

**MARINE APPROVAL and TESTING
SERVICES**

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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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List of Contents

Report Clause	Title	Page
1.	Introduction	1
2.	Equipment under Test	1
3.	Build Standard of Test Sample	1
4.	Tests and Assessment	1
5.	Climatic Tests	2
6.	Flotation Test	2
7.	Range Performance	3 & 4
8.	Sweep Characteristics	5
9.	Radiated Power	5
10.	Front End Protection	6
11.	Report Conclusions	7

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 th 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
The SART response was tested as defined in the specification indicated, with an X-Band Marine Radar meeting IMO resolutionA477(XII)
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.
Result
SART performance observed as satisfactory. Picture of SART response on next page.

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 th 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/m² from an X-Band Marine Radar meeting IMO resolutionA477(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.