Australian Government
Civil Aviation Safety Authority

Airworthiness Bulletin

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Emergency Locator Transmitter (ELT) Installation and Maintenance

An Airworthiness Bulletin is an advisory document that alerts, educates and makes recommendations about airworthiness matters. Recommendations in this bulletin are not mandatory.

1. Effectivity

All aircraft required to carry an emergency locator transmitter (ELT) in accordance with the respective Civil Aviation Safety Regulations (CASR) (1998) Manuals of Standards.

2. Purpose

Advise aircraft operators, pilots and maintenance personnel regarding installation, and continuing airworthiness aspects of these devices in order to improve the performance and reliability of these units under emergency conditions and increase the likelihood of achieving the intended safety benefit.

3. Background

The ATSB states: “Emergency locator transmitters are radio beacons carried on most aircraft so that in the event of an accident in a remote location the aircraft wreckage and its occupants can be located quickly by Search and Rescue (SAR) operations. Finding the aircraft wreckage quickly not only increases the chance of survival of the occupants, but also reduces the risk to pilots of SAR aircraft who commonly need to operate in marginal weather conditions and over mountainous terrain”.

The relevant Manuals of Standards detail the circumstances in which the carriage of an emergency locator transmitter (ELT) is required for flights in Australian airspace. ELTs are distress beacons which are activated following an accident either automatically or manually by a pilot or other person. An active beacon is detected by orbiting satellites which transmit a signal to Search and Rescue (SAR) coordinators. An internationally utilised service provider ‘Cospas-Sarsat’ is currently used in Australia to provide satellite-based ELT monitoring services. The ELT also emits a transmission on a frequency which can be detected, and homed in on, by overflying aircraft.

NOTE: *The Cospas-Sarsat system ceased processing the 121.5/243 MHz signals from distress beacons on 31 January 2009. The system now only detects 406 MHz beacons. The current requirement is that the 406/121.5 MHz ELT must be registered with the Australian Maritime Safety Authority (AMSA). This is crucial for the proper operation of the ELT and is a free service. More information about the registration process is available on the AMSA website or by calling (free call) 1800 406 406.*

Data from the ATSB's database show that ELTs function as intended in about 40 to 60 percent of accidents in which their activation was expected. Records from AMSA's SAR incidents show that ELT activation accounted for the first notification in only about 15 percent of incidents. However, these ELT activations have been directly responsible for saving an average of four lives per year.

The ATSB also found carrying a personal locator beacon (PLB) in place of or as well as a fixed ELT will most likely only be beneficial to safety if it is carried on the person, rather than being fixed or stowed elsewhere in the aircraft.

In accidents where ELTs did not work effectively (or at all) it was found that their performance could be affected by:

- Not selecting the ELT activation to armed before flight
- Incorrect installation
- Flat batteries
- Lack of water proofing
- Lack of fire protection
- Disconnection of the co-axial antenna cable from the unit during impact
- Damage and/or removal of the antenna during impact
- Aircraft coming to rest inverted after impact (shielding the antenna).

This AWB seeks to address the continuing airworthiness aspects of ELTs. Pilots, operators, and maintainers of general aviation and low-capacity aircraft need to be aware that fixed, automatic ELTs should be installed, maintained, and operated in accordance with approved data in order for the device to function as intended.

ELT Installation

The inability to quickly locate aircraft wreckage after an accident in a remote location is frequently due to disconnection and damage to the antenna during impact, and other installation and mounting faults which indicate that the initial installation of the ELT system was not in accordance with approved data. Inappropriate designs and/or improper installations may also lead to inadvertent activation and false alarms. The ELT system should be installed in the aircraft, as with any modification, in accordance with approved data.

ELT Maintenance

A periodic inspection of the ELT system should be carried out in accordance with the aircraft's maintenance schedule. If the aircraft's maintenance schedule does not contain sufficient requirements for inspecting and maintaining the ELT system, the maintenance schedule needs to be amended to meet the registered operator's responsibilities under regulations 41 and 42 of the Civil Aviation Regulations 1988 (CAR 1988) for Class B aircraft.

Where approved data from the ELT component manufacturer and Type Certificate holder are found to be insufficient, FAA AC 43 13-1B Chapter 12-22 may be used, if AC 43.13-1B is identified in the aircraft logbook statement as part of the aircraft maintenance data or is otherwise identified or incorporated in an approved maintenance schedule.

ELT Testing

All Cospas-Sarsat type approved 406 MHz beacons include a self-test mode of operation. The content of the self-test message always provides the beacon 15 Hex ID, except for location protocol beacons when they are transmitting a self-test message encoded with a GNSS position. The transmission of a self-test GNSS position is optional.

The complete self-test transmission is limited to one burst and is activated by a separate switch position. The Australian-New Zealand 406 MHz EPIRB and PLB beacon standard requires that the 121.5/243 MHz transmission during the self-test is restricted to just one second.

The self-test function performs an internal check and indicates that RF power is being emitted at 406 MHz and at 121.5 MHz, if applicable. The beacon will provide an indication of the success or failure of a GNSS self-test. The self-test mode signal is not processed by the satellite equipment.

Accidental Activation of ELTs

If you accidentally activate your ELT, call AMSA Search and Rescue on 1800 641 792.

False alarms detract from the integrity of the SAR system and cause great inconvenience to SAR personnel as they seek to confirm the authenticity of the emergency signal. Causes of false alarms include inadvertent activation and self or uncommanded activation which has been known to occur while the aircraft is static, parked in the hangar, or during taxi and flight.

Uncommanded activation may be caused by corrosion following battery acid leaking from the ELT battery set, water ingress, radio activation and heat. Inadvertent activation is sometimes caused by passengers via induced shock caused by bumping the unit, or accidental activation of the ELT switch during cleaning or other maintenance. Consideration should also be given to isolating the ELT from other power sources to prevent inadvertent activation caused by electromagnetic interference.

Batteries

A further problem has been highlighted by defect reports regarding the type of battery used. Some ELTs are designed to use only Duracell MN1300 Alkaline Batteries which are date stamped by the manufacturer. These batteries are manufactured in America and are manufactured to imperial specifications. Duracell batteries supplied by European and Australian manufacturers, however, can be slightly larger in diameter, being manufactured to metric standards. Using the wrong sized battery in these beacons is a common error which may result in chaffing. Chaffed batteries can result in false alarms or damage to the equipment. The correct batteries should be used in accordance with the ELT manufacturer's instructions.

Part 91 Manual of Standards clause 26.49(e) states that if the ELT is fitted with a lithium-sulphur dioxide battery, the battery must be of a type authorised by the FAA or EASA in accordance with (E)TSO-C142a.

When reassembling and re-installing ELTs after battery maintenance, care should be taken to ensure correct alignment of the ELT case in accordance with the manufacturers' instructions to ensure the case is not cracked by over-torquing screws and achieves the design requirements for moisture exclusion, crashworthiness etc. and that the installation is IAW the unit instructions.

Other battery problems can occur when aircraft are operated in extremely hot climates, such as found in central and northern Australia. Extreme heat can result in leaking electrolyte. A physical check of the ELT should be performed at least every 100 hours' time-in-service or 12 months, whichever is the earlier. If the ELT is exposed to extreme heat, consideration should be given to more frequent inspections to ensure that no battery leakage has occurred.

Lack of emergency SAR signals is known to have been caused by deficiencies such as (but not limited to): time-expired and flat batteries; loss of ELT battery electrolyte; corroded battery compartments where the battery contacts have high resistance; acidic battery electrolyte corroding through the power wire from the battery to the transmitter; and installation of incorrect batteries which have chaffed the compartment. In some cases of battery failure, it was apparent that the person responsible for the previous battery change had not done the job in accordance with the ELT manufacturer's instructions.

4. Recommendations

CASA recommends the following:

(a) Automatic ELT systems are installed only in accordance with approved data.

(b) Operators and maintenance personnel should install only those battery packs or batteries specified in the equipment manufacturer's maintenance instructions or batteries which have FAA Parts Manufacturing Approval and are listed as being approved for the particular ELT to which they are to be fitted.

(c) Persons involved in ELT maintenance are reminded of their obligation to perform such maintenance (including battery changes) strictly in accordance with the manufacturer's instructions or, if the manufacturer's instructions are insufficient, in accordance with other approved data.

(d) Pilots and operators should consider the ATSB statement: "The effectiveness of ELTs in increasing occupant safety and assisting SAR efforts may be enhanced by using a GPS-enabled ELT, using an ELT with a newer 3-axis g-switch, ensuring it is installed correctly".

(e) Ensure your ELT is registered with AMSA, and where possible, pre-emptively activate the beacon if a forced landing or ditching is imminent.

(f) Aircraft operators, maintainers and pilots should refer to the Australian Government Maritime Authority (AMSA) website for further information regarding proper storage and disposal of ELT batteries.

5. Reporting

All reports of defects in relation to ELT systems or installation deficiencies, should be made via the Defect Reporting system.

6. Enquiries

Enquiries regarding the content of this Airworthiness Bulletin should be made via the direct link email address:

AirworthinessBulletin@casa.gov.au

or in writing, to:

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National Operations and Standards
Civil Aviation Safety Authority
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