

GUIDELINES FOR SHORE-BASED MAINTENANCE OF SATELLITE EPIRBs

MSC/Circ.1039

1 Introduction

1.1 The purpose of these guidelines is to establish standardized procedures and minimum levels of service for the testing and maintenance of satellite EPIRBs to ensure maximum reliability whilst minimizing the risk of false distress alerting.

1.2 The guidelines are intended to be applicable both to 406 MHz EPIRBs and to L-band EPIRBs, as either type may be carried to comply with the requirements of SOLAS regulation IV/7.1.6. EPIRBs may include 121.5 MHz transmitters, or Global Navigation Satellite System (GNSS) receivers.

1.3 The guidelines also apply to service exchange EPIRBs which should be properly encoded to match the appropriate registration database.

2 Shore-based maintenance (SBM) provider

2.1 The SBM provider should:

.1 have a quality control system audited by a competent authority in respect of its servicing operation;

.2 have access to adequate calibrated test equipment and facilities to carry out the SBM in accordance with these guidelines;

.3 have access to batteries and other spare parts to the original equipment specification;

.4 have access to up-to-date technical manuals, service bulletins and the latest software versions as provided by the original equipment manufacturer;

.5 keep records of maintenance, available for inspection by the Administration as may be required;

.6 ensure that all personnel responsible for supervising and for carrying out the maintenance procedures are adequately trained and fully competent to perform their duties; and

.7 issue a shore-based maintenance report with a list of the test results and maintenance performed.

3 Prevention of false distress alerts

3.1 Throughout the testing and maintenance process, **great care must be taken to avoid the transmission of false distress alerts**. The transmissions may be picked up by aircraft as well as satellites.

3.2 A radio-frequency-screened room or enclosure should be used for all maintenance procedures involving, or likely to involve, any transmission from an EPIRB.

3.3 Provision of a 121.5 MHz monitor receiver is required; this will pick up the homing transmitter and give a warning if the EPIRB is accidentally activated outside the screened enclosure.

3.4 If a distress signal is transmitted accidentally, the local RCC should be contacted immediately and informed of the coordinates of the test site.

4 Maintenance service interval

4.1 406 MHz satellite EPIRBs should be inspected and tested in accordance with MSC/Circ.1040.

4.2 Shore-based maintenance of all satellite EPIRBs, as defined in paragraph 1.2, should be carried out in accordance with these guidelines at intervals specified by the flag Administration and not exceeding 5 years. It is recommended that the maintenance be performed at the time when the battery is to be changed.

5 Self-test

5.1 Prior to carrying out any maintenance and, upon completion, a self-test should be performed, following the instructions on the equipment, and the results noted.

5.2 Attention is drawn to paragraph 3 on the prevention of false distress alerts. Avoidance of live transmissions is required to prevent unnecessary loading of the satellite channels.

5.3 It should be verified that the self-test mode operates properly. This check could be performed by holding the switch in self-test mode position for 1 min after the first self-test mode burst transmission. All transmissions should cease after releasing the self-test mode switch.

Additionally, for 406 MHz satellite EPIRBs which received the COSPAS-SARSAT type approval after October 1998 (Type Approval Certificates 106 and higher) the number of self-test bursts should be verified to be no more than one.

6 Battery change

6.1 The main battery should be changed in accordance with the manufacturer's recommendations, including the replacement of any other routine service parts (e.g. seals, memory battery, desiccant).

6.2 The removed batteries should be disposed of in accordance with the manufacturer's and/or national/local recommendations.

6.3 After having changed the battery, the new expiration date should be displayed on the exterior surface of the EPIRB.

7 Satellite distress transmission

7.1 The satellite EPIRB should be activated in its normal transmitting mode (i.e. not just self-test). Attention is drawn to paragraph 3 on the prevention of false distress alerts. Where seawater contacts are fitted, these should be connected together to activate the EPIRB.

7.2 The transmitted signal should be checked with a suitable test receiver to verify the signal integrity and coding.

7.3 The frequency of the transmitted signal should be recorded and verified to be within the limits required by the specification to which it is approved.

7.4 The output power of the transmitter should be checked in the self-test mode. A simple method of the emission verification, such as a low sensitivity receiver placed at an unobstructed distance of at least 3 m from the EPIRB antenna, may be used for this check. The original equipment manufacturer may suggest an appropriate method to verify the output power. Attention is drawn to paragraph 3 on the prevention of false distress alerts.

8 121.5 MHz homing transmission

8.1 The satellite EPIRB should be activated in its normal transmitting mode (i.e. not just self test).

Attention is drawn to paragraph 3 on the prevention of false distress alerts. Where seawater contacts are fitted, these should be connected together to activate the EPIRB.

8.2 The transmitted signal should be checked with a suitable test receiver for the characteristic swept tone modulation.

9 Global Navigation Satellite System (GNSS)

9.1 Some satellite EPIRBs are designed to transmit a position derived from a GNSS receiver, which may be internal or external to the EPIRB.

9.2 The original equipment (EPIRB) manufacturer should be consulted for a method of testing the correct operation of this function, e.g.: by using a GNSS repeater/simulator or external input.

This test may involve a live transmission from the EPIRB and should be performed in a screened room or enclosure in accordance with paragraph 3.2. Attention is drawn to paragraph 3 on the prevention of false distress alerts.

9.3 A test receiver should be used to verify that the signal transmitted by the satellite EPIRB contains the correctly encoded position data derived from the GNSS receiver. Attention is drawn to paragraph 3 on the prevention of false distress alerts.

10 Waterproof integrity

10.1 The satellite EPIRB should be inspected for any signs of damage or cracks to the casing, or of water ingress. Any damaged item should be replaced in accordance with the manufacturer's recommended procedures.

10.2 The satellite EPIRB should be tested for waterproof integrity at the end of the SBM. The equipment manufacturer may suggest an appropriate method to test the integrity of the EPIRB.

10.3 One method involves immersing the equipment in hot water (20-30°C above ambient) for a period of 1 min. It can be readily seen if there are any problems with the seals, as the air inside the beacon expands and escapes as a stream of bubbles. This test should not be carried out with cool water, as the water may be drawn into the equipment without showing significant release of air bubbles.

10.4 Satellite EPIRBs equipped with seawater switches should have this function disabled during the immersion test to prevent activation, unless the complete test is performed inside a screened room. This disabling may be achieved by immersing the EPIRB complete with a mounting bracket if the bracket includes an interlock to prevent activation before release. In some cases the EPIRB contains an inversion switch, so it will not be activated if immersed in the inverted position. The manufacturer should be consulted for specific guidance.

11 Labeling

11.1 As a minimum, the equipment external labeling should be checked for the following details:

.1 manufacturer's serial number. This identifies the equipment, even if the programmed data (e.g. MMSI or callsign) is later changed;

.2 the transmitted identification code:

- for L-band EPIRBs, it will be the INMARSAT System Code; and

- for 406 MHz EPIRBs, this will be the beacon 15 Hexadecimal Identification

(15 Hex ID) and other encoded identification information (MMSI / callsign) as required by the Administration. It should be verified that the label matches the information decoded from the self-test mode transmission using the test receiver. For the COSPAS-SARSAT location protocol beacons, the 15 Hex ID should correspond to position data set to default values;

.3 the expiration date of the battery; and

.4 the date when the next shore-based maintenance is due (see paragraph 12.1).

11.2 The above checks also apply if a replacement EPIRB is provided by the SBM provider.

12 Shore-based maintenance report and other documentation

12.1 The results of shore-based maintenance should be provided in the form of a shore-based maintenance report, a copy of which is to be kept on board, and a label affixed to the exterior of the beacon detailing the name of the SBM provider and the date when the next shore-based maintenance is due.

12.2 The SBM provider may affix a tamperproof seal or similar device on completion of the SBM.

12.3 Before returning the beacon to the owner, or when providing a replacement beacon, the SBM provider should check the registration details with the beacon registry, where practicable.

GUIDELINES ON ANNUAL TESTING OF 406 MHz SATELLITE EPIRBs

MSC/Circ.1040

1 The annual testing of 406 MHz satellite EPIRBs is required by new SOLAS regulation IV/15.9 entering into force on 1 July 2002.

2 The testing should be carried out using suitable test equipment capable of performing all the relevant measurements required in these guidelines. All checks of electrical parameters should be performed in the self-test mode, if possible.

3 The examination of the installed 406 MHz satellite EPIRB should include:

.1 checking position and mounting for float-free operation;

.2 verifying the presence of a firmly attached lanyard in good condition; the lanyard should be neatly stowed, and must not be tied to the vessel or the mounting bracket;

.3 carrying out visual inspection for defects;

.4 carrying out the self-test routine;

.5 checking that the EPIRB identification (15 Hex ID and other required information) is clearly marked on the outside of the equipment;

.6 decoding the EPIRB 15 Hexadecimal Identification Digits (15 Hex ID) and other information from the transmitted signal, checking that the decoded information (15 Hex ID or MMSI/callsign data, as required by the Administration) is identical to the identification marked on the beacon;

.7 checking registration through documentation or through the point of contact associated with that country code;

.8 checking the battery expiry date;

.9 checking the hydrostatic release and its expiry date, as appropriate;

.10 checking the emission in the 406 MHz band using the self-test mode or an appropriate device to avoid transmission of a distress call to the satellites;

.11 if possible, checking emission on the 121.5 MHz frequency using the self-test mode or an appropriate device to avoid activating the satellite system;

.12 checking that the EPIRB has been maintained by an approved shore-based maintenance provider at intervals required by the Administration;

.13 after the test, remounting the EPIRB in its bracket, checking that no transmission has been started; and

.14 verifying the presence of beacon operating instructions.

406 MHz EPIRB

(Emergency Position Indicating Radio Beacons)

EPIRBs can be 406 MHz (Digital) and 121.5 MHz (Analogue) distress beacons.

IMPORTANT NOTE: 121.5 MHz distress beacons are no longer detected.

What is a distress beacon?

A distress beacon is a small electronic device that, when activated in a life-threatening situation, assists rescue authorities in their search to locate those in distress.

Why switch to a 406?

As of 1 February 2009 Cospas-Sarsat satellites no longer detect 121.5 MHz distress beacons.

Major advantages of switching to a 406 MHz distress beacon are:

- **their improved accuracy - especially those that are GPS capable;**
- **the capability for search and rescue authorities to determine whether the alert is legitimate - for those that are registered, a simple phone call can determine this;**
- **and a faster response - valuable information about those in distress and the distress location can be gained by rescue authorities contacting friends and family nominated as emergency contacts.**

What types of distress beacons are there?

There are 3 types:

- **Emergency Position Indicating Radio Beacons (EPIRB)** used in ships and boats;
- **Emergency Locator Transmitters (ELT)** used in aircraft; and
- **Personal Locator Beacons (PLB)** for personal use by bushwalkers, four-wheel drivers, other adventurers on land, employees working in remote areas, crew in boats and aircrew.

EPIRBs are designed to float in the water to optimise the signal to the satellite. An EPIRB is required to operate for a minimum of 48 hours continuously once activated. An EPIRB has a lanyard that is used to secure it to something that is not going to sink so that it can float free. There have been a number of incidents where vessels have sunk quickly and crew have not been able to deploy an EPIRB. In such incidents, float-free EPIRBs may have reduced response times and saved lives. Float-free EPIRBs are held in a bracket and fitted with a hydrostatic release that is water activated deploying the beacon automatically if the vessel sinks. If the vessel continues to float then the EPIRB can be manually deployed where a distress situation exists.

ELTs are usually fixed in the aircraft and are designed to activate on impact. ELTs are required to operate continuously for 24 hours once activated. Civil Aviation Safety Authority (CASA) regulations require most aircraft to carry an ELT. CASA regulations allow for PLBs or EPIRBs to be carried in General Aviation aircraft as an alternative to an ELT.



PLBs are designed for personal use in both the land and marine environment. This type of beacon is becoming a multi-environment beacon. PLBs are required to operate for a minimum of 24 hours once activated.

406 MHz beacons come in two basic types: those that provide an encoded (GPS) location and those that do not. The satellite system can calculate a beacon's location, but locating a distress site is usually much faster if the beacon signal provides a GPS location.

How does a distress beacon work?

When a distress beacon is activated, it transmits a signal that is detectable by satellites and overflying aircraft. As the satellites orbit the Earth they 'listen' for any active beacons and report their position to rescue authorities.

Beacons developed for the Cospas-Sarsat satellite system operate on 406 MHz and use digital technology that allows the beacon to transmit a unique code (HexID or UIN) that identifies the beacon. **Satellite processing of 121.5 MHz signals ceased on 1 February 2009.**

What is the HexID or UIN?

The HexID or Unique Identity Number (UIN) is the unique code programmed into each 406 MHz distress beacon and transmitted when the beacon is activated. When registering a distress beacon, this code must be included on the registration form as it is the only code that links the individual distress beacon to the registration database. Without the HexID the beacon cannot be registered.

The HexID is 15 characters long and is made up of hexadecimal numbers (0-9) and letters (A-F). The code can be found on the label of all 406 MHz distress beacons.



How do I decode a programmed HexID?

406 MHz distress beacons are coded to reflect the beacon type and use. The coding carried out by the supplier results in a unique identifier for your beacon called the HexID. When the HexID is decoded it reveals the country code (503 is Australia) and, depending on the protocol used, a vessel or aircraft radio callsign, MMSI or registration, or a serial number linked to the registration database and, in the case of beacons with input, a GPS position.

If a beacon is coded with an MMSI, radio callsign or aircraft registration, it is tied to that vessel or aircraft and if it is transferred to another vehicle it would have to be recoded. Beacons coded using either the manufacturers' serial numbers or national serial numbers available from AMSA can be transferred more easily.

406 MHz EPIRB MODELS

BRAND	MODELS				DISCONTINUED MODELS	
	 <p>RLB32 Satellite 2 406</p>	 <p>RLB35 Globalfix 406</p>	 <p>ResOMate</p>		 <p>RLB27 Satellite 406</p>	 <p>RLB33 Rapidfix 406</p>
	 <p>MT400</p>	 <p>MT403G</p>		 <p>MT401</p>		
	 <p>TRON 30S</p>	 <p>TRON 40S and GPS</p>	 <p>TRON 45SX</p>			
	 <p>406 WH, S, WS & FH</p>	 <p>406 PRO Series</p>	 <p>406 M</p>	 <p>406 Manual/Auto</p>		
	 <p>RB6</p>					
	 <p>E5 SMARTFIND</p>	 <p>G5 FASTFIND PLUS</p>		 <p>E3 SOS RESCUE</p>	 <p>G4 SOS PRECISION</p>	
	 <p>EP50/EG50 (GPS)</p>	<p>IMPORTANT NOTICE *</p> <ul style="list-style-type: none"> • From 1 February 2009, analogue 121.5 MHz distress beacons are no longer detected by satellite. • You must carry a digital 406 MHz distress beacon. 				