



Supplier Quality Audit Report

General Supplier Information

Company Name: Teledyne Webb Research
Phone: 508 548-2077
Fax: 508 540-1686
Item(s) Supplied: P/N 3304-00003-00001 Coastal Glider with 200m buoyancy engine
P/N 3304-00003-00002 Coastal Glider with 1000m buoyancy engine

Address: 82 Technology Park Drive
City: East Falmouth
State: MA
Zip Code: 02536

Contact Information

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Engineering: James Truman **Phone:** 508 548-2077 **Fax:** 508 540-1686 **Email:** jtruman@teledyne.com
Production: William Wieler **Phone:** 508 548-2077 **Fax:** 508 540-1686 **Email:** bwieler@teledyne.com
Other: Shawn Green - Quality Eng. **Phone:** 508 548-2077 **Fax:** 508 540-1686 **Email:** sgreen2@teledyne.com

Facilities Information

No. of Employees Total: 54 **Manufacturing:** 18 **Quality:** 2 **Management/Administration:** 34*
No. of Mfg. Shifts: 1 **Mfg. Area (sq. ft.):** 17,000 (3,000 for Gliders) * Includes Engineering

Quality System Information

What Standard(s) is Supplier's Quality System based upon?

ISO 9001:2008 ISO/TS16949 AS 9100 ISO 13485 Other:

Is Supplier's Quality System certified by a recognized ISO registrar?

Yes **Registra:** Det Norske Veritas (DNV) **Certificate No.:** CERT-09263-2004-AQ-HOU-ANAB Rev. 1

Audit Type & Scope

QMS Conformance Audit Process Audit

Procedure(s)/Process(s) Audited: Slocum Electric Glider Assembly and Test Process

Reference Document(s): 237-003 Slocum Electric Glider Quality Plan, Rev. 001 (attached)
Blue Book for Slocum Electric Glider, Model: 200M SN: 0221

Auditees: Bill Wieler – Glider Production Manager Shawn Green – Senior Quality Engineer

Audit conducted By: George Dussault

Signature:

Date: 05/09/2011

Audit Summary

Major Findings and Corrective Action Required:

No findings that indicate a breakdown in the implementation or compliance with the Slocum Electric Glider Quality Plan that could impact the quality of the product were found. No corrective actions for any Major Findings are required.

Minor Findings and Corrective Action Required:

No findings that indicate any lapses in compliance with documented procedures, that if not addressed, could potentially impact the quality of the product delivered were found. No corrective actions for any Minor Findings are required.

Observations:

Because the Slocum Electric Glider serial number selected for this process audit was produced during the transition/implementation of new and revised documentation, testing results/reports for some of the test identified in the Test Plan were not required at the time of production and therefore not available for review.

Several of the procedures that support the Slocum Electric Glider Quality Plan are still being documented and/or have not been fully implemented. Until these tasks have been completed, there are some gaps in the quality plan documentation. Because Teledyne Webb Research (TWR) is actively in the process of documenting and implementing these procedures I did not consider this issue a finding requiring any corrective action at this time by TWR. TWR's progress toward completing this task will be monitored to ensure the Slocum Electric Glider Quality Plan procedures and associated records are fully documented, and implemented, prior to the production of CGSN's first Coastal Glider. A follow up audit of Slocum Electric Glider Quality Plan documentation will be conducted prior to the Production Readiness Review.

General Comments: Teledyne Webb Research's manufacturing facility is clean and appeared to be well organized. Bill and Shawn were both very cooperative and responded with a positive attitude to my requests for specific test records and questions about the procedures associated with the Slocum Electric Glider Test Plan. This audit required approximately 4 hours at the supplier's facility to conduct and about same amount of time preparing a process audit checklist from Teledyne Webb Research's Slocum Electric Glider Test Plan.

Procedure/Process Audit Artifacts

1. **Process:** Slocum Electric Glider – Final Assembly Bench and Flight Tests

Glider Model: 200M (PO 00081531)

Serial Number: 0221

Final Ballast: Test Procedure 4095 – GBP Reviewed test record in 4095 GBPSH for SN 0221, Test Date 3/25/11

Flight Test: Test Procedure 4095 – FDE (CK list) Reviewed test record 4095-FDE for SN 0221, Test Date 3/22/11

Ballast: Test Procedure (Production) 4095 – GBP Reviewed test record 4095 GBPSH for SN 0221, Test Date 3/19/11

Bench Test: Test Procedure 4095 – FCP (CK list) Reviewed test record 4095 FCP for SN 0221, Test Date 3/11/11

2. **Process:** Final Assembly

Forward Section Assembly (A 200M or B 1000M): SN 0228

- ✓ Payload Bay Assembly (C): SN 0221
- ✓ Aft Section Assembly (D & E): SN 0338
- ✓ Battery Kit Assembly (F): SN 1100008
- ✓ Hull, Forward/Aft Component Assembly (H): Forward SN 0014, Aft SN 0015
- ✓ Strobe Assembly (J): SN 927
- ✓ Airmar Altimeter: SN 2201120

3. **Process:** Forward Section Assembly A (200M)

Forward Section Assembly: SN 128 Assembly Procedure 3140-AP Drawing 3140

Forward Section Assembly Pressure Test: Procedure 242-108 (New Procedure No. 3140-TP WIP document)
Reviewed test data 3140-TD for SN 0128, Test Date 3/3/11

- ✓ Ballast Drive Assembly: SN 0198 Assembly Procedure 3545-AP Drawing 3545
 - ✓ Ballast Drive Assembly Test: Procedure 3545-TP
Reviewed test data log 3545-TD for SN 0198, Test Date 1/3/11
 - ✓ Brake Bobbin Wound: Drawing BOM item only, no SN assigned
 - ✓ Motor/Gear Box Assembly: Drawing BOM item only, no SN assigned
- ✓ Pitch Motor Assembly: SN 0946 Assembly Procedure 3095-AP (WIP document) Drawing 3095
 - ✓ Pitch Motor Assembly Test: Procedure 3095-TP (WIP document)
Reviewed test record log 3095-TD for SN 0946, Test Date 1/4/11
 - ✓ Pitch Motor Sub-Assembly: Drawing BOM item only, no SN assigned
 - ✓ Pitch Motor Modified: Drawing BOM item only, no SN assigned
 - ✓ Pitch Motor: Drawing BOM item only, no SN assigned
- ✓ Ball Nut Assembly: Drawing BOM item only, no SN assigned
- ✓ Potentiometer: Drawing BOM item only, no SN assigned
- ✓ Leak Detection Board Assembly: Drawing BOM item only, no SN assigned
- ✓ Ballast Bottle: Drawing BOM item only, no SN assigned
- ✓ Anode Assembly: Drawing BOM item only, no SN assigned
- ✓ AIR Mar Altimeter Assembly: SN 2201120

4. Process: Forward Section Assembly (B 1000M)

Forward Section Assembly: This process is not applicable to 200M model

5. Process: Payload Bay Assembly

Payload Bay Assembly: SN 0221 Assembly Procedure 3201-AP (WIP document) Drawing No. 3201

- ✓ Payload Bay Assembly Pressure Test: Procedure No. 241-146 (New Procedure No. 3201-TP WIP document)
Reviewed test record for SN 0221, Test Date 3/5/11
- ✓ Wiring Harness (Vendor Test/COC): See comments section.
- ✓ Science Bay Motherboard: SN JJ00111
 - ✓ Science Bay Mother Board Test: This test procedure is not currently documented nor is a test record maintained.
Comment: This is a simple power up test.
- ✓ Flash Card: SN 24768
- ✓ Persistor Programed: SN 53348
 - ✓ Persistor Test: This test procedure is not currently documented nor is a test record maintained.
Comment: This is a simple power up test.
 - ✓ Persistor Configure: Procedure 3480-CF
 - ✓ Persistor: SN 53348
- ✓ Sensors (Vendor COC): Seabird SN 042 Reviewed COC dated 10/24/11 for SN 042
- ✓ Sensors (Vendor COC): Wet Labs SN 456 Reviewed Calibraton Record dated 1/6/11 for SN 456

6. Aft Tray, Electric Assembly

Aft Tray, Electric Assembly : SN 239 Drawing 3029

- ✓ Air Pump Assembly: SN 1057 Assembly Procedure 2931 Drawing 2913
 - ✓ Air Pump Assembly Test: Procedure 2931-TP (WIP document)
Reviewed test data log 2931-TD, Test Date 1/31/11
 - ✓ Solenoid Wiring Assembly: Drawing BOM item only, no SN assigned
 - ✓ Air Pump Wiring Assembly: Drawing BOM item only, no SN assigned
 - ✓ Preasure Switch Wiring Assembly: Drawing BOM item only, no SN assigned
- ✓ Glider Main Control Board: SN JJ00169
 - ✓ Glider Main Control Board Test: Procedure 2792-TP (WIP document) Test Data 2792-TD (WIP document)
- ✓ Compass Module: (E408) SN 54163
- ✓ Cable, TNT Attitude Sensor (Vendor Test/COC): See comments section.
- ✓ Cable, Iridium (Vendor Test/COC): See comments section.
- ✓ Cable, COMM Power (Vendor Test/COC): See comments section.
- ✓ Cable, COAX (Vendor Test/COC): See comments section.
- ✓ LNA Board Assembly: Assembly Procedure 3187-AP Drawing 3187 (missed this items SN)
- ✓ Configured Iridium Phone: SN 300025010805200 Note: Teledyne SNs are now being assigned to configured phones.
 - ✓ Iridium Phone Configuration/Test: Procedure 3481-CF Data Log 3481-PD (no configuration test data record, pre log for this SN)
 - ✓ Iridium Phone: SN 300025010805200
- ✓ Tie Rod Assembly: Drawing BOM item only, no SN assigned

- ✓ Flashcard: SN 24780
- ✓ Programmed Persistor: SN 53435
Note: Teledyne SNs are now being assigned to configured Persistors.
 - ✓ Test Persistor Currently test procedure is not documented or is record of this test logged (simple power up test).
 - ✓ Configure Persistor: Procedure 3480-CF
 - ✓ Persistor: SN 53435
- ✓ Communications Board Assembly: SN 0238 Assembly Procedure 3025-AP Drawing 3025
 - ✓ Communication Board Assembly Test: Procedure 3025-TP (WIP document) 3025-TD (WIP document)
No test report/record available
 - ✓ Communications Board: SN JJ00126
 - ✓ Communications Board Test: Procedure XXXX-TP (WIP document) XXXX-TD (WIP document)
No test report/record available
- ✓ XCAT ARGOS Transmitter: SN 0133029
 - ✓ Configure XCAT ARGOS Transmitter: Procedure 3483-CF Drawing 3483
 - ✓ XCAT ARGOS Transmitter: SN 0133029
- ✓ Configured Radio 900mhz Freewave: SN 879-3669 Drawing 3484
 - ✓ Configure Radio 900mhz Freewave: Procedure 3484-CF
 - ✓ Radio 900mhz Freewave: SN 879-3669
- ✓ Configured GPS Receiver: SN 1QH007223 Drawing 3482
 - ✓ Configure GPS Receiver: Procedure 3282-CF
 - ✓ GPS Receiver: SN 1QH007223

7. Aft End Cap Assembly

Aft End Cap Assembly: SN 109 Assembly Procedure 3154-AP (WIP document) Drawing 3154

- ✓ Aft End Cap Assembly Pressure Test: Procedure 3154-TP
Reviewed test data, Test Date 3/10/11
- ✓ Anode Assembly: Drawing BOM item only, no SN assigned
- ✓ Leak Detect Board Assembly: Assembly Procedure 2580-AP Drawing 2580 Drawing BOM item only, no SN assigned
- ✓ Burn Wire/Ejection Weight Assembly: Drawing BOM item only, no SN assigned
- ✓ Pressure Transducer Assembly: Assembly Procedure 3002-AP, SN 83587
 - ✓ Pressure Transducer (Vendor Test/COC): Reviewed vendor COC dated 10/9/10 for SN 83587
- ✓ Air Bladder Assembly: SN (n/a pre assigning) Assembly Procedure 3100-AP Drawing 3100
 - ✓ Air Bladder Assembly Test: Procedure 3100-TP Test Log 3100-TD (No test record available, pre log)
 - ✓ Air Bladder (Vendor Test/COC): See comments section.
 - ✓ Air Bladder Test: Procedure 3114-TP Test Data Log 3114-TD (No test record available, pre log)
- ✓ DIGFIN Antenna Ruder Assembly: SN 906 Assembly Procedure 3265-AP (WIP document) Drawing 3265
 - ✓ DIGFIN Antenna Ruder Assembly Cycle Test: Procedure (WIP Document)
 - ✓ DIGFIN Antenna Ruder Assembly Antenna Test: Procedure (WIP Document)
 - ✓ DIGFIN Antenna Ruder Assembly, 1800 PSI Pressure Test: Procedure 3265-PT1800 (WIP document)

- ✓ DIGFIN Antenna Ruder Assembly Oil Fill: Process step only
 - ✓ DIGFIN Antenna Ruder Assembly, 10 PSI Pressure Test: Procedure 3265-PT10
 - ✓ Cable Assembly, DIGIFIN:
 - ✓ Cable Assembly, DIGIFIN Test: Assemble & Test Procedure 2974-AP Drawing 2974
 - ✓ Sero Saver Assembly: Drawing BOM item only, no SN assigned
 - ✓ Stepper Motor Assembly: SN 159 Assembly Procedure 2553-AP Drawing 2553
 - ✓ Oil Degas & Fill: Procedure 2553-IF
 - ✓ Configuration & Test, Tail Fin Motor Control: Configure & Test Procedure 2480-CF
 - ✓ Fin Assembly: Drawing 3264
 - ✓ Delam Test: Procedure 3264-DLT
Reviewed test record on 3265-HS for SN 159, Test Date 12/18/10
 - ✓ Potted Fin Antenna Assembly Test: Procedure 3264-AT (WIP document)
Reviewed test record on 3265-HS for SN 159, Test Date 12/15/10
 - ✓ Unpotted Fin Antenna Assembly Test: Procedure 3263-AT (WIP document)
Reviewed test record on 3265-HS for SN 159, Test Date 11/18/10
 - ✓ Antenna Board Assembly: Drawing BOM item only, no SN assigned

8. Battery Kit Assembly

Battery Kit Assembly: SN 1100008

- ✓ Degauss Emergency Lithium Battery: Procedure 4103-LID
 - ✓ Degaussed Emergency Lithium Battery Test (sample testing): Procedure 4103-LID Reviewed Data Log, Test Date 2/9/11
 - ✓ Emergency Lithium Battery (Vendor Test/COC): See comments section.
- ✓ Degauss Pitch Lithium Battery: Procedure 4103-LID
 - ✓ Degaussed Pitch Lithium Battery Test (sample testing): Procedure 4103-LID Reviewed Data Log, Test Date 2/9/11
 - ✓ Pitch Lithium Battery (Vendor Test/COC): See comments section.
- ✓ Degauss Aft Lithium Battery: Procedure 4103-LID
 - ✓ Degaussed Aft Lithium Battery Test (sample testing): Procedure 4103-LID Reviewed Data Log, Test Date 2/9/11
 - ✓ Aft Lithium Battery (Vendor Test/COC): See comments section.

9. Nose Recovery System Assembly

Nose Recovery System Assembly: Drawing 3149 Drawing BOM item only, no SN assigned

- ✓ Nose Recovery Spool Assembly (w/line loaded): Assembly Procedure 3261-AP Drawing 3261
Drawing BOM item only, no SN assigned
- ✓ Burn Wire Release Block Assembly: Assemble Procedure 3410-AP
Drawing BOM item only, no SN assigned
- ✓ Burn Wire Release Collar Assembly: Drawing BOM item only, no SN assigned
- ✓ Burn Wire Cable Assembly: Assembly Procedure 3241-AP
Drawing BOM item only, no SN assigned



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10. Hull, Fore/Aft Composit Assembly

Hull, Fore/Aft Composit Assembly: Front SN 0014, Aft SN 0015

- ✓ Hull, Fore/Aft Composit Assembly Test: 3135-TP Test Data 3136-IF Reviewed 3136-IF test record for SNs, Test Date 2/24/11

11. Strobe Assembly

Strobe Assembly: SN 0927 3150-AP Drawing 3150

- ✓ Strobe Assembly Test: Procedure 3150-AP Record 3150-SNL (Test record not documented, tested prior to start of test log)

Audit Notes

COTs Items: COCs when required are specified on the Purchase Specification.

Documentation: Teledyne Webb Research is in the process of implementing a new documentation numbering system, updating procedures, and documenting some low level processes that were not documented.

Artifacts: Some artifacts were not available for the Slocum Glider serial number selected for this audit because it was assembled before some of the new test documentation requirements had been implemented.