



Verification Procedure & Results

Test Case Name: Coastal Surface Piercing Profiler L4 Inspection and Analysis VER-CG-165		Test Plan Document # 3161-90000	Test Plan Rev.: A	Test End Date:
Test Procedure Document No.: 3166-90101	Test Procedure Rev.: A			
Test Conductor (Print Name) Signature	Design Engineer (Print Name) John Koegler	Approval Signature John Koegler		Date 1/6/2014
Test Director (Print Name) Signature	System Engineer (Print Name) Jonathan Fram	Approval Signature Jonathan Fram		Date
Witnessed by (Print name) Signature	QA/QC Engineer (Print Name)	Approval Signature		Date
DOORS Verification Procedure ID Ver-CG-165	DOORS Verification Event ID CG-VE-3091	Test Results Reviewed	QA:	Date
			Test Dir.	Date

Test Description

The Coastal Surface Piercing Profiler (CSPP) is an instrument platform to be deployed at selected Endurance Array and Pioneer locations. The CSPP, less the anchoring system, is purchased as a fully-integrated platform. Instruments are attached to instrument frames within the the CSPP with vendor-fabricated brackets. The uncabled implementation is internally powered and communicates either by LOS radio or satellite phone. Nominal deployment method is to use a ship's winch to deploy the anchor and mooring. The cabled embodiment derives power and communications from the Regional Scale Nodes (RSN) 48V/100 BaseT cabled infrastructure through the RSN Medium Power Junction Box (MPJBox) at CESH02. Nominal deployment method is to use an ROV to 'fly' it to the desired location and then use a wet-mateable connector for cable connection. This test case verifies that the physical and software characteristics of the CSPP satisfy the cited L4 requirements as captured in the OOI DOORS system. This document is for (remove strikethrough of appropriate series) P/N 3310-00004-00001 ~~Uncabled Configuration (Series A)~~ P/N 3310-00004-00002 ~~cabled Configuration (Series B)~~

Requirements Addressed

L4-CG-PR-RQ-195,L4-CG-PR-RQ-354,L4-CG-PR-RQ-181,L4-CG-PR-RQ-182,L4-CG-PR-RQ-196,L4-CG-PR-RQ-340,L4-CG-PR-RQ-198,L4-CG-PR-RQ-335,L4-CG-PR-RQ-200,L4-CG-PR-RQ-201,L4-CG-PR-RQ-202
L4-CG-PR-RQ-203,L4-CG-PR-RQ-204,L4-CG-PR-RQ-205,L4-CG-PR-RQ-206,L4-CG-PR-RQ-208,L4-CG-PR-RQ-209,L4-CG-PR-RQ-210,L4-CG-PR-RQ-211,L4-CG-PR-RQ-212,L4-CG-PR-RQ-184,L4-CG-PR-RQ-213,
L4-CG-PR-RQ-214,L4-CG-PR-RQ-215,L4-CG-PR-RQ-216,L4-CG-PR-RQ-217,L4-CG-PR-RQ-69,L4-CG-PR-RQ-78,L4-CG-PR-RQ-355,L4-CG-PR-RQ-71,L4-CG-PR-RQ-72
L4-CG-PR-RQ-73,L4-CG-PR-RQ-81,L4-CG-PR-RQ-82,L4-CG-PR-RQ-84,L4-CG-PR-RQ-218,L4-CG-PR-RQ-87,L4-CG-PR-RQ-88,L4-CG-PR-RQ-89,L4-CG-PR-RQ-90,L4-CG-PR-RQ-91,L4-CG-PR-RQ-96,
L4-CG-PR-RQ-98,L4-CG-PR-RQ-264,L4-CG-PR-RQ-106,L4-CG-PR-RQ-107,L4-CG-PR-RQ-108,L4-CG-PR-RQ-372

Test Setup

The CSPP will be fully assembled and integrated, including all electronics, pressure housings, and cables. Pre-delivery operational testing has been performed by the vendor. Where "demonstration" is listed as Verification Method, the testing will be witnessed by OOI personnel.

Test article description:

Test Artifacts

This document (all required measurements will be incorporated in the Observed Results section)

Vendor supplied test reports

Test Procedure 3166-90101 Rev A				Test Results		
Step#	Instructions	Expected Results	Requirement ID	Observed Results	Pass/Fail	Notes
1	Review design, compare as-built construction to reviewed design for components sensitive to wear, corrosion and deterioration as determined during CDR.	The materials used in construction of the profiler, sensors, and sensor mounts are chosen and treated in such a way as to reduce the levels of wear, corrosion and deterioration to allow multiple deployments of each unit.	L4-CG-PR-RQ-195			
2	Inspect shipping container and shipping history	Profiler is provided with reusable transportation cases that meet or exceed ASTM-D3951, "Standard Practice for Commercial Packaging."	L4-CG-PR-RQ-354			
3	Review fish-bite mitigation strategies against CDR recommendations.	All structural and electrical cables on the profiler is protected from fish bite.	L4-CG-PR-RQ-181			
4	Review sensor removal and installation procedures.	The core sensors on a profiler are field-swappable without requiring the opening of the pressure housing.	L4-CG-PR-RQ-182			

Test Procedure 3166-90101 Rev A				Test Results		
Step#	Instructions	Expected Results	Requirement ID	Observed Results	Pass/Fail	Notes
5	Review software issues that may be raised by sensor replacement. Changing calibration coefficients or other sensor-specific data is not considered software modification.	The field replacement of a core sensor does not require the modification of any profiler software.	L4-CG-PR-RQ-196			
6	Review sensor removal and installation procedures.	Science sensors are user-replaceable in the field with identical spare sensors.	L4-CG-PR-RQ-340			
7	Review surface-assessment code. If an opportunity arises during the test or sea-trials deployments, the capability can be demonstrated. If no opportunity arises, lack of opportunity will be noted.	The profiler is able to assess the surface conditions and avoid surfacing of the sensor package in hazardous conditions.	L4-CG-PR-RQ-198			DEMO
8	Review engineering sensor operation and data for evidence of capability.	The profiler has the capability to monitor the orientation (attitude and heading) of the profiling body.	L4-CG-PR-RQ-335			
9	Review winch-control and depth monitoring systems.	The profiler has the capability to control and monitor the range of vertical motion of the sensor package.	L4-CG-PR-RQ-200			
10	Review design and actual sensor control systems and storage capabilities.	The profiler has the capability to control and monitor the data acquisition and storage of sensor data.	L4-CG-PR-RQ-201			
11	Review telemetry code for control and monitoring capability.	The profiler has the capability to control and monitor the telemetry subsystem.	L4-CG-PR-RQ-202			
12	Review power-management capabilities, especially for shore-direction of functionality reduction.	The profiler has the capability to reduce overall system functionality as power becomes limited or when directed by commands from the shore station.	L4-CG-PR-RQ-203			
13	Review capability of control software to turn off power and communications to sensors.	The profiler has the capability to turn off sensors or instruments when directed by commands from the shore station.	L4-CG-PR-RQ-204			
14	Review science data files received from the profiler for time stamps.	The profiler time-stamps and stores all data from core sensors in non-volatile memory.	L4-CG-PR-RQ-205			
15	Review engineering data files received from the profiler for time stamps.	The profiler monitors the health of subsystems and records the time-stamped engineering data in non-volatile memory.	L4-CG-PR-RQ-206			
16	Review decimation of telemetered data against full internally-stored data for demonstration of capability.	The profiler has the capability to send decimated subsets of sensor data to a shore station.	L4-CG-PR-RQ-208			DEMO
17	Review telemetered data files for engineering data.	The profiler has the capability to send engineering data to a shore station.	L4-CG-PR-RQ-209			
18	Review test records. Telemetered commands may include profiler commands and sensor/instrument commands	The profiler has the capability to receive commands from a shore station.	L4-CG-PR-RQ-210			
19	Review changes in operation of the profiler platform as a result of received commands	The profiler demonstrates response to commands from a remote shore station to change the operation of the profiler, sensor package, core sensors, and telemetry system.	L4-CG-PR-RQ-211			
20	Review code for error detection and correction protocols.	The data communication protocol employs an error detection/correction protocol.	L4-CG-PR-RQ-212			
21	Review and use the mission planning tool to predict changes in power usage after variation of sensor operation. The predictions do not need to be quantitatively accurate.	The vendor provides a mission planning tool to provide estimates of energy usage as a function of sensor payload and sampling interval.	L4-CG-PR-RQ-184			DEMO
22	Review and use the mission planning tool to predict changes in power usage after variation of profiler operation and environmental conditions. The predictions do not need to be quantitatively accurate.	The mission planning tool provides estimates of energy usage as a function of profiling speed, vertical profiling speed, current speed, and in situ water density.	L4-CG-PR-RQ-213			DEMO
23	Review and use the mission planning tool to predict changes in data-storage usage after variation of sensor operation. The predictions do not need to be quantitatively accurate.	The mission planning tool shall provide estimates of the data storage needs as a function of sensor payload and sampling interval.	L4-CG-PR-RQ-214			DEMO
24	Review and use the mission planning tool to predict changes in telemetry bandwidth usage after variation of sensor operation. The predictions do not need to be quantitatively accurate.	The mission planning tool provides estimates of the telemetry bandwidth requirements as a function of sensor payload, sampling interval, and data decimation options.	L4-CG-PR-RQ-215			DEMO
25	Review demonstration of interaction of mission planning tool and telemetered battery conditions.	The mission planning program monitors the power usage of a deployed profiler and provides estimates of the capacity remaining.	L4-CG-PR-RQ-216			DEMO
26	Review demonstration of interaction of mission planning tool and telemetered data storage conditions.	The mission planning program monitors the data storage usage of a deployed profiler and provides estimates of the capacity remaining.	L4-CG-PR-RQ-217			DEMO
27	Review design limitations per results of CDR and compare to as-built profiler.	The Profiler is capable of profiling between the surface and a depth of 200 m under normal operating conditions.	L4-CG-PR-RQ-69			

Test Procedure 3166-90101 Rev A				Test Results		
Step#	Instructions	Expected Results	Requirement ID	Observed Results	Pass/Fail	Notes
28	Review design limitations per results of CDR and compare to as-built profiler.	The profiler has the capability to reach the surface in the presence of a uniform current of 40cm/sec between the surface and 200m depth.	L4-CG-PR-RQ-78			"Reach the surface" means make a measurement in the top meter of the water column.
29	Review design limitations per results of CDR and compare to as-built profiler.	The coastal surface piercing Profiler shall have the capability to reach the surface in conditions of winds of 10 m/s and maximum significant wave heights of up to 3 meters.	L4-CG-PR-RQ-355			"Reach the surface" means make a measurement in the top meter of the water column.
30	Review design limitations per results of CDR and compare to as-built profiler.	The Profiler is designed to sustain 30 year return period extreme waves, winds, currents, and tides.	L4-CG-PR-RQ-71			
31	Review design limitations per results of CDR and compare to as-built profiler.	The Profiler is designed to survive 100 year return period extreme waves, winds, currents, and tides.	L4-CG-PR-RQ-72			
32	Review design limitations per results of CDR and compare to as-built profiler.	The designed maintenance and operation interval for the Profiler is be seven months.	L4-CG-PR-RQ-73			
33	Review test records for reasonability of results.	The Profiler measures Conductivity, Temperature, and Depth (CTD).	L4-CG-PR-RQ-81			DEMO
34	Review test records for reasonability of results.	The Profiler measures Dissolved Oxygen (DO).	L4-CG-PR-RQ-82			DEMO
35	Review test records for reasonability of results.	The Profiler measures Chlorophyll a Fluorescence, CDOM Fluorescence, and Optical Backscatter.	L4-CG-PR-RQ-84			DEMO
36	Review test records for reasonability of results.	The Profiler measures the Partial Pressure of Carbon Dioxide (pCO2) in water.	L4-CG-PR-RQ-218			DEMO
37	Review test records for reasonability of results.	The Profiler measures multispectral optical attenuation and absorption.	L4-CG-PR-RQ-87			DEMO
38	Review test records for reasonability of results.	The Profiler measures Spectral Irradiance.	L4-CG-PR-RQ-88			DEMO
39	Review test records for reasonability of results.	The Profiler measures Photosynthetically Active Radiation (PAR).	L4-CG-PR-RQ-89			DEMO
40	Review test records for reasonability of results.	The Profiler measures Nitrate.	L4-CG-PR-RQ-90			DEMO
41	Review test records for reasonability of results.	The Profiler measures three axis point velocity.	L4-CG-PR-RQ-91			DEMO
42	Review results of telemetered data from test deployments.	The Profiler demonstrates transfer of a subset of the data to shore using a bidirectional communications link.	L4-CG-PR-RQ-96			DEMO
43	Use the profiler communications software to demonstrate bidirectional satellite telemetry.	The Profiler utilizes bidirectional satellite telemetry when deployed using internal power and not connected to a subsea power and data cable.	L4-CG-PR-RQ-98			DEMO
44	Inspect for acoustic telemetry port provision. The profiler does not need to have acoustic telemetry, just include the provision to add it.	The uncabled Profiler includes provision for a port to a bidirectional acoustic telemetry system.	L4-CG-PR-RQ-264			
45	Review engineering data files for evidence of compliance.	The Profiler contains a GPS receiver capable of acquiring a fix with a minimum of 3 satellites within 5 minutes of surfacing 90% of the time.	L4-CG-PR-RQ-106			DEMO
46	Review results of telemetered data to determine internal clock drift relative to GPS time.	The Profiler time stamps all data with an accuracy of +/- 1 second relative to UTC obtained from the GPS receiver.	L4-CG-PR-RQ-107			DEMO
47	Inspect for presence of emergency position indicator independent of the GPS system.	The Profiler contains an emergency position locator, such as a System Argos beacon or equivalent, to allow the location and recovery of the profiling sensor package should it become detached from the main body.	L4-CG-PR-RQ-108			
48	Review results of steps 13, 18, 19 in this document	The Profiler is controllable from ship/ shore via vendor-provided software.	L4-CG-PR-RQ-372			