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**MARINE APPROVAL and TESTING  
SERVICES**

Cody Technology Park  
Ively Road  
Farnborough  
Hampshire  
GU14 OLX

*Selected Test Results*

*of*

SIMRAD

SEARCH & RESCUE TRANSPONDER

QinetiQ/S&E/SPS/EMC/R/2004/199-A

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Commissioned by

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| Report Originator | R Sharp     | <i>R Sharp</i>   | 6/12/04     |

Issued by

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REPORT ON THE SELECTED TESTING  
OF  
SIMRAD

SEARCH & RESCUE TRANSPONDER

**1. Introduction**

- 1.1 The customer requested Marine Approval & Testing Services (MATS) part of the EMC Group QinetiQ Farnborough, conduct validation testing on a Search & Rescue Transponder. The selected tests on the Simrad SART were conducted in accordance with specification BS EN 61097 Operational & Performance Requirements for Search & Rescue Transponder. Testing was conducted at QinetiQ Farnborough and QinetiQ Fraser Range. Note that testing to BS EN 61097 is not accredited.

**2. Equipment under Test**

- 2.1 The following item was supplied:-

| Item No | Item                        | Type No | Serial No      |
|---------|-----------------------------|---------|----------------|
| 1       | Search & Rescue Transponder | SA50    | T.A.Unit # 001 |

**2.2 Duration of Testing**

- 2.2.1 The SART was tested during October – November 2004

**3. Build Standard of Test Sample**

- 3.1 The item supplied for test is a production item.

**4. Tests and Assessments**

- 4.1 To confirm SART function during testing a portable microwave source was used.
- 4.2 The Search & Rescue Transponder was tested to the following selected clauses of specification BS EN 61097.

| Clause | Test Description                     |
|--------|--------------------------------------|
| 6.2.7  | Immersion Test                       |
| 6.2.8  | Thermal Shock                        |
| 6.2.9  | Flotation                            |
| 6.7    | Range Performance                    |
| 6.9.4  | Sweep Characteristics ( PW & Sweeps) |
| 6.9.5  | Radiated Power                       |
| 6.9.9  | Front End Protection                 |

**5. Climatic Tests**

5.1 **Immersion Test (6.2.7) & Thermal Shock (6.2.8)** The two tests were combined

5.1.1 Thermal Shock (Hot)

The pressure vessel used for this test was filled with water which was at a temperature of 21°C.

5.1.2 The SART was placed in a climatic chamber and raised to a temperature of 66°C and maintained at that temperature for greater than 3hrs after which it was removed from the climatic chamber and placed in the pressure vessel which was raised to 1 bar and maintained at that pressure for 1 hour.

5.1.3 After this period the SART was removed inspected for leakage and malformation and a performance test conducted.

5.1.4 **RESULT:** - The SART functioned correctly and showed no sign of damage.

5.1.5 Thermal Shock (Cold)

The pressure vessel used for this test was filled with water which was at a temperature of 21°C.

5.1.6 The SART was placed in a climatic chamber and lowered to a temperature of minus 9°C and maintained at that temperature for greater than 3hrs after which it was removed from the climatic chamber and placed in the pressure vessel which was raised to 1 bar and maintained at that pressure for 1 hour.

5.1.7 After this period the SART was removed inspected for leakage and malformation and a performance test conducted.

5.1.8 **RESULT:** - The SART functioned correctly and showed no sign of damage.

5.1.9 The above tests confirm that the SART complies with clause 6.2.7 Immersion test.

**6 Flotation Test (6.2.9)**

6.1 The SART was placed in a vessel of water and observed for a period of 5 minutes.

6.2 After this period the SART was removed inspected for leakage and a performance test conducted.

6.3 **RESULT:** - The SART was capable of floating and functioned correctly.

## 7. Range Performance (6.7)

7.1 For convenience the Range Performance details are presented in tabular form.

|                      |  |
|----------------------|--|
| Equipment under Test | Simrad Ltd   |
| Build Standard       | Mr D Sheeky  |
| Power Supply         | Battery Powered  |
| Test Specifications  | BS EN61097-1 Clause 6.7 Range Performance                            |
| Test dates           | 25 <sup>th</sup> November 2004                                       |
| Time                 | 15:00hrs   |
| Modes of operation   | Equipment in active mode   |
| Test conducted by    | R Sharp/ M Blackwell   |
| Test Manager         | R Sharp  |
| Location of testing  | Radar site at QinetiQ Fraser Range, SART deployed at Bracklesham Bay |
| Radar Details        | Sperry Bridgemaster E 10kW X-Band Radar                              |
| Separation           | 7nm  |

### Test item Details

| Manufacturer | Type | Serial No      |
|--------------|------|----------------|
| Simrad       | SA50 | T.A.Unit # 001 |

### Environmental conditions

| Sea state | Visibility | Tide |
|-----------|------------|------|
| 1-2       | 7nm        | Low  |

### Test Results Summary

| Test   |
|--|
| <p>The SART response was tested as defined in the specification indicated, with an X-Band Marine Radar meeting IMO resolution A477(XII)</p> <p>The test was conducted with the SART positioned at the waters edge with the lowest part of the antenna set at 1 metre above the surface of the sea, and in line of sight to the Radar antenna at Fraser Range over a sea path. The SART response was observed on the Radar and the resultant display was photographed.</p> <p><b>Result</b><br/>SART performance observed as satisfactory. Picture of SART response on next page.</p> |



Picture of SART Response



**8. Sweep Characteristics (6.9.4) (Pulse Width & Sweep Count)**

- 8.1 The assessment of Pulse Width and number of sweeps from the SART was limited to the following procedure.
- 8.2 The SART was set up in an Anechoic Chamber. It was activated using an X-band microwave source. The resultant SART response was captured with an X-Band horn and delivered to a Hewlett Packard 8990A Peak Power Analyser.
- 8.3 The Peak Power Analyser displayed the captured SART signal envelope in a time domain. This enabled the Pulse Width to be determined and the upper profile of the pulse enabled a sweep count to be taken.
- 8.4 **RESULT:-** The nominal Pulse Width was measured as 96uS and 12 sweeps were observed along the upper pulse profile.

**9. Radiated Power (6.9.5)**

- 9.1 The assessment of Radiated Power was limited to determining the SART output power from a static transmission position. It was not possible to rotate the device and determine EIRP. Therefore the following procedure was conducted.
- 9.2 The Hewlett Packard 8990A Peak Power Analyser was set up in an Anechoic chamber and its input and gathering X-Band horn were validated using a calibrated microwave source.
- 9.3 The SART was set up in the Anechoic Chamber and activated using an X-band microwave source. A gathering X-Band horn was placed at a predetermined distance from the SART and connected to the Peak Power Analyser.
- 9.4 The resultant SART response was captured by the X-Band horn and delivered to the Peak Power Analyser.
- 9.5 By applying figures obtained during the equipment validation the SART Radiated Power was determined.
- 9.6 **RESULT: -** The SART produced, within this test environment, an output power that was measured as 31dBm.

## 10. Front End Protection (6.9.9)

10.1 For convenience the Front End Protection details are presented in tabular form.

|                             |  |
|-----------------------------|--|
| Equipment under Test        | Simrad Ltd                                     |
| Build Standard              | Mr D Sheeky                                    |
| Power Supply                | Battery Powered                                |
| Test Specifications         | BS EN61097-1 Clause 6.9.9 Front End Protection |
| Test dates                  | 17 <sup>th</sup> November 2004                 |
| Time                        | 9:45   |
| Modes of operation          | Equipment in active mode                       |
| Test conducted by           | R Sharp  |
| Test Manager                | R Sharp  |
| Location of testing         | QinetiQ Fraser Range                           |
| Interrogating Radar Details | JRC 25kW Scanner Unit ref NKE 22526HS          |

### Test item Details

| Manufacturer | Type | Serial No      |
|--------------|------|----------------|
| Simrad       | SA50 | T.A.Unit # 001 |

### Test Requirement

The SART is required to survive a radiated field of 28dBW/m<sup>2</sup> from an X-Band Marine Radar meeting IMO resolution A477(XII)

Historically this was achieved by placing the SART 20 metres from a 50Kw Radar. No Radar of that power is available at Fraser so it is proposed to conduct the test with a marine radar of reduced power but at a distance from the antenna that achieves the required field density

### Test Results Summary

| Test   |
|--|
| It was determined prior to testing that the JRC radar listed could produce the required field density. The SART was switched on and placed at the appropriate distance from the radar. The radar was then activated. During this period the SART continued to function. After 5 minutes the radar was switched off and the SART continued to function correctly. |
| Result   |
| SART passed front-end Protection test.   |

**11. Report Conclusions.**

- 11.1 The validation tests and assessments were successfully conducted and the unit of equipment that comprises the Simrad SART has satisfactorily completed the tests indicated.