



Verification Procedure & Results Document No.: 3167-20103 rev A

Test Case ID: 003, Ver-CG-70	Test Case Name: VE-CG-3100 Transit outbound		Test Plan Document No.: 3167-20000	Test Plan Rev.: 2-00	Test Date:
Test Director (Print Name) Ed Dever	Signature in lieu of electronic signature	Design Engineer	Approval Signature John S. Dingess in lieu of electronic signature		Date 10-11-2012
Test Conductor (Print Name) David Neiman	Signature 	System Engineer	Approval Signature Ed Dever (in lieu of electronic signature)		Date 10/15/2012
Witnessed by (Print name)	Signature	QA/QC Engineer	Approval Signature Michael A. Zernick		Date 10/17/12

Test Class	<input checked="" type="checkbox"/> Performance <input checked="" type="checkbox"/> Behavioral <input type="checkbox"/> Reliability <input type="checkbox"/> Endurance / Longevity <input type="checkbox"/> Survivability <input type="checkbox"/> Safety
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Test Description
 The glider will be deployed in the vicinity of the Southern California Bight. It will begin its navigation to the CORC01 and CORC02 moorings. Navigation conditions to achieve 20cm/s forward flight will be determined. The SM75 self-contained modem mooring will also be deployed with the glider, ideally in ~1500m deep water if needed for requirements verification.

Requirements Addressed
 L4-CG-GD-RQ-139 (L3-CG-RQ-226, L3-CG-RQ-819, L3-CG-RQ-824, L3-CG-RQ-827, L3-CG-RQ-538), L4-CG-GD-RQ-216, L4-CG-GD-RQ-86, L4-CG-GD-RQ-90

Test Setup	Test Artifacts
The glider will be deployed from an available vessel. After deployment, it will proceed autonomously toward programmed destinations following shore commands for flight characteristics (ballast pump setting, etc.).	This document Records of dives to 1000m Glider time/position chart correlated to dive parameters

Test Procedure				Test Results		
Step No.	Instructions	Expected Results (Accept Criteria)	Requirement ID	Test Data	Pass/Fail	Notes/Waiver No.
3.1	Deploy the glider from the available vessel. No special fittings are to be used (A-frames, glider deployment cart, standard ship winches are not considered 'special')	The glider will be launched with no difficulty.	L4-CG-GD-RQ-216	Dep. Lat:32 33.992N Dep Long:118 02.913W Dep time: 12:29 PDT Water depth:1643m	Pass	Launch was from the F/V Outer Limits.



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Test Procedure				Test Results		
Step No.	Instructions	Expected Results (Accept Criteria)	Requirement ID	Test Data	Pass/Fail	Notes/Waiver No.
3.2	Use 1000m dives to navigate the glider. Navigate the glider past obstructions <1000m deep (e.g. Blake Knolls) before turning off altimeter	The glider will make repeated dives to 1000m depth without loss of functionality.	L4-CG-GD-RQ-139 L3-CG-RQ-226 L3-CG-RQ-819 L3-CG-RQ-824 L3-CG-RQ-827 L3-CG-RQ-538	See Appendix A	Pass	Sample files are 272-0-0, 272-0-1, 273-0-0 to 273-0-13, 273-1-0 to 273-1-3, 274-0-0 See Appendix A for supporting data.
3.3	While using minimum-400m depth dives to navigate, establish ballast and trim conditions that give a 20cm/s forward speed. For each set of conditions, perform at least 1 2-yo segment to 1000m at some point during the deployment, although shallower dives can be used to evaluate dive parameters.	Dive conditions for efficient 20cm/s flight will be developed.	L4-CG-GD-RQ-86	See Appendix A	Pass	The interest here is to find the relationship of ballast/trim conditions to give efficient flight at 20cm/s forward speed. Analysis of power usage during 20cm/s flight will be used to verify later requirements. See Appendix A for supporting data.
3.4	Compare glider actual power usage to that predicted by the mission planning spreadsheet	Agreement between spreadsheet and actual power usage will be considered adequate by the Endurance System Engineer	L4-CG-GD-RQ-90	The power-consumption tool is being refined with data from this deployment.	defer to TC007 (3167-20107)	TWR development of the power use tool is ongoing. The current tool underestimates the power usage.

Appendix A: Verification of requirements from steps 3.2 and 3.3

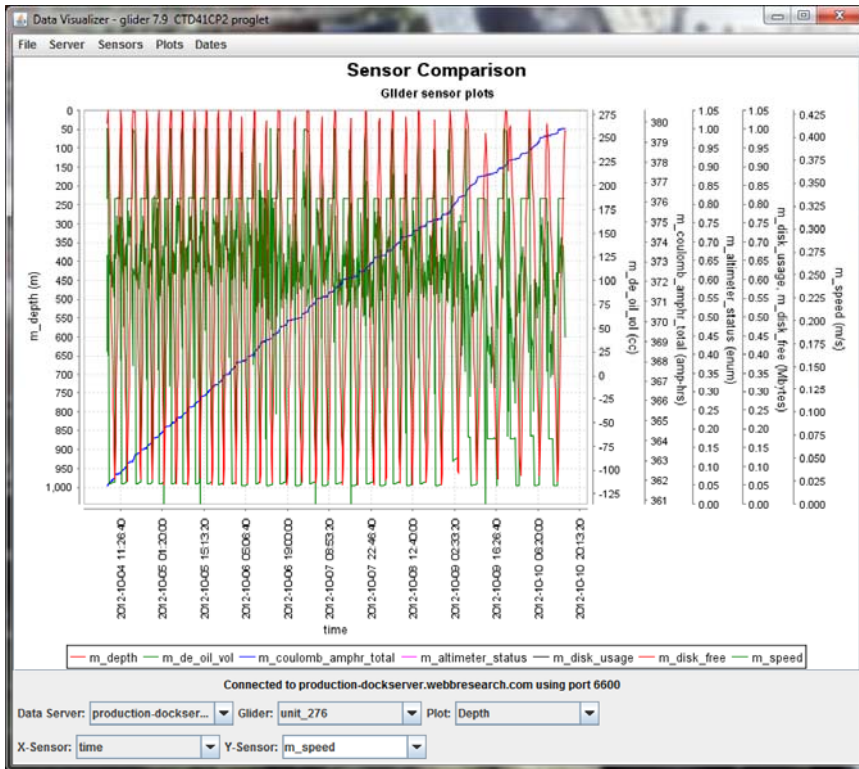


Figure 1: Glider data for dive depth and other parameters.

Figure 2 shows data for verification of the requirements for steps 3.2 and 3.3. The depth reading (red) shows 30 dives to 1000m depth, some with communication sessions (red trace reaches 0 depth) and some with subsurface inflections (red trace does not reach the surface before indicating a dive has started). The m_speed (green) trace is a calculation in the glider of the glider's forward speed based on pitch angle and descent rate. The glider speed calculated during the time period shown (10/4-10/2012) was validated by comparing time/distance plots from Google™ Earth of the glider's Argos position from earlier in the deployment (Figure 2), which give speeds of ~23cm/s where the ballast pump use is similar to that shown in Figure 1.

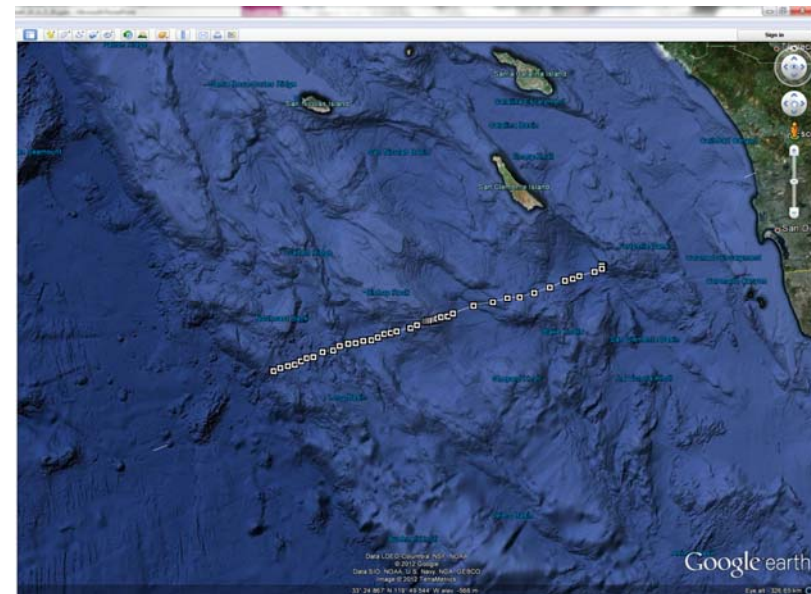


Figure 2: Glider positions exported from Argos reports. Each point is time-stamped, allowing calculation of the glider's speed over ground.