

MRT AU9-AIS / AU10 RTCM 11901.1:2012 Test Report

Annex E - AIS Type MSLD System E.8 Link layer tests

11 February 2014

Product:	MRT AU9-AIS / AU10 dual-band personal Man Overboard (MOB) Alerting Unit (AU)
Manufacturer:	Marine Rescue Technology Marshall House Zarya Court, Grovehill Road Beverley, East Yorkshire HU17 0JG
Serial Number(s):	972418880, 972412430
Date tested:	21 February 2014
Standards Tested to:	RTCM Standard 11901.1:2012 "For Maritime Survivor Locating Devices (MSLD)" – Annex E : "AIS Type MSLD System"
Summary:	The sample tested met the requirements after software modification.
Tested by:	M.Swale
Report Author:	T.P.Jarvis

Project: MT251-RP2

STATUS: Draft

1.1 Manufacturer Information



MRT AU9-AIS / AU10

The AU10 (formerly known as the AU9-AIS) is a dual-operation personal MOB Alerting Unit (AU) transmitting on 121.5 MHz SAR frequency, whilst simultaneously sending GPS position information on maritime AIS channels AIS1 & AIS2.

- (i) Ports: (1) Antenna cable (260+260mm).
- (ii) EUT Software version: V2.10-RTCM

1.2 Notes relating to the assessment

Two receivers were used to compensate for occasional missed messages common to AIS.

1.3 Variations

The test recording period was extended from 40 minutes to 1 hour 20 minutes in order to better check the randomness of slot selection for message bursts.

1.4 Summary of Compliance

The sample met the requirements following software modification.

1.5 Modifications

1 – Firmware update to V2.17-RTCM

1.6 Results Table

Clause	Test	Appendix /note	Mod State	Result
E.8.1	Synchronisation accuracy	NOTE ^[1]	1	PASS
E.8.2.1.2	Initialisation period	A	1	PASS
E.8.2.1.3	Message content of Message 1	B	1	PASS
E.8.2.1.4	Message content of Message 14	C	1	PASS
E.8.2.1.5	Transmission schedule for Message 1	D	1	PASS
E.8.2.1.6	Communication state of Message 1	E	1	PASS
E.8.2.1.7	Transmission schedule for Message 14	F	1	PASS
E.8.2.1.8	Transmission with lost EPFS	G	1	PASS
E.8.2.1.11	Test Transmission with EPFS data available	H	1	PASS
E.8.2.1.14	Test Transmission without EPFS data available		1	NOTE ^[2]

NOTE [1] – Measured indirectly.

NOTE [2] – The manufacturer declares that his equipment does not make unsynchronised test transmissions in accordance with ITU recommendations.

NOTE [3] – The abbreviation STO in the appendices refers to the Slot Time-Out value in received messages.

Signed 25 February 2014:



T.P.Jarvis BSc CEng MIEE MIEEE

A Appendix: Initialisation Messages

The first message was received 2 seconds after activation.

- a) The Message ID received was 1.
- b) The Repeat indicator received was 0.
- c) The User ID received was 972000009
- d) The Navigational status received was 14.
- e) The Rate of turn received was -128.
- f) The SOG received was 102.3
- g) The Position accuracy received was 0.
- h) The Position received was latitude 91° & longitude 181° (default position).
- i) The COG received was 360.
- j) The True heading received was 511.
- k) The Time stamp received was 63 seconds (unsynchronised).

B Appendix: Message content of Message 1

The first message with a valid position was received 60 seconds after activation.

- a) The Message ID received was 1.
- b) The Repeat indicator received was 0.
- c) The User ID received was 972000009
- d) The Navigational status received was 14.
- e) The Rate of turn received was -128.
- f) The SOG received was 0.
- g) The Position accuracy received was 0.
- h) The Position received was latitude 53.84417°, longitude -0.4038° and this was confirmed to be correct.
- i) The Position received was continuously updated in subsequent messages.
- j) The COG received was 360.
- k) The True heading received was 511.
- l) The Time stamp received was the seconds component of UTC time.
- m) The live incident indication was observed as per manufacturer's documentation^[1].

NOTE[1]: a live incident is indicated by SOS beep pattern and the red alerting LEDs also flashing using an SOS Morse-code pattern.

C Appendix: Message content of Message 14

Two message 14's were received in every 4th message burst.

- a) The Message ID received was 14.
- b) The Repeat indicator received was 0.
- c) The Source ID received was 972000009.

d) The message text received was “MOB ACTIVE”.

D Appendix: Transmission schedule for Message 1

- a) The Communication State Sync state received was 0.
- b) A burst of 8 messages every minute were received.
- c) The duration of each burst of received messages was 14 seconds.
- d) Every burst received consisted of 8 messages.
- e) Consecutive messages received were received on continuously alternating channels AIS 1 and AIS 2.
- f) Consecutive Messages received in a burst were 75 slots apart. Example: table D.1

Message Type	Burst	Slot Number	Δ (slots)
Message 1	2	1296	-
Message 1	2	1371	75
Message 1	2	1446	75
Message 1	2	1521	75
Message 1	2	1596	75
Message 1	2	1671	75
Message 1	2	1746	75
Message 1	2	1821	75

Table D.1 – Received Message Burst Slot Timing Example

- g) The use of the same set of slots were observed from burst 1 to 8 (STO 7 to 0).
- h) A new set of slots was chosen for the burst 1 in each new set of 8 (STO=7).
- i) During the period of observation each new set of slots differed from the previous set by $1 \text{ min} \pm 6 \text{ s}$, and the selection appeared to be random.
- j) The manufacturer declares the firmware uses entropy gathering to generate true randomness. A 32-bit variable is pre-loaded with the unique serial number of the microcontroller. This is used as a seed value. Entropy is gathered from three sources:
 - (i) The least significant bits of each analog to digital conversion
 - (ii) The least significant bits of the fast timer used to measure the RF synthesiser lock time.
 - (iii) The least significant bits of the battery saving sleep timer

E Appendix: Communication state of Message 1

- a) The same communication state was received for all message 1's received.
- b) The Communication State Sync state received was 0.
- c) The time-out received was STO=7 for all 8 messages of burst 1 in a sequence of 8 burst and that burst 1 was received with a new, randomly chosen, slot sequence.
- d) Each subsequent burst received had STO decrement by one so that the last burst received had STO=0.
- e) The time-out received was reset to STO=7 in the burst received after burst 8 (with STO=0).

- f) The sub message received in messages with STO=3,5,7 was 0.
- g) The sub message received in messages with STO=2,4,6 was the slot number.
- h) The sub message received in messages with STO=1 was the UTC hour and minute respectively.
- i) The sub message received in messages with STO=0 was slot offset to the transmission slot in the next frame.

F Appendix: Transmission schedule for Message 14

- a) Two consecutive message 14's were received every 4 minutes.
- b) Each pair of Message 14's received were received on alternating channels AIS 1 and AIS 2.
- c) Message 14's were received in bursts 1 and 5 in positions 5 and 6 and they replaced the message 1's received in these same positions in other bursts.
- e) No message 14's were received in burst 8 (STO=0).

G Appendix: Transmission with lost EPFS

NOTE EFPS was inhibited after 1 hour and 15 minutes of recording and not the 40 minutes required by RTCM 11901.1:2012 (see section 1.3).

Following EFPS inhibition the following was recorded:

- a) Message burst continued to be received in the same manner as before EFPS inhibition.
- b) The same transmission schedule was observed as before EFPS inhibition.
- c) The Communication State Sync state received in all messages was 3.
- d) The SOG received was 0.
- e) The Position accuracy received was 0.
- f) The Position received was latitude 53.84424°, longitude -0.40372° and this was confirmed to be the last known good position and this did not subsequently vary.
- g) The COG received was 360.
- h) The Time stamp received was 63 seconds (unsynchronised).
- i) The Position accuracy received was 0.
- j) The manufacturer uses the audible alert pitch to indicate EFPS lock with a 2 KHz beep tone indicating locked and a 1 KHz beep tone indicating out of lock. The tone observed during the test decreased in pitch shortly after the EFPS was inhibited.

H Appendix: Test Transmission with EPFS data available

- a) The message burst received during the test contained correct position data. From this it was inferred that the EUT waits until it has a position fix before it transmits a test message sequence.

- b) A single burst of 8 messages was received in the correct sequence.
- c) The User ID received was 972000009
- d) The Navigational status received was 15.
- e) The SOG received was 0.
- f) The Position accuracy received was 0.
- g) The Position received was latitude 53.84416°, longitude -0.40379° and this was confirmed to be correct.
- h) The COG received was 360.
- i) The Time stamp received was 0.
- j) The STO received in all message 1's was 0. The sub message received in all message 1's was 0.
- k) After one burst of 8 messages no further message were received during the test.
- l) The message text received in both Message 14's was "MOB TEST".
- m) The test indication was observed as per manufacturer's documentation^[1].

NOTE[1]: test is indicated by:

- (i) An occasional beep and no flashing of the alerting red LEDs.
- (ii) A green indicator whilst the test button is held depressed indicating that the internal battery is good.

I Appendix: Test Equipment Used

	Item	Serial
1	Thrane & Thrane Sailor 6217 Radio	0455820055
2	Comar AIS-3R AIS Transponder	207644

Table I.1 – Test equipment used

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