WILLIAMSON + ASSOCIATES, INC.

PARTY CHIEF LOG
FOR HMAS SYDNEY
SEARCH

log started 25 Feb 2008, Geraldton,
Western Australia.

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Monday 25 February

1105 Five Williamson crew arrive + join Art Wright in Geraldton. GeoSounder due 1500 on Tuesday 26 Feb

Tuesday 26 February

0900 DOF Subsea Induction for new personnel moderated by DOF HSE Manager Chas Sinclair. Art Wright, Phil Colvin, Brian Bunge, Carter Le, Kelly Curtis and Mike Kelly attending.

1300 Bill Heather arrives Geraldton

1345 Crew visits HMAS Sydney memorial

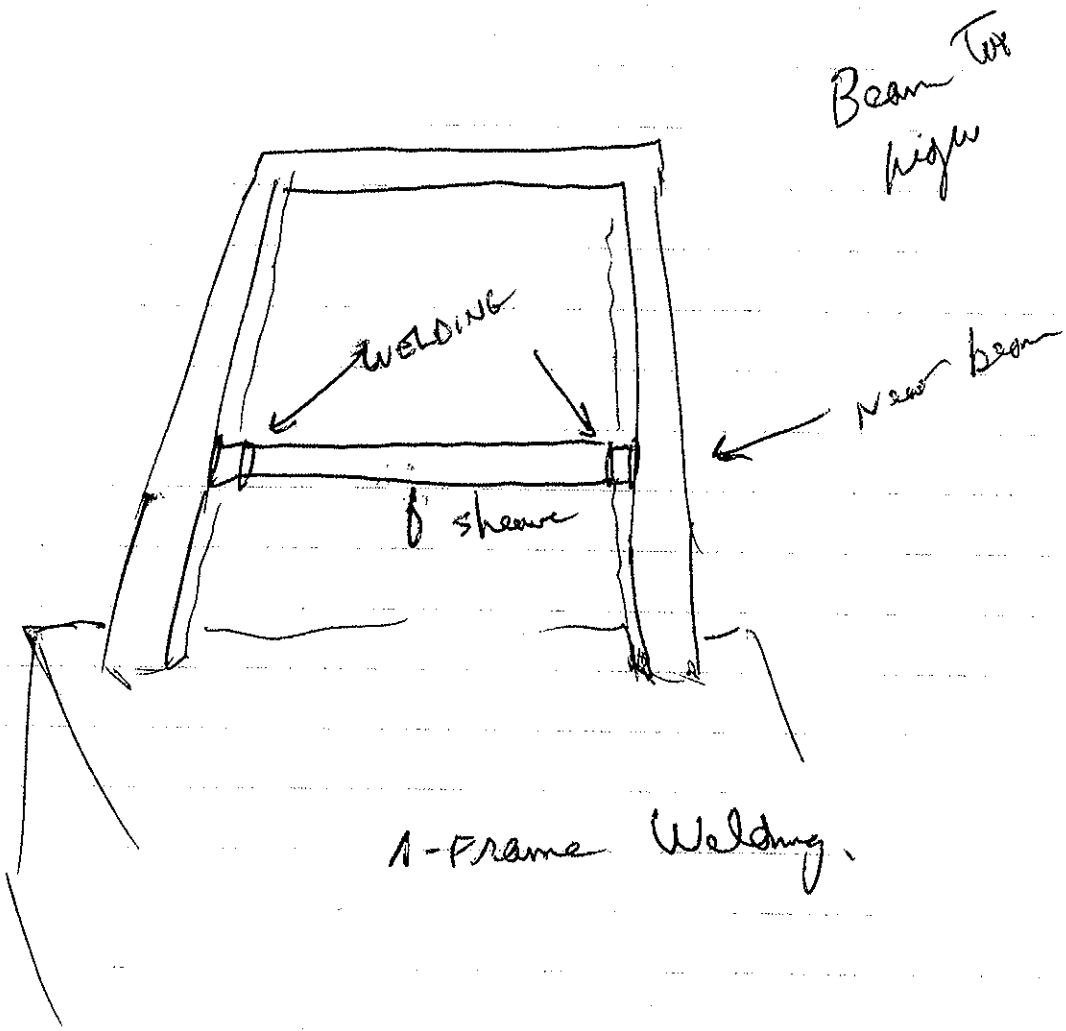
1515 Jeff Koch arrives; Williamson crew now complete.

1530 GeoSounder in port.

Wednesday 27 February

0610 Williamson crew on board to commence MOB.

0745 Truck with SM-30 & AMS-60 Sonars and computers and spares arrived. AMS-60 topside still enroute.




A-Frame Welding.

Wednesday, 27 February (continued)

0900 Usual delays in coordination and crane availability delaying work.

1100 All hands transferring food on board.

1300 Crane arrives; Williamson equipment coming on board.

1600 All Williamson gear on board.

Thursday 28 February

0800 Staff Meeting:
Bumpers will be at 1500 to accommodate A Frame Beam welding.
Beam will be load tested on completion of welding.
Induction for new crew at 1330-1430
Underway tonight still a remote possibility.

1500 Welding stopped for bumpers.

1600 AMS-60 topside electronics unit arrived by Tool truck from Perth.

1615 B1 Rochester cable has short between shield and armor.

1620 SM-30 ran on deck for 2 minutes and then quit.

Thursday 28 February (continued)

1900 Staff Meeting:
No underway tonight
Major areas of concern:
1/ completion of welding on A-frame and load test
2/ Fix SM-30 and float test
3/ V-SAT comm system is not yet operational.
Underway will be rescheduled for 0900 Friday.

2230 Carter & Ford found burned out chip in telemetry downlink circuit master controller and replaced it. SM-30 working.

2300 Will crew off. Major items remaining:
Put electronics back on cans.
Put nitrogen purge on cans.
Float test towfish; get Dynacon wired up.
Secure equipment for sea.

Friday 29 February

0600 Welders on board
0215 Welding complete; rigging for load test

8

Friday 29 February (Continued)

0800 Deprecon termination complete.

0915 Electronic Assemblies back in cans on topside; nitrogen purge in progress.

0945 Deprecon Slip ring installed

0950 Rub test satisfactory on SM-30

1000 Float test complete. No trim and pitch problems.

1055 Load test complete. Our tensiometer registered 12,700 pounds. Calibrators strain gauge registered 6.6 Tonnes or 14520 pounds.

1110 VSAT still being working on. Sailing scheduled for 1600. W/A securing for sea.

1500 Williamson equip tied down. Problems are DI cable ground and check-out of IMS-60. SM-30 & Deprecon are ready.

1530 VSAT OK. U/W Time 1600

1610 Underway. Plan is to get clear of shore & stream gear for test & helicopter photo op.

Friday 29 February (Continued)

1640 Fire in Engine Room lagging. Ship will proceed to anchor and investigate. Scratch stream gear & photo op. When investigation complete, we'll get underway and stream gear for test and demo at a site about five hours away.

1752 Anchored just north of Geraldton at 28-42S, 114-36E in 12.6 meters water.

2300 Still anchored off Geraldton. No status on the fire investigation.

2400 End of Dayshift. Status unknown.

Saturday 1 March

0001 Anchored off Geraldton. Fuel leak that caused lagging fire is unable to be repaired at sea. Captain is endeavoring to obtain a berth so that ship can get a proper repair job in Geraldton.

0330 AMS-60 SETUP & SUCCESSFULLY TESTED ON DECK.

1200 Head shed is developing a plan to fix fuel leak

Saturday, 1 March (continued)

1430 Pilot on board. We will go alongside Berth 2 in Geraldton, have fuel removed, clean and degas tank and repair.

1510 Alongside. Tank cleaners on pier.

1540 Tanker truck alongside.

1555 Defueling. We could be finished tomorrow. Welder is scheduled for 1000.

Sunday, 2 March

0001 Moored Berth 2, Geraldton Port. Fuel off-loaded. Degassing fuel tank preparatory to welding.

1000 Welders arrive

1600 Welding complete

1700 Refueling. No pilot available until 0800 on Monday.

Monday, 3 March

0001 Moored Berth 2, Geraldton Port. Underway scheduled for 0800.

0810 Underway.

0850 EMERGENCY DRILL - GENERAL MUSTER

3/25/09

For Patrick Flynn
a Leahna Evans

FINDING SYDNEY

12 March
forwarded
to Art. BT 7/4

From
Art Wright

Monday, 3 March (Continued)

1415 Tool Box meeting on bridge for IMS-60/SM-30 launches, tests and recoveries.

1430 Rigging for launch. Seas 9-11 feet from south.

1600 Shifting towfish on deck; will test IMS-60 first

1630 Tool Box meeting for IMS-60 launch.

1643 IMS-60 in water.

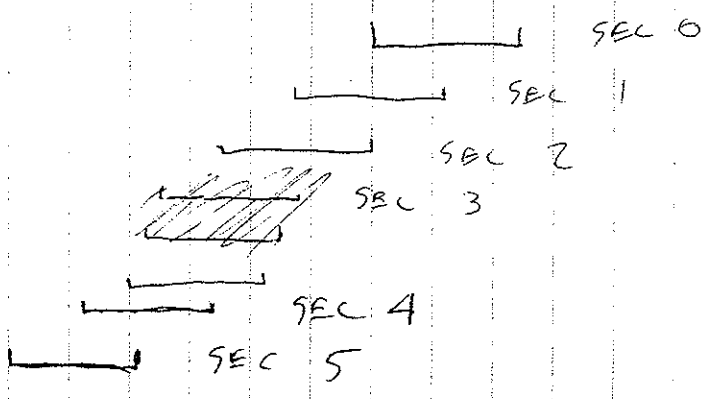
1700 Proceeding to a line west of the Abrolhos Islands in 350 meters depth to test sonar on a geophysical anomaly.

1730 Swath width 2.0
Volts 280
Amps 1.5
Transmit Low
Receiver gains Port L3
Stbd L3
SBP Low 4

1830 Swath width 2.0. Volts 280 current 1.5
Transmit Sidescan - Hi. SBP - Hi
Rcv - Low Port 5 Stbd 4 SBP low 4.
TVG - Survey. OW - Nom, Nom.
PW - Nom; Nom.

1831 Test complete.

1850 Tool Box Meeting for recovery.


SEC 0
SEC 1
SEC 2
SEC 3
SEC 4
SEC 5

Monday, 3 March (continued)

1905 Depressor on deck

1917 AMS-60 Towfish on deck. rigging SM-30 for launch; Tool Box meeting

2018 SM-30 Towfish in water.

2022 Depressor in water; Commence SM-30 sea trial.

2308 Run by two targets. Per David Means, test satisfactory. Making preparations to recover towfish.

2340 Cable out 30M Towfish Pwr Secured.

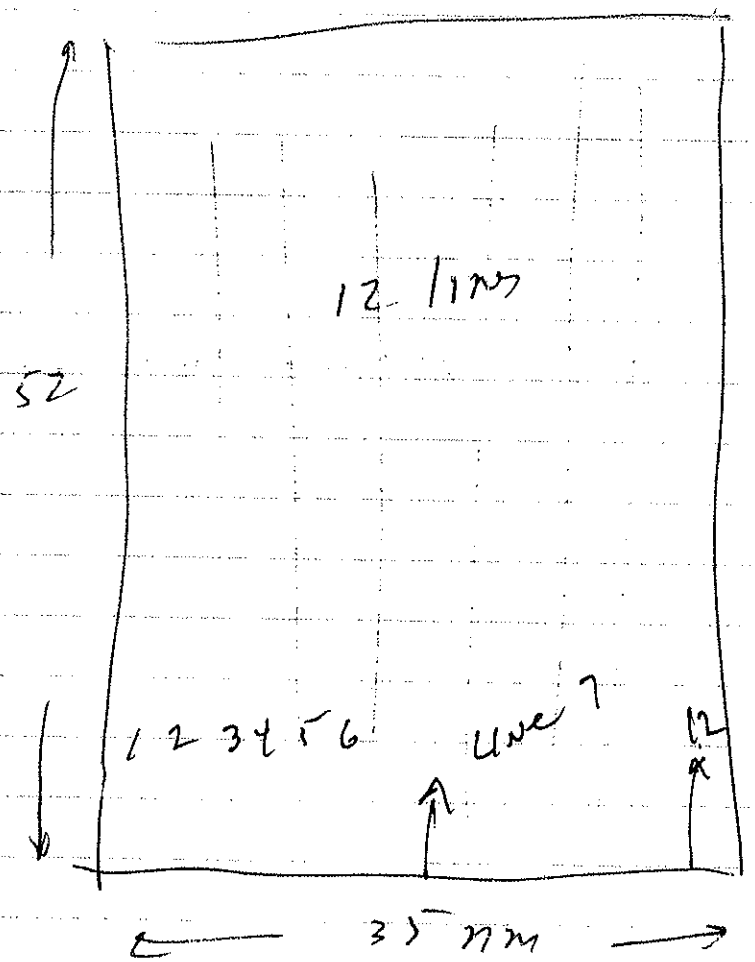
2342 Tool Box Meeting for Towfish recovery.

2345 Seas marginal for towfish recovery. Steaming to a lee in the Abrolhos Islands at 4.5 KTS, towfish at 30 m cable out, ~ 18 m depth.

Tuesday, 4 March

0001 Proceeding to lee in Abrolhos Islands to recover towfish and depressor. Seas from South at 8-12 feet. Towfish at 18 m on 30 m of cable out. Ship at 350, 4.5 KTS.

0315 Calmer; making preparations to recover SM-30.


12 lines
52
1 2 3 4 5 6
line 7
12
35 mm

~~Thursday~~ TUESDAY, 4 March (Continued)

0325 Depressor aboard.
0331 Towfish on board.
0355 Back deck secure; proceeding to 26-45S, 111-00E for first line @ 9.5 KTS.

0745 Daily Meeting:
- Primary search area will be a box 52 nm NS and 35 nm EW. There will be 12 NS line.
- One Hazard Report. In future when working on depressor, ensure railings at stern are in place.

17:20 If necessary to go offline with QINSy make sure to reset ISIS Output to ISIS for grid coordinates vs. Geographical.

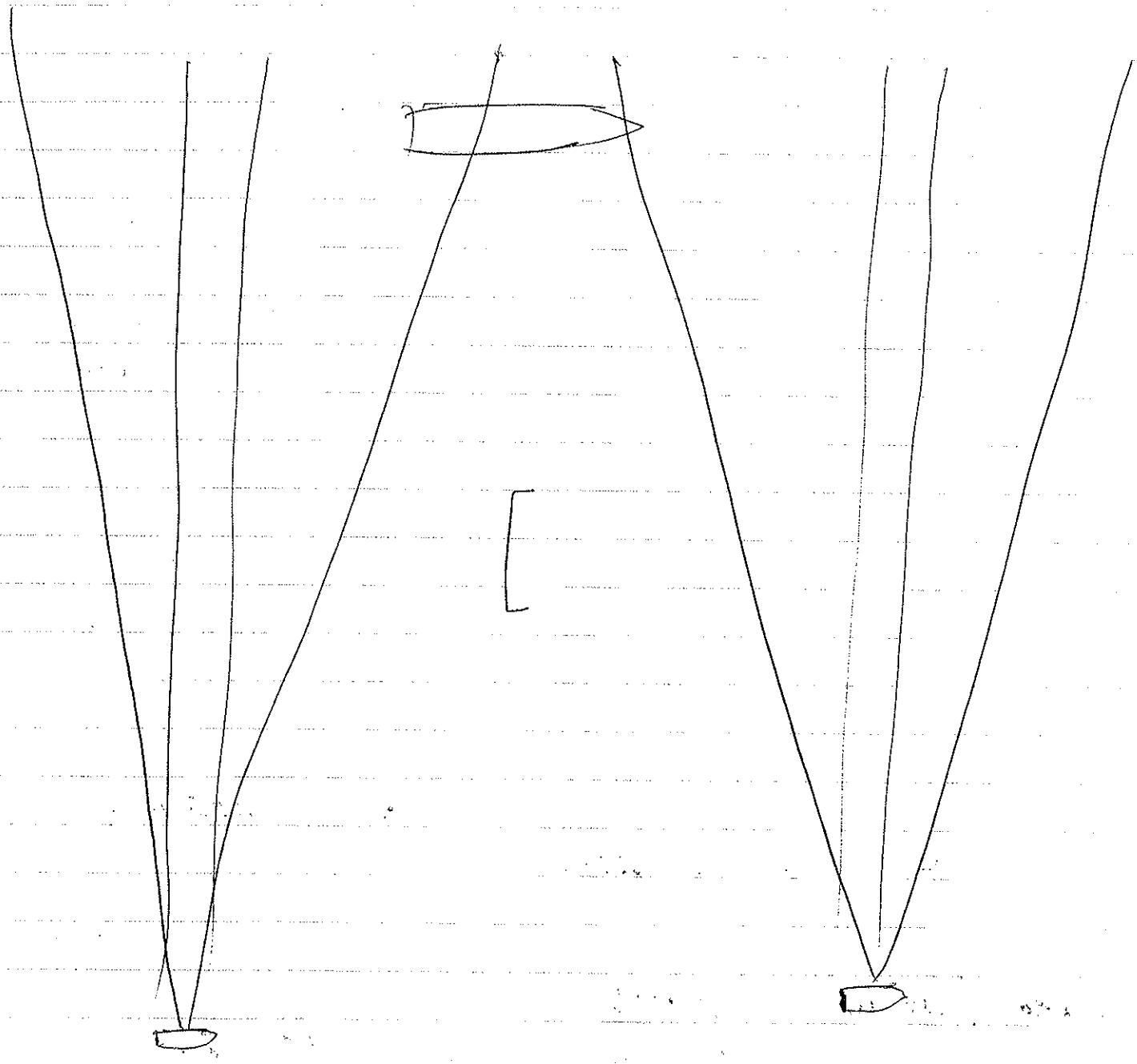
23:20 Tool box Meeting for launch.

23:58 Fish in water, paying out cable & heading to 1st line ("Line 07") on a northerly course at 3 kts.

~~Friday~~ Wednesday, 5 March

0001 Proceeding to line 7 at 3 kts paying out cable at ~ 40 m/min. Pitch is minus 15. Wind 12 kts from South. Seas 6-8 feet.

0030 1300 m cable out; depth 600 m



Wednesday, 5 March (continued)

0100 Cable out 2414 m; depth 1052 m
0130 Cable out 3280 m; depth 1450 m

0132 Plan is to continue cabling out until you reach altitude 300-350 m. Maintain ~40 m/minute payout and no more than 15° down angle.

0148 SONAR WIZ CRASHED AS ADJUSTMENT TO SONAR CABLES FROM RACK INDUCED STATIC

0342 TARGET AND ASSOCIATED DEBRIS FIELD
6700 CABLE OUT, ALT 235, DEPTH 3442

| TARGET 1 | | TARGET 2 | |
|---|---|---|---|
| 3531 | 1800 m SLANT RANGE | 3676 | 1950 m SLANT RANGE |
| 3469 | | 3635 | |
| 62 PINGS @ 2.3 KTS | | 41 PINGS @ 2.3 KTS | |

2.5 KTS → 4 PINGS = 20 m (KORMORAN WIDTH)
30 " = 157 m ( " LENGTH)

1800 SIN 1.4 = 44 m  1950 SIN 1.4 = 47.6 m

62 x 6 = 372 SEC  41 PINGS x 6 = 246 SEC
@ 2.4 KTS ⇒ 446 m  = 295 m
EVALUATED OFFLOAD

0506 SONAR ENTERS SEARCH AREA
6632 C.O.  3264 m DEEP  376.5 m ALT

WEDNESDAY, 5 MARCH (CONTINUED)

0700. Lost 1515 & SONARUIZ while attempting to tee off a CODA line. EPC presentation OK. Right hand side, starboard side, of SM30 output stops at 2200 meters. Will investigate during turn.

0740 Ground fault between shield & ship. Will continue on line.

0745 Morning meeting:
Will recover sonar to eliminate ground fault at end of line.

0815 Starboard side scan was saturated. Reducing gain mostly eliminated problem. There is still an interference band at ~2200 meters.

0850 Dynacon winch pressures.

| | |
|---|---|
| System | 140 kg/cm² |
| Charge | 24 kg/cm² |
| Levelwind | 2000 kg/cm² |

0930 SM-30 V = 235 A = 1.42 Sweep 5K
SD/SS XMIT. 1K

| Gain | PORT L2, | STBD L3, | SS L1 |
|---|---|---|---|
| PW | 4 | 4 | 6 |
| BW | 1K | 1K | |

1430 Discovered NE reversed in 1515 Nav String

Wed 5 Mar 2008 (continued)

1435 SM30 V = 233 A = 1.4

| | PSS | SSS | SB |
|---|---|---|---|
| Gain Range | Lo | Lo | Lo |
| xmit pwr Hi | 2 | 4 | 1 |
| pulse Width | 4 | 4 | 6 |

5K swath

2213 While Carter moved some coax cables on the SM30 topside box SonarWiz program crashes. ??? Check with John Gann or Colin Stewart for any ideas as to what could cause this?

1335 The NE in ISIS Nav Template needs to be swapped.

Thursday 6 March

0001 Surveying north at about 2.8 kts on Line 7 in HMAS Sydney Search box with SM 30 and Dynacon winch. Ground fault between shield and armor is drastically reducing dynamic range. Intend recover towfish at end of line to correct problem. 190 meters of cable out. Tension 3800 pounds. Towfish depth 126 meters & altitude 375 meters. A goal for altitude is 350-400m with a cable out to towfish depth ratio of 2.5 to 1.

~~1449 LTC~~ Sonar

Thursday 6 March (continued)

1919 CITC SONAR WIZ DROP OUT - Nothing touched.

0001 ~~0500~~ WATCH RELIEVED

0002 SONAR WIZ back on-line.

0220 End of Line 7. We will investigate various problems with SM-30 during turn.

0229 On 1K swath, system is not proper. Carter needs to bring electronics into lab.

0229 Commence recovery; c/o 6700 m

0445 c/o 2000 m

0510 Tool box meeting on progress for recovery.

0553 Depressor on deck.

0558 Towpoint on deck.

0745 Morning Meeting:
- Ship will loiter at north end of line 6 while adjustments are made to sonar.
- Electric Picture may have a boat to rendezvous to offload tapes.

0750 Changed cables between umbilical and telemetry can. Cable could have been responsible for ground fault.

0830 SM-30 electronics in sonar lab for gain adjustments.

Thursday 6 March (continued)

0905 In Ship: SM-30 missing TVG signal and Starboard Receiver Hi-Low function.

0945 Replaced chip in Starboard Receiver Data Decoder Board. Working on TVG issue.

1150 Replaced TVG board + improved board seating. System apparently OK.

1400 System OK in lab but when put in Towfish Cans, there is an apparent seating problem. ∴ Bring cans back to lab.

1615 Adjusted another decoder board to fit slot. Seems to work. Preparing to launch.

1625 Tool Box meeting for SM-30 launch.

1632 Towfish in water

1634 Depressor in water. Cabling out to survey depth. Proceeding to line 6.

1925 C/O 4962 meters. TF depth 1790 m

1926 Meeting with David, Blair on cyclone to North where is at 35 KTS and lessening but heading our way. Consensus is to wait until midnight. Continue cabling out.

Thursday 6 March (continued)

21:40 Ship Lost Power momentairly
21:41 Bringing up fish. Sonar still not working.
21:46 Stopped winch until bridge can sort out power problems & has time to start winch cooling pump.
21:56 Bringing fish in.
23:30 Towfish @ 100m

Friday 7 March

0001 On station in HMAS Sydney survey area at northy end of Line 6. Sonar not working properly and Cyclone Ophelia (35-40 KTS) is bearing down on us. Solution is to recover towfish.

0005 Toolbox meeting for towfish recovery.
0010 Commence recovery
0015 Depressor on deck. Seas very lively.
0030 Moving depressor from center of deck to port side to allow more room for umbilical handling.

0125 Towfish on deck. Plan is to proceed to shelter in Shark Bay and to attempt sonar repair.

0200 Proceeding on C071 at 9.5 KTS to avoid Ophelia

0930 Removed electronics and umbilical to lab.

Friday 7 March (Continued)

1029 Vessel heading north to avoid Cyclone Ophelia.

1520 Ophelia past us. C/C to 262 to return to search area. ETA ~2030. Wind diminishing; swells confused. Some blue sky.

1700 SM-30 up and running. Problem was bad starboard receiver board in power con and dead power transistor in telemetry con. Sonar is rigged for launch and has been sub-tested.

1710 Squalls in area. Wind to 30 KTS and seas to 12'.

2330 ARRIVE WORKING GROUNDS. WINDS 30KTS SEAS 8-12'. STANDING BY FOR WEATHER TO IMPROVE.

2345. CONDITIONS NOT SUITABLE for safe launch. Back deck is too lively to permit adequate safety of personnel and equipment. Wind is abating and seas should improve shortly.

SATURDAY 8 March 0001. On weather standby at top of line 6 waiting for sea conditions to improve. Seas confused at 8-12 feet. Wind less than 15 kts. SM-30 is rigged, operational and ready for launch.

SATURDAY 8 MARCH (continued)

0005 Ship at 180, 2.5 Kts.

0414:16 launching SM30
Reading Voltage 245
Reading current 1.45
Ground fault check

0350 Seas have abated, preparing to launch SM-30
0355 Tool box meeting
0413 Towfish in water.
0415 Depressor in water

0418 Proceeding to North end of Line 6.

0700 C/O 4682 TF Depth 2047 alt 270 m
WIND South @ 12 KTS, Seas 6-8'

0745 Morning Meeting - no major issues.
0807 Ship entering field C/O 6350 m. TF Depth 2450 m
0830 C/O 6440 TF Depth 2420, alt 285 m.
0845 Total swath is only 5750. Port max range equals 3000, starboard is 2750 m. According to Carter, this is due to the new sidescan receiver board be installed yesterday.
0905 ~~We previously ran a short segment of Line 6 about 2030 on 6 March. Therefore this line 6 is a re-run.~~ Line 6 is not a rerun.

Saturday 8 March (continued)

2910 CO 6381m, depth 2384m, alt 285 m, Tension 4900#

0945 Acoustic noise on outer ranges. Reduced receiver bandwidth from 2K to 1K.

0950 Sonar Volts 245, Current 1.45 a Swath 5K
Transmit Power 1K
Sonar Raw. P L3 PW P 7
S L4 S 7
SB L2 SB 4
BW 1K, 1K.
CO 6377, TF Z 2372 alt 283 T. 4800#

0948 Towfish entered search area.

1145 Winch policy during lines – speed 10 m/min or less, unless in danger of hitting bottom.

1159 FYI: GPS time is 15 seconds ahead of UTC time

1200 Maintain altitude of 250 m or higher in order to minimize impact of surface return. When depth increases beyond 3000 m ~~bring~~ altitude up to 380 m so ~~that~~ speed can be increased.

1235 Restarted SonarWiz because telemetry & Cableout were not reading correctly.

1240 27 secs difference between SonarWiz

Saturday 8 March (continued)

Time ~~&~~ actual UTC Time.

1205 Adjusted SonarWiz Computer time to UTC.

1510 C/O 5992 TFZ 2496 Alt 212 Tension 5100#
Spd 2.5 KTS

1700 SonarWiz crashed

1910 Wind 15 kts from South; seas 8-12 feet.

2240 Spd. 2.2 KTS. C/O 6390 TFZ 2455 Alt. 210
Tension 6100#

2330 Wind 20 kts from South; seas 12-18 feet.

~~0~~45 38 km to go on this line. At 2.5 KTS, ETC is 0800.

Sunday, 9 March

0001 Surveying south on Line 6 in HMAS Sydney Search area at about 2.5 kts. ~~ETC~~ EOL ~0800. Sonar working normally, except only 2660 meters available on starboard channel. Wind from south at 20 KTS; seas 12-15'. Tensiometer 4600 - 7000#. Cable out 6610 m. Towfish depth 284 m.

0337 GROUND FAULT WHILE CABLING OUT (INTERMITTANT) C.O. = 7411 DEPTH 2843 ALT 386 HDG 180 WENT AWAY WHEN CABLING OUT STOPPED, THEN CAME BACK / WENT AWAY - OSCILLATION

Sunday, 9 March (Continued)

0338 TRANSMIT POWER SECURED FOR APROX 4 PINGS

0400 GROUND FAULT (SHIELD TO ARMOR) CONTINUES TO BE INTERMITTANT, REGARDLESS OF WHETHER OR NOT CABLE IS BEING ~~WINCET~~ WINCHED IN or OUT

0428 GROUND FAULT STEADY. No ~~VISIBLE~~ ASSOCIATED DEGRADATION IN IMAGE QUALITY

0436 GROUND FAULT FLUTTERING SHORTLY AFTER CABLEING OUT IS STOPPED.

0439 GROUND FAULT VANISHES AFTER CABLING OUT RESUMES

0444 C.O. = 7900 DEPTH = 2941 ALT = 416 SPD = 2.6 KTS
CABLING OUT CONTINUES. No GROUND FAULT

0448 GF FLUTTER. STOPPED w/ WINCH STOP

0556 Lowered ISIS threshold.

0744 E.O.L CO = 8279 DEPTH = 3260 ALT = 395 2.1 KT
SWITCHING ISIS SYSTEMS TO SEE IF "DROP OUT" ISSUES W/ STBD CHANNEL GO AWAY

0830 Problems:
- Intermittent ground fault between shield + armor
- Dropouts on starboard side
- Range to only 2660 (vice 3000) to obj.

We will recover towfish, attempt to find ground. If not able to pinpoint we will replace cable electrical termination, replace

Sunday 9 March (Continued)

umbilical, and have Carter work on cam electronics.

1038 Cabling in port 3200 m c/o. TI depth is 2800. Ground fault still there. Cable speed at 38 m/minute.

1058 Increased cable in spd to check fastest rate. Reached 100 meters per minute. Now recovering at 50 m/minute. c/o 2410.

1200 c/440 meters

1205 Tool box meeting for recovery complete.

1212 c/o 50 m

1216 Depressor on deck.

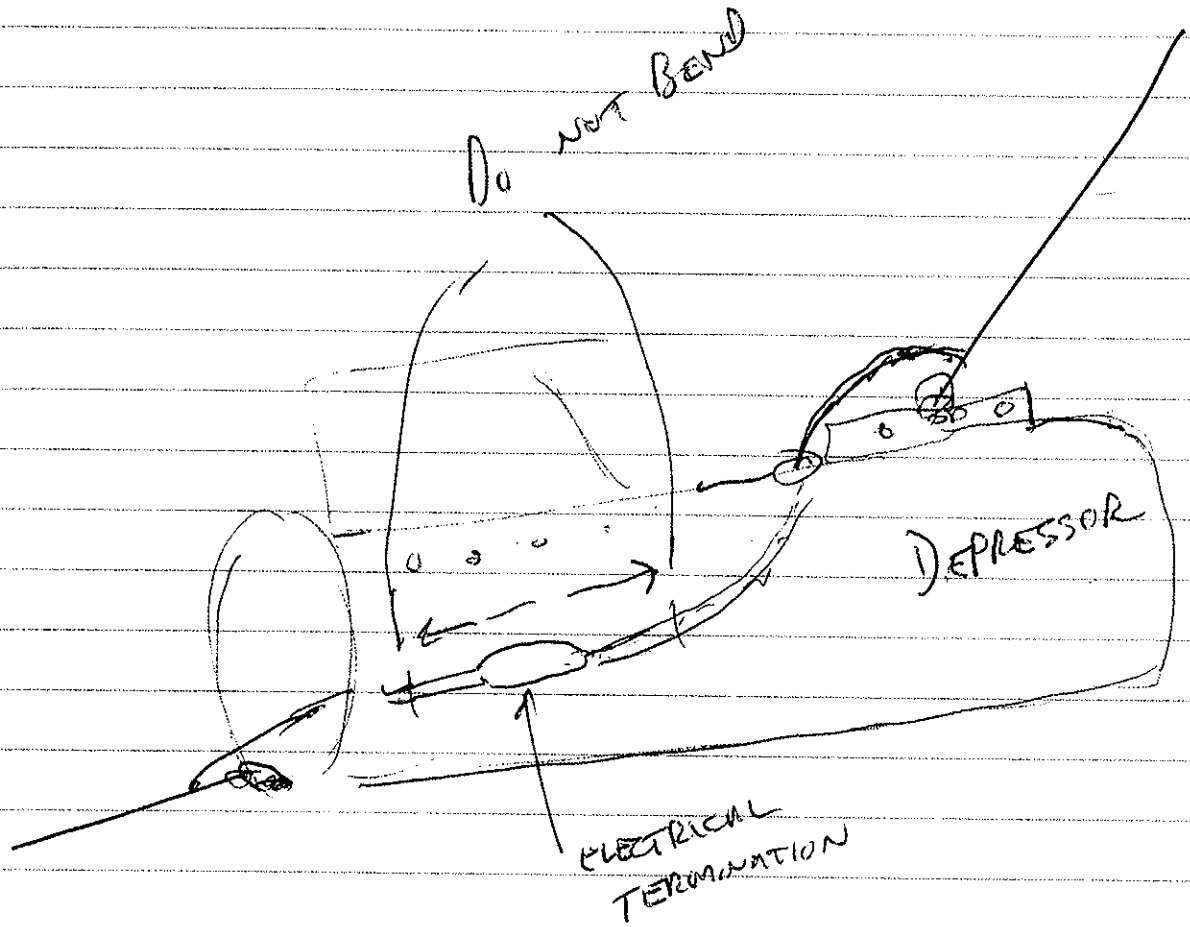
1229 Towfish on deck.

1235 All secure; checking for ground faults.

1310 Found ground fault in electrical termination at end of cable + PMI. Will report.

1340 Electronics cans in sonar room. Carter rigging for tests.

1355 At next deployment, we will start at 21 km south of line 8. We estimate 4.5 hours to deploy to depth.


DO NOT BEND
DEPRESSOR
ELECTRICAL TERMINATION

Sunday 9 March (continued)

1500 Electrical termination at PMI reported.

1800 Still trouble-shooting electronics. Wind 18-20 kts from South; Seas 8-12 feet.

1905 On the Saturday 0413 launch, the electrical termination inside the depressor was bent back over itself, probably allowing the ground fault to occur. In future, we will not bend this termination.

1950 Found bad LN308 chip in Starboard Pre-amp receiver board.

2000 When we next deploy starboard will be hotter than port by 9db — 3 thumbwheel settings. When port thumbwheel is on 4, starboard will be on 1.

2100 Removed TVG ramp on starboard channel.

2115 Putting electronics back in towfish

2130 Making preparations to launch. Wind 20 kts from S.

2215 Tow Box Meeting Complete, will be a downwind launch.

30 Towfish in water

2233 Depressor in water, cabling out.

2245 % 545, Depth 289.

SUNDAY 9 MARCH (Continued)

2300. - For the next line, line 8, the ship may have trouble slowing down. Do the best you can but don't exceed 3:1 cable out to TF depth.

- When you get the bottom in sight, wake Carter & have him reduce the starboard gain.

- During today's maintenance session we did:
  eliminate the ground fault
  extend starboard channel from 2600 to 3000 m.
  reduce impact of surface return.
  Reduce starboard drop-outs
  Replaced 50m umbilical w. 40 m umbilical from IMS-6

MONDAY 10 MARCH

0000 WATCH RELIEVED ON APPROACH TO LINE 8. LOWERING CABLE.

0330 SONAR @ 600 M ALTITUDE. WOKE CARTER TO ASSIST IN TUNING.

0400 UNABLE TO ELIMINATE NOISE FROM STBD CHANNEL. SOME NEAR FIELD "DROP-OUTS"

0421 FISH ENTERING SEARCH AREA
C.O. = 8488 ALT = 387 M DEPTH = 3163 SPD = 2.4 KTS

0624 GROUND FAULT FLUTTERING, THEN GONE

MONDAY 10 MARCH (CONTINUED)

1650 P.C. MEARNS DETERMINED THAT SONAR QUALITY IS INSUFFICIENT FOR CURRENT NEEDS.
LINE ENDS AND RECOVERY OF SONAR INITIATED.

C.O. = 7887 DEPTH = 3070m ALT = 348 SPD = 2.5 KT.

0715 WIND 18 kts from South; seas 10-15'.

0740 Cabling in at 36 m/min, 6650 m c/o, Tension 6500 - 7000.

0800 Morning meeting:
No shorts on back deck during deck ops.
Safety meeting at 1030.

0815 Starboard channel has only 1400 meters of usable range. In his decision to recover, David said politically he could not afford another bad link.

1000 Winch level wind springs are losing their stiffness and no longer hold the level wind athwartships on the level wind bar. For operation, necessary to manually level wind. Intend replace springs after recovery.

1030 Safety Meeting:
Keep Escape Hatch Clear.
Don't go in Cable Room or Freezer Boxes.
Minimize power cables on deck in survey room.
Salad Tongs on top of container vice in container.

Monday 10 March (continued)

1113 Tool box meeting for Towfish recovery complete.

1119 Depressor on deck.

1132 Towfish on deck. In 10-12 foot seas, ship rode better with wind on the beam. For future recoveries in these sea states, perhaps wind/seas on the starboard beam should be considered.

1230 TIGHTENED AND TAPED TOGETHER LEVEL WIND GUIDE BARS.

1300 Inspection of splices indicates Port termination splice may again be at fault. All other splices in system megger OK, but termination is weak.

1330 Dissection of termination splice reveals that epoxy did not set up; epoxy did not bond to shield and that cable end on which splice was made may previously been water soaked ⇒ redo mechanical splice.

1520 Mechanical splice completed. Cut off eight feet to reach "new" shield.

1525 Electrical splice in progress.

1530 Emotional email from Patrick covering his position. He appears to have no idea of what is involved in a deep tow survey.

Monday 10 March (Continued)

55 Electrical termination complete. Need 4 hours set time.

2000 Molded termination unsat. Reporting

2230 Megged cable - OK Cable resistance to ground - 1 MΩ
Umbilical OK
Slip ring OK.
Reset Microamp Meter.

2330 On coming water section:
Be ready to launch at 0400.

Tuesday 11 March

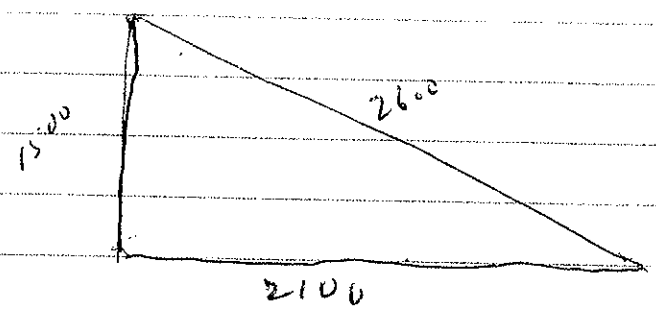
0001 Maintaining station at South end of Line 8 waiting for molded electrical termination to set. When ready, SM-30 will be deployed and line 8 will be run. Wind from South at 16-18 KTS; seas 10-12 feet.

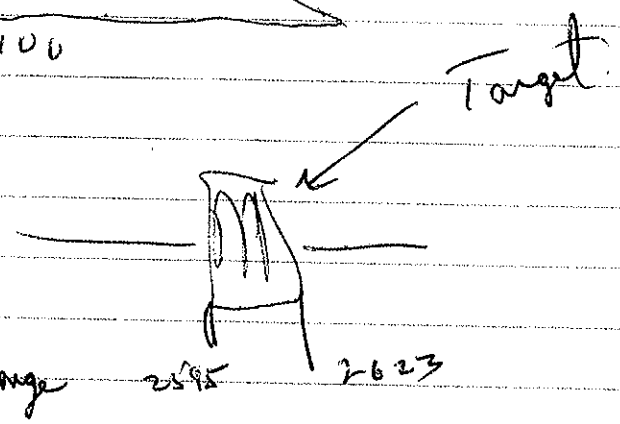
0437 Tool box meeting and launch check list complete. Proceeding w. launch.

0440 Sonar in water
0445 Depressor in water, cabling out.
30 Wind 15-18; Seas 8-10 From South.

## Target Mensuration

SLANT RANGE CORRECTION ON R41 Target




$$28\,m \times \frac{2100}{2600} = 21\,m \text{ wide}$$

$\therefore$ Target is $153 \times 21\,m$

$= 502' \times 69'$.

Tuesday 11 March (Continued)

0840 SIGNIFICANT TARGET OBSERVED ON STBD CHANNEL WHILE APROACHING RUN-IN TO LINE 8. NEITHER ISIS OR SONAR WIZ RECORDED IMAGE

C.O. = 6618 DEPTH $\alpha$ = 2170 ALT $\alpha$ = 1500 TOTAL DEPTH = 3600

15 PINGS ON TARGET
2600 m SLANT RANGE
3 KTS SPEED
} ⇒ 153 m TOTAL LENGTH

MIN SLANT RANGE = 2595 MAX = 2623

ROUGH POSITION 7030379 N 505966 E

1200 Wind South at 15 kts; sea 8-10'.

1205 It is interesting that target at 0840 was observed on the "noise" on the starboard channel.

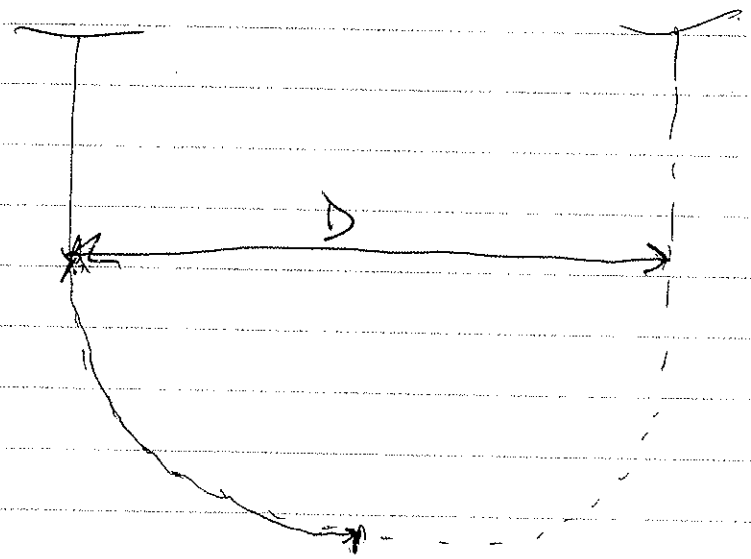
1300 Fire Drill. Simulated fire in galley. Survey and Chart party muster on boat deck

1315 Secure from fire drill.

1320 Wind freshening — 20 kts from South.

1330 87 km to go on this line. At 2.3 KTS EOL is 0836 tomorrow morning.

Minimum turning circle is such that the cave out equals 1/4 the turning circle circumference.




EXAMPLE:

If cave out equals 3000 m, turning circle circumference equals 12,000 m

$2\pi D$ = circumference.

Tuesday 11 March (continued)

.640 C/o 7416 m; Tf depth 2792, Ratio 2.66:1
Tension - 6000 - 7000 #
1730 Small wreck appearing target to starboard.
1912 Request from Robert to fly at lower altitude so surface return would move further towards outer edge of data.

Wednesday 12 March

0001 Surveying north on line ~~of~~ 8 in HMAS Sydney Search area at 2.9 kts. Conditions normal with SM-30 sonar - some noise at outer edges. Sonar at depth 2508 meters, C/o 7603 m, ratio CO:TFZ is 3:0:1. Tension is 5000 - 6000 pounds. Towfish altitude 255 meters. Wind from South at 12-15 kts; Seas 6-8 ft. Client has requested we attempt to keep surface return at outer edge of swath insofar as possible. 132 km to EOL; EOL ~ 0600. On turn haul in cable to a C/o equal to water depth and turn starboard to line 9. New line spacing will be selected so that surface return will be eliminated.

& LATE entry.
0745 Morning Meeting. Strong to near gale winds may occur Thursday night.

Wednesday 12 March (Continued)

0533 LINE ENDS IN 2400 m WATER. CABLING IN TO 2400 m OUT. MAX USABLE RANGE 2150. LINE OFFSET TO REMAIN AT 3500. RANGE LIMITED BY OVERPRINTING OF SURFACE RETURN. CONFIDENCE IN UNOBSCURED DATA IS HIGH

0710 SECURITY ROUND OF DECK. ALL SECURE
WX: WIND SSE ~10 KTS SEAS 4'

1715 SENT e-mail to Gary Brown at South Bay Cable requesting their procedures for electrical terminations. (Three of four of our Scotchcast 2130 terminations have not adhered to the cable insulation jacket)

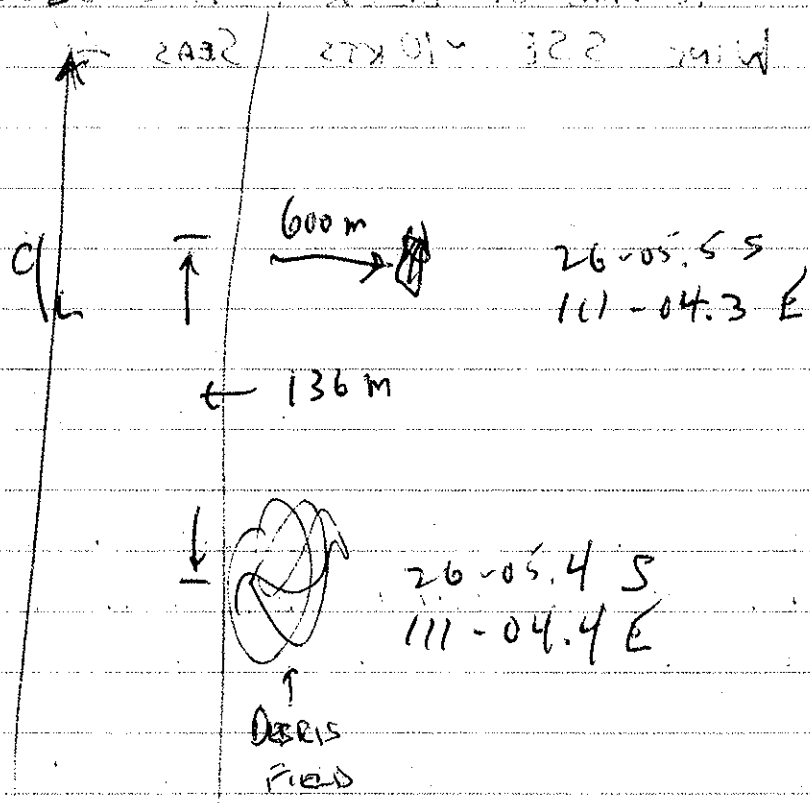
0.0 CABLE IN TO 2600 m BEGIN TURN TO LINE 9.
OFFSET ESTABLISHED BY CLIENT REP @ 3400 m
DEPTH ≃ 1260 m TOTAL DEPTH = 2435

0910 COMING OUT OF TURN. CABLING OUT ON APROACH TO LINE 09. ATTEMPTING TO REINSTALL SONAR WIZ AFTER SYSTEM CRASH.

0946 INTERESTING CONTACTS ON BOTH CHANNELS LARGE CONTACT TO STBD, POSSIBLE DEBRIS TO PORT. CO-INCIDES W/ LARGE SCALE GEOLOGICAL FEATURES FROM MULTI-BEAM

1110 Y 5164 m. TF depth 1837; Alt 470
7 KM to SOL for ship.

1357 SOL Line 09 180° spd. 2.8


600 m
26-05.5 S
111-04.3 E
136 m
26-05.4 S
111-04.4 E
DEBRIS FIELD

WEDNESDAY 12 MARCH (CONTINUED)

1640 80 KM to EOL. C/O 7403; TF Z 2208m
Ratio – 3.4 Too High – Reducing
Ship Speed = 3.0 kts
EOL approximately 1000 Tomorrow.

1738 Large debris field and big sections of large vessel appearing on screen. Close aboard to 600 m to starboard. Position
*K ~26-06 S, 111-04 E. Probably Komoran due to position, size, and degree of destructive disolution of vessel. Depth is approximately 2500 m. TF altitude 230 m. Cable out was 6894. Speed 3.05 KTS. Course 180.3

1920 More discrete targets to starboard. Possible battle position

1930 C/O 7608; TF Z 2470 Spd 2.9 KTS
Alt 227 m

1945 All Hounds Meeting in lounge. Dowell Mears asserted confidentiality policy.

2320 C/O 6917; TF Z 2385 Spd 2.7 KTS
Alt 237 m. EOL ~ 0900.

THURSDAY 13 MARCH 2008

0000

UNDERWAY AS BEFORE CONDUCTING DEEP TOW SURVEY OPERATIONS W/ SM30 IN SEARCH OF THE HMAS SYDNEY.
HDG 180 ON SURVEY LINE 9 DSOL TOWFISH = 63 K
TOTAL DEPTH OF WATER 2983, CO 7145, ALT 224, DEPTH 2503.

WEATHER: CURRENT WINDS S@ 23 PROJECTED TO INCREASE TO 25-30 BY MID DAY. SEAS 6-8'

0131 - 0148 SERIES OF STRONG RETURN CONTACTS ON STBD CHANNEL. SIZE AND GENERAL ORIENTATION SUGGEST GEOLOGY. NEEDS CLOSER EXAMINATION OFFLINE

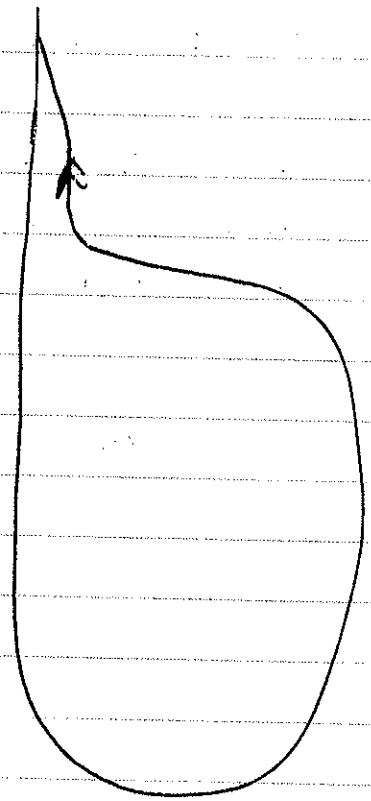
0505 C/O 7802m; TP Z 2946m; Alt 312m Tension 6300 - 6900#. EOL ~ 0900. Then 7 km SOUTH TO INSPECT target lying South of Field.

0513 DOUBLE PING DROP ON STBD CHANNEL, GROUND FAULT INDICATOR STARTING TO TWITCH @ 10 μA

0525 PING DROP STBD. GROUND FAULT @ 2 μA

0556/57 2 PING DROPS GROUND FAULT TWITCHING @ 10 μA

0 35 Winds 12-15 KTS from South; seas 8-10 feet.



Thursday 13 March (Continued)

0800 Morning meeting: Information embargo in place. No word of yesterday's targets to reach the beach.

Weather may increase to 27 KTS

0911 Entered search area. Proceeding south for 11 March Target.

1000 Wind 28 kts from South; seas 10-12 ft.

1145 Found many targets, two somewhat large (but less than cruiser size) that can be levelled geology. Continuing to proceed south to exhaust this possibility.

1146 Cabling on slowly to increase altitude. Cable oiling in progress.

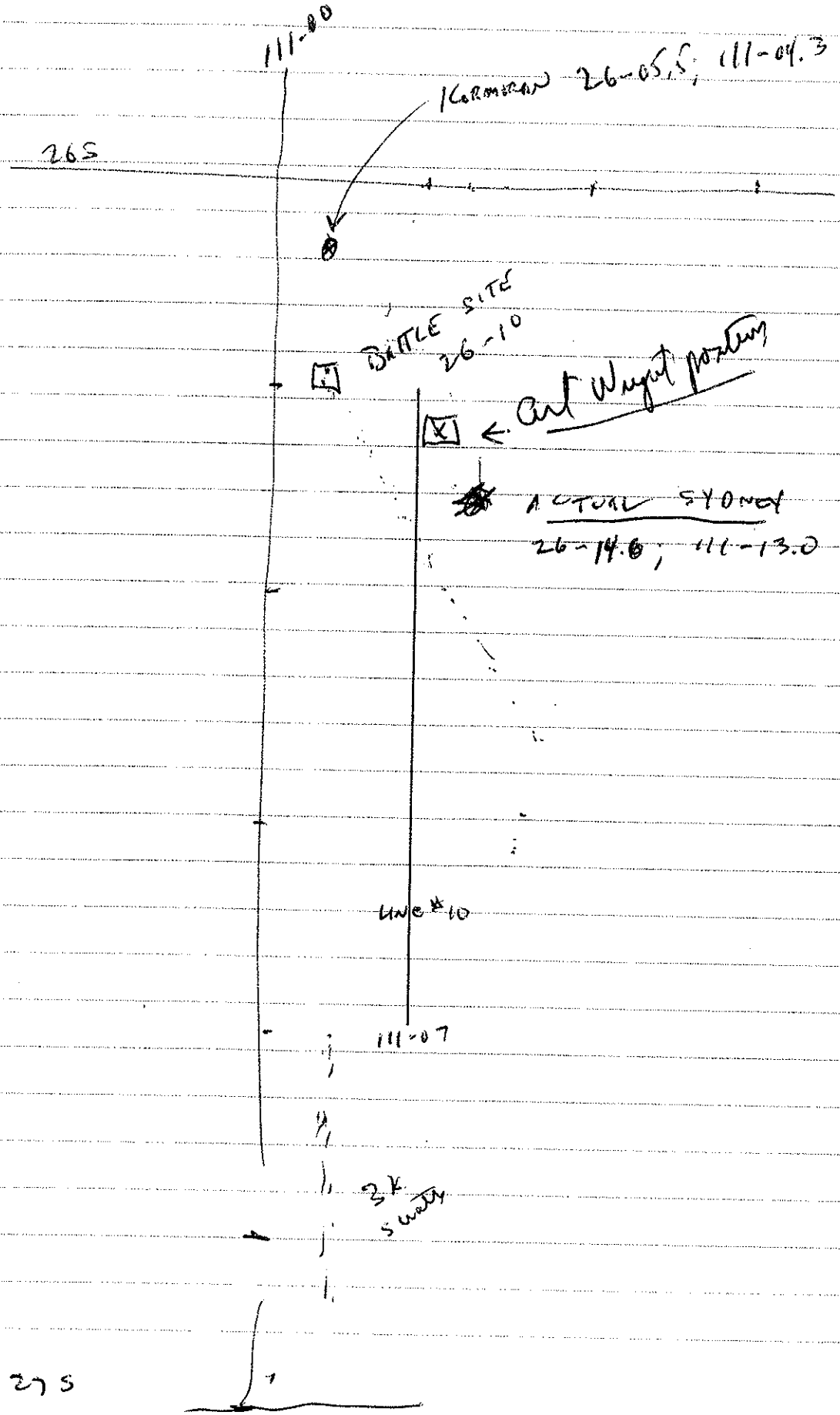
1205 Cabling in preparatory to turn, C/O 2300 m

1415 Cabling in complete. C/O 3500 m. Turning in a 4500 m diameter turning circle at 3.0 KTS.

1610 Within 1000 meters of line, getting ready to cable out. Distance to line start is 10 km.

1645 Cabling out from 3500 m. On course 320, eventually coming to 360.

1650 C/C to 330. Cable stop


111-00
KORMORAN 26-05.5; 111-04.3
26S
BATTLE SITE
26-10
Carl Wright position
ACTUAL SYDNEY
26-14.6; 111-13.0
LINE #10
111-07
3K
SWATH
27S

Thursday, 19 March (continued)

1652 Continue cable out – 3612 m.
1655 C/S. C/L to 340. C/O 3680.
1657 On course 340. C/O at 30 m/min.
1700 C/L to 350. C/O 3838.
1708 Ship 8 km from BOL; TF 11 km from BOL
C/O 4040 Need ~ 7000 m C/O
at 30 m/min 3000 meters time 100 minutes.

1717 Ship is on line. Towfish to BOL is 11.1 km.
C/O 4327 m.

1732 C/O 4556; ship spd 2.5 KTS; Depth 1825.

1748 C/O 4896; TF Z 1943 m;

1800 C/O 5178, TF Z 2008.

1824 C/O 5830, TF Z 2235, Spd 2.6 KTS.

1844 Wind 28 KTS from South; seas 10-12 ft.
1845 C/O 6305 m; TF Z 2458 m; alt 1510 m.
6.2 km to SOL for Towfish.

1930 C/O 7555; TF Z 3031 alt 796.
4 km to BOL. Spd 3.9 km/hr.

2000 Kommorsen Point 26-05.5; 111-04.3

2020 In 3000 m sweep window. C/O 8703; TF Z 3542
alt 250 m. Turn complete. Shift to 3K.

2030 Towfish LAT 26-57.04. Target Latitude 26-49.57

2040 We are taking a close look at targets developed earlier — sonar & geology.

Thursday, 13 MARCH (continued)

2310 C/O 8537; TF Z 3527m Tension 6100-8100 #.

2335 Completed 3K area; cabling in for 20° turn.

2340 Switch to 5K swath. C/C to 010. Line is ~~not~~ now lead in to line 10.

2345 C/O 8108; TF Z 310 m. C/C to 020.

2358 C/C to 030. Spd 2.2 KTS

Friday 14 March

0001 Surveying as before, proceeding to line 10 North on a 5K swath at 2.2 KTS in the HARS SYDNEY search area. C/O 7975 m, TF Z 3210m; alt 340 m. Tension 64-7500 #. Steering 300° to right of base course 000 to move 4600 m to the east. Line 10 will end just north of the "battle site" at ~ 26-10 N. Next line will be 3500 m to the east of line 10.

0115 BOL LINE 10

0130 7 STBD CHANNEL PING DROPS IN LAST 30 MIN. GROUND FAULT TO 10 μA

0510 Wind 20 KTS from South; Seas 10-12 feet TF Latitude - 26-34.6; ~ 25 nm left on this line. EOL ~ 10 hours remaining - EOL 1510

Friday, 14 March (continued)

0950 40 7131 m, TF Z 2368 m alt 231 m
Spd 3.2 KTS, Tension 51-57 00 ~~F~~.
Wind 12-15' from South, Seas 10-12 ft.

0915 B1 Cable

| | CTR - SHLD | SHLD - ARMOR |
|---|---|---|
| TDR | NO PROB | NO PROB |
| MEGGER | 50 MOHM | 0 Ω |
| OHM-METER | INFINITE | 6 K Ω |

No obvious break in B1 cable. Appears to be an insulation breakdown.

1005 Plan is to image Kormoran bow section on a 1000 or 2000 m swath after completion of line 10.

1100 ALTER COURSE TO RECON KOMORAN. EOL 10
START OF LINE KORMORAN_RECON 01. ALTERING
COURSE SLOWLY TO NEW BASE COURSE 351°T
C.O = 7269 DEPTH 2318 ALT. 225 SPD 3.1

1405 SHIFTED to 1K Swath on SM-30 to image Kormoran bow section.

1430 SM-30 SET-UP
V = 148 V I = 2.3 a 1K Swath
Transmit - 1ki REVR Port 6W, STBD 5H
BW 1K, 1K, AW 444.

1441 Commenced passing "Kormoran" wreckage.

Friday 14 March (continued)

1520 Cabling in for turn.

1525 Shift to 5K swath.

1707 Cable on Complete, C/O 3000m. Commencing 3350m diameter turn to port.

1735 Cable counter counts quite well and always comes back to zero on recovery of depressor. However the count is off such that the true value is .86 × the readout as calculated from target layback. We will enter .86 in the DINSY layback calculation but the tensiometer readings will require a manual calculation.

1824 Complete turn, cabling out.

1910 8.9 nm to go to Kormoran area; C/O 4144. Spd 2.5.

2015 ETA at Kormoran 2150. Pass at an altitude of 50m and a speed of 2.3 kts on the 500m swath (750m in 15.5)

2150 Approaching Kormoran. PW P3 SB 53 4
Gain Hi P & S 6 SB L1. BW 500
Transmit Hi.

2215 Passing 1st chunk of wreckage

2225 Passing debris field

2240 Past large target

Friday 14 March (Continued)

2242 Changing course to 180. Proceeding to "Battle site".
2246 C/c to 190
2255 C/c to 200
2301 C/c to 210
2315 C/c to 200.
2317 C/c to 190
2322 C/c to 180 Battle site 4.4 km from towfish

Friday Night Plan

1) Image "Battle Site" on 750m swath at 40-50m altitude on course 180.

2) when finished, cable in and turn to north to pick up gap on line 10 on SKS

3) at first light 20m Lobsley Boat will be alongside to take off film and to give us veggies. Drumsea transfer

4) after line 10 is complete, turn for Line 11.

SATURDAY 15 MARCH

0000 UNDERWAY AS BEFORE CONDUCTING HI-RESOLUTION SM 30 ~~LINE~~ SURVEY OF SUSPECTED HMAS SYDNEY BATTLE SITE, ON 750 M SWATH. HDG 180, CO 6266, DEPTH 2636, ALT 58, SPD 30

0018 2 LARGE AND ONE SMALL TARGET ABEAM TO STBD. SIZE & LOCATION CONSISTANT W/ DESTRUCTION OF HMAS SYDNEY BRIDGE.

0219 BEGIN CABLING IN

0330 START TURN

0400 TURN COMPLETE; cabling out.

0606 FINISHED CABLING OUT CO 5202 ALT 292 DEPTH 2265 SPD 2.1 KTS

0800 Morning Meeting - Supply Boat is late.

0848 SONAR PASSING COURSE CHANGE POINT FROM PREVIOUS LINE 10. ENTERING NEW GROUNDS

0940 Lobster boat alongside transferring stores.
0955 Boat off; preparing for next pass.
1000 Wind 12 KTS from South; wind waves less than 4 feet. Swells from South 8-10.

1050 Boat attempted 2 more unsuccessful passes. Now waiting until we finish line and can provide a lee.

SATURDAY 15 March (Continued)

1058 Towfish latitude 26°-08'.
1104 Line 10 run as extended complete. Cabling in.
1115 Bridge directs 3 course alteration of 10° each to starboard to facilitate bringing supply boat along side.

1117 C/O 5331 TP Z 2188 Alt 361
C/C to 010.

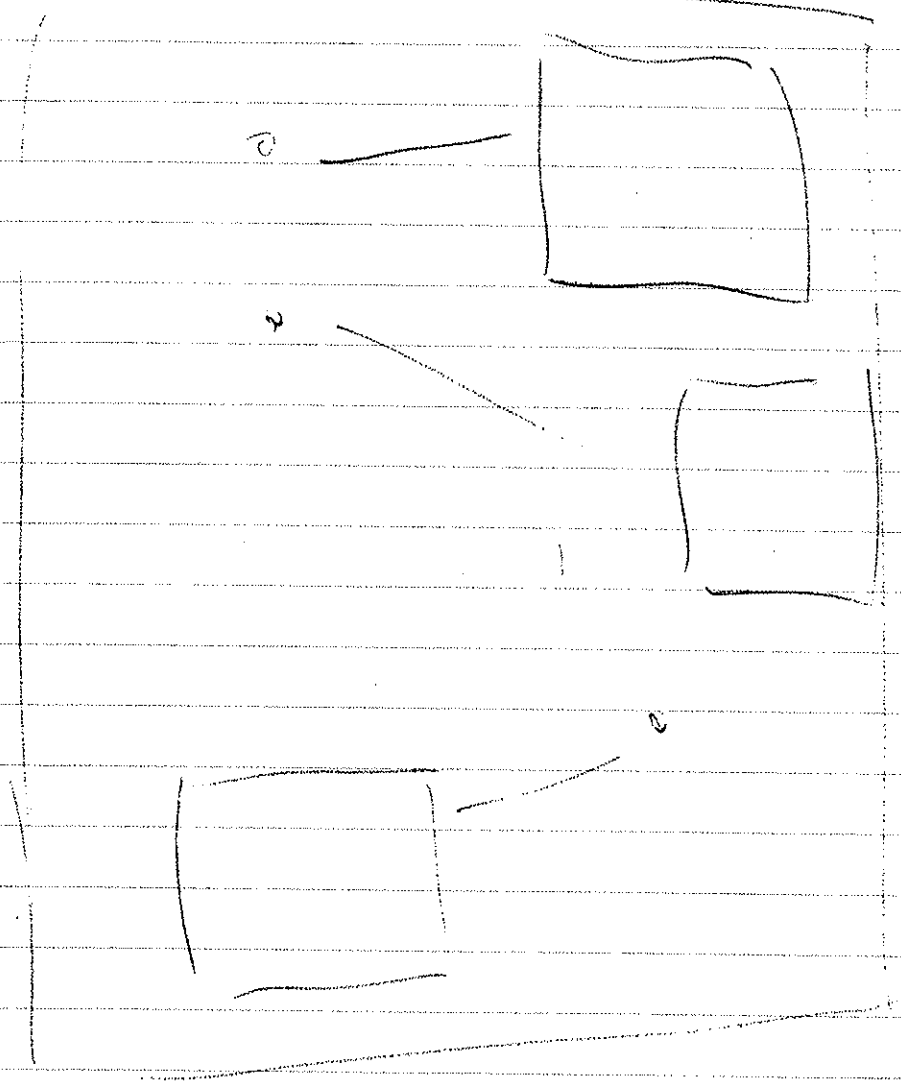
1135 Small boat alongside; transfer complete

1207 C/O 4291; TP Z 1604 Alt 398.

1236 Commence Turn
1351 Complete Turn
1350 Cabling out.
1532 Complete cabling out.
1356 Start Line 11. Course South.
1638 C/O 5977; TP Z 2262 Alt 220.
Spd 2.4; Towfish Latitude 26-07-505

1800 Wind - South 12; waves - nil; Swell 6-8'
2025 Still sailing down line 2.4 Kts. 168°
no sightings
2152 12.3 Km to go to EOL.
2155 SATURDAY NIGHT PLAN
About 0045 at Line 11, EOL, cable in to ~ 3300 meters, then turn on a 4300 meter ~~circle~~ diameter turning arc and proceed to Line 12 North which is 4300 m E of Line 11.

POSSIBLE - CHART WITH WRECK PICS.



SUNDAY, 16 MARCH

0000 U/W AS BEFORE CONDUCTING DEEP TOW SM30 OPERATIONS IN SEARCH OF HMAS SYDNEY. HDG 180 ON LINE 11 w/ 6734m C.O., DEPTH 2496, ALT 249, SPD 3.1 KTS

0033 EOL LINE 11; commenced cabling in.

0210 Completed CI; C/O 3300m. Commenced turn to port to Line 12.

0330 FINISHED TURN. BEGIN CABLING OUT

0550 Completed cabling out. C/O 7020; TPZ = 2400 Alt = 300m.

0600 Wind S-15; Sea 8-10.

0703 BOL Line 12. C/O 7367. TPZ 2437, ALT 239m

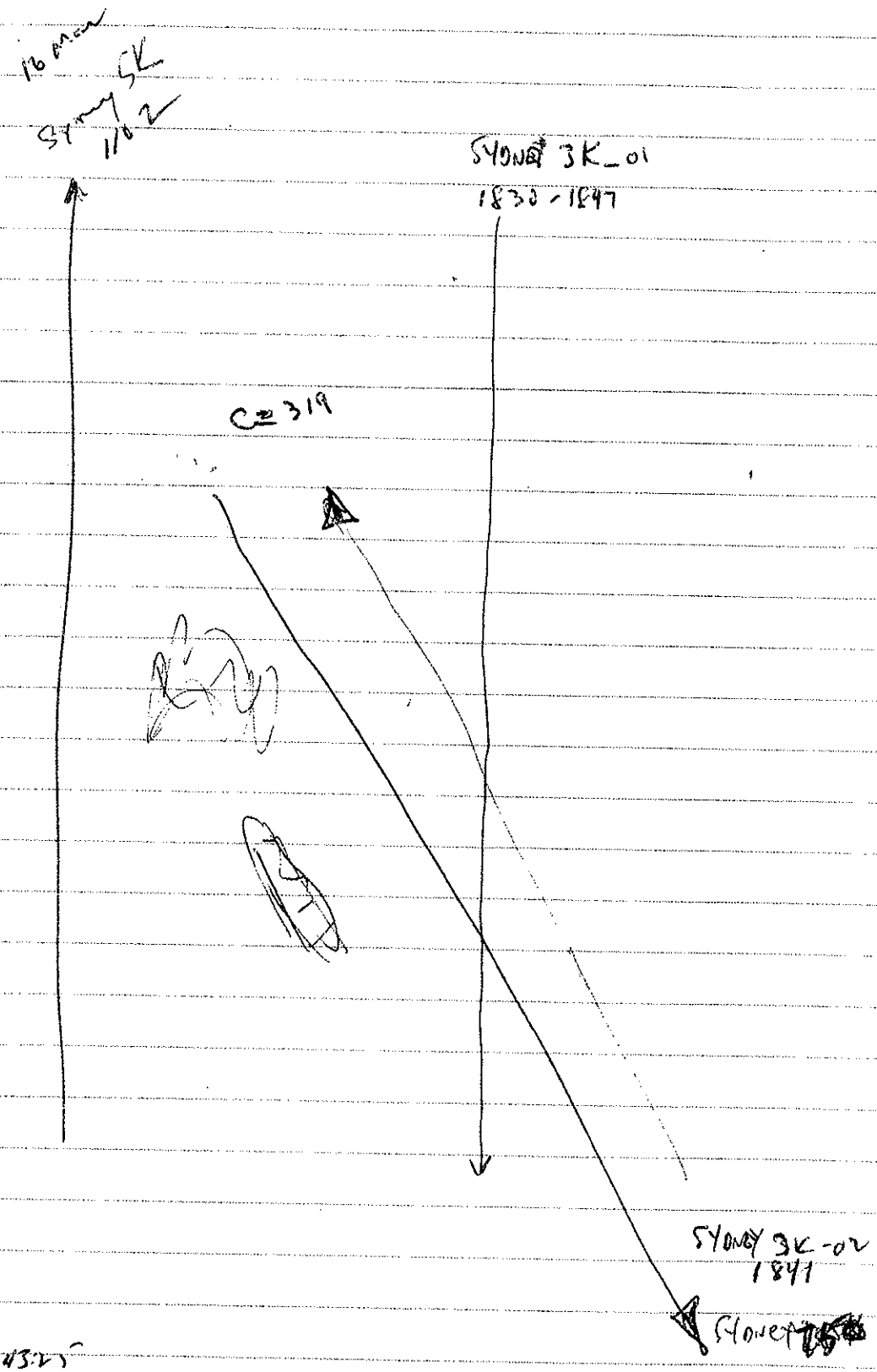
0810 Morning Meeting:
David says either one or ten days.
Kormoran announcement to be made in Canberra today between 0900-1100 our time.

~~X~~S

1102 Target 1000m to starboard; probably Sydney.

1150 C/O 7128; TPZ 2236m Alt 237m.
Spd 3.3 TP CSE 334

1256 Cabling in for a starboard turn.
1240 Shifted from 6K swathy to 3K swathy.
1315 Cable in to 4094m. Commencing turn.




Calculation
0943:25
0941:47
1:38 = 98 seconds to pass Sydney.
20 secs to pass point target
78 seconds for measurement.
1.15 × 78 = 89.7
= 142 m.

Sunday 16 March (continued)

1317 Commencing starboard turn on a 3200 m diameter circle.
1425 Complete turn; cabling out
1455 C/O 4466 m.

1625 11.5 Km from Towfish to Sydney Posit. approx 2 hrs. to image target. C/O 6500 m.
speed 2.7 Kts
course 180°

1830 C/O 6070; TP Z 2229; alt 177.
Spd 2.2 KTS One Km to Sydney position.
Intend to pass 700 m to Starboard on 3000 m swath.

1835 Passing Sydney Debris field.
1841-54 Sydney down
1845 Past Sydney
1847 Cabling in for next pass.
1930 Cable in to 4311. Commencing turn on a 5600 m diameter Turning Circle.
2050 Turn complete. Cabling out.
2215 Cable out C/O 6012, TPZ 2335 alt 75 m
2234 Change altitude from 75 m to 100 m.
2255 C/O 5918
2259-50 Passing Sydney.
23 01 49

Brian's Sonar Way Time 140155 − 135955
135985
200

Spd 2.7 KTS = 1.35 m/s

Range 335 m.

Sin 1.4 × 335 = 5.18 m 5.18/1.35 = 6.0 secs

2310 Cabling in. 1.54 at 1.35 = 154 m.

Sunday 16 March (Continued)

2015. Passed Sydney at 1811 + 2300 ⇒ 4 hrs 19 min.
2340 C/O 4850.

2345 Plan –

1) Run my West side of Sydney on 750m Swath on course 139 at 2.9-3.0 kts at 75m alt.
2) Recovery SM-30
3) Rig AMS-60 while proceeding to Kormoran site.
4) Memorial Ceremony at Kormoran.
5) Deploy AMS-60 for Kormoran (SMS)
6) Proceed down debris trail to Sydney site
7) 2 AMS-60 runs on Sydney
8) Sydney Memorial Service
9) Proceed to Geraldton.

Monday 17 March

0001 Surveying as before proceeding to North on turn to return to West side of Sydney on 750m Swath on course 139 at an altitude of 70m and a speed of 2.9-3.0 kts. C/O 4018. Covering up to 3200 m. Turning circle diameter will be 3500-4000 m.

Monday, 17 March (continued)

0031 Completed cabling in to 3500 m. Commenced turn.
0145 Completed turn; cabling out.
0400 Cabling out complete. C/O 6696. TF Z 2413; ALT 108m
0410 Seas 8-10 feet from South: Wind 12-15 KTS.

0510 C/O 7224, TF Z 2350 ALT 76m, SPD 2.9 KTS
Tension: 5200-5500 #
Sonar on 750 m South, TF ~~Course~~ Hdg 165
Transmit Power - Hi
Rcvr Gain:
Port L7 SB L 0
STBD L7
PW PORT 1 STBD 2 SB 1
BW 5K 5K

0516 400 m to Sydney.
0523 C/O 7198 TFZ 2346
0524 Sydney in sight to starboard at 180 m.
0524 C/O 7200 Spd 2.9 KTS. 3.5 hrs to haul in.
0536 Cabling in for recovery at 35-40 m/minute.
0826 C/O 500 m
0855 Tool Box Meeting
0902 Depressor on Deck.
0911 Towfish on Deck.
0915 Proceeding to Kormoran Site. Rigging AMS-60
1020 Reset Cable Counter to 9.608 pulses per meter, on payout scale. All cable readings heretofore need a .93 factor.

Monday 17 March (continued)

1020 Previous cable counter value was 8.212 pulses per meter

1040 Proceeding to Kormoran site. Distance 9.8 Km.
After Memorial Service we will proceed
16 Km North to launch:

16 Km = 8.63 nm
at 2.5 KTS ⇒ 3.45 hrs = 207 min.
Need 6800 m cable out ⇒ 33 m/min
cable out rate.

1145 At Kormoran site. Memorial Service for Kormoran.

1510 Proceeding to a site 16 Km SW of Kormoran
posit to begin deployment of AMS-60 Towfish.
speed 3.7 Knots (engine problems?)
Hdg. 186°
1510 checklist complete / toolbox completed
1515 Towfish Launched
1517 Depressor " u/w for Bottom
500 m swath AMS-60

1525 Uplink telemetry not working.

1530 Preparing to recovery towfish.

45 Toolbox meeting for recovery complete.
1556 Depressor on deck.
1609 Towfish on deck. Center Troubleshooting.

Monday 17 March (continued)

1623 Removing electronics from Can.
1725 Electronics being rigged on Sonar
1730 Phonecon w. Patrick: Demob in Geraldton.
Welders
Cameage
Motel Rooms
Transport to Fremant
Welding Permit.

1835 Carter increased gain on telemetry signal Topside. Telemetry apparently OK. Rigging for launch of MAS-60

1900 ~~Transport~~ Toolbox meeting complete.

1902 Towfish in water

1905 Depressor launched, cabling out.

1920 Plan is to make one run ~~on west side~~ over top ~~of Kom~~ of Komoran on a swath width of 800 m altitude 100. This assumes some error and maximizes opportunity to get target in window.

2205 Towfish at depth. C/O 5341. TF Z 2705m Alt 90 m. Carter to steel tuning.

2207 Captain says there is an engineering limitation due to a head gasket problem. He is having trouble maintaining course and his max speed seems to be 2.2 - 2.3 KTS.

2330 Wind S @ 18-20 KTS; Seas 10-12 feet.

Monday, 17 March (continued)

2335 IMS-60 Telemetry is not solid. Carter believes it an uplink problem.

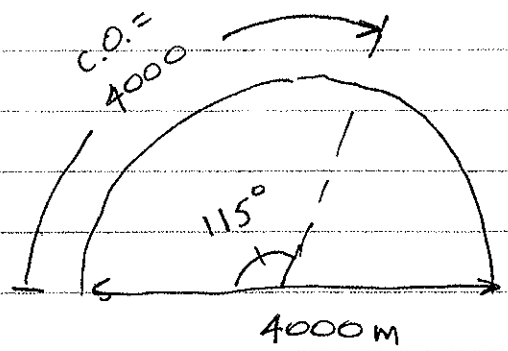
2355 Electrical Interference on 1515 and C004 but not EPC and Sonar Wiz.

Tuesday 18 March

0001 Surveying as before proceeding to pass over Kormoran wreck so that it might appear on one side or the other. IMS-60 at 5400 m cable out, 600 metre swath. Ship on course 026 at speed about 2.5 KTS. Requested altitude is 100 m. Towfish depth is 2470 m. After Kormoran we will proceed to Sydney, then debris field between battle site and Sydney and then to demob in Geraldton. Ship has an engineering problem in that speed is limited to about 2.8 KTS.

0004 Robert requests 50 m altitude.

0008 70 5411, TV Z 2470, altitude 56 m.


C.O.=
4000
115°
4000 m

Tuesday 18 March (continued)

~~8~~ 9 Passing Kormoran 176 m to starboard.

0032 END OF LINE. CABLING IN TO BEGIN TURN TOWARD SYDNEY

0130 CABLE IN TO 4000. BEGINNING TURN ON 4000 M DIAM CIRCLE. ∝ ALTITUDE = 500 m SPEED = 2.5-2.7 KTS

0146 MIN ALTITUDE 380 m

0200 ALTITUDE 250 M, RESUME CABLING IN, SPD 2.0

0300 c/o 2850. Stop cabling.

0330 Ships speed reduced to 1.5 kts due to blown head gasket.

0440 Capt & Robert confer w. Rupert, Chief Mate, on bridge. Not a good situation — Williamson equipment at hazard if ship goes DIW. Williamson will heave in cable to less than water depth and we will proceed toward next line which is about 19 Km away.

0445 Cabling in. c/o 2800.

0515 c/o 2317. 1 Fed cable. Depth under ship 2468 m.

0550 Carter de-energizing IMS-60 to Tweak telemetry

Tuesday 18 March (continued)

0800 Towfish back on. Looks good.

1100 Plan is to finish this pass over Sydney and recover. Then proceed to Sydney site for memorial service. ETA Geraldton is 1600 Thursday.

1200 C/O 4375; TF Z 2375 Alt 58 M.
Ship Spd 1.7 KTS. 750 m to Sydney.

1223.20 Passing Sydney. Spd 2.3 Range 170 m.
1225.35 Past Sydney Spd 2.3

230 Sonar survey complete. Five runs in Sydney — no misses. Fantastic navigation!

1233 Rigging cable greaser.

1245 Sphere rigged; cabling in. C/O 4261

1308 C/O 3470. Occasional ground fault.

1348 C/O 2000. Commence turn.

1421 Complete turn; course 335.

1455 C/O 630 m.

1515 C/O 80 m

1520 Tool Box Meeting for Recovery Complete

1536 Depressor on deck.

1543 Towfish on deck. Recovery Complete.
Survey Complete: Proceeding toward Geraldton.

Tuesday, 18 March (continued)

1700 Meggered AMS-60 umbilical - no problem.
Megger slip ring connector to PMI connector & entire cable.
Shield to Centre OK
Shield to Armor - goes to 1.5 Meg Ω then increases to 55 over 12 seconds.
Resistance - Shield to ground - 1 Meg Ω.

Wednesday 19 March

0600 Proceeding towards Geraldton at 5 kts
kts on course ~150. ETA off Pilot Station ~0700 Thursday.

0745 Morning Meeting.
Patrick has arranged for pilot at 1600. Tied David we would prefer an earlier entry.
1700 ETA is now 1230

Thursday 20 March
Morning Meeting. ETA 1230.
~1245 Moored Geraldton.

# TURNS

| [illegible]NE | EOL/CI | END CI COMMENCE TURN | CABLE OUT ON COMPLETE TURN | END C/O. AT DEPTH | BOL | TIME TO TURN |
|---|---|---|---|---|---|---|
| [illegible] 3/12 | 0533 | 0750 | 0910 | 1120 | 1357 | |
| -10 3/13 | 1205 | 1415 | 1645 | 2020 | 0115 | |
| [illegible]MORAN 3/14 | 1520 | 1707 | 1824 | 2015 | | |
| -10 3/15 | 0219 | 0330 | 0500 | 0606 | 0848 | |
| -17 3/15 | 1104 | 1236 | 1351 | 1532 | 1356 | |
| -12 3/16 | 0033 | 0210 | 0330 | 0530 | 0703 | |
| - SYDBK 3/16 | 1156 | 1315 | 1425 | 1625 | | |

Misc supply
Plastic Baggies
SM 30 Chips
Office Pens
Scotch Tape
DVD label kit
Flashlight
Scissors
Springs for Dynacon
Set of Resistors.
New Telemetry end endcap for MS-60