Verification Procedure & Results

Test Procedure Document No.:	Test Procedure Rev.:
3167-00106	1-01

Test Case Name:	Test Plan Document #	Test Plan Rev.:	Test End Date:
Requirement Analysis	3166-70000	1-01	

Test Conductor (Print Name)	Signature	**Design Engineer** (Print Name): Taylor Semingson	Approval Signature	Date: 2013-07-01
Test Director (Print Name)	Signature	**System Engineer** (Print Name): Sheri N. White	Approval Signature	Date: 2013-06-28
Witnessed by (Print name)	Signature	**QA/QC Engineer** (Print Name): Gary Cook (I&T Lead)	Approval Signature	Date: 2013-06-28
DOORS Verification Procedure ID: Ver-CG-269	**DOORS Verification Event ID**: CG-VE-3092	**Test Results Reviewed**	**QA:**	Date
			Test Dir.	Date

Test Description

This test procedure will have a list of requirements that have been verified by analysis. The analysis will be included in the test procedure and/or Technical Data Package.

Requirements Addressed

L4-CG-MO-RQ-221 Mooring riser assemblies shall be modular in design allowing the addition, removal and reconfiguration of common components to meet site specific environments.
L4-CG-MO-RQ-74 Dual acoustic releases shall be used on all surface and subsurface moorings, so that either release can release the mooring.
L4-CG-MO-RQ-76 Mooring riser assemblies shall have backup recovery buoyancy sufficient to float all mooring components to the surface.
L4-CG-MO-RQ-249 Mooring riser segments designed to be separated from the rest of the mooring for recovery shall incorporate buoyancy sufficient to float the segment to the surface.
L4-CG-MO-RQ-231 Mooring riser segments designed to be separated from the rest of the mooring for recovery shall include emergency beacons and flashers.
L4-CG-MO-RQ-230 Mooring riser loads shall conform to the details specified in 3307-00003.
L4-CG-MO-RQ-229 Mooring risers shall not go slack under design conditions.
L4-CG-MO-RQ-233 Mooring riser segments supporting wire-following profilers shall maintain a tension of at least 500 lbs. on the cable to support profiler translation.
L4-CG-MO-RQ-228 Coastal and Global Mooring anchors shall be constructed of standard CGSN anchor modules.
L4-CG-MO-RQ-269 Anchor weights for each mooring shall conform to the details specified in 3307-00003.
L4-CG-MO-RQ-241 Instrument Frames shall provide protected space for mounting electronics pressure housings.
L4-CG-MO-RQ-283 Lift points on sub-surface spheres shall conform to the details specified in 3307-00003.
L4-CG-MO-RQ-268 Universal joints shall be capable of a 45 degree deflection angle.
L4-CG-MO-RQ-238 Mooring riser component designs shall incorporate isolation and anode protection to prevent damage fr
L4-CG-MO-RQ-79 Mooring riser assemblies shall be designed to sustain anchor launch transient loads.
L4-CG-MO-RQ-207 Mooring riser components shall be capable of being shipped in assembled and/or disassembled form, us
L4-CG-MO-RQ-213 Instrument Frames shall provide protected space for the mounting of instruments.
L4-CG-MO-RQ-264 Inductive wire rope components shall enable the clamp-on mounting of instruments and profilers.
L4-CG-MO-RQ-210 Instrument Frames shall provide protected space for the mounting of platform controller components.
L4-CG-MO-RQ-275 Mooring riser components shall be designed to interface with inductive telemetry systems.
L4-CG-MO-RQ-272 "Inductive wire rope shall be jacketed cable with a diameter in the range of 1/4 to 3/8 inches to support
L4-CG-PS-RQ-284 Primary Battery Power System for the Global Flanking Moorings and Global Hybrid Profiler Moorings shall be designed to have sufficient capacity to support platform control and telemetry functions over a 13 month deployment interval.
L4-CG-TS-RQ-86 Acoustic modems shall have standard RS232 serial connections.
L4-CG-TS-RQ-206 Acoustic Telemetry Systems on moorings shall be compatible with vehicle acoustic telemetry systems within the same Array.
L4-CG-TS-RQ-207 Acoustic modems shall include omni-directional transducers.
L4-CG-TS-RQ-208 Acoustic telemetry systems shall operate within the frequency range 9-14 kHz.
L4-CG-TS-RQ-209 Acoustic telemetry systems shall employ data handshaking techniques.
L4-CG-TS-RQ-210 Acoustic telemetry systems shall be capable of transmitting data at no less than 140 bits per second.
L4-CG-TS-RQ-211 Acoustic modems shall be capable of adjusting bit rates, to fine the optimum bit rate for transmission.
L4-CG-TS-RQ-212 Acoustic telmetry systems shall be capable of Multiple Frequency-Shift-Keying (MFSK) modulation.
L4-CG-TS-RQ-213 Acoustic telmetry systems should be capable of both MFSK and Phase-Shift-Keying (PSK) modulation.
L4-CG-TS-RQ-214 Acoustic telemetry systems should have a nominal range of 3-5 km in open ocean.
L4-CG-TS-RQ-216 Acoustic modems shall have a power source level of less than 213 dB re 1 µPa @ 1m.
L4-CG-TS-RQ-217 Acoustic modems shall have source level at full power of no less than 184 dB re 1 µPa @ 1m.
L4-CG-TS-RQ-218 Global acoustic modems shall be capable of operating in water depths of 2000 m.
L4-CG-TS-RQ-220 Global acoustic modems shall be capable of surviving in water depths of 6000 m.
L4-CG-TS-RQ-182 Inductive modems shall have a standard RS-232 serial connection.
L4-CG-TS-RQ-98 Inductive telemetry systems shall be capable of transmitting data at a no less than 1200 bps.
L4-CG-TS-RQ-181 Inductive telemetry systems shall incorporate a seawater return path.
L4-CG-TS-RQ-119 Inductive telemetry systems shall be capable of supporting no less than 16 instruments on a single mooring.
L4-CG-TS-RQ-120 The inductive link shall have a bit error rate of no more than 1 error in 1E+9 bits.
L4-CG-TS-RQ-127 Beacons shall be capable of monitoring platform position with accuracy specified by non-military GPS.
L4-CG-TS-RQ-130 Beacons and flashers shall be battery powered, independent of platform power system.
L4-CG-TS-RQ-164 Subsurface emergency beacons and flashers shall be capable of being mounted at depths no less than 1000 r
L4-CG-TS-RQ-151 The subsurface emergency beacons shall detect the presence of seawater and transmit when seawater is no

L4-CG-MO-RQ-273 Global Hybrid Profiler Mooring Risers shall be capable of supporting Global Surface Piercing Profilers.
L4-CG-MO-RQ-279 Acoustic releases shall be designed to sustain a straight line proof load of 10,000 lbs.
L4-CG-PC-RQ-744 The SIO Platform Controller shall be designed to operate from primary batteries.
L4-CG-PC-RQ-745 The SIO Platform Controller shall be designed to support deployment intervals of no less than 13 months.
L4-CG-PC-RQ-856 The SIO Platform Controller shall monitor and record primary battery voltage.
L4-CG-PC-RQ-857 The SIO Platform Controller shall monitor and record temperature inside the pressure housing.
L4-CG-PC-RQ-858 The SIO Platform Controller shall monitor and record time status.
L4-CG-PC-RQ-846 The SIO Platform Controller should be capable of connecting to instruments via a serial communications ir
L4-CG-PC-RQ-847 The SIO Platform Controller should be capable of connecting to instruments to provide power.
L4-CG-PC-RQ-283 Platform Controller components, except for storage media, shall be capable of operating in ambient temp
L4-CG-PC-RQ-260 The data storage media on the Platform Controller shall be non-volatile flash memory.
L4-CG-PC-RQ-874 Platform Controllers shall interface to inductive telemetry components per ICD 3102-10008.
L4-CG-PC-RQ-875 Platform Controllers shall interface to acoustic telemetry components per ICD 3102-10009.
L4-CG-PC-RQ-835 Platform Controllers shall interface to Wire-Following Profilers per ICD 3102-10003.
L4-CG-PC-RQ-863 Platform Controllers shall interface to the Global Surface Piercing Profiler per 3102-10004 Wire-Following
L4-CG-PC-RQ-845 Platform Controller components shall be capable of being mounted on mooring instrument frames/cages.
L4-CG-PS-RQ-103 Primary battery power systems shall be capable of being mounted in any orientation.
L4-CG-TS-RQ-152 The subsurface emergency beacons shall detect orientation and only transmit while facing upward within plu
L4-CG-TS-RQ-153 The subsurface emergency beacons shall be remotely programmable for transmission cycle rate and position
L4-CG-TS-RQ-156 The subsurface emergency beacons shall be capable of no less than 750 transmission cycles and position fix c
L4-CG-TS-RQ-165 Subsurface emergency flashers shall be capable of detecting the presence of seawater and be configurable to
L4-CG-TS-RQ-166 Subsurface emergency flashers shall be capable of detecting ambient light and be configurable to flash when
L4-CG-TS-RQ-167 Subsurface emergency flashers shall be capable of detecting orientation and be configurable to only flash wh
L4-CG-TS-RQ-168 Subsurface emergency flashers shall be configurable for flash rates.
L4-CG-TS-RQ-169 Subsurface emergency flashers shall have a nominal life expectancy of no less than 250,000 flashes.

Test Environment

- All as-built mooring components are located at the burn-in site.
- TDP artifacts have been released to Alfresco.

Test Setup

Analysis.

Test Artifacts

Test Artifacts consist of the Pass/Fail results for steps contained within this procedure.

Test Procedure 3167-00106 Rev 1-01				Test Results		
Step#	Instructions	Expected Results	Requirement ID	Observed Results	Pass/Fail	Notes
1	Note HYPM 64" sphere modular design in drawing 3707-00809, and verify that the as-built parts are the same. Note load cage modular design in drawing 3707-00804, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-221			

Test Procedure 3167-00106 Rev 1-01				Test Results		
2	Note the use of dual acoustic releases in HYPM top assembly drawings 3601-00008, 3602-00006, 3603-00006, 3606-00006, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-74			
3	Note the backup buoyancy plot on page 7 of the HYPM model analysis documents 3201-00010, 3202-00010, 3203-00010, 3206-00010.	Backup buoyancy is positive.	L4-CG-MO-RQ-76			
4	Verify that the static tension plot on page 8 of the HYPM model analysis documents 3201-00010, 3202-00010, 3203-00010, 3206-00010 complies with the details specified in document 3307-00003.	Mooring loads comply with document 3307-00003.	L4-CG-MO-RQ-230			
5	Verify that the static tension plot on page 8 of the HYPM model analysis documents 3201-00010, 3202-00010, 3203-00010, 3206-00010 does not show any components in negative tension.	As-built parts are the same.	L4-CG-MO-RQ-229			
6	Verify that the static tension plot on page 8 of the HYPM model analysis documents 3201-00010, 3202-00010, 3203-00010, 3206-00010 is above 500 lbs. on wire shots supporting WFPs.	As-built parts are the same.	L4-CG-MO-RQ-233			
7	Note the backup buoyancy plot on page 7 of the HYPM model analysis documents 3201-00010, 3202-00010, 3203-00010, 3206-00010.	Verify that components which can be separated have enough backup buoyancy to float to the surface.	L4-CG-MO-RQ-249			
8	Note the use of standard CGSN anchor modules in HYPM top assembly drawings 3601-00008, 3602-00006, 3603-00006, 3606-00006, and verify that the as-built parts are the same. Anchor assemblies are detailed in drawings 3707-00726, 3707-00843, 3707-00844, and 3707-00845.	As-built parts are the same.	L4-CG-MO-RQ-228			
9	Verify that the anchor weights used in HYPM top assembly drawings 3601-00008, 3602-00006, 3603-00006, 3606-00006 are greater than 1.2 times the vertical component of the riser tension as detailed on page 8 of the HYPM model analysis documents 3201-00010, 3202-00010, 3203-00010, 3206-00010.	Anchor weights are greater than 1.2X the vertical component of the mooring tension.	L4-CG-MO-RQ-269			
10	Note the protected mounting configuration of the controller housing in drawings 3707-00804, 3707-00783, 3707-00808, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-241 L4-CG-MO-RQ-210 L4-CG-PC-RQ-845			
11	Note the mooring wire sizes in HYPM top assembly drawings 3601-00008, 3602-00006, 3603-00006, 3606-00006, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-272			
12	Note the use of a GSPP in HYPM top assembly drawings 3601-00008, 3602-00006, 3603-00006, 3606-00006, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-273			
13	Note the lift points on sub-surface spheres in drawings 3707-00783 and 3707-00809, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-283			
14	Note the 45 degree deflection angle of the universal joint in drawing 3707-00615, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-268			
15	Note the recommended maximum static working load of 12,000 lbs. as listed on page 8 of the Edgetech 8242 Acoustic Release manual.	Static working load of 12,000 lbs.	L4-CG-MO-RQ-279			
16	Note the isolation and anode protection of components and applicable sub-assemblies detailed in HYPM top assembly drawings 3601-00008, 3602-00006, 3603-00006, 3606-00006, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-238			
17	Note the launch tension analysis shown on page 9 of the HYPM model analysis documents 3201-00010, 3202-00010, 3203-00010, 3206-00010, on which the component designs have	Launch tension is safe.	L4-CG-MO-RQ-79			

Test Procedure 3167-00106 Rev 1-01				Test Results		
18	Note the components and sub-assemblies detailed in HYPM top assembly drawings 3601-00008, 3602-00006, 3603-00006, 3606-00006, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-207			
19	Note the protected instrument mounting space in the load cage in drawing 3707-00804, and verify that the as-built parts are the same. Note the protected instrument mounting space in the HYPM 64" sphere assembly in drawing 3707-00808, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-213			
20	Note the inductive wire rope diameter shown in HYPM top assembly drawings 3601-00008, 3602-00006, 3603-00006, 3606-00006, and verify that the as-built parts are the same.	As-built parts are the same.	L4-CG-MO-RQ-264			
21	Note details of Inductive Telemetry System ICD document 3102 10008.	Components can interface with inductive modem.	L4-CG-MO-RQ-275			
22	Note controller primary battery packs shown in drawing 3703-00220.	Primary batteries, can be mounted in any orientation.	L4-CG-PC-RQ-744 L4-CG-PS-RQ-103			
23	Refer to battery consumption and data capacity document specific to the deployment to ensure controller will survive for	Controller will last for 13 months.	L4-CG-PC-RQ-745 L4-CG-PS-RQ-284			
24	Refer to source code (instrument.c, Pollinstrument function) for monitoring and recording of battery voltage, pressure housing internal temperature, and time status.	Controller monitors voltage, temperature, and status.	L4-CG-PC-RQ-856 L4-CG-PC-RQ-857 L4-CG-PC-RQ-858			
25	Verify that components listed in documents 3703-00226, 3703-00230, 3703-00234 are capable of operating in the specified ambient temperature range.	Components are capable of operating in specified range.	L4-CG-PC-RQ-283			
26	Note that data storage media on platform controller is non-valatile flash memory, as is required to interface with Persistor CF2 called out in drawing 3703-00222.	Data storage is non-volatile flash memory.	L4-CG-PC-RQ-260			
27	Note the description of the interface between the platform controller and inductive telemetry components in document 3102-10008, and verify that the test setup complied with ICD.	Controllers can communicate with inductive modems.	L4-CG-PC-RQ-874			
28	Note the description of the interface between the platform controller and acoustic telemetry components in section 3.2.3.2 of document 3102-10009, and verify that the test setup	Controllers can communicate with acoustic modems.	L4-CG-PC-RQ-875			
29	Note the description of the interface between the platform controller and Wire Following Profiler in document 3102-10003, and verify that the test setup complied with ICD.	Controllers can communicate with WFPs.	L4-CG-PC-RQ-835			
30	Note the description of the interface between the platform controller and Surface Piercing Profiler in document 3102-10004, and verify that the test setup complied with ICD.	Controllers can communicate with GSPPs.	L4-CG-PC-RQ-863			
31	Note the ATM-965 acoustic modem specifications described in the Benthos ATM-900 Series Acoustic Telemetry Modems manual, Version D. Specifications can be found in section 2-1 and 2-2, sub-headings General and ATM-965.	Modem specifications meet requirements.	L4-CG-TS-RQ-86 L4-CG-TS-RQ-207 L4-CG-TS-RQ-208 L4-CG-TS-RQ-209 L4-CG-TS-RQ-210 L4-CG-TS-RQ-211 L4-CG-TS-RQ-212 L4-CG-TS-RQ-213 L4-CG-TS-RQ-214 L4-CG-TS-RQ-216 L4-CG-TS-RQ-217 L4-CG-TS-RQ-218			
32	Note the interface between open ocean gliders and acoustic modems as described in document 3102-10007.	Gliders interface with acoustic modems.	L4-CG-TS-RQ-206			
33	Note the inductive modem module specifications listed in the IMM spec sheet entitled IMMBrochureFeb10.pdf.	Inductive modem specifications meet requirements.	L4-CG-TS-RQ-182 L4-CG-TS-RQ-98 L4-CG-TS-RQ-181			
34	Note the range of instrument IDs possible with the inductive modem as listed in section 11.6 of the IMM Technical Reference Manual Version 11.	Inductive modem can handle more that 16 instruments on a line.	L4-CG-TS-RQ-119			
35	Note the use of a CRC checksum in figure 1.1 on page 7 of the IMM Technical Reference Manual Version 11.	CRC checksum is used.	L4-CG-TS-RQ-120			

Test Procedure 3167-00106 Rev 1-01				Test Results		
36	Note technical specifications in appendix A of Sable manual version 2.1. Note technical specifications in appendix A of XMF-7500 manual version 1.0. Note technical specifications in appendix A of XMB-7500 manual version 1.1.	Beacons match specifications.	L4-CG-TS-RQ-127 L4-CG-TS-RQ-130 L4-CG-TS-RQ-164 L4-CG-TS-RQ-151 L4-CG-TS-RQ-152 L4-CG-TS-RQ-156 L4-CG-TS-RQ-165 L4-CG-TS-RQ-166 L4-CG-TS-RQ-167 L4-CG-TS-RQ-169			
37	Note the instructions for setting the timing of the Sable beacon in section 3.3.3.1 of the manual, version 2.1.	Timing can be changed.	L4-CG-TS-RQ-153			
38	Note the instructions for setting the XMF-7500 flash rates in sections 3.1.2 and 3.1.3 of the XMF-7500 manual, version 1.0.	Flash rates can be changed.	L4-CG-TS-RQ-168			