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Broadband Borehole Seismic System Integration Tests

Report of the system integration tests at MPL/SIO

by

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INTRODUCTION 1
RESULTS OF THE INTEGRATION TESTS 1
MPL Birthday Cake *1*
CV to BCU operation *1*
BIP TV, lights, release *2*
Power Control, -50 volts (motoIC), +50/300 (LIP) *2*
Logging Cable, Sonde Power *2*
Measurements made: *2*
Sonde, Data, motoIC *3*
Power Control to LIP, LIP Operation, TV, Lights and Data *3*
Tube Sonde for Standup Test *3*
Stand-Up Data Acquisition Test *4*
Fully Tubed Operation *5*
Shake Rattle and Roll *5*
MEASUREMENTS 6
SONDE POWER AND VOLTAGE DROP IN LOGGING CABLE 6
CLOCK TIME MARK DELAY, PULSE WIDTH AND JITTER 6
Pulse widths: *6*
Pulse delay through telemetry: *6*
Power to BCU from MPL *6*
Power to LIP: *6*
LOOSE ENDS AND UNRESOLVED QUESTIONS 7
CAUSE OF BCU TRAUMA? 7
DETAILS AND CAUSE OF LIP FAILURE 7
LOGGING CABLE TERMINATIONS (DEPTH) 7
LIP DATA 7
EMLA BATTERY CAPACITY 7
CLOCK TIME STRING 7
BCU COLD RESET EVENT 7
DISK FORMATTING 8
SECURITY OF 300 VOLT OPERATION (RELAY IN SONDE) 8
TESTS NOT MADE 8
APPENDIX A PERSONNEL 9
APPENDIX B TIME LINE 10
APPENDIX C INTEGRATION TEST PLAN 12
APPENDIX D DEPLOYMENT CHECKLIST 18
APPENDIX E THE SUBROUTINE: 21
APPENDIX F DATA FROM INTEGRATION TESTS 22

Broadband Borehole Seismic System Integration Tests

SIO/MPL, 17-25 November, 1997

DRAFT

Introduction

This report describes a series of tests performed at SIO/MPL, Point Loma the week of 17 November 1997 designed to achieve integration of the Broadband Borehole Seismic System (BBBSS) in preparation for the OSN Pilot Experiment cruise on R/V Thompson during January 1997. Representatives from all groups were present (see appendix A), with their respective parts of the system and support equipment.

It was anticipated that these tests would result in the complete integration of the various components of the borehole seismometer system in preparation for the January cruise. The system would be assembled and tested following a plan (see appendix C) that would culminate in the fully integrated borehole seismometer being wet tested off the MPL pier.

Results of the Integration Tests

Integration of the seismometer system was carried out at the MPL facility in Point Loma, where the Control Vehicle (CV) was being prepared. Other components of the system were the Bottom Instrument Package (BIP) which comprises the Bottom Control Unit (BCU) and Data Recording Unit (DRU) from WHOI and the low frequency seismometer sonde from Scripps IGPP. A shipping area adjacent to the MPL laboratory provided a convenient location for placing the sonde and a spool of well logging cable, while the WHOI van was placed just outside this room in the parking lot. The van held the BCU, DRU and WHOI surface equipment, a small work area, and the IGPP computers.

MPL Birthday Cake

Integrate the MPL telemetry package into the BCU. The BCU end cap was modified to provide room for additional circuit boards added to the Bcake since the preliminary tests were made at WHOI on October 27. The uplink telemetry signal from the BCU was found to couple into the downlink to the BCU through the Bcake when MPL power was turned off. This was traced to the optical isolation interface board, where forward bias on the opto isolators from the BCU telemetry signal charged up a bypass capacitor which turned on the output transistors driving the BCU receiver. Diodes were added to the optical isolator circuit board in the Bcake to prevent telemetry signals from coupling through the power supply.

CV to BCU operation

Connect CV to the BCU / Bcake with coax to simulate the soft tether. Connect the telemetry signals from the CV surface console to the BCU deck box. Check 36-volt power from Bcake to BCU. Check telemetry signals between BCU and thruster. Occasional erratic operation of the BCU was traced to jabbering on the down link telemetry channel from the surface to the BCU. An adjustment made to the Bcake electronics stopped the random prattle. The jabbering occurred over the course of the test and appears to be temperature related.

BIP TV, lights, release

The BIP mounted video camera and lights were connected to the MPL interface junction bottle along with the BIP release hook. Lights and video were commanded on and off successfully by operator action on the surface console. Release functions were tested. When the Bcake is first powered on, the release motor moves to the unhooked position. Following initial turn on, the hook was successfully commanded open and closed. The safety relay in the BCU was tested. With the relay disabled, release hook activity could not be initiated. With the release relay enabled, the hook mechanism could be operated. Operation of the release hook by acoustics means was not tested at this time, pending modifications to the acoustic transponders. However a test of the acoustic release function was made during the MPL visit to Woods Hole by simulating the pulse from the transponder into the BCU and through to the Bcake. The 15 msec positive going signal was roughly approximated using a clip lead to bring the input pin high and low.

Since the release hook is commanded to open during power up of the Bcake, the launch sequence plan should include a check to insure the release relay in the BCU is in the disabled position prior to launching the system. As soon as the CV and BCU are first powered on after launch, the release needs to be commanded to the closed position.

Power Control, -50 volts (motoIC), +50/300 (LIP)

The SCU was connected to the BCU and voltage measurements were made in preparation for testing the logging cable and sonde. The ± 50 volts on cable 5 was tested, as was the 300 volts on cable 3 and 4 when the + 50 volts was on. Relays in the BCU and Bcake operated correctly.

Logging Cable, Sonde Power

After verifying the correct power and control voltages were present, the top end of the logging cable was connected to the SCU, while the lower end was connected to the sonde. The sonde internal chassis had been removed from its pressure housing, and the hole-lock assemblies and slacker unit were positioned to permit all interconnecting cables to be connected. Control signals and voltages were again checked at a connector leading directly from the logging cable into the sonde power supply.

Measurements made:

Sonde power = 35.6 volts.
1 PPS on, can be commanded on and off from surface.
±50 volts as commanded from MPL control
No voltage present on cables 3 or 4 with +50 volts on, and 300 volts off.
315 volts on cable 3 and 4 with +50 volts on and 300 volts on.

With all voltages found to be correct, the connector was plugged in, and the BCU and sonde assemblies were powered on together.

The above tests were made before a circuit board in the BCU was updated with the correct relays for the high voltage switching on cables 3 and 4. A second set of voltage tests was performed after the board had been modified.

Sonde, Data, motoIC

Measurements made with the sonde connected to the logging cable:

Sonde input voltage = 34.9 volts.
Relay observed to operate with + 50 volts on.
With LIP power on, 317 volts was measured on connector to LIP.
With –50 volts on, the Sonde Auxiliary power supply output was +24 volts.

Sonde data was present on the surface at the WHOI data-recording computer. 4800-baud data was successfully passed through the MPL telemetry.
Sonde data was present at the IGPP Sun computer.

Since telemetry errors occurred during this phase of testing, the following test was made using the WHOI deck cable in place of the MPL telemetry.

The down link telemetry is shared between the BCU and the sonde to enable the IGPP surface system to communicate with the computer located in the sensor. A switching matrix in the BCU determines whether the telemetry down link is directed to the BCU computer or transmitted down the logging cable to the sonde. The BCU computer has control of the switch. When commanded, the BCU redirected the telemetry downlink to the sonde, allowing the IGPP Sun and motoIC surface computer to communicate directly with the sonde. To recover the telemetry link, the BCU computer listens for a unique character sequence, and when received, redirects the switching matrix back to itself. The recovery sequence proved to be not very robust. Binary data from the motoIC caused the BCU program to malfunction, and recovery was not possible. Communication with the BCU was reestablished by re-booting the computer via an MPL power cycle.

Power Control to LIP, LIP Operation, TV, Lights and Data

Voltage measurements were first made at the end of the sonde assembly on the connector leading to the LIP before connecting the lead in assembly. These measurements verified that the 300 volts could be commanded on and off, and that all signals were on the correct pins. After connecting the LIP to the sonde, the 300 volts was turned on. A video image was received at the MPL surface console. The LIP was operated for 1 hour before being turned off. LIP data was not available at this time pending completion of the data up-link telemetry channel.

Tube Sonde for Standup Test

Before installing the sonde in its pressure housing, the complete borehole system was powered on to verify proper operation. Components checked included:

MPL power and telemetry
BCU and DRU
Sonde and logging cable
LIP

After these tests the sonde was installed in the pressure housing and the verification tests were performed again. This time the sonde failed to operate. The failure was traced to a problem with the mounting of the computer chassis within the sonde frame, causing a short to earth when inserted in the housing. In the process of correcting the computer mounting, a wire broke off the CPU power connector. After repairs to the sonde were completed, verification tests were performed again:

MPL power and telemetry
BCU and DRU
Sonde and logging cable
LIP

Sonde Current 150 to 200 ma, depending on voltage.
BCU current 55 ma

Stand-Up Data Acquisition Test

A full up integration test was performed which included the CV, MPL telemetry, BCU, logging cable, sonde and LIP. This test was intended to verify operation of the assembled components in the configuration which will be used during the at sea experiment. The sonde was rendered fully operational by clamping it to a vertical frame member of the MPL gantry hoist. A boom truck was used to suspend the top of the sonde, while the gantry hoist held the bottom, allowing the complete assembly to be raised to the vertical without dragging on the ground. Sufficient logging cable was spooled from the reel to connect the tool to the WHOI equipment van. The BCU and DRU remained in the WHOI van on their shelves, without pressure housings, to allow ready access test points.

Power up tests were again made after the sonde was installed on the pole. All systems operating properly.

The EMLA protection system in the sonde was in operation, having timed out during the process of moving the sensor into the test position on the pole.

The sonde unlock procedure was started at 15:20 and completed at 15:45. Leveling was started at 15:45. Telemetry errors reappeared causing interference with the leveling procedure. An adjustment to the Bcake silenced the noisy downlink. Leveling was completed at 18:00. It was not possible to reconnect the BCU to the downlink, so an MPL power cycle was used to re-boot the computer.

Data acquisition was started in cabled mode. CV and MPL telemetry were on, however the high voltage to the CV was off due to safety concerns. 120 VAC patched into the low voltage side of the CV transformer provided system power. The deck cable was connected but switched out of the system. The Sonde OK flag in the BCU was set to OK. Acquisition started at 18:13 local time
Start time = 327 02 13.
End time = 327 07 43.

At 2340 local time acquisition was switched from cable mode to autonomous mode by turning off the power to the MPL system. The deck cable was switched in so messages from the BCU computer could be logged on the surface console. With MPL power off, the BCU re-booted to stand alone mode. The soft tether was disconnected from the system by removing the coax connector from the MPL junction box.
Start time 327 07 48
End time 327 16 06

Following the overnight tests, MPL power was turned on. The BCU rebooted. The disks were verified to have recorded data, and no system anomalies were noted for either segment of the test.

The sensor was locked and system turned off.

See Appendix F for a brief summery of the recorded data.

Fully Tubed Operation

In preparation for the wet test the BCU and DRU were installed in their pressure housings, a test battery was assembled in a housing, and an acoustic release was connected to the BCU. This equipment, representing the contents of the BIP, plus a spool of logging cable was placed into a wire basket for deployment during the wet test. The sonde was placed on the bed of the boom truck awaiting delivery to the MPL pier.

The power up test of the assembled system indicated the BCU to be working but that data from the sonde was intermittent and that system power had climbed to 350 ma. MotoIC data was not available. It was eventually determined the logging cable connector had failed, shorting several of the pins to earth ground.

Telemetry errors were again observed, preventing communication between the surface console and the BCU.

The wet test was postponed pending a new termination on the lower end of the logging cable and modifications to the Bcake.

Shake Rattle and Roll

After repairs to the cable and Bcake were made, the components were assembled in housings in preparation for a wet test. Again, the power up test of the assembled system indicated all components were operating. Since it was now late in the day, with the sunlight fading, the plan of a wet test was abandoned, and replaced by a power on simulation of in water operation. All housings, components, connectors and cables were shorted together with one continuous length of bus wire, bringing the complete system to the same electrical potential. Again, power up tests demonstrated correct system operation. A second test, simulating the rigors of launch on the sonde, consisted of suspending the sonde from its center of mass and while hanging from the boom truck, tipping the unit through various angles. MPL power was on, telemetry was operating, and the BCU and IGPP computers were receiving sonde data. The ±50 volt control line was at 0 volts and the 300 volts was off. After shaking the sonde, the LIP was tested. +50 volts was turned on followed by the 300 volts. The reentry lights were briefly turned on. They flashed momentarily, and then ceased to operate. Communication was lost to the BCU.

Testing found the BCU and sonde OK while a problem existed in the Bcake.

This event was universally recognized as the concluding moment of the Borehole seismometer system integration tests.

Measurements

Sonde Power and Voltage Drop in Logging Cable

Reftek on
Teledyne on
CV power off
Shore power on

Volts	Volts	Current	Power
At BCU	At sonde	mA	W
35.4		200	7.08
32.08	28.74	220	7.06
30.05		235	7.06
30.02	26.5		
29.0		240	6.96
28.05	24.28	250	7.01
25.95	21.85	275	7.14

Clock time mark delay, pulse width and jitter

Pulse widths:

Sync pulse width from Seascan clock into telemetry = 100 μsec
Sync pulse as received from MPL telemetry = 1 msec.

Pulse delay through telemetry:

Readings: 477.4μsec, 454.8, 462.2, 448.8, 461.4, 474.8

Average delay = 463.2 μsec
Approximate Jitter is 30 μsec

Power to BCU from MPL

MPL voltage = 36 volts (approx.)
current probe on P8-4, MPL power to BCU
With sonde simulator connected 450 mA
With sonde simulator not connected 80 mA

Power to LIP:

Measure current on cable 3 and 4 together
Attach current probe to wires from BCU P12-1and P12-5
Lights off 140 mA
Lights on 2.8A
Measure current on cable 3 and 4 individually, lights on:
Pin 5 measured 1.56A
Pin 1 measured 1.52A

Loose ends and Unresolved Questions

This is a compendium of issues that came up over the course of the integration testing.

Cause of BCU Trauma?

The BCU suffered a traumatic event that resulted in the failure of a number of electronic components related to data communication. Parts damaged by the event include the BCU imbedded computer, the telemetry switching matrix, and several buffer ICs which distribute the telemetry down link signal. At the time the event occurred the BCU was powered on by simulated MPL voltage through the deck cable. The Bcake was installed but power to it from the CV was off. The soft tether was connected. The CV was operating from high voltage. P10, the data I/O connector between the Bcake and the BCU was not connected, but the power connectors and other interface connectors were installed. The logging cable was being worked on when the event occurred. However, it was unplugged from the BCU. The event was sudden, causing complete loss off functionality. The cause of the electronic failure is not known.

Details and Cause of LIP Failure

The sudden end to the integration test was brought about by a failure of the telemetry system associated with turning on the lights in the LIP during the sonde tipping test, as described above. Causes of this failure is not known at this time.

Logging Cable Terminations (depth)

A question was raised as to weather the inserts to the G.O. connectors were rated for the pressures at 4000 meters. New inserts have been ordered.

LIP Data

At the time of the integration tests, the unlink telemetry data channel from the LIP was not ready.

EMLA Battery Capacity

It is possible the EMLA battery could be consumed during the launching of the borehole assembly since it may not receive timely reset pulses from the BCU. This could occur if power is off for a period longer than the EMLA timeout. A battery with greater capacity will be installed.

Clock Time String

Time strings from the BCU to the sonde should occur in groups of three, with strings separated by four seconds. It was noted during one part of the tests that the separation between strings was seven seconds, resulting in the sonde clock rejecting the time update. The clock set function did work at the start of the tests. It is working now.

BCU Cold Reset Event

Prior to the integration tests, the BCU and associated equipment were operated in a cold chamber at +2°C, simulating tethered data acquisition, with data being recorded in both the DRU and the surface recorder. During this test a failure occurred wherein the BCU computer would reset. A reset occurred every two hours, when the DRU was powered on. This pattern continued over one night. Two resets were made to happen manually by powering on the disk drive the following morning while investigating the problem. Then the problem disappeared. It has operated correctly ever since. A thorough check of the circuitry found nothing wrong. An open input to an unused gate was found and tied to ground, but it is unlikely to have caused this problem.

Disk Formatting

The disk formatting function in the BCU program does not correctly reset the block pointer. A stand-alone program does work and is being used for this purpose.

Security of 300 volt operation (relay in sonde)

During the sonde integration tests a loose connector in the BCU caused the cable switching relay to drop out, putting 300 volts across the protection diodes in the sonde. Two diodes and two resistors burned up from the event. No further damage occurred. The relay could be made self latching, using the 300 volts to hold in the armature. A suitable voltage dropping resistor would be required.

Tests Not Made

Transponder initiated recovery
Wet test
Read back from DRU disk
This function has been subsequently tested at WHOI

Telemetry (BCAKE) cold test
Real time data display on the WHOI Sun workstation.
(Real time data display is available on the IGPP workstation)

Appendix A Personnel

Institute for Geophysical and Planetary Physics, SIO
- John Orcutt
- Frank Vernon
- Dave Willoughby
- Glen Offield

Marine Physical Laboratory, SIO
- Fred Spiess
- John Hildebrand
- Richard Zimmerman
- Dave Jabson
- Patrick Jonke
- Gary Austin

Woods Hole Oceanographic Institution
- Ken Peal
- Robert Goldsborough
- Matt Gould
- Tom Bolmer

Appendix B Time line

- 17 Nov
  - WHOI unpack, set up
  - meet re test plan
  - IGPP sonde delivered, opened
  - MPL check out WHOI logging cables
  - MPL working on BCAKE
- 18 Nov
  - BCAKE delivered
  - debug BCAKE/BCU interface
  - resolve telemetry operation problems
  - check BCAKE outputs
  - terminate, ring out logging cable
- 19 Nov
  - further telemetry debugging
  - BCU trauma
  - repair BCU
  - check logging cable
  - connect to sonde
  - set up van for sonde operation (IGPP Sun, PC)
- 20 Nov
  - repair BCU
  - meeting with P.I.s
  - debug sonde operation
- 21 Nov
  - high current relay added to BCU card C4
  - MPL set up LIP TV
  - MPL adjust BCAKE
  - measure voltage at LIP
  - connect, operate LIP
  - measure power drains and voltage drops
  - debug fried 100 ohm resistor in sonde
- 22 Nov
  - tube sonde and LIP
  - debug sonde fit problem
  - sonde power wire disconnect and fix
  - sonde operate
  - LIP operate
  - move sonde to I-beam (vertical)
  - power, unlock, level Teledyne
  - start acquisition
  - change to BCU standalone operation
- 23 Nov
  - stop test, evaluate results
  - read disks, evaluate data
  - tube BIP (BCU, DRU, junction box, battery)
  - rig for wet test in parking lot
  - dry test
  - sonde data intermittent
  - open BCU, sonde
  - blowing -50 fuse in BCAKE
  - bad cable

    - move to cover
    - telemetry sing-around problem
- 24 Nov
    - new cable termination
    - BCAKE adjusted
    - confirm BCU-alone operation
    - install BCAKE
    - reconnect in stages
    - achieve fully tubed operation, wire interconnection
    - rig then shake sonde
    - LIP/BCAKE failure

Appendix C Integration Test Plan

Bore Hole Seismometer Integration Tests

Scripps MPL Facility

November 17-21, 1997

General test goals:

Our goal is to have all equipment assembled, cabled and operating as it will be during the deployment on the January cruise and the subsequent autonomous acquisition cycle. These tests shall specifically exercise the equipment in the manner of the deployment to ensure the various components function together. System tests shall be in three phases:

Test all functions of the sensors and BCU while operating on the 0.68 cable with data going to IGPP surface equipment.

> Test all functions of the sensors and BCU while operating on the 0.68 cable and recording to disk at the surface.
>
> Test all functions of the sensors and BCU while operating on battery power and recording to disk in the DRU.

Discussion Items

- Installation of MPL components and cabling on BIP
  - Junction Box
  - Video Camera
  - Release Hook

Logging Cable wire assignment Relays in BCU

Wet Test:

Procedures and Details

Consequences of sea water connection to the open soft tether

Emergency lock of sonde sensor mass

Test Outline:

Initial setup and performance verification of WHOI equipment

Unload WHOI van

Set up BCU and DRU in the WHOI van.
Using the sonde simulator and the deck cable, verify system operation.

Connect and set up:

- Surface data processing computer system
- deck cable
- simulated MPL power
- simulated battery
- Operators computer
- data recording computer and disk garage

Operation with MPL telemetry

Install MPL module in BCU
Connect Surface Switch box to MPL surface equipment

Connect:

- 2400 baud telemetry
- 4800 baud data
- clock pulse

Connect MPL junction box to BCU
Connect soft tether to thruster and junction box
Connect release hook assembly to MPL junction box

- check for proper voltages to BCU
- Check that 300 volts from MPL module is off
- Power BCU from MPL module

Operate the BCU through the MPL system.

- Test power up of BCU from MPL power supply
- Test telemetry from the BCU through the thruster to the surface
  - 2400 baud bi-directional link
  - 4800 baud up link
  - clock tick up link
    - measure pulse delay and jitter through telemetry

Disconnect sonde simulator from cable to BCU.
Measure BCU current.

Release tests:

Check operation of release relay
Disable release motor
enable release motor
Verify normal release function from the MPL console
Verify emergency release via EG&G release unit

Operate BIP mounted camera and lights

Operation with Sonde

Connect SCU to BCU
Connect logging cable to SCU

Check voltages to the sonde assembly from the BCU through the logging cable.
28 volts
1 PPS
4800 baud up link
2400 baud up link
2400 baud down link
+/- 50 volts
300 volts

Connect sonde assembly to the 250 meter logging cable

Verify proper reception of the 4800 baud data from the sonde by the BCU and surface computer
Send command to set the communications switch in the BCU to connect the sonde com port to the MPL telemetry.
Verify operation of the sonde by IGPP.
Send command to set communications switch to reconnect BCU to the MPL telemetry.
Measure voltage drop across logging cable
Measure current drawn by the sonde

Check 300 volt switching to LIP connector

turn on +50 volts
turn on 300 volts
measure 300 volts on LIP connector

Turn off 300 volts
Turn off 50 volts

Operation of Lead in Package

Connect LIP to the sonde

Turn on 50 volts
Turn on 300 volts
Check telemetry from LIP to MPL
Check video and lights
Measure voltage and power of 300 volt line with LIP on
Measure voltage drop of 300 volts with LIP on

Take seismic data

Connect test battery to the BCU to insure continuous power to sonde.

Install the sonde in housing and attach the LIP in it's housing.
Mount sonde vertically to allow sensor operation
Operate sonde

Set BCU to connect communications between sonde and surface
Turn on -50 volts
Set sonde in Moto IC mode
Operate leveling motors
Record data on IGPP surface computer
Evaluate Teledyne data quality

Measure current drawn by sonde when leveling motors are on
Measure current from -50 volt supply

Stand alone test

switch MPL +36 volts off
Record data on BCU disk
Measure battery voltage and current
Read disk and evaluate Teledyne data.

Data recording Over Night Test

With sonde operating, record data in the BCU and on surface recorder over night through MPL telemetry.
Verify data recording in BCU from operators console.

Read and check disks using WHOI software
Evaluate Teledyne data.

Wet Test

Lock and remove power from sonde.
Assemble and install in their housing the BCU, DRU, CV and other system components.
Transport to dock.
Use 0.68 cable to connect CV to Surface.
Interconnect pressure housings for deployment
Use 250 meter logging cable with water proof connectors between SCU and sonde assembly.
Use connection and power up sequence as for January cruise.
Record data in DRU and on surface recorder.

Appendix D deployment checklist

Borehole system deployment plan and checklist

DRAFT

1. Preliminary electronic tests (before integration)

1.1 CV (CV, heave compensator, slip rings, lab equipment)

Tests (MPL TBA)
- deck and lab equipment tests

Tube and purge
Install on CV
Retest through coax

1.2 BIP (BCU, DRU, SCU, batteries, releases and logging cable)

Tests (BCU functions):
clock check and set if necessary
use sonde simulator
data acquire in DRU (battery powered) and in lab (PC)
lab disk readback
downhole data readback
data evaluate
format disks
Set configuration:
verbose, details, buffers, divisor, release relay disable
Tstring period, release relay
reset dog bites and disk errors

Tube and purge
Install on BIP cage
Retest using deck cable and battery (leave on shore power)

1.3 Sonde (Teledyne, Reftek, motoIC)

Tests (IGPP TBA):
- PC and Sun interface
- motoIC function
- data collect (Sun) and evaluate
- EMLA

Set configuration:
- EMLA battery enable
- fail safe start time
- EOE time

Tube and purge, retest

1.4 Lead-in package (lights, TV, data system)

Tests (MPL TBA):
video and data logger functions, standalone
Tube and purge, retest
Integrate with sonde

2.System interconnection (on deck)

2.1 Ship to BIP

Connect soft tether between CV and BIP
Retest BIP through CV and coax
BCU functions
shore and battery power

2.2 Ship to sonde

Sonde on deck, horizontal, logging cable connected
Connect logging cable from winch to SCU (using extender cable)
Retest sonde through BIP, CV and coax
Reftek
motoIC
LIP TV and data

2.3 Prepare to launch

disconnect logging cable exender
connect BIP deck cable, apply simulated MPL power
disconnect soft tether

3. Launch

launch sonde, transfer load to logging cable

pay out logging cable, stop at top of logging cable

connect logging cable to SCU in BIP on deck

go/no-go decision for next stage of deployment:
test sonde, LIP and BCU through deck cable

disconnect BIP deck cable (BCU starts acquiring)

launch BIP, transfer load to soft tether

pay out soft tether, stop at top of soft tether

launch CV, connect soft tether

transfer load to coax

pay out coax, stop at 100(?) meters

go/no-go decision for next stage of deployment:
    test sonde, LIP and BCU through coax

    ready for reentry

4. Hole reentry and lock

Hole reentry - MPL TBA

Teledyne and holelock operate and test - IGPP TBA
    Set sonde OK bit

5. Tethered data collection

initial evaluation of Teledyne data
IGPP (dbpick) and WHOI (real time display)
acquisition downhole (BCU) and on ship (PC and Sun)
readback and evaluation of surface disk data
readback and evaluation of sample downhole data

time checks

6. Experiment start

format downhole disks

final clock check

soft tether release

Appendix E The subroutine:

A procedure for testing the BCU, sonde and LIP which developed over the course of the integration period from the experiences of failures in the connectors on the logging cable.

a) The BCU and telemetry are verified to operate
b) The sonde is powered on and communications are established with the Reftec and motoIC computers in the sonde, which verifies the sonde is alive.
c) +50 volts is turned on, passing communication to the LIP, and pictures are taken.
d) The 300 volts are turned on to test the lights.
e) After the LIP test, the sonde computers are tested again to verify no damage has occurred to them from the 300 volts.

Appendix F Data from Integration Tests

Subject:
Disks checked at MPL
Date:
Fri, 05 Dec 97 14:47:48 -0500
From:
"s. thompson bolmer" <tomb@snark.whoi.edu>
To:
kpeal@whoi.edu
CC:
rgoldsborough@whoi.edu, tomb@snark.whoi.edu, rstephen@whoi.edu

Ken;
I hope this is the kind of summary that you asked for from the MPL connection tests. Yesterday, I was able to get the disks to read fine. There was a SUN disk format problem on my end that once I fixed it let me read the disks fine.

Tom

****

Data recording at MPL November 1997
Tom Bolmer
12/05/97

All in all the data recorded during the Point Loma tests looked good. Disks given to me on three different days. The times and channels that are missing form the Post tests seem to be when modes of recording were being changed. Listed below are the block numbers from the start of the disk and the recorded times on the disks. The gaps shown are when time or channels were missing from the data. The Post test data had status packets written every 5 seconds, something that should not happen during the at sea deployment.
A problem in the program that transcribs the data from our format on the disks to the CSS format has been fixed and the programs are running well now.

1) Data looked at on November 18th.
Checked with program Chksond805 which checks index counters, size of packets, and time for continuity.

Disk 2209
good data from:
block time
3 323:02:36:32.030
2783 323:04:15:23.000

2784 323:16:07:05:040
2923 323:16:12:01.040

2) Data looked at on November 21st.
Checked with Chksond805 for continuity.

Disk 4087
good data from:
block time
4444 325:04:05:44.000
26118 325:16:08:12.000

Disk 7259
good data from:
block time
3 325:03:59:17.000
21870 325:16:08:12.000

21871 325:16:09:08.000 This part seems to be part of the stopping system.
22283 325:16:22:52.000

3) Data looked at on November 23rd., the overnight Post test.
Checked with Chksond805 for continuity and also transcribed to CCS format for use with dbpick program.

Disk 4087 from the BCU.
good data from:
block time
26124 327:02:13:13.000
27025 327:02:43:15.000

27025 327:02:43:17.000
35995 327:07:42:16.000

36004 327:07:48:43.000
48243 327:14:36:40.000

Disk 7259 from the deck PC.
good data from:
block time
22283 327:00:39:31.000
25088 327:02:13:11.000
Missed channel 1 here
25088 327:02:13:11.000
25990 327:02:43:15.000

25990 327:02:43:17.000
34960 327:07:42:16.000

34960 327:07:43:19.000
35046 327:07:46:10.000
Missed channel 3 and 1 here
35046 327:07:46:11.000
50003 327:16:04:44.000