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Report On

FCC and IC Testing of the
Raymarine AIS500

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FCC ID: PJ5-AIS500
IC ID: 4069B-AIS500 B

Document 75905837 Report 01 Issue 1

March 2009



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REPORT ON FCC and Industry Canada Testing of the
Raymarine AIS500

Document 75905837 Report 01 Issue 1

March 2009

PREPARED FOR SRT Marine
Wireless House
BATH
BA3 4BS

PREPARED BY 
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Test Supervisor

APPROVED BY 
J Pither
Authorised Signatory

DATED 24 March 2009

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47: Parts 15 B. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);



J Holcombe





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SECTION 1

REPORT SUMMARY

FCC and IC Testing of the
Raymarine AIS500



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Raymarine AIS500 to the requirements of FCC CFR 47 Part 15B: 2006 and RSS-Gen Issue 2: 2007

Objective	To perform FCC and IC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Raymarine PLC
Model Number(s)	AIS500 Class B AIS Transceiver
Serial Number(s)	AE62235029001
Software Version	V10.5 / V10.6.8.16
Hardware Version	V5
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15B: 2006 RSS-Gen Issue 2: 2007
Incoming Release Date	Declaration of Build Status 13/03/2009
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	639 12/03/2009
Start of Test	06 March 2009
Finish of Test	06 March 2009
Name of Engineer(s)	J Holcombe
Related Document(s)	ANSI 63.4: 2001



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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 15B and RSS-Gen Issue 2, is shown below.

Configuration 1 - Normal						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
2.1	15.109	Radiated Emissions (Enclosure Port)	Receive			ANSI 63.4
	15.107	Conducted Emissions (AC Power Port)	Receive		N/A	ANSI 63.4

N/A – Not Applicable




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1.3 DECLARATION OF BUILD STATUS

DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	AIS500 Class B AIS Transceiver
MANUFACTURER	Raymarine PLC
TYPE	AIS500
PART NUMBER	
SERIAL NUMBER	EP2-22
HARDWARE VERSION	V5
SOFTWARE VERSION	V10.5 / V10.6.8.16
TRANSMITTER OPERATING RANGE	156.025 to 162.025 MHz
RECEIVER OPERATING RANGE	156.025 to 162.025 MHz
COUNTRY OF ORIGIN	UK
INTERMEDIATE FREQUENCIES	1 st IF RX1 117.170 to 123.170MHz 1 st IF RX2 129.970 to 135.970MHz 2 nd IF RX1 38.855MHz 2 nd IF RX2 26.055MHz
ITU DESIGNATION OF EMISSION	15K4G1DXT
HIGHEST INTERNALLY GENERATED FREQUENCY	Radio : 162.025MHz DSP internal clock: 196.608MHz
OUTPUT POWER (W or dBm)	2W
FCC ID	TBD
INDUSTRY CANADA ID	TBD
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Class B Marine AIS Transceiver to IEC62287-1
BATTERY/POWER SUPPLY	
MANUFACTURING DESCRIPTION	NA – External 12V or 24V DC supply required
MANUFACTURER	
TYPE	
PART NUMBER	
VOLTAGE	
COUNTRY OF ORIGIN	
MODULES (if applicable)	
MANUFACTURING DESCRIPTION	
MANUFACTURER	
TYPE	
POWER	
FCC ID	
COUNTRY OF ORIGIN	
INDUSTRY CANADA ID	
EMISSION DESIGNATOR	
DHSS/FHSS/COMBINED OR OTHER	
ANCILLARIES (if applicable)	
MANUFACTURING DESCRIPTION	
MANUFACTURER	
TYPE	
PART NUMBER	
SERIAL NUMBER	
COUNTRY OF ORIGIN	

Signature 

Date 13/02/09
Declaration of Build Status Serial Number EP2-22



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Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

No responsibility will be accepted by TÜV Product Service as to the accuracy of the information declared in this document by the manufacturer.



1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a SRT Marine Raymarine AIS500 as shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



Equipment Under Test



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1.4.2 Test Configuration

Configuration 1: Normal

The EUT was configured in accordance with FCC CFR 47 Part 15B and RSS-Gen Issue 2.

1.4.3 EUT Cable / Port Identification

Port	Max Cable Length specified	Usage	Type	Screened
DC Power	1.5m or <3m	Power Lead	2 core	No
Signal	1.5m or <3m	Data	Multicore	No
Signal	5.0m	GPS Antenna	Coax	Yes
Signal	5.0m	VHF Antenna	Coax	Yes

1.4.4 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 - Receive

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



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1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure as appropriate.

The EUT was powered from a 12v DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	N/A	N/A
1	Customer re routed the GPS Cable inside the EUT from running underneath the PCB to run along the edge of the enclosure.	Abiy Mengistu	06/03/2009



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SECTION 2

TEST DETAILS

FCC and IC Testing of the
Raymarine AIS500



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2.1 RADIATED EMISSIONS (ENCLOSURE PORT)

2.1.1 Specification Reference

FCC CFR 47 Part 15B, Clause 15.109
RSS-Gen Issue 2, Clause 6(a), 7.2.3

2.1.2 Equipment Under Test

Raymarine AIS500, S/N: AE62235029001

2.1.3 Date of Test and Modification State

06 March 2009 - Modification State 0 and 1

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of ANSI 63.4.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.1.6 Environmental Conditions

	06 March 2009
Ambient Temperature	21 - 24.6°C
Relative Humidity	23 - 49%
Atmospheric Pressure	1002 - 1023mbar

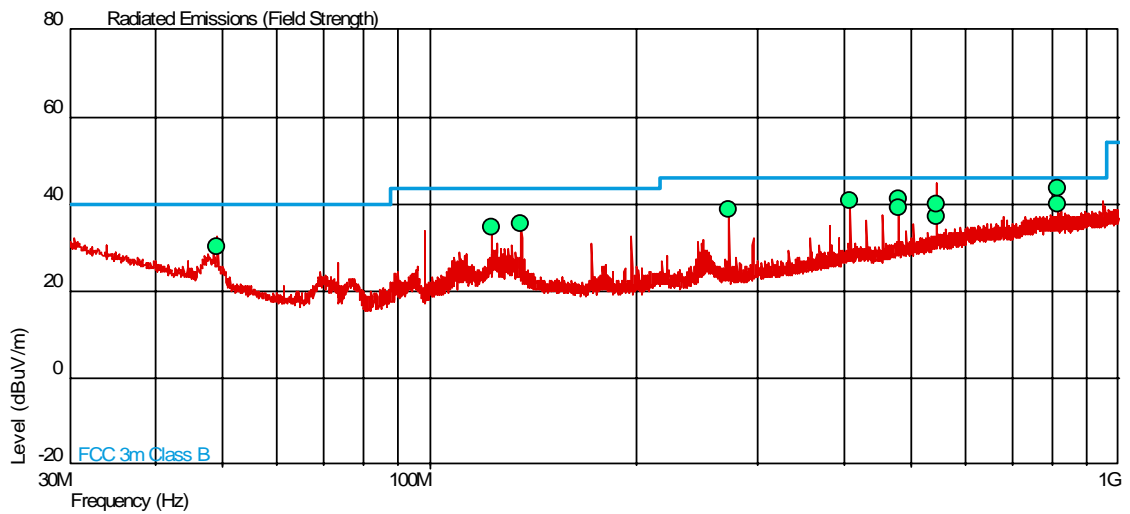


2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15B and RSS Gen Issue 2, for Radiated Emissions (Enclosure Port).

The test results are shown below.

Configuration 1 - Mode 1



Frequency (MHz)	QP Level (dBuV/m)	QP Limit (dBuV/m)	QP Margin (dBuV/m)	Angle(Deg)	Height(m)	Polarity
49.152	30.3	40.0	-9.7	359	1.00	Vertical
123.125	34.6	43.5	-8.9	360	1.00	Vertical
135.970	35.6	43.5	-7.9	342	1.00	Vertical
271.935	38.6	46.0	-7.4	169	1.48	Horizontal
407.912	41.0	46.0	-5.0	296	1.00	Horizontal
479.218	41.4	46.0	-4.6	178	1.00	Horizontal
479.221	39.3	46.0	-6.7	263	1.00	Vertical
543.871	37.0	46.0	-9.0	279	1.00	Horizontal
543.876	40.0	46.0	-6.0	34	1.00	Vertical
815.820	40.0	46.0	-6.0	19	1.00	Vertical
815.832	43.8	46.0	-2.2	98	1.02	Horizontal



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SECTION 3

TEST EQUIPMENT USED



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3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 EMC - Radiated Emissions					
Signal Generator	Hewlett Packard	ESG4000A	38	12	2-May-2009
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	6-Sep-2009
Pre-Amplifier	Phase One	PS04-0085	1532	12	15-Sep-2009
Pre-Amplifier	Phase One	PS04-0086	1533	12	15-Sep-2009
Screened Room (5)	Rainford	Rainford	1545	36	11-Feb-2011
Mast Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Turntable/Mast Controller	EMCO	2090	1607	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	28-Nov-2009
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	20-Aug-2009

TU – Traceability Unscheduled



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	26MHz to 2.5GHz Test Amplitude	1.4dB†
Conducted Susceptibility	100kHz to 250MHz Amplitude	1.8dB†
DC Input Ripple Immunity	Current Voltage	0.45% 0.91%
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.4dB*
Magnetic Field/Flux iaw EN 50366	10Hz to 400kHz	2.64%
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—
Compass Safe Distance	Azimuth Accuracy	0.10°

Worst case error for both Time and Frequency measurement 12 parts in 10⁶.

* In accordance with CISPR 16-4

† In accordance with UKAS Lab 34



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SECTION 4

PHOTOGRAPHS



4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)



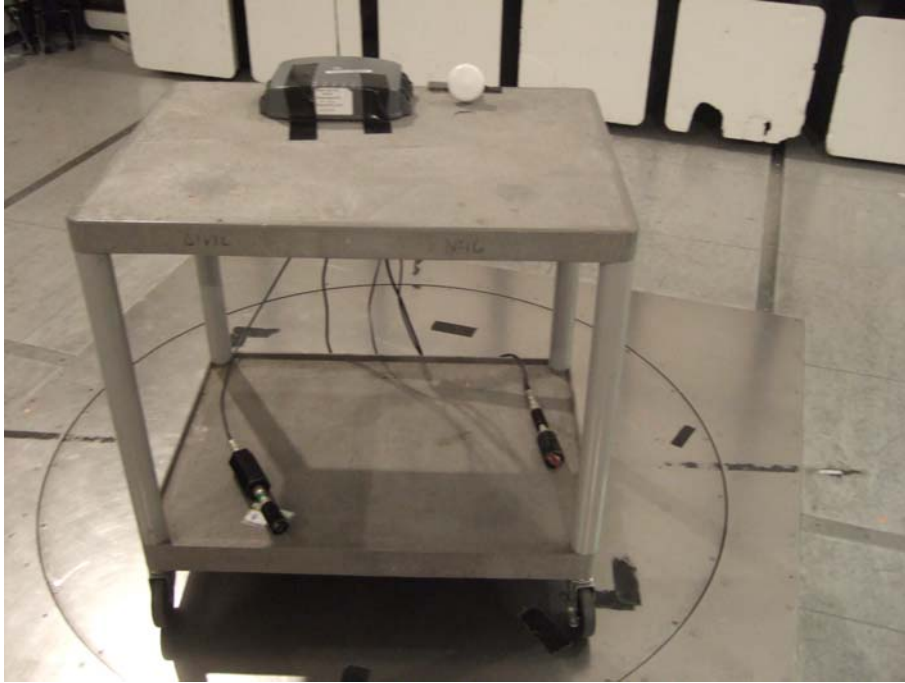
Equipment Under Test Top View



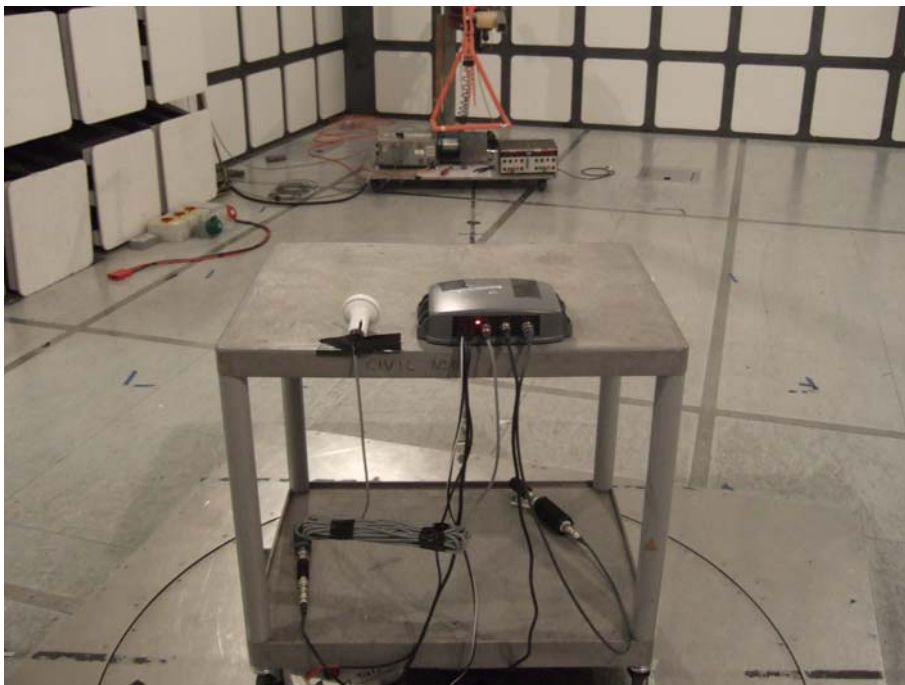
Equipment Under Test Underside View



4.2 TEST SET UP PHOTOGRAPHS



Radiated Emissions (Enclosure Port)



Radiated Emissions (Enclosure Port)



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SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



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5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
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