

 Unit 10 Caddsdawn Industrial Park Clovelly Road Bideford Devon EX39 3DX Telephone: +44(0)1237 421255 Facsimile: +44(0) 1237 423541 Email: info@parcsw.co.uk Web site: www.parcsw.co.uk	TEST REPORT	Customer Confidential
---	----------------------	------------------------------

ENVIRONMENTAL TEST REPORT NO. 4857-1

**MARINE RESCUE TECHNOLOGIES LTD
MARSHALL HOUSE
ZARYA COURT
GROVEHILL ROAD
BEVERLEY
YORKSHIRE
HU17 0JG**

DATE : 18 OCTOBER 2013



2379

*This report shall not be reproduced, except in full, without the written approval
of the testing laboratory*

Product Assessment and Reliability Centre Ltd. performs all of its product testing under a rigorous laboratory management system. We are accredited by UKAS to BS EN ISO/IEC 17025:2005, the "General requirements for the competence of testing and calibration laboratories". Details of our UKAS accredited tests and a copy of our UKAS Schedule of Accreditation are available upon request. Tests marked "non-UKAS" are currently not covered by our UKAS 17025:2005 accreditation. All testing, whether UKAS or non-UKAS, is performed within the same laboratory management system and to the same levels of calibration and traceability.

The results contained in this report relate only to the samples submitted.

TEST REPORT

Customer Confidential

Report Number: 4857-1

Issue Number: 1

Date of Issue: 18/10/13

Reason for Re-issue: N/A

Page 1 of 16



2379

Date Samples Arrived

09/08/13

Date Testing Started

19/08/13

Date Testing Completed

23/09/13

Customer Purchase Order No:

32807

Requested by:

Geoff Smith
Marine Rescue Technologies Ltd
Marshall House
Zarya Court
Grovehill Road
Beverley
East Riding
HU17 0JG

Description of equipment under test:

3 off personal locator beacons, Model No AU10

Serial/Identity numbers:

Serial No M16130048/MMSI No 972418545, Serial No M16130049/MMSI No 972418546,
Serial No M16130107/MMSI No 972418604

Test Performed:

Process	Altitude	UKAS	In accordance with (Test Specification or Standard/Customer supplied test programme)
Process 1	Altitude	UKAS	EUROCAE ED-14G Section 4, Category B2. Condition @ 25000ft & ambient temperature for 2 hours.
Process 2	Temperature variation	UKAS	EUROCAE ED-14G Section 5, Category B. 2 cycles of the profile with temperature extremes of +70°C & -45°C.
Process 3	Operational vibration	UKAS	EUROCAE ED-14G Section 8, Category U. Resonance search, 10 minutes of performance levels, 2 hours of endurance, 10 minutes of performance, resonance search. Repeat sequence 3 times in each of the 3 axes.
Process 4	Operational shock & crash safety (Impulse)	UKAS	EUROCAE ED-14G Section 7, Category B. 6g 11 msec TPS, 3 shocks in each sense of each axis followed by 20g 11msec TPS, 1 shock in each sense of each axis.
Process 5	Icing	UKAS	EUROCAE ED-14G Section 24, Category A. 3 cycles of the following - Stabilise samples @ -55°C, transfer to chamber @ +30°C & 95%RH, leave until sample reaches +5°C then transfer back to chamber @ -55°C.
Process 6	Crash safety (Sustained)	UKAS	EUROCAE ED-14G Section 7, sub contracted. Sustained acceleration using a centrifuge to achieve 20g in all directions.
Process 7	Functional Test	Non UKAS	As per test schedule MRT AU9-AIS JARS OP3.110 (CAA AC200908)

Report Summary:

The samples were subjected to the test regime outlined in this report.

During the test processes a sample was monitored for false triggering using an AM radio and no instances of false triggering were noted during any of the test processes.

The samples operated correctly during all of the functional tests conducted during all test processes with the exception of the random vibration test.

Upon completion of the post performance test 2 serial No M16130048 failed to operate correctly, the sample was returned to the customer and was replaced with serial no M16130107 for the remainder of testing.

Disposal of Sample

Returned to customer via courier on 24/09/13

Distribution:

1. G.Smith
2. PARC Ltd File

Test Engineer

Name: N.Edwards

Signature:

Approved by:

Name: R.Tabor

Signature:

Job Title: Sales Manager

1. Sample Content

Description	Serial Numbers
3 off personal locator beacons, Model No AU10	Serial No M16130048, MMSI No 972418545
	Serial No M16130049, MMSI No 972418546
	Serial No M16130107, MMSI No 972418604

2. Test Equipment Used

Test Equipment	PARC Ltd ID number	Calibration Due Date
Altitude chamber	385	23/11/13
ARS1100 climatic chamber	687	23/05/14
Pico logger	651	09/01/14
Thermocouple	629	11/10/14
Shaker system & amplifier	178 & 179	Monitored by calibrated equipment
Charge amplifier	54 & 55	29/11/13
Dactron controller	279	25/01/14
Accelerometer	240	05/02/14
Accelerometer	669	25/03/14
Accelerometer	559	22/10/13
ARS1100 climatic chamber	580	23/04/14
Pico logger	650	10/01/14
Thermocouple	605	10/09/13
Thermocouple	627	11/10/13
Thermocouple	706	02/08/14

3. Initial Inspection (Non UKAS)

The samples were subjected to an initial visual inspection (non UKAS) and no obvious signs of damage were noted. A pre test functional check was also conducted as per test schedule MRT AU9-AIS JARS OP3.110 (CAA AC200908) and customer's instructions. This consisted of arming and then activating the beacons, a check was made to ensure that they emitted audible SOS tones and that a down swept tone was transmitted on 121.65MHz.

4. Test Procedure**4.1 Process 1**

Altitude test in accordance with EUROCAE ED-14G Section 4, Category B2 & previous project WIP 2734. Samples numbered Serial No M16130048 & Serial No M16130049 were loaded into the chamber as shown in the photograph in paragraph 4.1.1 and were then subjected to the conditions detailed below

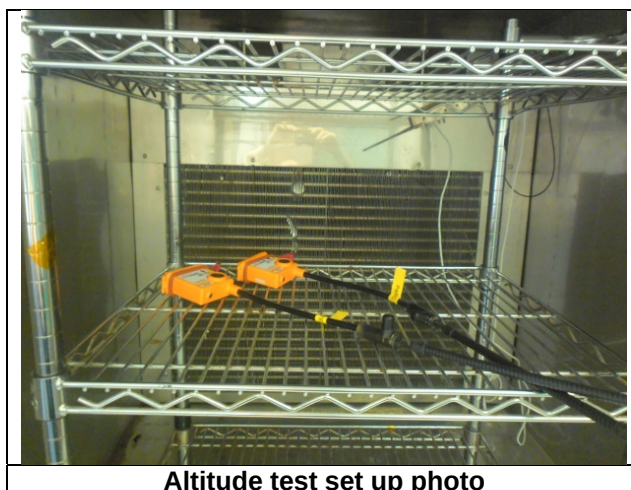
Altitude 25000ft (376 mbar)

Temperature +25°C

Duration 2 hours

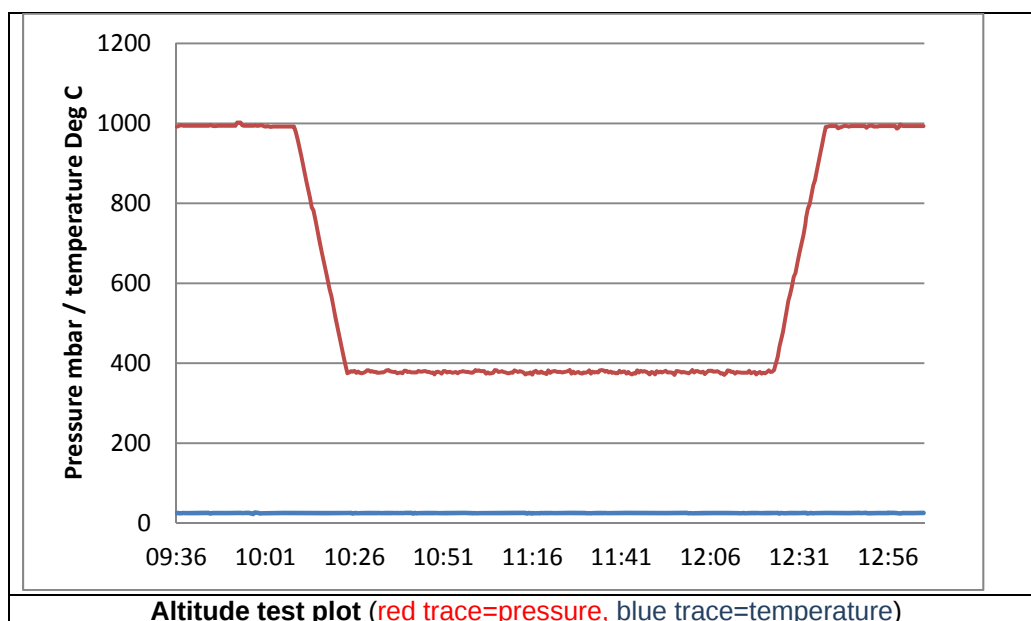
Sample state Serial No M16130048 was armed but not transmitting & Serial No M16130049 was unarmed

4.1.1 Test Photos



Altitude test set up photo

4.1.2 Test Results/plots



Altitude test plot (red trace=pressure, blue trace=temperature)

Note – A correction error of -7 mbar needs to be applied to the above plot to ascertain a more accurate reading.

4.1.3 Function Test (Non UKAS)

An AM radio tuned to 121.65MHz was used to monitor the sample for false triggering; no instances of false triggering were noted.

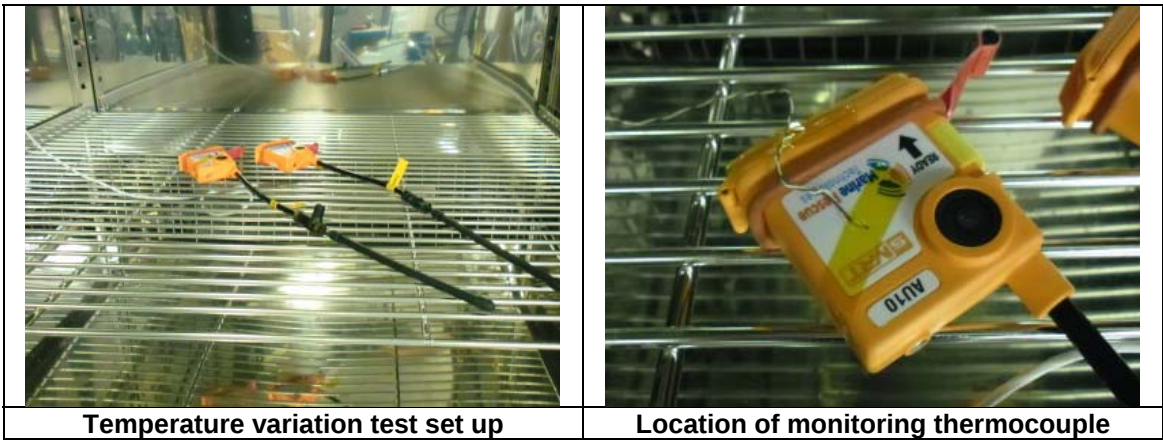
Upon completion of test a functional check was carried out on both samples as per initial the initial inspection. Both samples operated correctly during these tests.

4.2 Process 2

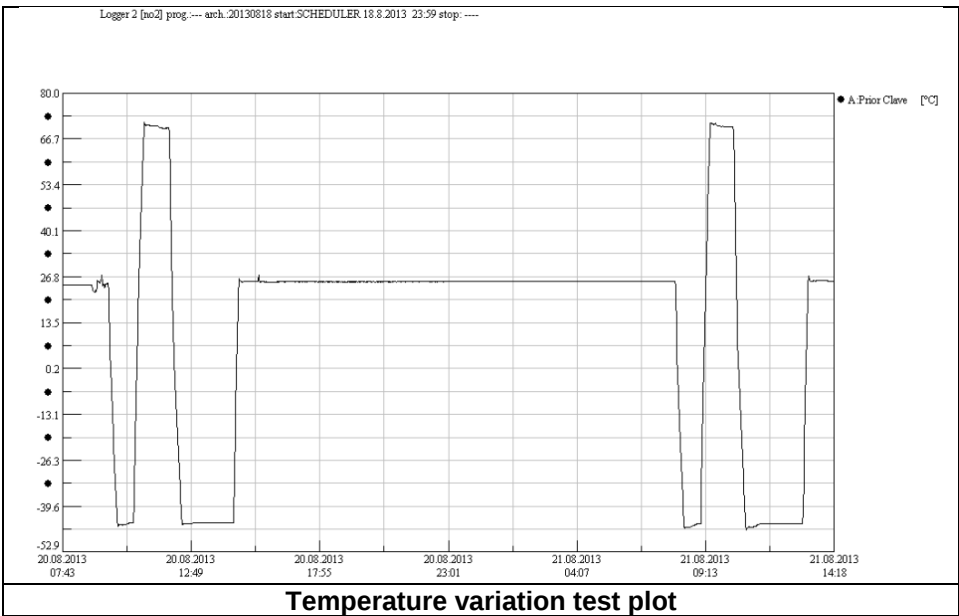
Temperature variation in accordance with EUROCAE ED-14G Section 5, Category B & previous project WIP 2734. Samples numbered Serial No M16130048 & Serial No M16130049 were loaded into the chamber as shown in the photograph in paragraph 4.2.1 and a thermocouple was attached to monitor stabilisation times. The samples were then subjected to 2 cycles of the conditions detailed overleaf

Chamber conditions	Serial No M16130048	Serial No M16130049
Ramp chamber from +20°C to -45°C	Sample armed	Unarmed
Stabilise sample @ -45°C	Sample armed	
Ramp to +70°C	Sample function tested	
Stabilise sample @ +70°C	Sample armed	
Dwell @ +70°C for 2 minutes	Sample switched off	
Ramp chamber to -45°C	Sample function tested	
Stabilise sample @ -45°C	Sample armed	
Dwell @ -45°C for 1 hour	Sample armed	
Dwell @ -45°C for 30 minutes	Sample switched off	
Ramp chamber to +20°C	Sample switched on	
Stabilise sample @ +20°C	Sample function tested	

4.2.1 Test Photos



4.2.2 Test Results/plots



Note – No correction error needs to be applied to the above plot to ascertain a more accurate reading.

4.2.3 Function Test (Non UKAS)

An AM radio tuned to 121.65MHz was used to monitor the sample for false triggering; no instances of false triggering were noted.

Upon completion of test a functional check was carried out on both samples as per initial the initial inspection. Both samples operated correctly during these tests.

4.3 Process 3

Operational vibration in accordance with EUROCAE ED-14G Section 8, Category U & previous project WIP 2734. Samples numbered Serial No M16130048, M16130049 & M16130107 were loaded onto the shaker system as shown in the photograph in paragraph 4.3.1 and were then subjected to the sequence detailed below in each of the 3 axes

Sample Nos M16130048 & M16130107 were armed during the test processes and M16130049 was unarmed.

1. Resonance search
2. Pre performance 1 (10 minutes duration)
3. Endurance 1 (2 hours duration)
4. Post performance 1 (10 minutes duration)
5. Resonance search
6. Pre performance 2 (10 minutes duration)
7. Endurance 2 (2 hours duration)
8. Post performance 2 (10 minutes duration)
9. Resonance search
10. Pre performance 3 (10 minutes duration)
11. Endurance 3 (2 hours duration)
12. Post performance 3 (10 minutes duration)
13. Resonance search

Note – Due to a sample mal-function serial No M16130048 was replaced with serial No M16130107 before conducting the post test 2/pre test 3 resonance search.

Resonance search test details	
Frequency (Hz)	Acceleration (g)
10	0.5
2000	0.5
Sweep rate 1 oct/min	

Performance 1					
Frequency (Hz)	Acceleration (g ² /Hz)	Sine tone 1	Sine tone 2	Sine tone 3	Sine tone 4
10	0.01	11Hz @ 0.44g _{peak}	19.9Hz @ 0.79g _{peak}	35.5Hz @ 1.42g _{peak}	63.9Hz @ 1.6g _{peak}
300	0.01				
2000	-3.66dB/oct				

Endurance 1					
Frequency (Hz)	Acceleration (g ² /Hz)	Sine tone 1	Sine tone 2	Sine tone 3	Sine tone 4
10	0.02	11Hz @ 0.7g _{peak}	19.9Hz @ 2.48g _{peak}	35.5Hz @ 2.5g _{peak}	63.9Hz @ 2.5g _{peak}
300	0.02				
2000	-3.66dB/oct				

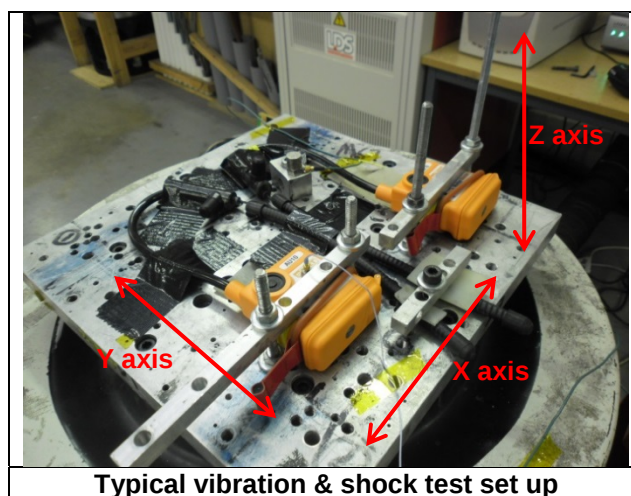
Performance 2					
Frequency (Hz)	Acceleration (g ² /Hz)	Sine tone 1	Sine tone 2	Sine tone 3	Sine tone 4
10	0.01	13.4Hz @ 0.536g _{peak}	24Hz @ 0.96g _{peak}	43.4Hz @ 1.6g _{peak}	77.8Hz @ 1.6g _{peak}
300	0.01				
2000	-3.66dB/oct				

Endurance 2					
Frequency (Hz)	Acceleration (g ² /Hz)	Sine tone 1	Sine tone 2	Sine tone 3	Sine tone 4
10	0.02	13.4Hz @ 1.18g _{peak}	24Hz @ 2.5g _{peak}	43.4Hz @ 2.5g _{peak}	77.8Hz @ 2.5g _{peak}
300	0.02				
2000	-3.66dB/oct				

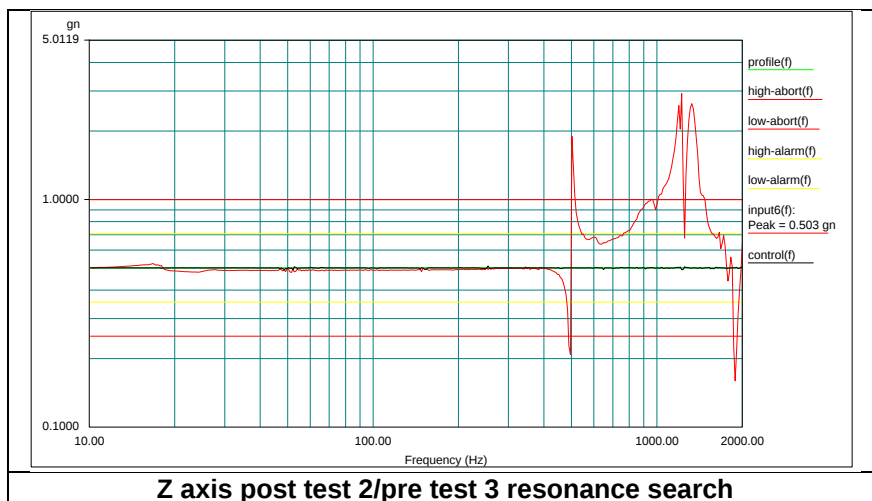
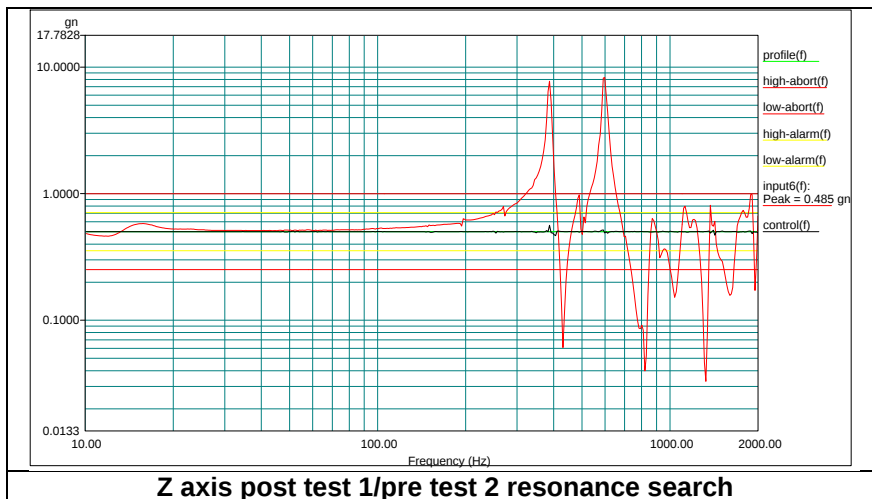
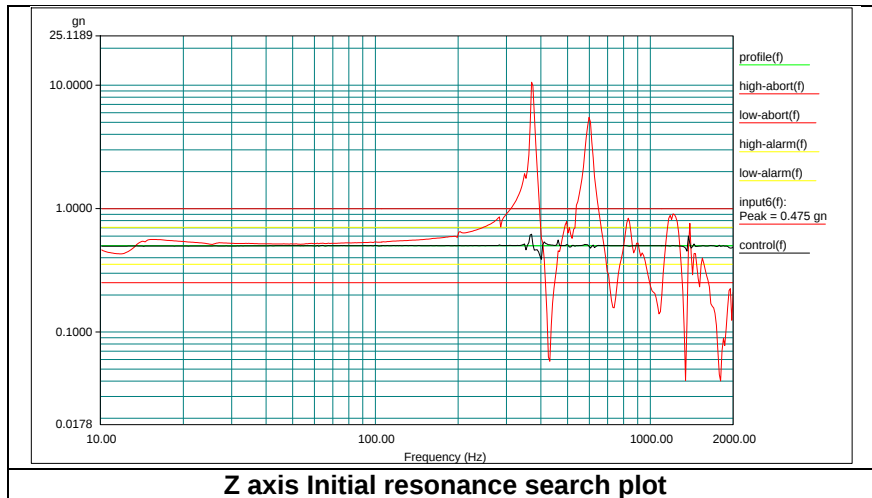
Performance 3					
Frequency (Hz)	Acceleration (g ² /Hz)	Sine tone 1	Sine tone 2	Sine tone 3	Sine tone 4
10	0.01	16.3Hz @ 0.652g _{peak}	29.9Hz @ 1.168g _{peak}	52.5Hz @ 1.6g _{peak}	94.9Hz @ 1.6g _{peak}
300	0.01				
2000	-3.66dB/oct				

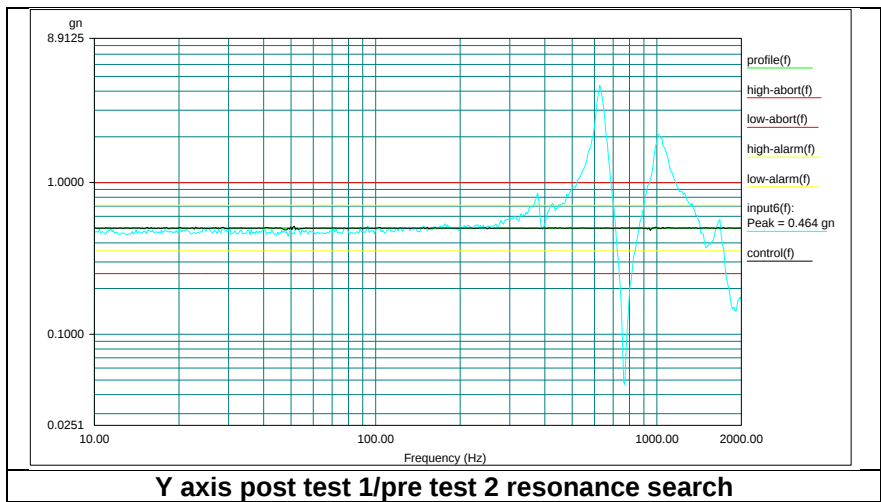
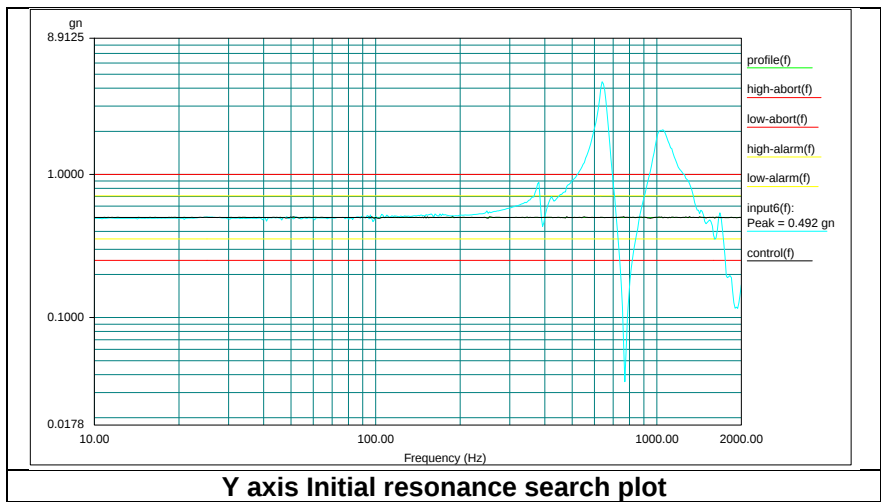
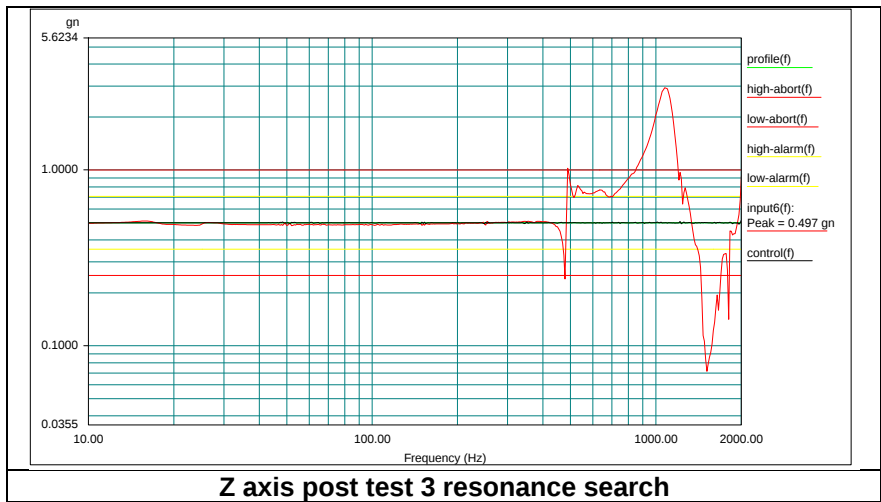
Endurance 3					
Frequency (Hz)	Acceleration (g ² /Hz)	Sine tone 1	Sine tone 2	Sine tone 3	Sine tone 4
10	0.02	16.3Hz @ 1.76g _{peak}	29.9Hz @ 2.5g _{peak}	52.5Hz @ 2.5g _{peak}	94.9Hz @ 2.5g _{peak}
300	0.02				
2000	-3.66dB/oct				

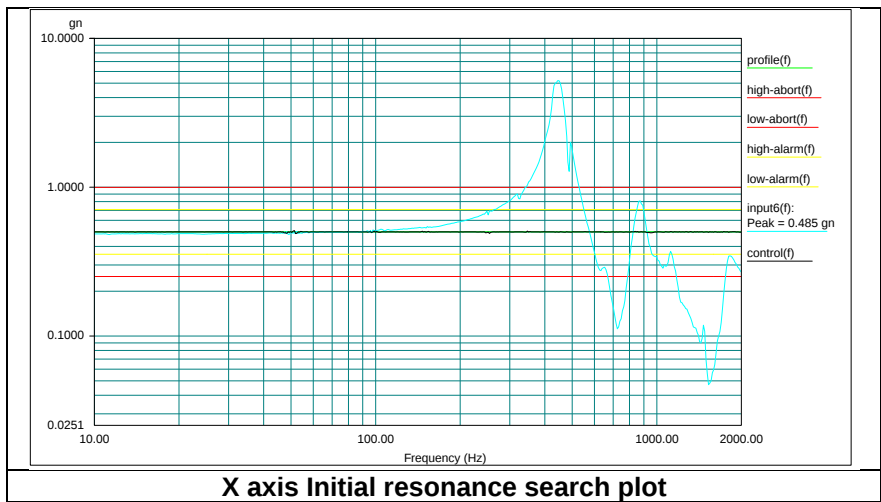
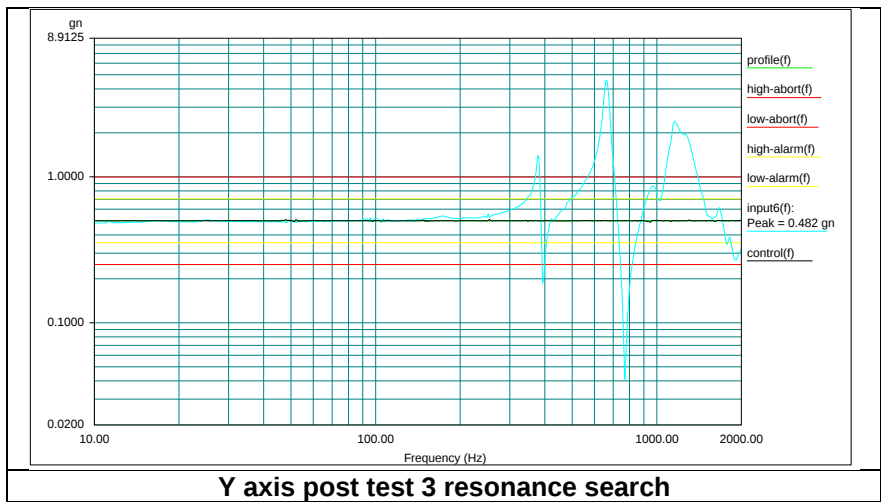
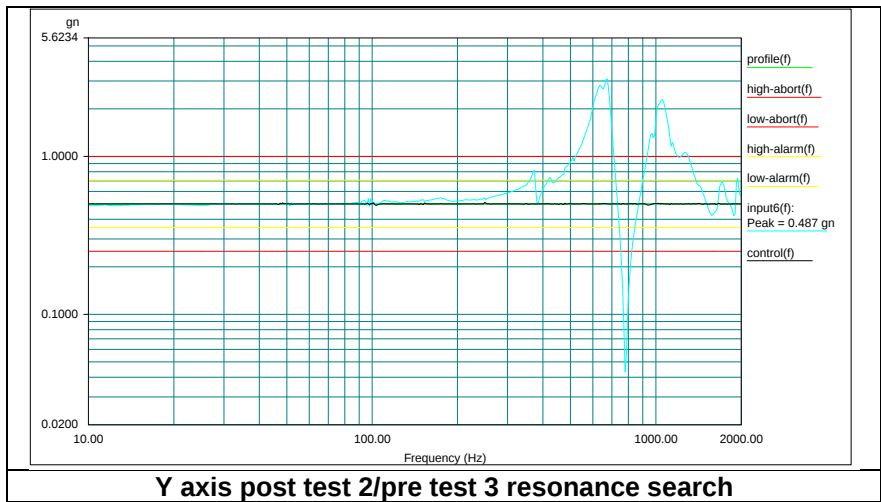
4.3.1 Test Photos

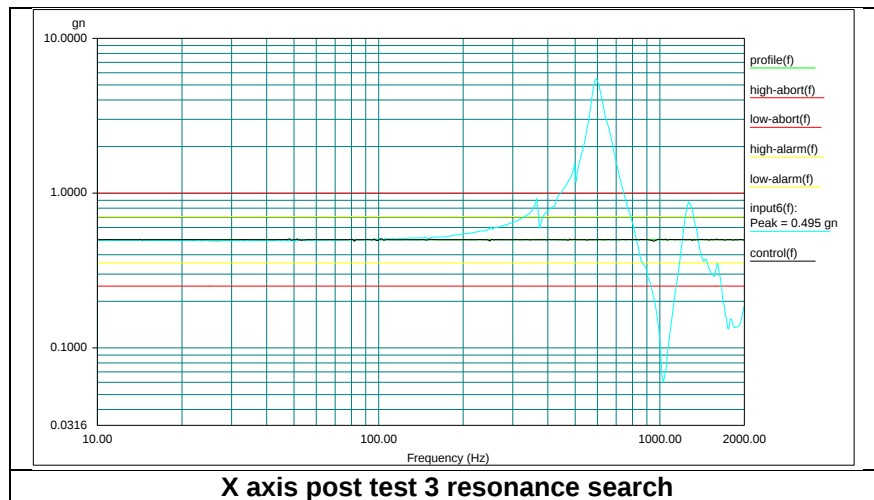
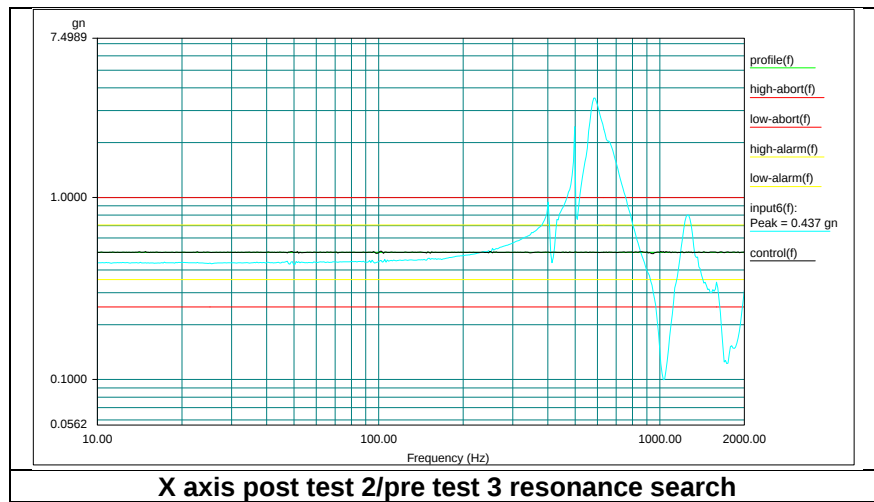
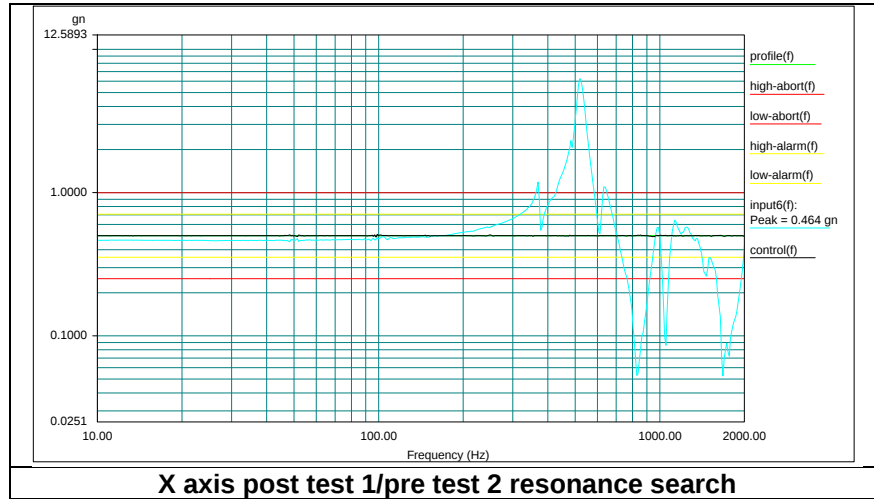


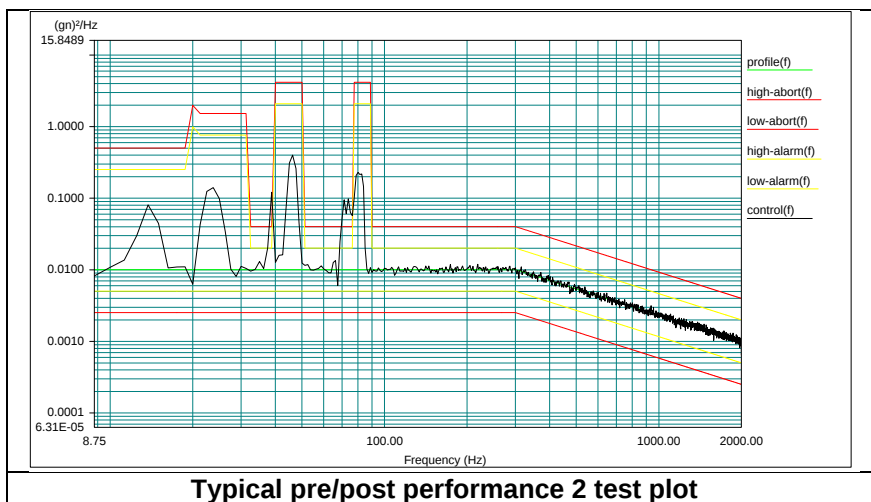
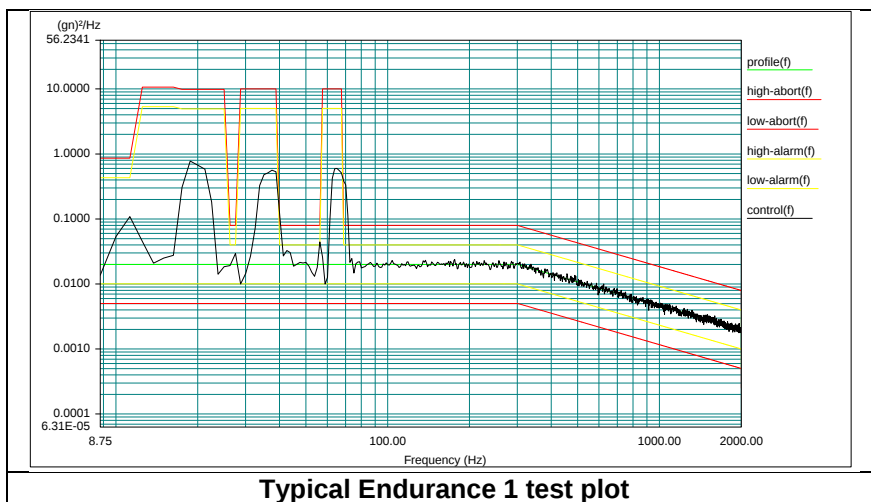
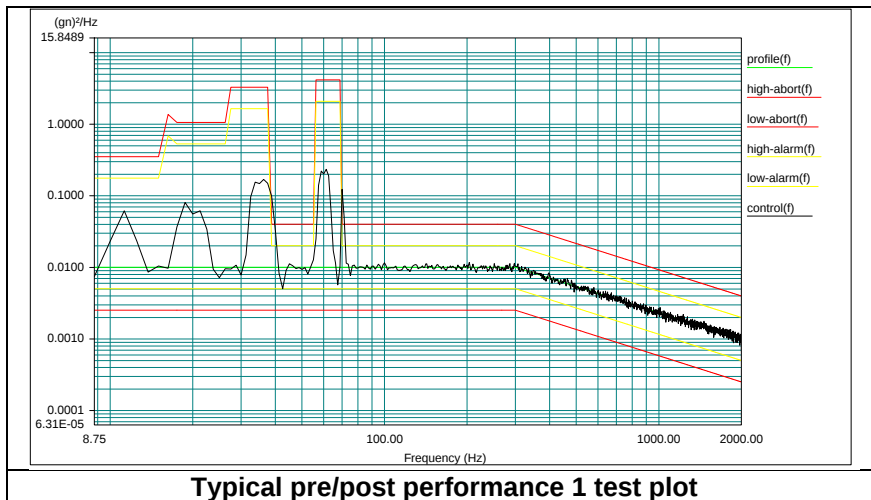
4.3.2 Test Results/plots

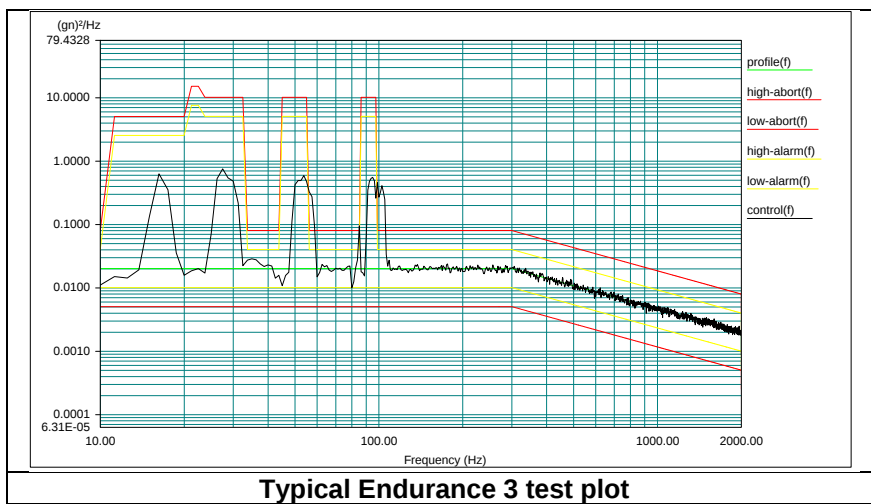
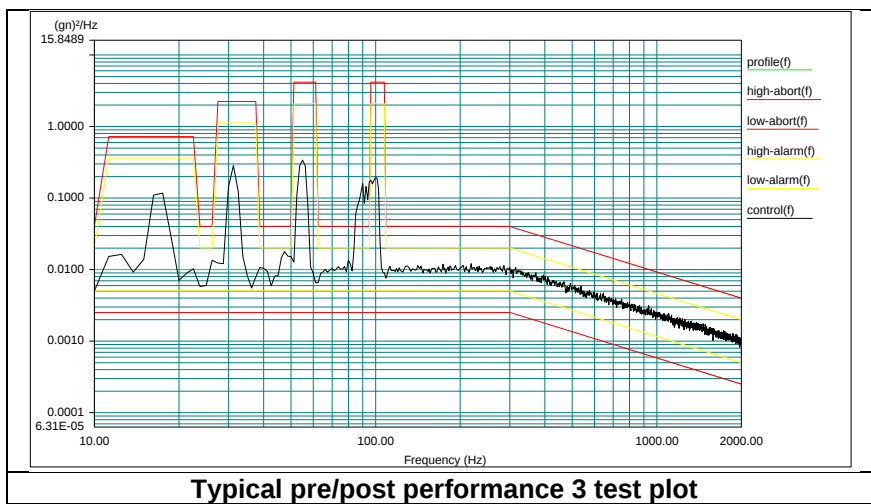
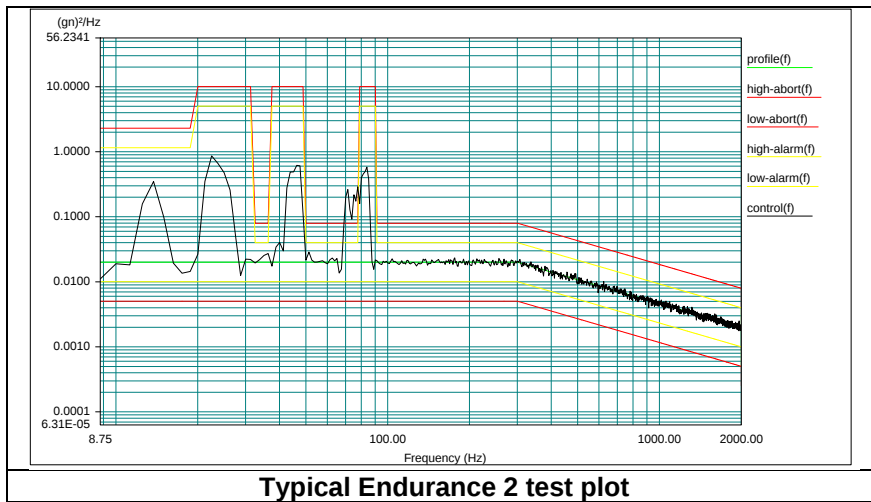












4.3.3 Function Test (Non UKAS)

An AM radio tuned to 121.65MHz was used to monitor the sample for false triggering; no instances of false triggering were noted.

Upon completion of the post performance test 2 serial No M16130048 failed to operate correctly, no SOS tones were emitted and the down swept tone transmitted on 121.65MHz could not be heard, instead a random series of tones were heard.

Serial No M16130048 was returned to the customer for investigation and was replaced with serial No M16130107.

During the Z axis of test it was noted that the shaker system was affecting the operation of the samples, the shaker system had to be completely powered off to enable the functional tests to be conducted.

No other problems were noted during any of the functional tests.

4.4 Process 4

Operational shock & crash safety (Impulse) in accordance with EUROCAE ED-14G Section 7, Category B & previous project WIP 2734. Samples numbered Serial No M16130049 & M16130107 were loaded onto the shaker system as shown in the photograph in paragraph 4.3.1 and were then subjected to the sequence detailed below in each of the 3 axes

Acceleration - $6g_{\text{peak}}$

Duration - 11 msec

Pulse shape - Terminal peak sawtooth

Number of pulses - 3 in each sense of each axis

Sample state - Serial No M16130107 was armed but not transmitting & Serial No M16130049 was unarmed

Followed by

Acceleration - $20g_{\text{peak}}$

Duration - 11 msec

Pulse shape - Terminal peak sawtooth

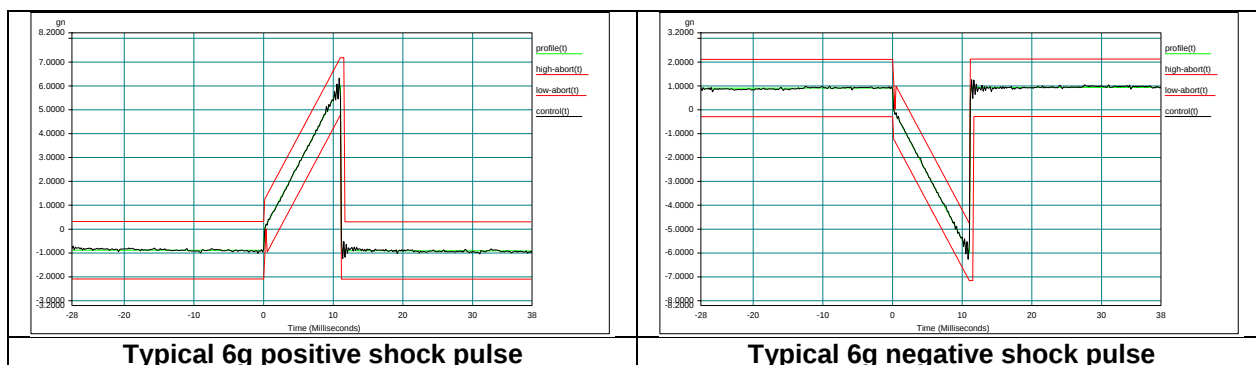
Number of pulses - 1 in each sense of each axis

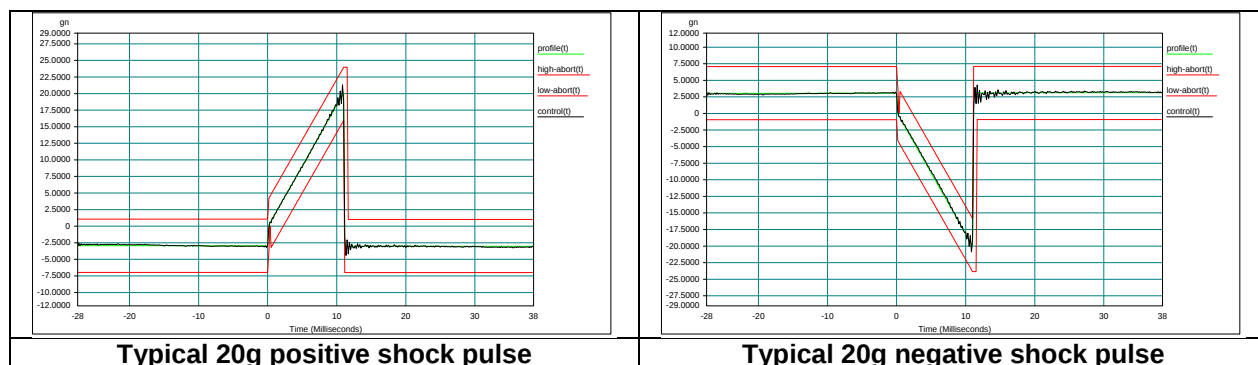
Sample state - Serial No M16130107 was armed but not transmitting & Serial No M16130049 was unarmed

4.4.1 Test Photos

See paragraph 4.3.1 for information

4.4.2 Test Results/plots





4.4.3 Function Test (Non UKAS)

An AM radio tuned to 121.65MHz was used to monitor the sample for false triggering; no instances of false triggering were noted.

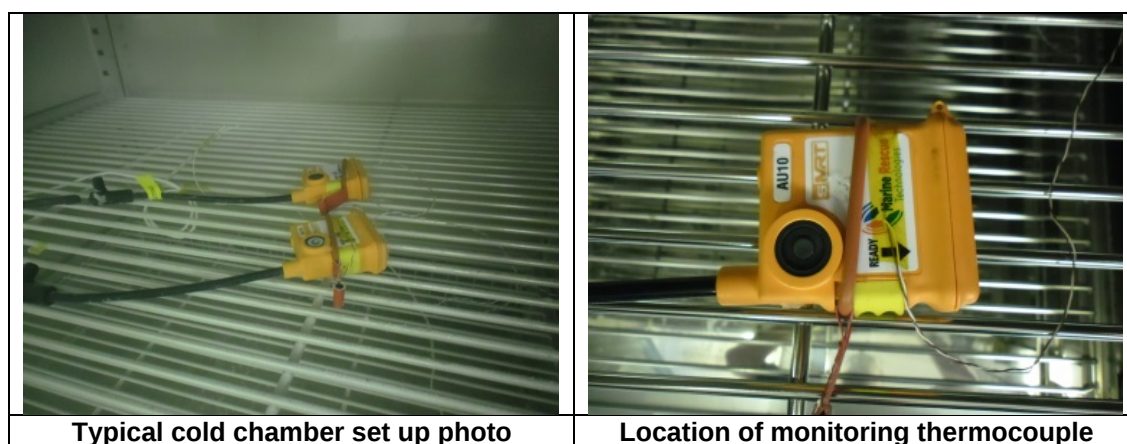
Upon completion of test a functional check was carried out on both samples as per initial the initial inspection. Both samples operated correctly during these tests.

4.5 Process 5

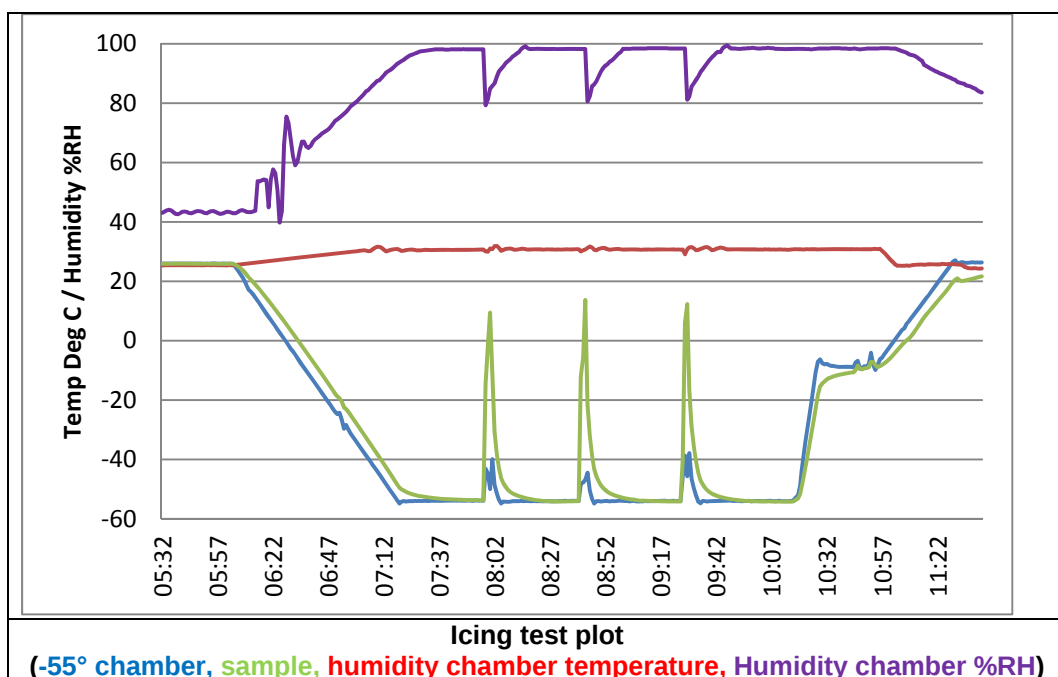
Icing in accordance with EUROCAE ED-14G Section 24, Category A & previous project WIP 2734. Samples numbered Serial No M16130107 & Serial No M16130049 were loaded into the cold chamber as shown in the photograph in paragraph 4.5.1 and a thermocouple was attached to monitor stabilisation times. The samples were then subjected to the conditions detailed below

1. Stabilise samples @ -55°C
2. Transfer to a chamber set to +30°C & 95%RH and leave until sample surface temperature reaches +5°C
3. Transfer back to chamber set to -55°C
4. Repeat steps 1 – 3 for a further 2 cycles
5. On completion of the third cycle raise the chamber temperature to -10°C and leave sample to stabilise.
6. Once stabilised conduct a functional check
7. Ramp chamber back to ambient temperature.

4.5.1 Test Photos



4.5.2 Test Results/Plots



4.5.3 Function Test (Non UKAS)

An AM radio tuned to 121.65MHz was used to monitor the sample for false triggering; no instances of false triggering were noted.
Once stabilised @ -10°C and also upon completion of test a functional check was carried out on both samples as per initial the initial inspection. Both samples operated correctly during these tests.

4.6 Process 6

Crash safety (Sustained) in accordance with EUROCAE ED-14G Section 7, sub contracted.
Sustained acceleration using a centrifuge to achieve 20g in all directions.
See appendix 1 for report.

5. Report Summary

The samples were subjected to the test regime outlined in this report.

During the test processes a sample was monitored for false triggering using an AM radio and no instances of false triggering were noted during any of the test processes.

The samples operated correctly during all of the functional tests conducted during all test processes with the exception of the random vibration test.

Upon completion of the post performance test 2 serial No M16130048 failed to operate correctly, no SOS tones were emitted and the down swept tone transmitted on 121.65MHz could not be heard, instead a random series of tones were heard. The sample was returned to the customer for evaluation and was replaced with serial No M16130107 for the remainder of testing.

END OF REPORT

6. Appendices

Process 6 – Crash Safety (Sustained) sub contract report

**BAE Systems (Operations) Limited
The Faraday Test Centre**

Marconi Way
Rochester
Kent ME1 2XX
Telephone: 01634 203541
Facsimile: 01634 203647



0047

CERTIFICATE OF LABORATORY TEST**CUSTOMER**

Name: Product Assessment and Reliability Centre Ltd
Address: Units 10 to 13, Caddesdown Industrial Park, Clovelly Road, Bideford, Devon, EX39 3DX.

ITEM(S) TESTED

Title(s): Man Overboard Transmitter – 2 off
Type Number(s): 1) MOA-50000 2) MOA-50001
Serial Number(s): 1) M16130049 2) M16130107
Date(s) Received: 12 September 2013

TEST(s) PERFORMED Crash Safety Test Procedure 2 (Sustained)

ACCREDITED SPECIFICATION

Title: Environmental Conditions and Test Procedures for Airborne Equipment
Reference No: EUROCAE ED-14F
Issue: - **A/L:** - **Dated:** March 2008
Para. Number(s): Section 7, Paragraph 7.3.3 (See Remarks Section on Page 2)

DATE STARTED: 13 September 2013 **DATE FINISHED:** 16 September 2013

TEST REPORT REF: - **CUSTOMER ORDER No:** P/13/1521

Certified that the calibration status of equipment used for testing was correct and traceable to National Standards.
This Certificate applies solely to the Item(s) specified above.

Signed:

Name: J. M. Carley
Job Title: Principal Qualification Engineer
Date: 16 September 2013

For and on behalf of BAE SYSTEMS (Operations) Limited

**BAE Systems (Operations) Limited
The Faraday Test Centre**

Marconi Way
Rochester
Kent ME1 2XX
Telephone: 01634 203541
Facsimile: 01634 203647



0047

CERTIFICATE OF LABORATORY TEST**REMARKS:**

The Units were subjected to an acceleration level of 20g for a duration of 3 seconds in each direction of their three mutually perpendicular axes. Mounting of the Units to the centrifuge was achieved via a beam clamp.

Unit S/No. M16130107 was armed and did not activate during the test.

A quick look external visual examination carried out on completion of the test at room ambient temperature revealed no obvious deterioration of the Units.

DECLARED OR OBSERVED DEVIATIONS OF TEST ITEM PRIOR TO TEST:

NONE

FUNCTIONAL TESTS OR EVALUATIONS PERFORMED BUT NOT UKAS ACCREDITED:

On completion of each direction, the Units were functionally checked satisfactorily in accordance with customers' instructions.

FUNCTIONAL TESTS OR EVALUATIONS NOT PERFORMED BY THE LABORATORY:

NONE

DEVIATIONS FROM SPECIFIED TEST CONDITIONS:

NONE

UNCERTAINTY OF MEASUREMENT:

(To be entered when uncertainty may influence the Pass/Fail decision)

NOT APPLICABLE