

Subject: Emergency Locator Transmitters and Personal Locator Beacon - Annual Testing

Ref. Publications:

- Schweizerischen Sicherheitsuntersuchungsstelle (SUST) [Schlussbericht Nr. 2298](#) dated 08 June 2017.
- National Transportation Safety Board (NTSB) [reports](#) on the accident WPR16FA040 of Airbus Helicopters AS350 N74317 dated 06 December 2018.
- National Aeronautics and Space Administration (NASA) Technical Memorandum (TM) [TM-2016-219217](#), "Emergency Locator Transmitter System Performance During Three Full-Scale General Aviation Crash Tests", dated 01 July 2016.
- [NASA/TM-2017-219584](#), "Emergency Locator Transmitter Survivability and Reliability Study", dated 01 February 2017.
- United States (US) "[Code of Federal Regulations \(CFR\) Part 91, Subpart C, § 91.207 \(d\)](#), Emergency locator transmitters".
- [Canadian Aviation Regulations \(CAR\) Part VI, Standard 625, Appendix C Section 12](#), Emergency Locator Transmitters (ELT).
- [Federal Aviation Administration \(FAA\) Advisory Circular \(AC\) 91-44A](#), "Installation and Inspection Procedures for Emergency Locator Transmitters and Receivers", dated 02 January 2018.
- [European Organisation for Civil Aviation Equipment \(EUROCAE\) ED-62B](#), "Minimum Operational Performance Standard for Aircraft Emergency Locator Transmitters".
- COSPAS-SARSAT [Handbook of Beacon Regulations](#).
- COSPAS-SARSAT [Beacon Maintenance](#).
- COSPAS-SARSAT [Testing Your 406-MHz Beacon](#).
- [EASA SIB 2013-04](#) Hook and Loop Style Fasteners as Mounting Mechanism for an Emergency Locator Transmitter.
- [EASA CM-AS-008 Installation of ELTs](#).
- [CS 27.1470 and AMC: Emergency locator transmitters](#).
- [CS 29.1470 and AMC: Emergency locator transmitters](#).

Applicability:

All operators of aircraft equipped with ELT of type Automatic Fixed (AF) or Automatic Portable (AP), and all holders of a Type Certificate (TC) or Supplemental Type Certificate (STC) for aircraft type designs fitted with such ELT.

All operators of aircraft equipped with Personal Locator Beacon (PLB) carried to fulfil Regulation (EU) 965/2012 on Air Operations.

This is information only. Recommendations are not mandatory.



Description:

ELT and PLB are passive and dormant devices, whose status is unknown until they are required to perform their intended function. The performance is highly dependent on the beacon reliability, on proper installation and post-installation testing.

While the ELT manual self-test, as recommended by the beacon manufacturer, will monitor the correct functioning of most components, it gives neither information on the health of the g-switch or the performance of the antenna feed, nor on the condition of the battery.

The mechanical g-switch of an automatic ELT is generally used to detect the aircraft deceleration during impact. NASA documented the degradation over time of the performance of ELT, when subject to vibrations (see referenced NASA/TM above). Ineffective g-switches were also reported in accident reports (see referenced reports above).

Similarly, battery defects, degradation of the antenna feed or degradation of the ELT installation, are generally not detected by ELT manual activation, although they can also hinder the transmission of the ELT distress signals following an accident.

US CFR Part 91, Subpart C, § 91.207 (d) and CAR Part VI, Standard 625, Appendix C Section 12 (see references above) are requiring an annual test of the automatic ELT to detect such defects. Most ELT manufacturers refer to these regulations for US and Canadian operators, but do not provide or recommend a minimum testing interval for operators not subject to these regulations.

In addition, the Agency became aware that ELT are often not tracked as critical parts. Consequently, ELT manufacturers have limited visibility on ELT reliability in the field, which limits their ability to detect and report potential unsafe conditions.

Nevertheless, poor handling of ELT and PLB results in an unacceptable high rate of false alerts, which reduces the efficiency of the system and unduly divert Search and Rescue (SAR) resources. Testing ELT or PLB without precautions is one of the main cause of such false alerts. Regardless of where the beacon is and of the duration of its activation, operational 406 MHz beacon signals will be instantaneously detected by the COSPAS-SARSAT system. Alert messages will be routed to every Mission Control Centre in the COSPAS-SARSAT system for coordination around the world, and a response will be made (unless prior coordination was made with COSPAS-SARSAT and local authorities). Transmission of a false alert is punished by law in many countries. As a result, the beacon must be tested by activating the self-test mode, or with a dummy load attached to the antenna connector. Without such precautions, the beacon will transmit a message that will be received and processed by the SAR services as a real distress. The beacon manufacturer manual provides instructions appropriate to test the beacon.

Most beacons, in particular all beacons that are approved in accordance with TSO or ETSO-C126 at revision A or higher have a self-test capability. By activating the self-test using the dedicated switch or position of the beacon or remote controls. This will result in the transmission to the COSPAS-SARSAT satellites of a test signal, composed of a 406 MHz single burst, with a specific pattern that will be **not** transmitted to SAR services. During the self-test, the ELT will transmit up to 3 sweeps audible on the 121.5 MHz frequency.

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Activating an ELT by not using the self-test command will result in transmission of both 406 MHz and 121.5 MHz operational signals on its antenna connector. This latter must therefore be disconnected from the antenna and connected to a 50-ohm dummy load or antenna boot, to prevent the signal to be radiated into space. Testing a beacon in a metal hangar cannot guarantee that the radiated signal will not be detected by the COSPAS-SARSAT system. Technicians testing ELT devices in a hangar should therefore perform the test as if they were testing outside. The level of 406 MHz emissions should be less than -51 dBW in an area immediately external to the manufacturers' facility. The -51 dBW is equivalent to a power flux density of -37.4 dB (W/m²) or a field intensity of 11.6 dB (V/m).

For ELT without self-test mode capabilities, the frequency and power shall be verified with the appropriate equipment directly at the ELT antenna connector, and the performance of the ELT antenna and its feed should be verified without ELT, e.g. by using a Voltage Standing Wave Ratio (VSWR) analyser.

Besides these considerations addressing the beacon ability to perform its operation, some ELT and PLB are installed in floating survival equipment, such as life jacket, survival rafts or other floatation devices. Beacon battery failures resulting in a puncture of the floatation fabric have already been reported to the Agency. The inspection of the beacon battery should therefore also confirm that the article to which it is attached is not impaired.

At this time, the safety concern described in this SIB is not considered to be an unsafe condition that would warrant Airworthiness Directive (AD) action under Regulation (EU) [748/2012](#), Part 21.A.3B.

Recommendation(s):

EASA recommends that all affected operators accomplish a self-test of ELT and PLB as required by the manual of the beacon manufacturer.

EASA recommends that all affected operators perform an annual verification of the beacon registration.

EASA recommends that all affected operators accomplish, in accordance with the terms and conditions laid down in the relevant provisions of Regulation (EU) 1321/2014, as revised, a visual inspection of the ELT(AF) and ELT(AP) combined with an annual test and inspection in accordance with the Appendix 1 of this SIB.

EASA recommends all affected TC and STC holders to update their Instructions for Continued Airworthiness (ICA) of the affected products and modifications, by implementing a visual inspection of the ELT(AF) and ELT(AP) combined with an annual test and inspection in accordance with the Appendix 1 of this SIB.

EASA recommends all affected TC and STC holders to correct the ICA of the affected products and modifications if they do not implement the precautions to avoid the transmission of operational alerts described in the Appendix 1 of this SIB.

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Contact(s):

For further information contact the EASA Programming and Continued Airworthiness Information Section, Certification Directorate, E-mail: ADs@easa.europa.eu.

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Appendix 1: ELT Annual Test and Inspection

Test and verification objectives:

The ELT test and inspection should address the following aspects:

- ELT installation has not degraded (attachment to the aircraft structure, connectors, cables, antennas);
- absence of battery defect (absence of leak, vent, deformation, trace of heating);
- if the ELT is fitted in or attached to an article intended for floatability: absence of wear, puncture of the article fabrics that may affect the floating capability;
- g-switch operation;
- transmitted power and frequencies.

Acceptable methods of accomplishment:

The test and inspection should be accomplished in accordance with the manufacturer recommendations. In absence of manufacturer recommendations or if the manufacturer recommendations do not cover the objectives described above, the instructions of FAA AC 91-44A change 1 section 9, or those of section 7.2.4 of EUROCAE ED-62B could be used.

Precautions during ELT test:

Except in distress situation, the transmission of operational signal into space should be avoided and is punished by law in many countries. ELT should be verified by using the self-test mode only.

To verify the operation of the g-switch or to verify the performance of ELT when no self-test is implemented, the ELT antenna connector should be connected to a 50-ohm dummy load and/or directly to a means to measure the signal characteristics.

For beacons whose self-test does not limit the duration of the 121.5 MHz signal, the audio modulation of the 121.5 MHz signal should be limited to three sweeps of the 121.5 MHz signal.

Before performing any beacon test that may result in transmission, including self-test, the beacon owners should refer to national regulations or procedures. Some countries require that all tests are performed within the first five minutes after any hour, and that a coordination is performed with the local Rescue Coordination Centre (RCC) or Air Traffic Control prior to any test leading to an operational transmission.

If a beacon is inadvertently activated in its distress mode, the operator should deactivate the beacon (if it has a deactivation function) AND contact the nearest COSPAS-SARSAT Mission Control Centre or local RCC as soon as possible to request cancellation of the distress alert (Deactivating the beacon alone does NOT cancel the distress alert that already has been transmitted by the beacon and received by COSPAS-SARSAT).

Additional guidance is provided on COSPAS-SARSAT [Testing Your 406-MHz Beacon webpage](#).

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Action for failed ELT:

If an ELT is found failed or inoperative, as a result of self-test or inspection, the unit should be returned to the manufacturer or one of its approved repair centres, along with the report on its malfunction and estimated flight time. Before shipping, the unit must be disabled according to the manufacturer instructions and its registration updated.

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