

R/V Fred H. Moore Cruise Report FM35-02

Science Crew List:

- Thomas H. Shipley, Co-chief scientist University of Texas, Austin
- Eli Silver, Co-chief scientist University of California, Santa Cruz
- Don Reed, Post-Doctorate, University of California, Santa Cruz
- Hugh Winkler, graduate student, University of Texas
- Steffen Saustrup, undergraduate student, University of Texas
- Gina Miscovich, graduate student, University of California
- Fernando Alvarado, RECOPE, Costa Rica Observer
- Claudio Calvo, RECOPE, Costa Rica Observer
- Doug Clothier, Offshore Navigation, Inc., New Orleans
- Ken Griffiths, Research Engineer, University of Texas
- Mark Wiederspahn, Computer Analyst, University of Texas
- Marc Hirsh, Research Engineer, University of Texas
- Dan Martin, Geophysical Technician, University of Texas
- Oscar Febres-Cordero, Geophysical Technician, University of Texas
- Ryan Standley, Geophysical Technician, University of Texas
- Don Dean, Research Associate, University of Texas

Narrative

31 March 1987: Tuesday

Departed Panama 0900L. Deployed starboard 6-gun array at 1330. Started shooting at 1355. Deployed 6-channel streamer at 1400z. . Record 4 mill but Gus header problems did not allow any display of data. Recovered equipment at 1800L. Gun array in excellent shape after 4 hours of shooting. Unable to obtain near trace monitor on EPC.

Hugh Winkler informed me that the Macintosh realtime streamer display program is now working and he is proceeding with the binning program.

01 April 1987: Wednesday

Deployed various airguns all day. Tested PCV's on 2000ci guns. All seems fine with regard to the airgun tests. Starboard array ran another several hours with no problems. Lost one float on port array and recovered. Used the 6-channel streamer all day. Calibrated the depth indicator in inboard stretch.

Collected three tapes of 4 mill data using the 6-channel streamer. A major milestone has been reached. Quality control plots confirm that data is in good shape. EPC monitor is still poor.

02 April 1987: Thursday

Deployed port array with new float configuration and 6-channel streamer for about six hours. Recorded data on the Gus for 6 hours, all is well. 3.5 kHz echo sounder not working. EPC seismic monitor remains poor.

Began deployment of 96-trace streamer at 2100L. Blew hydraulic hose on main pump. Switched to back-up pump. After a few minutes chain broke and jammed hydraulic motor, resulting in second hydraulic hose break. As day ends repairs underway.

ONI made contact today with shore stations. Now in area and acquiring navigation data. Seems to be over 277m offset. Will investigate.

03 April 1987: Friday

Continuing deployment of 96-trace streamer. Blew third hydraulic hose about 2 am. Replaced main crossover behind main reel and added a second gauge. Began deployment again at 6 am. Have patched on the order of 5 more leaks in the cable. Deployed without birds, nearly balanced. Recovering for deployment with birds and compasses. Expect to start shooting tomorrow morning.

No new information on the ONI data offset. No new information on the navigation programs.

04 April 1987: Saturday

Continued deployment of 96-trace streamer. No more hydraulic problems. Began shooting line 1. Continuous problems of all types with airguns of all sizes. Lost ONI at about 100km range. Clutch failure caused termination of line a few km short. Began line 50.

05 April 1987: Sunday

Line 50 lost 429ci gun after about 1 hr. Pulled and began circle. Did not make it back to tie point. Putting second array in as a backup. Second array lasted about 10 minutes. Pulled arrays. Decided to let Oscar and Ryan sleep and then repair both arrays before deployment again. This will be the last attempt to collect data with the arrays. Oscar found that one of the 429 ci guns was put together incorrectly.

06 April 1987: Monday

Finished shooting Line 50a with single array. Completed Line 90. Shooting Line 40. Tamarindo station off the air for 4 to 6 hours. Caused early termination of the offshore part of Line 40. Large ship crossed 1 km this side of tailbuoy coupled with shrimper with doors dragging lead to early termination of shoreward portion of line 50a. Redefined swath to begin about 5 nm farther offshore. Because of compressor failure on seaward portion of 50a and ONI station problems, terminated seaward portion of line 40 at about the same position as 50a. Thus, lines have been shortened to 60 km.

Oscar and Ryan are working hard to keeping a single array operational. They are not really able to keep up. Still expect to shoot the grid with the 2000ci gun.

07 April 1987: Tuesday

Shot lines 10 and 60 today. Arrays still lasting only 4 to 8 hours. Tamarindo station unreliable beyond 100 km slant range. Streamer still in good shape, but several light and heavy sections. Well consider pulling at end of the swath work.

08 April 1987: Wednesday

Shooting line 80. Ship avoidance led to loss of streamer depth control. Finally fixed by power off/on of the Syntron controller. Lost the line. Also had compressor failure last night that lost 20 minutes of line. Shot line 70. Starboard array lasted 18 hours before recovery to repair 60 ci gun and detector on 108 ci gun. Continue to have problems with fishing boats on the shallow ends of the lines.

09 April 1987: Thursday

Finished all swath lines today using 1065 ci source array. Preparing to begin grid with same source.

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Completed lines 126, 130, 144, 180, 182. Continue to have problems with ship traffic, causing delays of hours on some lines. Current is about 1 knot to the northwest creating great problems with the shooting plan. Down current turns are too wide or take too long to make. Feathering is 500 to 1000m on far trace. Using ONI on track navigation, using Macintosh program of Ken's on bridge. Binning program is working. Streamer display is through the 1134.

11 April 1987: Saturday

Completed lines 178, 176, 174, 142, 140, 138. No new problems, taking greater time to make the downdip lines. Tamarindo station drops out at dusk. Binning program almost working.

12 April 1987: Sunday

Completed lines 134, 136, 172, 170, 168.

13 April 1987: Monday

ONI Tamarindo station acted up about 330pm local time, back on and ok about 630pm. Contacted Ivor and asked to check for heat problems. Lost last half of 164 and about 6 hours total.

Completed lines 132, 128, 166, 124, 1/2 of 164.

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Completed lines 162, 122, 160, 120, 158. Lost some data due to MTO Gus tape drive problems. Now seems ok.

15 April 1987: Wednesday

Completed lines 164A, 118, 156, 116, 154. No navigation problems. Two of 4 Gus tape drives down. 8 suspect traces on Gus.

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Completed lines 114, 152, 112, 150, 110. Current up to 2.5 knots for 8 hours. No navigation problems.

17 April 1987: Friday

Completed line 148, 106, 1/2 of 146, 200, 204, 208, 212. Lost Tamarindo station for 3 hours this morning. Now running the strike lines. Upcurrent at 33 1/3m, downcurrent at 50m. Have a total of 10 suspect traces, 3 which are clearly bad, the others with low amplitudes.

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Completed lines 216, 220, 218, 214, 210, 206, 202, 146A. Navigation fine today. This means have essentially completed the 200m grid between lines 110 and 182, plus a set of 2000m strike lines.

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22 April 1987: Wednesday

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25 April 1987: Saturday

Hugh may have completed a binning program. Should finish reading in the data from the logger tapes tonight for the inner 7 km of the grid. We will then be able to determine how to use it and then design some filling program.

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26 April 1987: Sunday

Ran over long-line at about 7am. Boat name Jet. Completed lines 183, 184, 184A, 107, part 105, 108. Several lines aborted today trying to keep away from big ships and small fishing boats.

27 April 1987: Monday

Completed lines 185, 104, 105A, 186, 323, 184A.

28 April 1987: Tuesday

Completed lines 187, 103, 211, 188, 102.

29 April 1987: Wednesday

Completed lines 189. Aborted new strike line due to ship traffic. Began pulling gear at 8 am. Finished at about 3:30 pm. Underway for Puntarenas.

Other discussion points:

Reel brake

Lab air conditioning

wind direction indicator

hydraulics

closed circuit tv

Fortran for the Macintosh

air gun technician watches and 3rd person?

food

headaches in stateroom

smoking

~~parts~~ chain, gearbox-motor

06 May 1987

Discussion points for Fred H. Moore

Air gun technicians

nominal requirements for staffing

griffiths--no check 1 mill, cover spare reels, wind on 6 trace

no set up Gus filters as requested

watch schedules (Martin no Gus)

Reel brake

Reel chain

Real hydraulics

Reel gearbox, motor

Lab air conditioning

Wind direction indicator

Closed circuit TV for stern, streamer/guns?

Spare reel device

Depth indicator repairs

4th tape drive

Camera

Sonobuoy

food, type, quality, service

noise-lab and staterooms

smoking policy

Science services

agents-shipping

Captain-crew lists

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MAY 20 1987

**1987 PACIFIC CRUISE
LEG IDENTIFICATION NUMBERS**

<u>ID</u>	<u>PROJECT</u>	<u>PORT</u>	<u>PORT</u>
FM35-01	TRANSIT	GALVESTON	PANAMA
FM35-02	COSTA RICA-3D	PANAMA	PUNTARENAS, COSTA RICA
FM35-03	TRANSIT	PUNTARENAS	HONOLULU, HAWAII
FM35-04	TRANSIT	HONOLULU	YOKOHAMA, JAPAN
FM35-05	BONIN ARCH	YOKOHAMA	TOKYO, JAPAN
FM35-06	NANKAI TROUGH	TOKYO	OSAKA, JAPAN
FM35-07	STUDENT CRUISE	OSAKA	OSAKA
FM35-08	TRANSIT	OSAKA	PALAU
FM35-09	SUNDA FOREARC	PALAU	GUAM
FM35-10	CRET. VOLCANICS	GUAM	MAJURO
FM35-11	TRANSIT	MAJURO	HAWAII

~~FM36~~

COSTA RICA

PROJECT: CR3D

FM3502

CHIEF SCIENTIST: TOM SHIPLEY

BALBOA, PANAMA

3/31 Departed dock at 0900

1330L SLOW TO PUT STARBOARD ARRAY IN
1830Z1355L GUNS FIRING at 12 SEC RATE
1855Z1400L DEPLOYING 6 CHANNEL STREAMER
1900Z1423L STREAMER IN THE WATER & STARBOARD ARRAY FIRING
1923Z BEGIN 6 channel streamer test line2328 Streamer and starboard array back on
Full ahead both engines

4/1

1508 Disengage Std Engine,
Switch on Port
starboard array is deployed

1630 (approximate) Start deploying 6-channel streamer.

1710 Start firing two 6-gun arrays.

1725 Guns stop firing - Lost balloon from guns.
Pulling in 6-channel streamer and chasing balloon.

1800 Balloon Retrieved, streamer let back out

1840 Firing starboard array + big gun

1847 speed thru water 4.9 kts - 24 ft depth

1905 speed - 5.0 kts - 23 ft depth 6-channel streamer

1913 Bringing in big gun (starboard)

1935 Switch to 16-sec. record length, 19 sec rep. rate

4/1

0002

jd 91

2000 Tape 0001 Plotted - Data looks OK

2100 Shift change -

2134 Changed to other tape drive - mt3

2154 put out "big gun" - 1cl on port side (2000 cu in)
change gun time to 20 secs

2225 6 channel streamer recovery started

2236 restarted gus because of bad tape

2242 6-channel streamer onboard

2249 I/S To Cruising (9 KTS?)

4/2 1 jd 91 02 APR

1631 Slow to 1 engine to deploy port A/G Array

1725 Start firing port array (6-gun)

1729 Start deploying 6-channel streamer

1742 Streamer deployed

1749:50 First shot to Gus tape 6 streamer depth 28 feet

2133 Stop shooting, retrieve guns + streamer

2159 gun array in, streamer in full speed ahead

4/3

0030 Tom Leads tape measurement of ship
And - Land base Nav Works!

3 April 87

0330 Slow for streamer deployment

0593

0406 ALL stop, lost hydraulics to streamer winch, blew a hose

0407 slow ahead

lost main hydraulic, will use backup

0434 lost hydraulic again, winch chain broke

0446 slow ahead on one engine, ~~streamer going out~~

0741 repairing winch drive chain

0747 Port drive chain replaced. Replacing portion of starboard chain and tightening

1530 another hydraulic hose blew out at about 0900Z

realigning Depth Indicators

2121 Streamer deployed, towing at 5 kts to check balance

2205 course 210° spd 5 kts

4/APRIL 87

0026 pulling streamer in

0100 streamer going out

0500 Replacing section 15

0600 New watch - still replacing section

0832 No advises Fishing boat doesn't answer.
may need to alter course to avoid it.1013 c/s 4.0 ~~kts~~ kts streamer deployed
command blade to 10m

1016 begin c/s to 000°, 40/min

1034 turn to 000° complete

1038 c/s 5.0 knots

1219 c/s slow on two engines

4/APR/87

- 1315 turn at 4° min to 305° putting all guns in water
- 1330 turn complete
- 1346 all guns in the water - both engines ahead
- 1417 begin test firing ~1420 port array 2000u
- 1427 6-gun port only
- 1428 c/c 040° at 4°/min
- 1444 switched to 6 gun starboard for test
- 1445 slow to pull in port 2000u³
- 1451 pulling in port 2000u to look at sensor
- 1452 resume speed both engines
- 1510 c/c 050° / pulled leader in to 162' from 210' ^{- 49.38m}
- 1626 c/c 225°

- 1649 1ST Shot Line #1!
6000 yds inches
Slightly off line - on course 205°
Speed 4.8 Kts - too fast
- 1651 Adj. Speed 4.0 Kts → 3.3 Kts (too slow?)
- 1656 On 4.0 Kts
3.5 KHz working, but very weak
- 1720 Problem w/ synchronization of C2 (large AG)
changed to C8.
- 1740 Holding line C8, to within 5m!
3.5 still working

4 April JD 95

1987

0005

FM35-02

1902 High Pressure Leak develops in array B.
Guns shut down for about 2½ minutes, then
resume. Five shots missed. (between 303 and 305)

1921 GUN 1B1 shut down 429 cu in STBD array
air leak → due to pressure loss

1929 Pressure back to 2000 psi., Gun 1B1 still
shut down.

1940 Everything running smoothly.

2143 Stbd large gun down to 1400 psi - shutting ^{it} down.

2149 Running w/o 2000 in gun (stbd), Pressure back to 2000 psi.

2147 - turn off 3.5 kHz

2300 Gun 1B1 has consistently large
range errors (> 1 msec).

2329 Gun in the water, ready to fire - Now both
2000 cu in guns on
Also both arrays minus 1B1

2335 Gun AG off due to air leak

2347 Gun BS w/ large range errors
Occasional misfire

Switched port 2000 cu in gun to 107

0128 Switch Main to Channel 94
0212 Starboard 2000 cu in gun leaking, pulling now

05 April 85

0006

FM3502

0228 starboard 2000 ci back on; total 5563 ci

0320 starting to lose ONI navigation signals

03:36:53 started shooting on time - 26 sec

lost at 90 km from Garza, reliable only to 85 km

0414 starboard 2000 ci gun leaking sylenoid bolts backed out

0433 starboard 2000 ci gun in array size 5563

0454 END OF LINE 1, terminated when clutch on compressor went out

0609 New watch - repairing air guns

0635 Begin turn to line 50, 4°/min

0455-0635 ONI not plotting
(resumes at 0635)

~~0738~~

0738 - Completed turn, putting in ^{port} ~~star~~ array

0809 - About to start shooting

0818 - manual shooting ok

0830 - Start GUS

reset shot number 001 Line 50-lead in

0833 - speed up to 5.0 kts

shooting on time - ~~13 sec~~ 26 sec, trying
recording - 10 sec to set at 13 sec.
~~shotpoint~~ 4

0918 Still trying to set rep rate @ 13 secs but even MW Stumped

0926 change rep rate to 13 sec finally
strong current + steer 065 to
make 045

0950 change to shooting on distance
33 m; shot 234

5 April

1024 lost logger - no clock - Sync

1028 logger up - clock ok

1109 Gun 1A (429 cu in) misfiring

1117 Gun off

1118 Begin Turn @ 4°/min
SP 626 was local1154 could not plot tape 350019 - this is the
tape with good shot data and the "bad data"
written while trying to figure out how to
stop gun - tried onshft.par and guspld.par -
no read errors on tape.1248 Resume firing
CSE 316 Turning 4°/min to
get back to line

1506 start shooting shot 651 Line 50

1526 429 in STBD GUN MISFIRING
Shut down shooting on Line 50 shot 728

1736 c/c 190°

1805 on cse 180°

1845 - 50 kW GEN HAS A FUEL LEAK - MAY HAVE TO
SHIFT US TO SHIP'S GEN FOR REPAIR

- 1849 - 3 HITS, COMPUTERS RESET.

1855 - logger down during generator change

- 1924) Tape off line, data lost but still written on paper output of logger
- 1943 Switch to \$ 150 kW generator, all computers crashed, including logger and ONI
- 2035 - Logger backup; on line without tape recording
QC computer working; back on 50kW generator
- 2143 ONI computer back up and reporting to logger every minute
~~Plotter~~ Plotter resumes operation
- 06 APR
- 0130 course change to 090 to get on line to Reshoot Line 50
- 0240 Both 106Tci arrays in the water
- 0250 lost pressure in all guns, maybe flooded guns
- 0255 c/c 130°
- 0351 begin Line 50A had bad approach speed too high creating logger + GUS errors, using ~~port~~ port array only 1065ci
- 0453 287 ONI 274 GUS compressor failure end recording
- 0457 bringing UP other compressor
- 0510 ONI SP 355 UT SP 277 UT Rec No 277

5 April 87

0655 ONI SP 818 UT SP 740 UT Rec # 740

0819 Tail buoy check -336 ~~216~~ m off
line of track at 3200 m
Compass 1 - 58°

0849 Bridge reports 3 small boats 5-6
miles ahead -- 1 port, 1 starboard, 1 dead
ahead

0918 Small boats are still too far away
to detect actual size, bridge will
inform lab as to situation

0931 Mark W. is uncertain if compass
readings are being logged -
the problem is the CUS is NOT
triggering on end of record, even
tho the logger does.

0947 change CUS to internal 13 sec
cycle, ~~is~~ timed to occur
at ~ END OF RECORDING

1004 shooting on time causes
Fixed cycle to walk -
put CUS on ONI start

11 11 small boat may intersect with tail buoy
shots fired - no apparent response

11 16 speed to 6 knots - due the cable

ONI 1953 = 849 file no m Gus, had to go off
track but it still cut across steamer

1122 Guns back on (Pataway) - resume 4.2 kts

6 April 87

1129 J/5nd 5 Kts to avoid more traffic

1134 up to 6 knots to avoid more traffic 896 Ffid
1137 cable to 30 M

Line 50 is over

1145 cable to 10 M again
C/c 085°

1155 Turning 5°/min slow to 4 Kts
Trying to avoid a third boat.

1241 ONI shot 321 = ϕ file no. = 1899 shot wT 1239Z
shot, record = same at 10

start Line 90 at shot 321

1243 shifted to starboard away, port 429 leaking
logger getting 1 min cycles, not for every shot
Doug is fixing ~~fixed~~

1258 pulling port gun array. Slow on stbd.

1326 Gun B3 (150 min) giving consistently
large (1-2 msec) closure errors

1329-1331 System off due to tape rejection

1332 RECORDING AGAIN

1400 NEW WATCH

1500 GUN ~~PORT~~¹⁵⁰ array misfiring, will pull ~~port~~^{STBD} array and deploy
~~STBD~~^{PORT} 106Sci

1505 BRIDGE WATCH OFF TRACK SINCE 1400
OVERSTEERING LINE

1512 PORT ARRAY FIRING 106Sci

1539 BRIDGE LOST STEERING CONTROL - AUTOPILOT TOOK OVER
WHEN SHIP INCREASED SPEED

6 APR 87

0011

1619 STBD ARRAY IN WATER, READY TO GO WHEN NEEDED

1647 MISSING ALOT OF SHOTS AS MANY AS 1 OF 5

1711 RESET GCS

1725 STILL OFF TRACK, HAVEN'T MISSED ANY SHOTS SINCE RESET

1756 STOPPED SHOOTING PIRESSURE LEAK IN 429ci port gun

1758 SWITCHED TO STBD ARRAY

1821 150 ci: ^{stbd array} ~~stbd array~~ ~~direction~~ large firing error; inconsistent

1839 Steering 216 to make 225

1921 ONI Station down; lost ~~10~~⁶ shots between 1920z - 1921z

1922 ONI Station returns

Problems with reception of

1927 Station A - Tamarindo

1933 Station A turned off
Nav Plotter not printing

1938 Shorten line in order to call on land station operator

1956 Gun B-4 shut down due to misfire.

2025 - Terminate Line due to loss of Tamarindo station

- 2054 CALCOMP NOW WORKING
NO ONI INFO
- 2102 ALL ARRAYS ON BOARD
- 2105 BRIDGE MAINTAINING COURSE OF 222 AND
DOING WORK WITH AUTOPILOT
- 2326 ONI back, but VERY SPOTTY - Doug is working
to fix
- 2342 Start turn to "left" - to line up w/ start of next line
40/min ~~4~~ kts ~5 kts

07 April

- 0125 Bridge asked by Oscar to light up compressor
0130 Compressors Out off.
- 0150 Port A/G array in
Putting in starboard array
- 0207 Both arrays deployed
Begin test firing
- 0213 Incr. speed \rightarrow 5 kts
- 0323 Begin Line 40
- 0342 Reboot logger 0342z, no shot number
Shot 85 is OK, reboot OK
Shot 93 first shot in starboard array, lost port 429ci
- 0400 various NAV/PCOT problems - reboot NAV/PCOT
- 0406 Both engines resumed; array is ~~on~~ on board

7 April 87

- 0415 having problems with starboard array
B3 + B4, 150 + 108 ci guns, relative fire
times, Trying to put in manual until
other array is fixed.
- 0425 turned off B3-108 ci gun
- 0445 Begin to deploy ~~STBD~~^{PORT} array
- 0450 SWITCHED TO ~~STBD~~^{PORT} Array at shot 389 1065 ci
- 0600 New watch
- 0605 - ~~Gain decrease~~ on Amplitude decrease
on EPC recorder, increase
gain to 20 db, followed by a
decrease to 6 db
- 0600-0700 EPC record extremely poor -
gain adjustment problems
- 0710 change stylus belt on EPC
- 0725 AGC turned off, gain set to
6 db
- 0928 Switch to stbd array - not firing
~~108~~ 108 ci. gun
Shot number 1450 first shot
Cause of switch 429 ci. gun
leaking in port array
- 1037 Boat traffic
- 1039 Begin c/c To line 10
- 1040 Turn of AG + GUS
- 1146 Begin shooting line 10
Some confusion concerning GUS

7 April 87

- 1155 Incr. Spd \rightarrow 4 kts, 4.6 kts
- 1211 4.6 kts doppler, 4.2 made good
- 1147 wrote tape 350052 w/ noise since shots were not happening, but this was started, plotted this tape had only noise - reuse tape + restart with 350052.
- 1443 LOST ALL POWER, GUNS DOWN SHOT 687
- 1444 POWER RACK UP, GUNS FIRING, SHOT ~690
- 1543 DI at head of section 8 showing 12-14M since the start of line 40
- 1700 STATION A OF ONI starting to get weak
- 1723 ENGINEER INFORMED LAB A GUN WAS LEAKING BECAUSE AIR PRESSURE DROPPED
- 1744 SWITCH TO STBD ARRAY GUN 108 ON STBY
WILL PUT 108 ONLINE
GUN 108 MISFIRING
- 1800 GUN 108 ON STBD SHUT DOWN
~~Port engine diseng.~~
- 1845 Shots being missed due to erratic nav signal.
- 1903 End of line 10, pulling in
port ~~stbd~~ array
- 1924 Bring starboard array

7 APR 87

jd 97

0015

1936 Starboard array in.

1948 Gun shack informs lab that they need about 2 hours -- go to slow on 1 engine.

2011 Start left turn toward Line 60 at $3^\circ/\text{min}$.

2020 Change to $5^\circ/\text{min}$.

2032 Back to $3^\circ/\text{min}$.

2038 ONI shut down for maintenance.

2141 Both arrays in water, speed up to 3.8 - 4.0 kts

2200 Firing Stbd array

2208 I/S ~ 4 kts
Firing on Distance

2216 Shot 11, logger started logging shot

2310 Plotter has not plotted since 2237
Rebooted. Track gap does not indicate a loss of data.

2312 Plotter off again

2324 Plotter up again

2353 Gun 1B4 continues to act weird
Closing error up to 6 msec.
Aha! Advance for B4 has been set to constant value of 18 msec.

8 April 87
Happy Birthday, Qing ✓

0300 GUN 108 IN STBD ARRAY ON MANUAL ADV.

0356 GUN 108 INDICATES MISFIRE ON GUN DISPLAY BUT
GUN IS FIRING. LOST TRANSDUCER SIGNAL
Blast phone signal confirms manual timing delay

0516 END OF LINE 60 WENT WHOLE LINE
ON ONE ARRAY

0617 Have been turning at $5^{\circ}/\text{min}$ -- too tight.
Turn back 5° to port and hold course
at about 150° . Speed over ground has
been 3-4 knots during turn.

0708 - start line 80 on time...
with shot 1 shooting by distance
all systems operational /
EPC not showing record. ///

0736 - change to external mode on trigger - EPC
now operational

0819 - Compressor problem stop shooting
last good shot 273
bridge alerted to slow to 4.0 kts
GUS stopped

0826 - GUS started, shot number restart
compressor problem with liquid suction
will be back up shortly

0832 Shot 320 - first shot; restart
all systems resume speed
to 4.0 - 4.5 knots, missed shot 46
shots

08 April

- 1000 dive the cable - wrong address
- 1003 2 nm away, crossing astern
- 1008 dive all - no effect
- 1016 .4 nm @ 85° , turning for isport
- 1023 passing ahead, streamer to 10m
missed some shots while @ 5 kts
- 1029 Resetting the birds
- 1147 Incr. Spd \rightarrow 4 kts
- 1211 GPS working
- 1219 Last 3 tapes have been noisy
Chuckin Pressure
(Near traces look OK)
- 1225 Slow to 3.5 kts to test whether
data improves w/ slowness.
- 1245 No real change
Looks like birds are on the surface
- 1334 Guns and G's off.
- 1400 new watch
- 1410 retrieve the ~~streamer~~ rig guns
- 1442 on cf 180°
- 1514 GUNS BEING DEPLOYED

1618 GUNS DEPLOYED, WILL BEGIN TEST FIRING

1730 APPROACHING LINE 70

1736 BEGIN LINE 70

1929 - Crossed beginning of grid on
line 70

2226 Crossed upper edge of grid on line 70.

9 April

0029 Lost Gun #6 60ci

0038 Switch to port away + pulling in starboard away
before end of run

0106 Begin C/C 5°/min to the left
end Line 70 FISHING BOATS IN THE
WAY

0139 6°/min to the rt - will come 270°

0259 START LINE 20 OFFLINE BY ~ 900 M
AT START DUE TO FISHING BOAT
PORT AHEAD 1065ci

0555 Slow to 3.0 kts to avoid
shrimp boats

0600 New watch

0604 Resume speed 4.5

~0730

Change circuit board for channel 32,
 now coming in good, first good
 reel # is #96; good trace began
 between records 51 and 81
 on reel #95

0839 crossed southern boundary of grid

1037 End line 20

Begin Williamson turn to line 30

Oscar is changing to St6d array

1144 End of turn

1205 1st Shot
 line #30

1700 NOTICED NOISY SHOTS at around 1555z
 1655z

1931 End line #30

Last shot 1744, last record
 on reel 111 record 744

start turn at 4° to right
 2005 - Turn radius decreased to avoid traffic

2010 - Waiting for streamer to

2018 - Start~~ing~~ shooting on line 80A
 streamer still curved but
~~the~~ near 30 channels should be good

LINE 80A FIRING ON PORT ARRAY

2100 Change belt on EPC

10 April

0235 All reels for LINE 80A have wrong
Reel number in header thru Reel 350120Reel 350112 → 350012
350120 → 350020

reel number changed on reel 350120

0348 END LINE 80A

0430 NEW PLOT ON CALCOMP

0530 TRANSIT TO START OF LINE 144

0703 START LINE 144 - STEERING 73° TO MAKE 45° 0708 ENTER TAIL BUOY BEARING 244° STREAMER COMPASSES $061-063^\circ$ >

DI's 9.6-11.2 m w/ #8 at 13.4m

Shooting Port Array

ONTI shot point is in GUS header, but
may be changed at end this line.
Stuck bit & causes ambiguity
of 0-8 1-9 in tens digit.0730 Closure error 2 msec on 429 ci.
gun - port array0731 switch to starboard array
first shot |||

10 April 87

0021

0744 Speed up to 4.5 kts

0820 Switch to port array
shot 312 first with port array
pressure drop to 1750 psi
0823 pressure

0827 Low frequency noise on records
sporadic, occurs at 10-15 minute
intervals; possible ship traffic noise
Bridge may be trying too hard
to maintain 4.5 kts, too
many prop adjustments?

0902 Missed time mark at 0900 on
EPC; sporadic noise has decreased
substantially, bridge getting a better
feeling for prop rpm to
maintain 4.5 kts

0932 Large ship in area, bridge
adjusting speed; Tanker noise

0945 Big gun, 429 c.i. port array large
closure errors 1.5 msec
Tanker noise

0953 End of line 144 (Between shots 683/684)
however, shots 684-690 were written to tape

0950 Pulling in stbd array

1035 de

1105 deploy guns - stbd array -

1120.20 1st shot line 182
1st shot # 683

10 April 87

0022

1123 Air pressure ~ 1900 ~~psi~~ psi

1129 " " ~ 2100 psi

1346 Speed up to avoid ship crossing streamer
5.2 kts, 5.4 kts, 5.6 kts, 6.0 kts -

1350 slow back down to
~ 4.5 kts

1414 END OF LINE 182

1414 Course change 4°/min

1519 start line 126 had problems getting ONI
started, first shot 13 on ONI, Rec 1 on tape
Could not get into line 142, so shooting 126 instead
Suggest next down current turn be at slow on 2 engines
and at 6°/min

~1600 started 6 channel strip w/GUSLOT.
one line per tape

1806 End of Line 126
Guns off; turn at 4°/min

1904 change to 4°/min on turn

1919 speed up to 4-4.5 kts

1923 ONI 682 first shot - Start Line 180
Gus shot number 2

2218 End of line

2220 Begin C/C to 142 - Turning it
at 5°/minute

10 April (St00!)

- 0258 Changed target to 132
- 2303 Begin line 132
- 1st Shot Pt 174 m off
- 2306 Dam - Should have chosen 130!
Done - Changed to 130
- 2312 Streamer at $\sim 90^\circ$ to St0d -
Lower part of line will be a loss -
Henceforth we need to give ourselves
at least 1 mile before turning.
Possibly 3 miles.
- 2318 Shot 60! As yet, data are
not useable
Hdg 065, Streamer 210
Difference of 145°
- 2324 - Streamer is reasonably OK
Shot 90 3 KM
- 2325 EPC on

11 April

- 0055 Just noticed plotter has been off
for over 10 minutes.
JD is re-setting it.

0105 Back on line after ply
usual double foot. He didn't even
cut it out, as is usually expected.

11 April 1987

- 0149 End line 130 Shot 684
- 0250 Begin C/C @ 4°/minute
- 0249 c/s 4 kts in water, can't begin Line 178 ship in the way, will do a 270° turn after getting farther upstream
- 0433 steady on 310° trying to get onto Line 178
- 546 START LINE 178
Shot ^{ONE} 684. GUS 1 AIRCON 1
- 0747 Ship crossing bow; approx 2nm in front of bow
- 0800 All proceeding according to plan!
End line 178
- 0840 pulling stbd array
begin turn on south dogleg cse 180
- 0857 Stbd array on board, back to 2 engines
beginning turn at 5°/minute
- 0955 Stbd array back in water, turn progressing nicely
- 1004 start Shot 5 - Line 138
Gus did not start - missed first 4 shots
- 1100 429 cur in gun misfiring in Portaway
Pressure down to 1500 PSI
switch to stbd array

11 April 87

- 1248 End line 138
- 1251 Begin C/c $4^\circ/\text{min}$ to line 176
- 1349 Start line 176
100 m off line
- 1356 Turn on recorder
- 1400 Blown gasket in compressor
bringing up other compressor, but
air pressure will be down for awhile.
- 1402 Decrease speed to 4 Kts
- 1421 back to 2000 psi, were at about 1700-1800 psi(?)
Mike not sure that port ~~main~~ deck compressor
will hold up
- 1653 END LINE 176
Begin $6^\circ/\text{min}$ turn to 180° to
retrieve port array
- 1712 port side array on board
Begin turn to line 142, again
- 1805 ~~start~~ ^{port} array in water
- 1816 Start line 142
start on shot 1
bring port array
- 1910 ONI ~~filter~~ ^{station} station filter time
changed to 75
ONI change back to 50 station filter time

11 April (still !)

0026

- 2100 Gus stopped at shot 634
missed 11 shots; bumped during vacuuming
- 2105 - missed shots due to Gus
slow ~~in~~ in recycling after start up
slow to 3.5 kt
- 2109 - speed up to 4.0 kt
- 2111 - End line 142;
Begin dogleg to port
- 2124 Begin turn to starboard
- 2210 I/sp 4-4.5 (from 3.3 thru 4.0)
- 2214 Begin Turn 4°/min
- 2216 Slow to a crawl
- 2236:35 1st shot online 174
spd 4.5 kts

12 April 87

0122:10

Last shot

- 0124 c/c 180 4°/min
- 0129 D/cc 6°/min
- 0144 Dead slow on α , α 6°/min
- 0247 Start line 140
- 0423 system is crash at shot point 351
on Line 140: lost \approx 26 shots
tape not online

12 April 1987 JD 102

- 0545 End line 140
pull in stbd ~~array~~ array
- 0635 - Noticed that tail buoy does not show up on radar, bridge can see visually
- 0649 - tail buoy back in radar contact
- 0715 - stbd array back in water
- 0720 - channel 86 weak or dead at end of last line. continuity and leakage test ok, BUS ICU oscillator shows ok on dot scope. Problem is in section itself?
- 0725 Start line 17Z - shooting stbd array
First Shot - 684, speed 4.48 kts
- 0738 - Speed up at 4.75 kts, slow to 4.4 kts
- 0740 - Compressor pressure down to 1940 psi
- 0755 - Pressure back to 2000 psi
- 0815 - Vacuum + Load problems with extra on-line tape drive - MT3
- 1012 - End line 17Z
- 1014 Begin Turn to port @ 6°/min
- 1020 ok 180°
- 1036 Dead slow on 2, come rt 6°/min
- 1119 Straighten out
- 1149 1st Shot line 136

12 April 87

1151 I/SP to 4.5

Lost Shot #1

1416 c/s to 4.5 was up to 4.8
stiff 10-15 kt wind from ENE

1432 END LINE 136

Slow to pull in port array

1450 port array on board

Note 4/13/87 HWW
line 170!1543 online, but compressor not ready
shooting anyway, will begin firing when have air —
lost 8 shots —1612 noticed than water column on EDC was
noisy. Looks like Gas problem, may be
from ship

1630 lost compressor ONI ~ 492 / ~ 194

1635 port array in water on again ONI 465
lost 27 shots

DRIVE MTI reset light won't go out, can not load

1730 slowed to let ship cross our bow

1800 watch begins - all system operating, on
line 172

1840 End line 172 (170?) - HWW

2000 Start line 134
Bring port array2029 Switch to starboard array
108 c.i gun in port array misfiring

12 April 87

2247:48 End line 134

Pulling in port array

2258 Port array in
Slow to 3 kts

2327 Begin ck rt @ 4°/min - for 1200 m

13 April 87

0003 c/c again 4°/min

0056 on line near start 168
Launch port array

0102 using port array
0103 c/sp 4.5 kts

0105:44 1st shot Line 168

0150 commanded B-5 to 7m

0218 Command B-2 to 12m
108 ci gun \pm 0.5 mills

0326 B-2 to 13m

0352 end line 168

0523 start line 132

0613 speed up to 4.5 kts

0630 ship making 4.3 kts

0650 speed down to 3.95 kt, speed up
to 4.3 kts

0810-0818 ship near tail buoy - low frequency
noise in data

0819 End of line 132

0931 start of line 166
firing port side array

13 April 87

1228 last shot - end of line 166 -

1230 pull in starboard array

1245 gun array out of water - starboard array

1255 start RT Turn $6^\circ/\text{min}$ Slow on 21351 Begin RT Turn @ $5^\circ/\text{min}$ 1355 i/turn - $6^\circ/\text{min}$

1410 Deployed Starboard Array

1413 nearly on line 128

heading into 20-25 kt wind !!

1432 START LINE 128

1725 END LINE 128

1735 begin c/c $40^\circ/\text{min}$ ~~1800~~

1836 Start line 164

firing starboard array; first shot 684

2013 - Ship speed drifted up to 4.8 kts,
slow to 4.4 kts

2016 ONI Station B lost signal

2027 Second ~~error~~ tape error on logger this
watch

2034 4th error on logger tape

2041 Switch logger to tape drive \emptyset

2046 Problems with ONI navigation

2048 Very poor ONI navigation - actual course
much smoother

2109 - ONI still noisy

2122 - END LINE 164 - ONI Navigation
poor, slight deviation on CSE to
starboard need to restart @ 2030Z
= ONI 200 shot

13 April 87

2247 Erratic Navigation
Going for line 122

2323

Begin C/C To Thrust @ $6^\circ/\text{min}$
Try again

2343 On 180° + holding

2354 Changing left to 165°
Sensor looks OK

14 April

0111 Down in the SW turning patch
Dead slow on 2, rt. at $6^\circ/\text{min}$

0224 Begin Line 124

essentially navigation down from 2030 to 0224
 ≈ 6 hours

0520 end line 124

0644 Start line 162, shooting port array
first shot 683

0923 - ONI slightly noisy at end of line,
only ~ 40 more shotpoints

0925 - Compressor down to 1750, 429ci. port - mishie

0926 - switch to starboard array - not firing, missed in 10 shots

~~0927~~ - All front panel settings ok but

0929 no fine pulses. Wiggled connectors

@ rear of AIRCON & started to

work, but don't know which or why. MW

0935 end line 162

Gus - wrote over first record

14 April 87

1014 Begin C/C to RT @ 6°/min
Dead slow on1129:30 1ST shot of Line 122

1411 c/s going too fast

1418 end line 122

1431 c/c 4°/min

1532 start line 160

1540 asked for more speed, down to 3.5 kts

1544 port array in water

1557 c/s down to 3.9 kts, asked for more

1725 lost data, tape stopped in middle.

1732 with error light on - turned off drive

~~1725~~ logger then hung up

1732 error, thing back on

1828 Last shot Line 160

1831 Contacting Iver - Unit 1

2013 Start Line 120, Guss did not start

2020-start, missed first 25 shots
first reliable shot is 25th ONI shotpoint

2305 End of line 120

2321 Begin C/C 4°/min RT.
straightened to avoid ship

2352 Begin C/C RT 6°/min, slow on 2.

15 April

0116 Begin Line 158

15 April

Shot 4 is 1st good shot

speed thru water around 5.2 kts for most of the line

0310 ONI getting jumpy

0357 END LINE 158

0419 d/c 6°/min slow on 2

0448 Replaced Reel Servo Logic card on Drive MTØ, should work now

0523 start line 118 going to fast on dead slow

0530 still going to fast, change record length to 9 SECS. at Shot 23
so gus can keep up.

0605 start 8°/min to right - abort line
freighter traffic; cannot make contact

0622 Turn to reshoot on Line 164 A

0712 ~~start at~~ 200 shot start line 164 A

0717 Tape drive error on GUS Drive O
Missed several (<10) shots, beginning w/ drive 3,
FRN about 10. Tape 350228 written over, does
not exist, formerly contained shots 1-5
of line 164 A

- 0724 speed 3.61 over ground, 4.2 through water, increase speed by $\frac{1}{2}$ kt. to 4.0 over ground, 4.7 kt through water
- 0809 Last shot - End line 164A returning to line 118
- 0940 Start 118A - speed overground 4.5 kts
Gus problem missed every other shot for first 50 shots on ONI
Gus needed to be reset -
- 0952 End Line 118A
1230 pull in stbd array
- 1230 end of line 118A shot pt 683 - ONI
682 - record
- 1310 Stbd array deployed
Begin rt. turn @ $5^\circ/\text{min}$
- 1316 Array fully out
- 1336 Hold cse @ 180° cmg
- 1429 start line 156
port array
- 1722 end line 156
c/c 180°
- 1745 c/c $40^\circ/\text{min}$ to the right
- 1931 Start line 116
missed first three shots; needed to reset Aircon unit
ONI #4
- 1934 Speed up to 4.3 kts
- 2221 Last shot line 116
- 2237 Begin rt turn @ $6^\circ/\text{min}$

15 April 87

2332

Shot 684

Start line 154

16 April 87

0030

Huge Cargo Ship passing ~1 mi
across our bow

Much noise on the single trace monitor

0228 END LINE 154

0252

c/c 5°/min

0344 port array in water

0423 start line 114

0722 End line 114, no problems

0842

Start line 152 shooting port array
missed first 3 shots, next 2
shots (ONI 681, 680) had 'poor closure
times

0858

poor closure times on 429 c.i. gun
of port array

0859

429 c.i. gun closure okay now

1100

1A1 (429 c.i. in) guns - closure problems
 $\pm 1 \text{ msec}$

1115

 $\pm 8 \text{ msec} \rightarrow < 1/2 \text{ msec}$ ~~1135~~

1131

End Line 152

1135 c/c 6°/min left to 180° mag - slow on 2

16 April 87

CSE 180

1203 Begin turn 5°/min rt

1342 Shot #1 line 112
Great Start

1411 ds slow down from 4.7 kts

1416 now 3.7 kts

1450 420 cc gun jumped out of sync - took 3 shots
to get back - from 14ms

1500 large errors ~16.00ms on 429 port gun

1502 lost few shots during array switch Shot #311
Switch to STBD

1545 Garza station incomm. that.

1625 Garza station OK

1636 Last shot line 112

1658 begin 6°/min turn to avoid ~~chimpanzee~~ small boat1800 Start Line 150 shooting port
array, first shot ONI 6842011 NAV down since 1915, now going again.
ONI is okay

2034 Speed up 1/2 kt to 4.3 kt

2040 port array back in water

2054 End of line 150
pulling stbd array on dog leg2111 stbd array ~~is~~ pulled out of water

2247 1st shot - no shot

Shot 10
remotely

1st shot fired

2250

16 April 87

2301 Firing Sfbal array
starting shot 432707 - Ship off track - probably due to
sudden loss of current

17 April

0144 last shot - End line 110

0324 First shot line 148

0408 ^{Shot} #160 ~~4~~ gun has large errors
#171 Big gun is okay0600 Problems with big gun; solenoid transducer
dying0625 End line 148 transducer on big
(port array) gun has died0750 - Current 2.0 kts, overshoot line 108
will do 106; ONI noisy; 36° deviation
between course made good

0803 - Start Line 106, shooting starboard array

0808 - ONI noisy but still operable

0813 - trying to stabilize Tamarindo

0819 - Tamarindo improving - ~ ONI ship point #80

ONI number is one more than ONI shot
number; shot 1 was recorded by GUS0915 - current still extremely strong, significant
streamer feathering 14° to port of course
made good; satellite calculates current
at 2.4 kts @ 335°; ship steering
77° to make 46°

1057 End Line 106

1121 Begin Rt turn 6°/min

17 April 87

1248 Start line 146
 Lost 1st 3.5 shots, dam unit
 Apparently an initial problem w/
 no closure # on Gun
 Or late start on ONI

1424 ^{ONI} Shot 290 began having signal problems
 with Tamarindo

1536 end line 146
 will have to re-shoot shots 1-290 ^{ONI}

1752 Start line 200
 Last shot may be 418

1930 - Gun 2 wide ranging closure times of Gun 2 of array
 1941 - Gun 2 misfire, electrical problem

1953 - Gun 2 (240 in) drifting in/out; electrical
 problem intermittent

1957 Firing manually, still misfiring

2014 End line 200 Last shot 418 on ONI

2246

Begin Line 204
 Poor Navigation - slowly gaining
 bridge on line

2336 - lost shots

2338 - shooting again

April 18

0003:52

18 April 87

0012 Begin c/c 6°/min RT

0115 Begin Line 208
All systems working
streamer straight back

gnd spd 3.6 kts ; 5.2 kts in water

0200 Gnd spd 4.0 kts; water 5.0 kts.

0205-0230 ship passing port side at around
8km - some noise on monitor.

0300 LOGGER has been sending compass
data w/ id=48, not 18! observable
symptom is streamer display does
not update compass section, only DT's
gyro heading.

0307 Last shot line 208

0310 reboot logger - streamer display ok
report from gun shack:

0347 compressor went down - blew a gasket
switched to other one

0417 Begin Line 212

0545 end line 212

0550 c/c 6° min to right

0644 Start Line 216, start with shot 1
33.3m shotpoint, spacing

0646 missed shots 6 & 7 9 -
Wiederspahn screwed up the GUS
after the start of the line.

0703 port 240ci - unstable closure times GUS
0727 switching to stbd array - shotpoint
152 150

- 0732 - sensor error on gun 3 (¹⁵⁰~~100~~ c.) stbd array, shows misfire, sensor problem, gun is firing
- 0741 sensor seems to be settling down
- 0839 End line 216 last shot 418
Turn 6°/min slow on 2; undercurrent approx 1.6 kts
- 0954 Start & line 220 shot 1
smooth start, firing stbd array
at 50 m, spotpoint
- 1012 5.0 kts in water / 5.75 kts over ground.
- 1055 off
- 1057 Lost 1 compressor
shut down firing momentarily
Back on - Pressure dropping
shut down line permanently
- 1108 Shot #12 back on
- 1112 End line 220
- 1113 RT @ 6°/min → 000°
- 1220 3 miles from start of line
Rebooting ONI, thanks to ^(EAS) watchman
- 1238 C/C
- 1243 Plotting ONI
- 1251 ONI Back on line
- 1315¹⁴⁵ Start Line 218 (whew!!)
- 1500 end line 218
- 1508 c/s dead slow + 6°/min
- 1603 START LINE 214
- 1728 END Line 214
- 1849 Start Line 210 missed first 6 shots
firing stbd array

- 1949 speed up to avoid ship after
tail buoy; speed up to 5.3 through
water; edge to right to
avoid ship
- 2001 Ship crossing behind tail buoy,
noisy records
- 2000 Back on line
- 2038 End Line 210
- Test 1~~A~~AZ gun during turn (port)
- 2036 Start Line 206 missed firing
ONI shots 274-277
Gus problem
- 2249 End line 206
- 2300 c/c left 6°/min, slow on 2

19 April 87

- 0001 Start Line 202
- 0009:40 Stop Sbd array - switch to
Port - Broken hose
- 0157 end line 202
- 0412 6°/min
Gus tests + steamer check during line
changes suggest
23, 24, 32, 33, 40, 45, 50, 52, 59, 73, 86 are bad
33, 50, 59, 73 are leaky

19 April

FM 35-02

CR 3D

0506 START 146A

0600 GPS Flaky, high DOP @ 10-11 courses
rapid shifting of selected sats,
but increase to DOP of 15 does not cure.0621 End line ~~146A~~ 146A

Testing port array during turn - successful

0809 Start Line 111

0921 Speed up to 4.3-4.5 kts

1102:52 End Line 111

1122 c/c @ 6°/min to 135

altered cse - Traffic

1210 starting to turn back to the rt @ 6°/min

Dodging Traffic

1252 Start Line 147

~~Begin~~ ± 50 m of line

1506 Drive 3 rejected new tape

on tape change shot 526 reel 350317

lost 1 or 2 shots

1546 end line ~~146~~ 147

1734 begin 113

1819 - Drive rejected, lost shot 176-190
~~1819-1820~~ ONI, 16 shots

1847 - c/s speed to 4.3 kts

1948 - missed one shot on tape drive ch

19 April

0043

missed shot # 528 on tape drive problem

No reels numbered 350319 & 350322
due to tape drive malfunction;
drives not transferred by Gus

2019 c/speed to 4.2

2026 End line 113

2144 Begin Line 149
Whooie !

Shot 661 ? - Lost 1 ONI station
Back on shot 664 (669-665 lost)
Lost 2 ~~3~~ 4 minutes Lost 5 shots

2330 - 0000 Large ship passing
low freq. noise

20 April 87

0038 End line 149
0041 c/c 180 @ 6°/min

0111 c/c Rt @ 6°/min → line 115 slow on 2

0228 START 115

0518 END Line 115

0534 c/c 50/min

0646 START LINE 151 shot 684
Firing Port array

20 April 87

0044

~~1000~~ ~~1000~~ ~~1000~~
0946 End line 151

1014 Begin c/c rt @ 5°/min slow m 2

1134:35 Start line 117

Exxon Tanker Passing 2½ miles ahead. May create noisy records

1351 Big Gun malfunctioning
Switching to STD array

1429 Last Shot 117

1514 c/c 5°/min 1325m off track 3.1 kts smg
1523 hold, turned too soon again 1.2 kt current
1525 hold, then turning try 1100 m, next time

1548 Start 153 missed 6 shots
Start at smv 678

~~1810~~ 1805 Gvs stop at tape drive change, logger crash

1812 - Gvs Back up - lost 30 shots

1847 End line 153

2027 Start line 119; speed over ground 4.25-4.4
speed through water 3.6 kts, guns
rowing a little deep

2113 - 2133 - ONI Garza noisy

20 April 87

2320 End Line 119

21 April 87

0004 c/c 5° min to line 155

0040 Start Line 155 shot 684
0335 end line 155

0407 ONI went away at shot pt 8
begin c/c 6° min
pulled on board starboard away

0518 START LINE 121

GUS NOT CYCLING PROPERLY

0520 ok @ record 10 - same long
interval between GUS HDR light
and EOR light. reset GUS + OK.

Logger streamer compass data
is ID 48, not 18. happened
at beginning of line.

0540 slow to let boat pass

0548 back up to speed, boat passing astern

0632 Mishring 429 ci. port array
0634 switch to starboard array on shot
~~307~~ 307

Cause - Leakage on transducer on big gun;
will splice in a blathphone

0654 - noise on EPC record.

0658 - noise due to single sideband? No!

0703 - noise continues but single sideband has
been off a long time; probably not
due to single sideband, maybe
ship traffic noise; 2 ships in area,
one off port, one off starboard

Inspection of gathers reveal that previous noise was due to ship traffic; noise displayed moveout!!

0807 End line 121

0809 reboot LOGGER - streamer display ok

0840 Hold ship during turn to wait for crossing of Japanese ship

0937 Start line 157 first shot ONI 684
smooth line - 1 ship passeth in the night ~ 1200Z

1225 End Line 157

1249 c/c Rt @ 5°/min from 180

1410 START LINE 123
had to reset AIRCON, 1st good shot is rec #8

SPD 4.5 OVER GROUND 3.5 thru water

1700 end line 123

1821 Start Line 159 first shot 684
shooting stbd array

1858 Port array deployed

1904 Lost shot 167 + Reel #367
TAPE 02 screwed up

1937 Speed up from 4 kt to 4.3 kt
2015-2020 - Some variability in firing closure of 240 c.i. gun ± 1.4 msec

April 21, 1987

- 2036 Slow from 4.6 to 4.74 kts
 2037 Tape drive ^{#2} screwed up again, at
 drive change, lost 1 shot
 #527
 2117 End line 159
 Large turn~~xx~~, heading for 145 Line

- 2320 Begin line 145
 0206 END 145
 0300 Start Line 179

0456 Tamaiindo gone, put on manual
 and dialed back in

0458 Settled back down

DRIVE #2 Reject

no tape 350379

Lost SP #526

0550 end line 179 c/c 60/min to 180°

0600 Channel T1, ~~has~~ been switched
 off at GUS for reels 350354-380
 turned back on for reel 350381

0714 Start Line 143, shots 1-4
 GUS was autocycle on first four
 shots; first shot on distance

22 April 87

FM35-02

was shot #5. GUS was still
 on LOCAL 11 sec rate from testing
 during turn. Wiedersprun's Fault!
 We will forgive him, but next time
 we feed him to the fishes!!

0720-0722

Tamarindo weak!!

0725

ONI still noisy

0734

Tamarindo is ok now

0833

Firing closure variability ok on

big gun (421ci) port array ± 1.5 msec
 range 1 msec - 60% - 70% of
 shots within ± 1.3 msec

Adv varies from 16.3 to 16.6

0943

Closure variability on big gun appears
 to be increasing to ± 1.7 msec

1005

End Line 143

1114

Start Line 177

1300

Large Tanker passing 3 Km ahead

1357

end line 177

1358

dc 60 min to 180°

1414

c/c 60 min to 045°, dead slow on 2
 winds about 10 kts, from NE (offshore)

1545

start line 141

1837

ONI did not send closure lost

ONI shot # 644

1840

Switch to starboard array on
 shot 657; port array misfire

1847

End line on big gun
 141

1952

start line 175; lost first 9
 shot; first shot ONI 675;
 Don's fault, should have informed
 gunshack, gunshack had disconnected
 solenoid for welding

April 22

0049

Firing stbd array
port array back in water
2046 Big gun stbd side - misfire - out of action
2047 Switch to port array - first shot 230
22 42:45 End line 175

2246 pull in stbd array
0001 April 23
put stbd array back out in water

0018 reject on MT2 - missed first shot
START LINE 139
0020 OOPS!! Forgot to turn on EPC
at start of 139

0311 END 139

0325 c/c 6°/min one big ship coming, may be problem
asked Captain, he said to go ahead and turn

0418 BEGIN 173

0712 END 173

0736 New tape mounted on
data logger reel 350008

0853 Start Line 137 shot 1

1157 End Line 137 shot 684

1211 Begin Turn Rt @ 6°/min, slow on 2

1232 pick up speed + continue on this course
to get streamer out of traffic

1233 - keep turning - bow off bow -

April 22

0050

1300 Making Large loop to try again
for line 161.

1356 holding 095°

1430

1446

can't turn into line big ship passing
begin turn to right, hope to be able to
make it into line 167 instead of 161.

1527 Start 167

1625 2 Fishing boats talking to each other
say "The Animal is coming"

Fred "The Animal" Moore

continues shooting

1700

ship remains in parallel heading at about 300m

1821

End line ~~135~~ 167

1830 ~

~~Logger~~ Logger working but plotter
down

2029

Start Line 135 shot 1

firing starboard array
Calcomp plotter still down

2151

Calcomp back in action!!!
Mark strikes again!!!

2320

End line 135

2334

Begin O/C RT @ 6"/min

Begin Line 161

0024Z \nearrow

0315 END LINE 161 pull STBD array
0456 begin line 133

0537 STBD array in water

0747 End line 133

~~08~~ 0900 Start Line 163
first shot 684 firing port
array

0930 Rainstorm
Gun Error about 240 \pm 2 msec
1/2 sample rate
...
large closure errors; range
of errors .3 to -.8
over 20 shots; 1 shot in
15-20 outside of ± 1.3 msec

1123 Versatec has consistent problems with
paper sticking to roller guides - the
black electrical tape was removed
because it was jamming up the rollers
as well - there's gotta be a
better way -

11-1130 Problems with tracking. Bridge
Claims ONI dot jumped. I think
they're asleep.

1153:00 End Line 163

1316 Start line 131

April 24, 1987

0052

FM 35 02

1601 end line 131

1711 Start 165

1946 ONI slightly noisy - increase
smoothing from 50 to 75 sec.

2011 End Line 165

2140 Start Line 129 shot 1
shooting port array

222 Missed shot 176 - M12 failed -
no status reported in registers or DNU

0026 End Line 129

0040 Begin Turn Rt @ 6°/min slow on 2

0141:45 Begin Line 169

0341 ONI ERRATIC

0428 ONI shot 20 lost Tamarindo, navigation no good

0433 end of line 169

0435 pulling in Port Array

0450 port array onboard

0455 6°/min slow on two

0542 start line 127

0656 port array back in water

0836 End line 127

0954 START LINE 171

Saturday 6
April 25, 1987

0053

1151 205 shots to go - All is well

~1208 Gas station out on ONI -
No effect on Navigation
Back in w/in a few minutes

1239 End Line 171

1254 Begin Turn RT @ 6°/min slow on 2
1349 going 3.3 kts in water, steamer deep
asked for more speed

1403 Start Line 125

1 ST shot OK - others late on
missing - 2-10 / Cleared Gas

Shot ^{ONI} 11 → OK

1701 END Line 125

1706 dc 4°/min → change logger tape

fishing boat near

1803 Start Line 181 shot 684

1950 Big ship off stern, mucho noise
in seismic data

2052 End line 181

2239 Start Line 109

April 26

0100 1 smooth line so far

0132 End line 109

April 26, 1987
FM35-02

0054

- 0154 Begin Rt turn $5^\circ/\text{min}$ → Line 183
0316 start line 183
- 0610 End Line 183
- 0627 stop array in water
- 0628 turn for right @ $5^\circ/\text{min}$
- 0800 start Line 108 shot 1 - firing port array
speed 4.3 kt. - stop array back in water
- ~~0800~~
0858 slow to 4.3 kt from 4.7 kt
- 1055 End Line 108
- 1111 Begin Rt turn $6^\circ/\text{min}$
- 1235 Start Line 184
- 1302 stopped shooting - keep gun going - to avoid
hooking net - but they got tangled anyway on
wants to pull in both arrays - air gun array
- 1306 dead slow on engine -
- 1307 pull in both gun arrays -
- 1308 drive the cable - down to ~25
- 1308 changed to event mode 1
- 1316 line is clearly not recoverable - so
rewind tape and rehook
- 1318 bring the cable up a little bit ~15

0053
April 26, 1987

FM35-02

1331- both air gun arrays on board -
~~no~~ evidence of fishing line, one hook & bait

1356 bring the cable up to "normal" recording level

Bird	depth
1	7
2	12
3	8
4	7
5	7
6	13
7	7
8	14
9	13
10	10

1507 start 158A

1544 END 158A

1555 5°/MIN RIGHT

1704 start 107

1953 End 107

Fishing boats on turn; caution exercised

2141 start Line 184A

Speed 4.3 kt firing port array
first shot 689

2223 Shot 515A the last of the
A's without shot 514 → 1 will be

2315 - Switch to Std Array
Problem with 240 cu in gun

27 April 1987

0028 End line 184A

0147 deploy port array

0150 deployed port array

0211 START 105

0335 c/s slow to let ship pass in front

0421 c/s increase speed to try to get small boat
to cross our steamer further back. It looks
like it will cross the steamer no
matter what we do.0427 aborted line c/s 5 kts in water
last good shot point is 540

428 power off/on GPS - 3 sats visible

0606 Another boat in the path; hold
course ~~until~~ until he clears
the area0718 Heading west to pick up aborted
105 segment0818 turn to right to join up with
aborted line 1050924 Start Line 105A Shot 495 - ONI number
Aborted segment; firing port 494
array, speed 4.0 kts

09° 47.0122 N 86° 05.2293 W

Coord. of 1st shot of line (ONI # 494) -- should
have been ONI # 496 -- all ONI #'s are low

by 2.

0945 Switch to Sftd array, ONI #
575; broke hose on number 1
gun

27 April 1987

1011 End Line 105 (Finally!)

1023 Pull in port array

1031 Start Rt turn 5°/min

1207 start line 185

1400 Large ship passing 2 Km in front of us.

1417 c/s 4.0 kts magnitude to give more room for ship to cross in front of us.

1455 end line 185

1628 start 104

port array → misfire on 429

1629 switch to STBD array shot #4

1919 End 104

will begin firing port array on next line - line 186, at least for the first few shots

2101 Start 186 Shot 684
firing port array speed 4.4 kts2145 switch arrays on shot 184 187
had no fire; now shooting STBD array

April 27

2350:20 End Line 186

April 28! 1987

0038 Begin Rt Turn 60/min to line 323

Missed track by 180 m
angling back - will put tight kink
in cable.0109 Start Line 323 $-(123^{3/4})$
started on track. Though cable
has 90° bend - only 6 m off track

0120 Ship on track

0127 Cable nearly straight

0358 end line 323

0521 Start 187 port array

0654 Aircon number not being sent to
GVS or logger; first number
sent 374.0 shot numbers on logger
printer 1-373 are listed
as ~~0000~~; ONI numbers 684-311

0718 slow from 4.65 kts to 4.3 kts

0755 closure errors of .8 to 2.0 msec
on guns 1 and 2 for a few
shots

0813 End 187

0958 Start Line 103 shot 1
firing port array

28 April 87

FM35-02

1006 Sandy off track ~ 35 m. to left
 1012 Back on track

1015 Now they're off 35 m to the right!

1036 Continuing swings of \pm 35-40 m.
 1 went 70 m off.

High winds seem to be the cause

1050 may be settling down
 Bridge is hand steering
 Auto pilot limits rudder angle - doing
 better hand steering.

1248 Aborting line Shot 850
 Turning left

1317 Begin Left turn $4^\circ/\text{min}$
 to Cdr 225

1405 considering running a strike line and then
 heading back up to NE to pick up line 188
 holding on 225° to let ship pass

1439 c/c $5^\circ/\text{min}$ to line 211, ship in way of turn
 onto 213

1517 first shot ONI #3 LINE 211

~1530 tail of streamer (sec 1-12) surfaced,
 set birds 1-4 to dive

1550 Streamer back to normal operating depth

1709 end line 211

1710 c/c $4^\circ/\text{min}$

1815 Port array on deck

- 1953 Start line 188 - 300 m off line to port; missed first 20 shots due to firing on time; shot 20 first good shot; on distance;
~~ONI shot 644 with 25 m on track;~~
 644
- 2002 ONI shot 644 & shot (GUS) 20 now within 25 m of line
- 2006 working way back to line after going 125 m to right of line
- 2028 Closure errors -1.8 to $+1.8$ on 240 cr: gun - stbd array
- 2101 Port array in water
- 2111 Switch to port side array on shot 306
- 2113 shot 312 - switch back to stbd array due to misfiring on big gun of port array
 - intermittent open on firing line & transducer of stbd big gun
- 2249 End Line 188
- 2255 all in port array April 29
- 0002 Start turn to the right at 40/min
- 0059: 38 Start line 102

April 29, 1987

0342 end line 102

Oscar unable to repair port array electrical problems. Plans to pull it in and use only the starboard array.

If starboard array fails, will have to repair and circle.

More problems with fishing boats + big ship. Two fishing boats at start of line 189. Will try to approach line from SE.

~~061418~~ 0629 Start line 189 start shot 683
missed shot 1;

0633 slowing to 4.4-4.5 kt

0637 Mishfire on small 60 c.i. gun; high pressure leak on small gun

0639 shot 48 first shot on starboard array; switch array to starboard side;
~~0639~~

0734 240 c.i. closure (stbd array) closure error $+ .7$ to $- .8$; only larray available;

0751 240 c.i. error in every 10-12 shots is approx. 1 shot @ -1.3 error

0806 ~~slow~~ slow to 4.3 kts

0807 240 c.i. is behaving better; one shot in ~ 20 with error of -1.3 msec

0844 240 c.i. behaving very well; errors $\pm .5$

29 April - The last
day

0062

0918 End line 189
Begin transit to strike line 201
Bring in port array to repair
60 li. gun

1100 Port array in water

1130 Ship had slowed during turn to
2.5 Kts. Sections 11 & 14 down
to 25 m depth.

Increased speed thru water to 3.5

1212 Start line 201

1220 Start monitor record (it was on int!)

1311 C/C 145°

1313 dive cable + speed up to avoid
cutting off haul buoy

1314 Stop guns - Shot #253 - evasive action

1315 "it wasn't supposed to end this way" - TMS

1332 On Cse 090

~1415 All guns on deck

1500 Streamer party

2110 Streamer party ends