOLD 470 KM
 TOTAL LINE KM 500.2



BASS BASIN		Figure
T89-2 PROPOSED 1989 SEISMIC PROGRAMME (BS89A)		
Author: EXO	Report No.:	Date: NOVEMBER 1989 Drawing No.: 25729



FULL FOLD (181.2) KM
 TOTAL LINE KM 201.2

5 cm



BASS BASIN			
T/18P PROPOSED 1989 SEISMIC PROGRAMME (BS89B)			
Author: EXO	Report No.:	Date: NOVEMBER 1989	Drawing No.: 25725

Figure

THE ARGO RADIOPOSITIONING SYSTEM

ARGO is the acronym for Cubic Corporation's Automatic Ranging Grid Overlay navigation system. It operates on the principle that a medium frequency (MF) radio signal traveling along the earth's surface in the "ground wave" mode experiences a time (and hence phase) delay proportional to the distance travelled. ARGO utilizes a time multiplexed (RF) pulse to service up to seven mobile stations interrogating up to four fixed responders.

ARGO has multi-user capability in a Range-range Mode for 12 mobile units with two base responders. ARGO's capability also allows unlimited user capacity in the Hyperbolic Mode of operation, with a reduced number of Range-range users.

An ARGO fixes responder installation typically consists of a Range Processor Unit (RPU), Antenna Loading Unit (ALU), Power Source, and appropriate antenna and interconnecting cables. Two responder locations are required to determine the position of the mobile station. The Range Processor Unit receives an interrogation burst, processes it, and transmits a reply burst with the same carrier phase as that received from the mobile interrogator. In addition, the station designated as Master Station generates system timing bursts which are transmitted to the other fixed land stations and all mobile interrogators to establish and maintain a common time synchronization.

THE ARGO RADIOPOSITIONING SYSTEM (continued)

The ARGO mobile interrogator installation typically consists of a Range Processor Unit, Antenna Loading Unit, Control Display Unit (CDU), Strip Chart Recorders, Power Source, and appropriate antenna and interconnection cables.

The mobile Range Processor Unit processes the transmitted and received signals, and measures the phase delays. The Control Display Unit displays the range distance in units and fractions of lanes. The distance from each fixed station location to the mobile interrogator location is determined by an accumulation of lane counts and computing positions within lanes.

The mobile equipment can be interfaced with the proper equipment to simultaneously display, print, record and plot ranges.

Since the ARGO system operates from ground waves, it will measure beyond the optical horizon. Skywave and re-radiation effects are minimized by special filtering techniques.

THE ARGO RADIOPOSITIONING SYSTEM (continued)

Optimum system performance depends to a very large extent upon proper selection of base station sites on shore, and proper mobile antenna installation. For maximum range capability, the land stations must be located immediately adjacent to the coastline and on ground of good conductivity. Poor ground conductivity and overland transmission path will each reduce the maximum obtainable range. In addition, overland transmission can adversely effect the accuracy of the system.

RANGE - RANGE MODE OPERATION

This mode is a multi-user, multi-range circular geometry navigation and positioning system that used active mobile interrogator stations and two to four active responder stations at known fixed locations. The system determines the distance from each fixed location to the mobile interrogator location by accumulating lane counts and computing positions within lanes. The lane is related to the frequency of the carrier burst transmitted between stations. It is equivalent to half the carrier wavelength. Therefore, since the ARGO operating frequency range is 1600 to 2000 KHz, the lane width is approximately 75 to 94 meters. The exact lane width for a particular operating frequency and operating area is determined by dividing (Propagation velocity in meters/second) by (2 x operating frequency in Hertz). The resulting answer would be the lane width in meters. (NOTE: Propagation velocity is dependent on the characteristics of the operating area.)

THE ARGO RADIOPOSITIONING SYSTEM (continued)

Position within a lane is determined by examining the phase relationship between a burst of RG energy transmitted from the interrogator and retransmitted by a fixed responder station. Only one frequency is used for all the ranging functions within a single network.

The ARGO system also incorporates a lane identification feature. This permits verification of the proper lane count provided that the position of the mobile station is known within plus or minus five (5) lanes. The determination of the 10-lane sector can be accomplished by means of a satellite receiver, dead reckoning or other means. The lane identification feature uses a second radio frequency separated from the primary ranging frequency by approximately ten (10) percent. The reliability of the lane identification feature is dependent, to a large extent, on such factors as man-made noise, propagation errors, and installation problems, such as guy wires, masts, powerlines, etc.

For each mobile station, an interrogation burst is transmitted to each responder every 2 seconds. Each 2-second period is initiated by the Master station (which is normally one of the fixed stations, but can be one of the mobile stations) and is divided into time slots. The first time slot is 120 milliseconds long, and is used for a timing burst from the master station to synchronize all interrogators and responders.

THE ARGO RADIOPOSITIONING SYSTEM (continued)

The remainder of the 2-second time frame is divided into time slots, the number and duration of which depends upon the number of base stations in the system. Each time slot is further divided into a 56 millisecond segment for the mobile station interrogation and two or more 44 millisecond segments, one for each fixed base station in the system. The final time slot in a 2-second frame is used for the lane identification feature. Only one mobile station is assigned to each of the available time slots.

Up to twelve mobile stations can operate simultaneously from two fixed base stations. If the system includes three base stations, up to nine mobile stations can be used. Use of four base stations in a system reduces the number of permissible mobile stations to seven. All stations in a system must be set for the same system configuration; that is, set for two, three or four range operation.

HYPERBOLIC MODE OPERATION

The following equipment is required to convert the ARGO system from the Range-range mode to the Hyperbolic Mode:

MOBILE STATION - Hyperbolic Firmware (V2.3 CDU)

(V2.0B RPU)

Antenna Coupler

Receiver/Coupler Cable

THE ARGO RADIOPOSITIONING SYSTEM (continued)

BASE STATIONS - The Master (Center) station must have Firmware V2.OB installed in the RPU.

NOTE: If a second hyperbolic Center Station is to be utilized, it must also contain Firmware V2.OB (PROMS).

A marine operation may utilize either the Range-range or Hyperbolic Mode of Operation. An aircraft operation preferentially utilizes the Hyperbolic Mode, as the basic hardware design of the ARGO system allows increased data rates for high speed operations.

In the Hyperbolic Mode, the ARGO mobile station does not initiate station interrogations. A fixed station (the "Master") generates the interrogation pulse and the other fixed stations (Slave) reply to the Master interrogation pulse. The mobile station receives pulses from the Master (Center) Station and each Slave in turn.

THE ARGO RADIOPOSITIONING SYSTEM (continued)

A normal 2-second timing/ranging sequence is illustrated in Figure 1. The Master/Center initiates a timing pulse used for system timing, as with the Range-range Mode. The Master/Center Station then interrogates the Slave Stations in time slots 1, 3, 5, and 7. (The Slave stations reply to the Master interrogations in these time slots). The mobile station measures the phase of the Master/Slave pulses, and the hyperbolic Line of Positions (LOP's) are displayed on the Range Displays/ The formula for determining a LOP is shown in Figure 3.

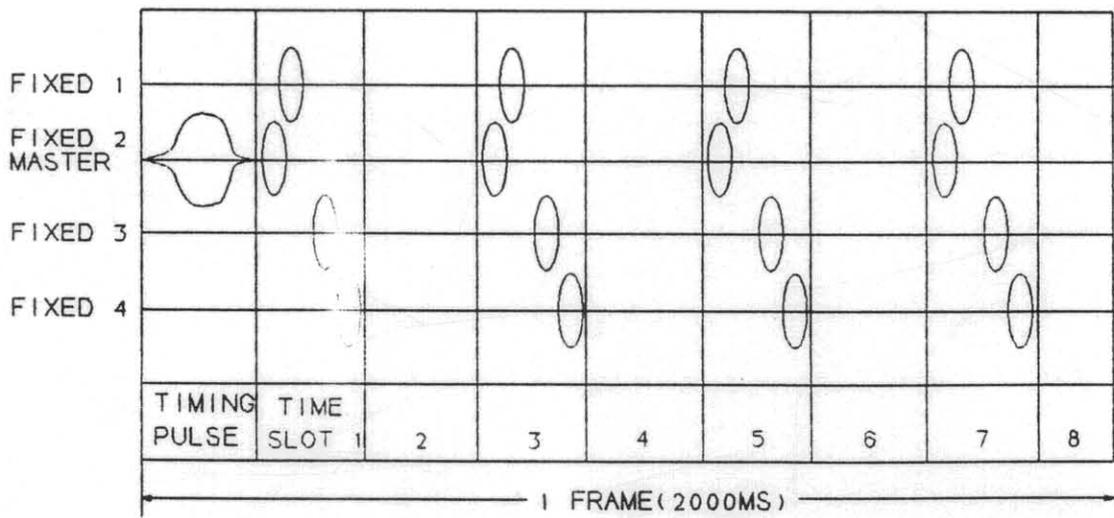
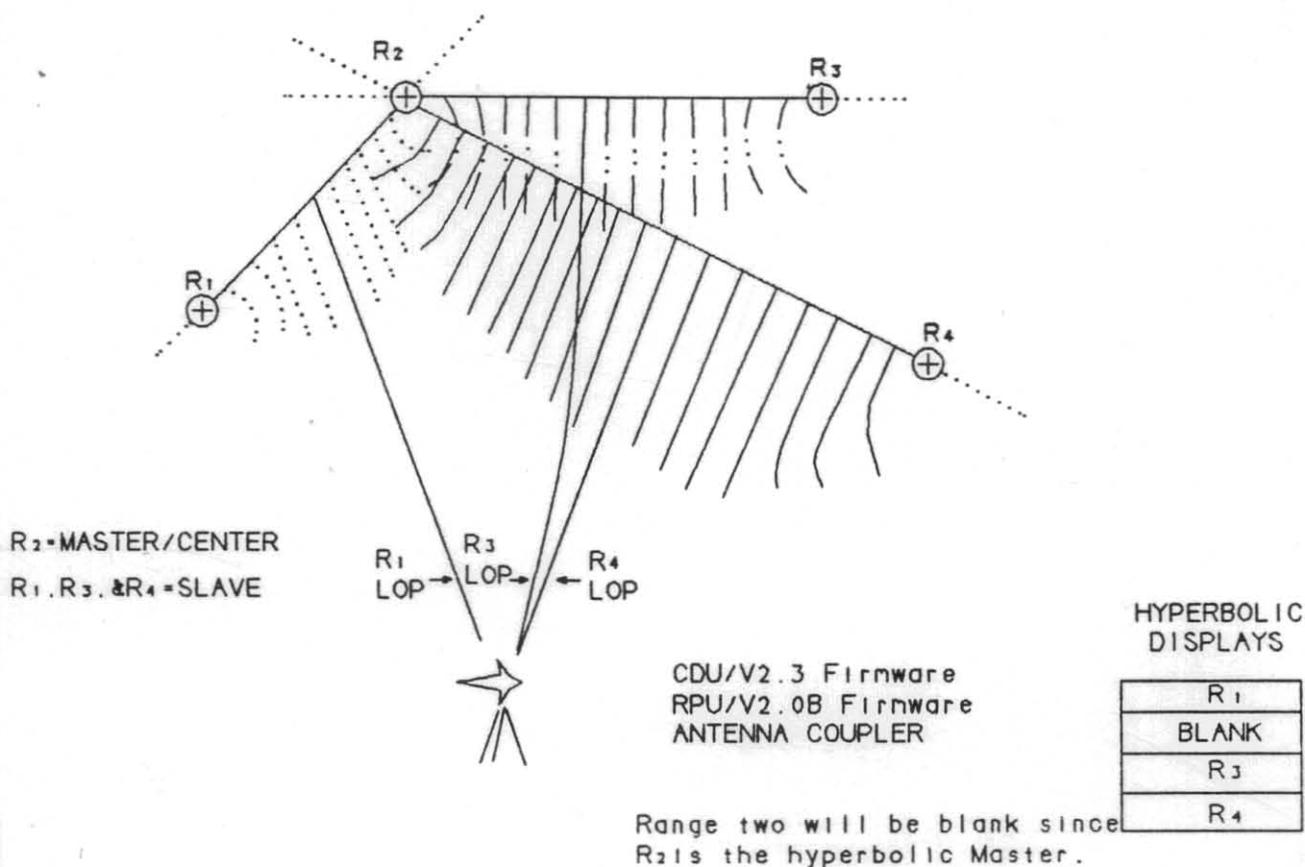


FIGURE 1

ILLUSTRATION OF MASTER INTERROGATIONS & SLAVE REPLYS

5 cm

TYPICAL HYPERBOLIC NET



R₁, R₃, & R₄ can have standard V1.6B or V1.8 Firmware and operate as a hyperbolic Slave. These stations can also have V2.0B Firmware installed as long as the station is operated in the Slave or Relay Mode.

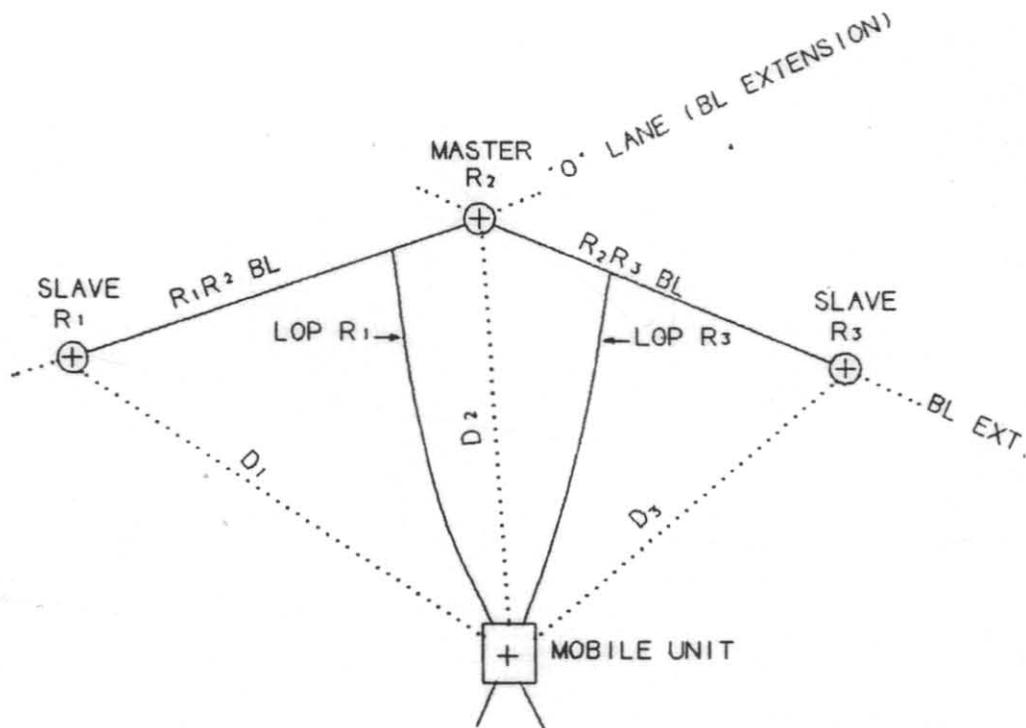
FIGURE 2

5 cm

THE ARGO RADIOPOSITIONING SYSTEM (continued)

In a Hyperbolic Network, there are a fixed number of ARGO "Lanes" (wavelengths) from the Master/Center Station to the Slave Stations. The number of lanes on a given baseline (that imaginary line which is the shortest distance between the Master/Center Station and Slave Station) can be determined by the formula: Twice the baseline length divided by the wavelength. "Zero" lane is located at the Master/Center Station, with the maximum number of lanes located at the Slave Station. Therefore, the baseline extension at the Master/Center Station is "Zero" lanes. This feature is used to conveniently calibrate the mobile unit. The mobile unit merely needs to circle the Master/Center Station, and adjust when the mobile display reaches its lowest reading. This indication will be at a point where the Master/Center Station is directly between the mobile unit and the Slave Station being calibrated. In addition, a check of the accuracy of the ARGO system can be accomplished by crossing the baseline extension at the Slave Station, and comparing this reading with the computed baseline length.

FIGURE 3



$$\text{HYPERBOLA } R_1 (\text{Lanes}) = \frac{BL R_1 R_2 + D_2 - D_1}{\text{WAVELENGTH}}$$

Where: D_2 = Distance to Master
 D_1 = Distance to Slave R_1

$$\text{HYPERBOLA } R_3 (\text{Lanes}) = \frac{BL R_2 R_3 + D_2 - D_3}{\text{WAVELENGTH}}$$

Where: D_3 = Distance to Slave R_3

$$\text{NUMBER OF LANES ON BASELINE (BL)} = \frac{2BL}{\text{WAVELENGTH}}$$

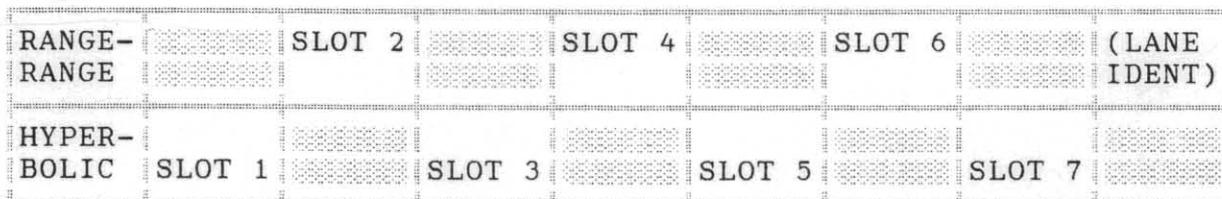
5 cm

THE ARGO RADIOPOSITIONING SYSTEM (continued)

The ARGO hyperbolic software allows for an unlimited number of hyperbolic users, and up to three range-range users when a four base station network is utilized, as indicated in Figure 4.

FIGURE 4

Timing RPU Switch=00 CDU Sign on = 4r L.I.HYP. .A.C.(CMD format#11



I/O PORTS BOARD SWITCH SETTINGS

SW7	SW8	
7	8	
ON	ON	4R L.I. HYP A.C.
OFF	ON	4R L.I. HYP L.I.
ON	OFF	3R L.I. HYP A.C.
OFF	OFF	3R L.I. HYP L.I.

If Hyperbolic Lane Identification is desired, one of the Range-Range time slots must be reserved for this feature. Time Slot 4 is used for Hyperbolic Lane Identification (See Figure 4 for the Input/Output Ports Board Switch setting to activate this feature). Hyperbolic Lane Identification is not used in aircraft operation, since the high speed operation reduces the reliability of this feature greatly.

THE ARGO RADIOPOSITIONING SYSTEM (continued)

A Range Processing Unit with 2.0B software installed will operate as a normal Range-Range base station, as long as the Timing Switch is set to "Slave" or "Relay". Setting the Timing Switch to "Master" makes the station a Hyperbolic Master/Center Station.

THE SYLEDIS RADIOPOSITIONING SYSTEM

SYLEDIS is a short to medium range radiopositioning system manufactured by Sercel (Societe d'Etudes Recherches et Constructions Electroniques). It is a versatile system which can be configured to operate in either range-range, hyperbolic or a combination of both modes. SYLEDIS is a pulsed system which utilizes a time sharing arrangement to allow each beacon, or mobile unit in a given network to transmit and receive without interference.

In the range-range mode, the mobile unit transmits an interrogate pulse and receives replies from the base station beacons. The Lines of Position (LOP's) in this mode are circular with the base stations being the center. Ranges are displayed in meters. In the hyperbolic mode, ranges are measured in lanes as the difference in arrival time between a master beacon signal and the responding signal that it elicits from the slave beacons. The LOP's in this mode are two sets of hyperbolae with the slave and master stations as the foci. In the compound mode, SYLEDIS is able to support a maximum of three range-range users and/or an unlimited amount of hyperbolic users.

In the range-range mode, one of the stations is designated synchro master. That station transmits a synchronization pulse to all other beacons and/or mobile stations in the network. This pulse insures the time slot sequence for each unit is in alignment with all others.

THE SYLEDIS RADIOPOSITIONING SYSTEM (continued)

By utilizing "pulse compression" techniques, SYLEDIS transmits an effective high energy pulse at low peak power. The SYLEDIS mobile interrogator is capable of tracking and displaying three ranges simultaneously. The positional data can be recorded and/or interfaced to other devices through three parallel BCD and one serial output ports.

Due to the repetitive nature of time slot allocations, SYLEDIS has a plus or minus 10-kilometer ambiguity. That is to say, when the mobile unit is first activated, the operator must select an approximate range (within ten kilometers) to each of the base stations.

Another operating characteristic of SYLEDIS is one shared by all range range systems. Because we are trying to measure the distance from one antenna to another by measuring the time it takes a radio wave to complete the round trip, dividing the time by two and multiplying the result by the proper constant, we must eliminate the time it takes the signal to travel down the antenna cable as well as the time it takes to travel through the electronics of the unit itself. This delay in boat-beacon-boat travel time is determined during calibration and is there-after known as the system delay. Manufacturer's specifications by distance measurement over a precisely known range.

THE SYLEDIS RADIOPOSITIONING SYSTEM (continued)

Once a mobile station is configured for operation in a net, it will automatically acquire signals. The operator should then adjust the 10 kilometer and 100 kilometer digits using front panel switches. Once this is done, the survey may begin. SYLEDIS does not suffer from "drift" or "lane ambiguity" so operation is relatively simple. Quality control of survey data is accomplished by baseline crossings and periodic three way fixes.