

AU10 FCC Waiver

Applicant: Marine Rescue Technologies Ltd

Correspondence Reference Number: 45776

Form 731 Confirmation Number: EA596693

Further to your questions **1 &2**) below and a request for additional clarification:

1) The waiver exhibit (WT Docket No. 13-99) states that MRT has been granted a waiver to upgrade the device to transmit identify and location information on the international AIS channels at 500mW ERP. It is thus understood that the EUT will radiate no more than 500mW ERP. Other power parameters listed in this application include a conducted output power of 1W, an air band power of 100mW ERP, and a marine band power of 1W EIRP (latter two values from the user manual exhibit). Although it is known that conducted output, ERP, and EIRP values will be different depending upon antenna gain and other system parameters, the large deviation in values requires additional clarification. Furthermore, please elaborate on the difference between the two mentioned ERP values (100mW v. 500mW).

- i) **Overview:** The EUT radiates close to 500 mW and it's conducted output power when measured directly is similarly just under 500 mW. The antenna is a whip with it's coaxial feed acting as counterpoise. This combination gives a high antenna gain. During testing to RTCM 11901.1:2012 the antenna gain was determined as 2.69 dBi @ 162 MHz. This accounts for the considerable difference between the ERP and EIRP radiated figures. The transmitter output power is reduced for 121.5 MHz transmissions by internal firmware and the corresponding slight reduction in antenna gain at 121.5 MHz means that the AU10 ERP radiated power never exceeds 100 mW.
- ii) **AIS Conducted:** The requirements of RTCM 11901.1:2012 clause E.7.2.1.3 means that the antenna gain is added to the conducted measurements and in all cases the AU10 passes the minimum requirement of 27 dBm (500 mW). The corrected values recorded were between 28.062 dBm and 30.007 dBm under all conditions. These values are closer to 1W and this is why the documentation uses 1W as the nominal figure.
- iii) **AIS Radiated:** The AU10 radiates no more than 500 mW ERP when tested using ETSI dipole substitution method employed in all ETSI standards. However when tested using the very different method employed by RTCM 11901.1:2012 clause E.7.3 the value recorded was 29.55 dBi (901.36 mW EIRP). Again this is closer to 1W and this is why the documentation uses 1W as the nominal figure.
- iv) **121.5 MHz Conducted:** The AU10's conducted output power measured at the RF output terminals and without any corrected factors applied falls between 80 and 120 mW. Furthermore this particular test is applied at the factory to all production units. 100mW is stated as the nominal conducted output power.
- v) **121.5 MHz Radiated:** The AU10 antenna gain at this frequency falls slightly and therefore the radiated power measurements made using the dipole substitution method never exceed 100mW ERP.

2) The Operational Description exhibit contains a file titled Declaration of Conformity. Per 47 CFR 2.1033(c), this document shall contain a detailed description of the modulation system to be used, a description of the modulating wave train, and any other information pertaining to operational capabilities and functions. This would power levels at different bands, antenna gain characteristics, etc.

Applications for equipment other than that operating under parts 15 and 18 of the rules shall be accompanied by a technical report containing the following information:

(1) The full name and mailing address of the manufacturer of the device and the applicant for certification – **see page 4 below.**

(2) FCC identifier – **see pages 4 & 6.**

(3) A copy of the installation and operating instructions to be furnished the user. A draft copy of the instructions may be submitted if the actual document is not available. The actual document shall be furnished to the FCC when it becomes available – **see pages 10 to 16 inclusive of operating manual.**

(4) Type or types of emission. **See page 34 of operating manual.**

121.5 MHz = A3X

AIS = F1D

(5) Frequency range. **See page 34 of operating manual.**

121.5 MHz (single channel)

AIS = 161.975 to 162.025 MHz

(6) Range of operating power values or specific operating power levels, and description of any means provided for variation of operating power. **See page 34 of operating manual.**

121.5 MHz = 100 mW PERP

AIS = 1 W EIRP

(7) Maximum power rating as defined in the applicable part(s) of the rules.

121.5 MHz = 100 mW PERP maximum (RTCM 11901.1:2012 clause B.3.5.1.6)

AIS = max not specified in RTCM 11901.1:2012 annex E.

(8) The dc voltages applied to and dc currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.

Not applicable

(9) Tune-up procedure over the power range, or at specific operating power levels.

Not applicable

(10) A schematic diagram and a description of all circuitry and devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation, and for limiting power. **See attached schematic.**

Schematic diagram to be supplied is mt200_s5_r1-0(sch).pdf

RF Frequency reference is X50 on page 12 of schematic.

RF Frequency source is ADF4360-9 (U51 on page 12 of schematic.).

Spurious filter is parts C77→C79, C81, L61→L63 & L67 on page 12 of schematic.

Modulation is under software control and by the circuitry around U6 on page 11 of schematic.

RF Power is under software control and by circuitry around U3→U5 on page 11 of schematic.

(11) A photograph or drawing of the equipment identification plate or label showing the information to be placed thereon. **See pages 5, 6 & 7 of attached and also on pages 8 & 9 of operating manual.**

(12) Photographs (8"×10") of the equipment of sufficient clarity to reveal equipment construction and layout, including meters, if any, and labels for controls and meters and sufficient views of the internal construction to define component placement and chassis assembly. Insofar as these requirements are met by photographs or drawings contained in instruction manuals supplied with the certification request, additional photographs are necessary only to complete the required showing. **See pages 5, 6, 8,9 and pages 8 & 9 of operating manual.**

(13) For equipment employing digital modulation techniques, a detailed description of the modulation system to be used, including the response characteristics (frequency, phase and amplitude) of any filters provided, and a description of the modulating wavetrain, shall be submitted for the maximum rated conditions under which the equipment will be operated.

The modulating wavetrain is fully described in ITU-R M.1371-4 annex 2 and tested in RTCM 11901.1 clauses E.7.3.1.4, E.7.4 & E.7.5.

(14→18) Not applicable

Declaration of Conformity

Name of Manufacturer Importer: Marine Rescue Technology Limited

Address of Manufacturer Importer: Marshall House

Zarya Court, Grovehill Road

Beverley, East Yorkshire

HU17 0JG

Declares that product: AU9-AIS/AU10

Maritime Personal Homing Beacon

Conform to the R&TTE Directive 1999/5/EC as attested by conformity with the following harmonized standards:

EN 300 152-2 V1.1.1:

Electromagnetic compatibility and Radio spectrum Matters (ERM); Maritime Emergency Position Indicating Radio Beacons (EPIRBs) intended for use on the frequency 121,5 MHz or the frequencies 121,5 MHz and 243 MHz for homing purposes only; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive.

EN 301 489-22 V1.3.1:

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 22: Specific conditions for ground based VHF aeronautical mobile and fixed radio equipment.

Conform to the Low Voltage Directive 2006/95/EC as attested by conformity with the following harmonized standard:

EN60950-1:2006:

Information technology equipment — Safety — Part 1: General requirements.



FCC ID 2AB4VAU10

Ken Gaunt

Director MRT Limited

20 May 2013

AU10 Identification Labels

sMRT AU10 Features



sMRT AU10 Front

1. **ANTENNA**
2. **AUTO ACTIVATION WATER SENSOR.**
3. Product name.
4. **ACTIVATION BUTTON GUARD.**
5. Front label.
6. **RUBBER O-RING** restrainer for **ARMING SWITCH**.
7. **BASE CAP** (hinged, not separate).
8. **AUTO ACTIVATION WATER SENSOR.**
9. Restrainer **GRAB TAG** for **ARMING SWITCH**.
10. **ARMING SWITCH**.
11. Round rubber **ACTIVATION BUTTON** (for activation and function testing).

12. Operation instructions (rear label).

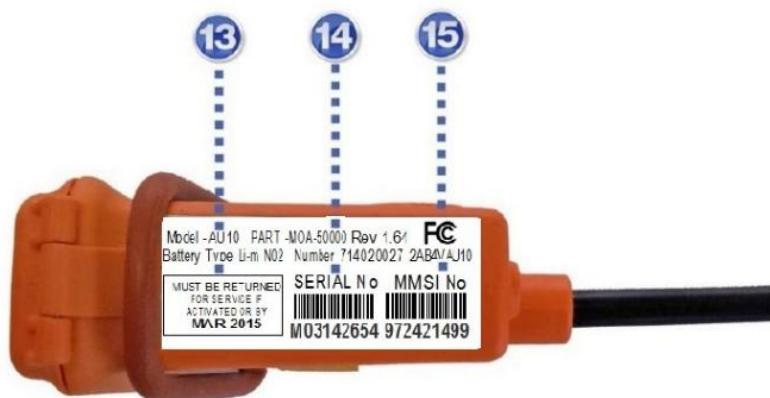


sMRT AU10 Rear

13. Mandatory Recertification/Service Date (side label)

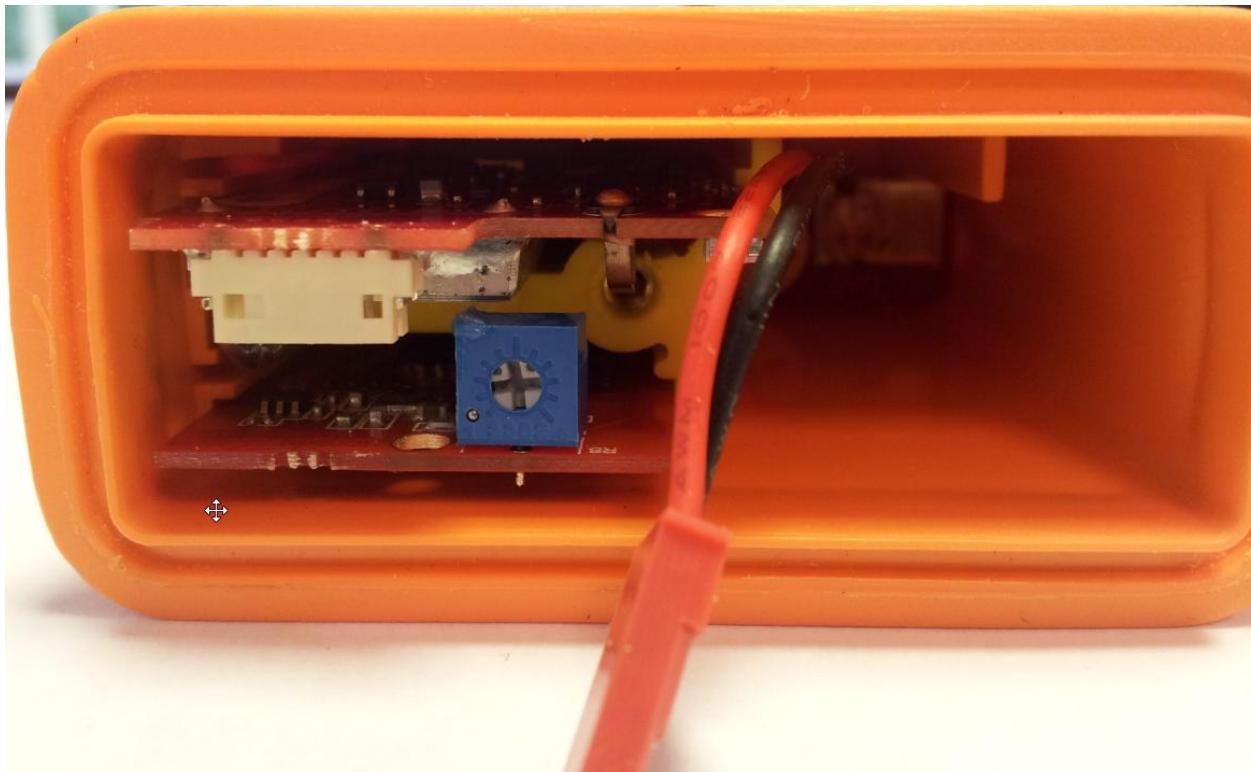
14. Device Serial Number (side label).

15. Device MMSI Number (side label).



sMRT AU10 Side

Environmental	
Sealing depth	IP68
Operating temp	-20° to +55°C
Storage Temp	-45° to +70°C
Operating humidity	to 95% non-condensing
Shock	20G min
Vibration	EuroCAE ED-14G
Compass safe distance	30cm (for <1° deflection)
Flammability Rating	ED-14G 26.3.3 Category C
Battery	6V Li-MnO2
Buoyancy	Buoyant (index=9%)
Transportation	Air cargo UN 3091 - not hazardous
Physical	
Dimensions (Case)	80mm x 95mm x 35mm
Weight	250g
Antenna Visible Length	535mm
Standards Applied	
EMC	EN 301 489-22 V1.3.1, EN 301 489-1 V1.8.1, EN 302 961-2 V1.2.2
Electrical Safety	EN 60950-1:2006
Marine	IEC 60945:2002
Radio (121.5MHz)	EN 300 152 V1.1.1, EN 302 961-2 V1.1.0
Radio (AIS)	ETSI 303 098-1 V0.0.4, RTCM 11901.1:2012,
Electrical	
Airband frequencies	121.500, 121.650, 121.775 MHz Distress
Modulation	AM compliant to ITU-R M.690-2 (2012)
Airband Power	121.5MHz = 100mW PERP max (RTCM 11901.1:2012 clause B.3.5.1.6)
Marine-band frequencies	161.975, 162.025 MHz (AIS1, AIS2)
Signaling type	AIS-MOB standards applied ETSI 303 098-1, RTCM STANDARD 11901.1
Marine-band power	AIS = 1W EIRP max not specified in RTCM 11901.1:2012 annex E.
Emmision Type	121.5 MHz = A3X - AIS = F1D
VHF antenna	Centre-fed dipole, comprising cable and 1/8 coil whip
GPS antenna	Circular-polarised wide-angle bulb
Operational	
Operating time	>12 hours continuous
Standby battery life	18 months
Permanently Armed/Ready	18 months with >6 hours continuous operation remaining
GPS position update	Every minute
GPS time to first lock	<1 minute under normal operating conditions
Alert indication	Audible and visible SOS signalling
Activation	Slide switch plus water sensor
MMSI	Permanent factory programmed (972 prefix)
Operational Life	5 years from the date of purchase







We take the **SEARCH** out of Search and Rescue

