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ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

SUBJECT: EMERGENCY LOCATOR TRANSMITTERS
OPERATIONAL AND MAINTENANCE PRACTICES

1. **PURPOSE.** This advisory circular provides guidelines relative to the installation, maintenance, and operation of emergency locator transmitters (ELT).
2. **CANCELLATION.** The following Advisory Circulars are cancelled: AC 00-35A, dated September 28, 1973; AC 00-36, dated March 15, 1973; AC 00-40, dated October 3, 1973; and AC 00-47, dated May 21, 1975.
3. **BACKGROUND.** In 1970, Congress enacted Public Law 91-596 amending Section 601 of the Federal Aviation Act of 1958 to require the installation of "emergency locator beacons" on U.S. registered civil airplanes. Federal Aviation Regulations were amended to implement this legislation. Among other regulations, FAR 91.52 and FAR 37.200 were adopted. FAR 91.52 requires that U.S. registered civil aircraft engaged in various types of operations be equipped with emergency locator transmitters meeting minimum performance standards. These standards are published in FAR 37.200, Emergency Locator Transmitters-TSO C-91.
4. **DEFINITION.** References containing the performance standards for these various ELT types are listed in Technical Standard Order (TSO) C-91, Emergency Locator Transmitters (FAR 37.200).
 - a. **Emergency Locator Transmitter (ELT).** This is a small radio transmitter radiating at least 75 milliwatts (peak effective radiated power) on 121.5 and 243 megahertz. It is modulated at least 85% by a downward sweeping audio tone over the spectrum of at least 700 hertz between 1600 hertz and 300 hertz, at a repetition rate of 2-4 times per second. It is activated by an inertial switch or equivalent system which will turn on the transmitter automatically when subjected to a force of 5(+2,-0) gravities and greater for a duration of 11(+5,-0) milliseconds and greater when the force is applied in a direction parallel to the longitudinal axis of the aircraft.

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- b. ELTs are of five types, differing in their installation requirements and performance standards. These ELT types are:

- (1) Type ELT (P), Personnel type
- (2) Type ELT (AF), Automatic fixed type
- (3) Type ELT (AP), Automatic portable type
- (4) Type ELT (AD), Automatic deployable type
- (5) Type ELT (S), Survival type

5. INSTALLATION. The installation requirements for ELTs are given in FAR 91.52 and FAR 37.200. In addition, installation of ELTs will vary according to whether the ELT is a fixed or a portable type. Some points to consider in this matter are:

a. Fixed Type Installation

- (1) In mounting the unit, maintain adequate clearance from control cables, pulleys, bell cranks, wiring, and attach to a rigid structural member of the aircraft.
- (2) When installed, the ELT should be visually and physically accessible to allow for easy monitoring of the battery change date and for arming of the unit.
- (3) Locate the ELT antenna as far as practicable from the other antennas on the airplane to prevent interaction between the avionics systems.

- b. Portable Type Installation - Automatic Portable types, ELT (AP), may be mounted in the cockpit cabin area or other locations. Experience has shown that ELT (AP) installations are adequate for search and rescue purposes when:

- (1) The ELT (AP) is oriented so that the inertial switch will operate when a force is exerted in the direction of the longitudinal axis of the airplane. Most ELTs have an arrow on the case indicating the proper orientation. The arrow should point forward.
- (2) The antenna is fully extended and in a vertical position when the airplane is in the normal flight attitude.
- (3) The extended antenna is as close to a window as possible without touching the metal window casing or other metal airplane parts. If the antenna is not enclosed in an insulating sleeve, one may be slipped over the antenna in those areas where the antenna is likely to touch metal if the cockpit area is deformed in a crash.

- (4) The antenna is located in the approximate center of the window so that at least 12 inches of the antenna length is exposed to the window. The window should be at least 12 inches high and 12 inches wide to accommodate the antenna.
 - (5) The manufacturer's installation instructions are followed. Approval of ELT (AP) equipment installations with the antennas mounted internally to the airplane as described above may be granted without an antenna radiation pattern measurement.
- c. In any case, the person performing the installation should:
- (1) Perform an operational test on the ELT after the installation is completed, in accordance with paragraph 7. a. of this advisory circular. The test should also include operation of the airplane avionics systems with the ELT armed. This will check for inadvertent activation of the ELT by the proximity of strong RF signals, such as from the VHF transmitter.
 - (2) Follow the manufacturer's instructions. When manufacturer's instructions are not provided, use standard installation practices as outlined in AC 43.13-1A, Acceptable Methods, Techniques, and Practices, Aircraft Inspection and Repair, and AC 43.13-2, Acceptable Methods, Techniques, and Practices, Aircraft Alterations.
- d. After making the installation, certain documentation must be added to the aircraft maintenance records. An entry in the aircraft's maintenance record is required for comparatively simple installations, such as bracket mounting and a single hole for an antenna mount. FAA Form 337, Major Alteration and Repair (Airframe, Powerplant, Propeller, or Appliance) (OMB 04-R0060), is required for more complex installations (see FAR 1 and 43, Appendix A), such as those requiring the penetration of a pressurized fuselage or bulkhead or of a stressed skin area.

6. MAINTENANCE.

- a. Aircraft owner/operator ELT maintenance is primarily limited to battery replacement. Aircraft owners/operators are responsible for compliance with the ELT battery requirements of FAR 91.52, which require that the batteries be replaced when:
- (1) The transmitter has been in use for more than one cumulative hour, or
 - (2) When 50% of the useful life of the battery (or, in the case of rechargeable batteries, 50% of the useful charge life of the

battery) has expired. This time is indicated by the date stamped on the battery case of the ELT.

- (3) After battery replacement and/or during the annual or 100-hour inspection, use the aircraft communication receiver (if available) or other receiver to check operation of the unit as outlined in paragraph 7a.
- b. The fifty percent useful life criterion for replacement or recharging of batteries is a very practical means of assuring adequate ELT power and battery life. It provides a safety margin by taking into consideration reasonable exposures to adverse conditions such as temperature extremes and typical decay, or discharge, of battery capacity when the ELT is in the "ready to use" condition.
- c. Replacement batteries may be obtained from ELT manufacturers, aircraft manufacturers, and other acceptable battery suppliers. Only batteries of a type approved by the ELT manufacturer should be used; over-the-counter batteries of the type that are generally sold for flashlights, portable radios, etc., are not recommended for use as replacement batteries in an ELT, since their condition and useful life are generally unknown.
- d. Proper battery replacement may be made by certificated pilots under the preventative maintenance provisions of FAR 43.3(h), except those battery replacements requiring the soldering of cells together. Rechargeable batteries should be recharged in accordance with the manufacturer's instructions, using approved recharging methods and testing procedures.
- e. Aircraft owners and operators should be aware of the battery expiration date on their ELTs. Careful judgement and advance planning should be made to insure that timely procurement is made of replacement batteries. This is particularly required for batteries with a replacement life measured in years. During routine maintenance or an annual 100-hour inspection, if maintenance personnel find the ELT battery expiration date has passed or will soon expire, they should notify the aircraft owner/operator of this condition.
- f. An exception to the above is the case of water-activated batteries, such as used in some survival type ELTs. These batteries have a virtually limitless shelf life, so they do not have an expiration date such as described above. However, they should be replaced after activation, regardless of time of use.

7. OPERATIONS.

a. An ELT activation produces a signal which is used to aid in finding aircraft in distress. Federal Communications Commission regulations prohibit operation of an ELT except in emergencies. Testing of an ELT should be done in accordance with the manufacturer's instructions, preferably in a shielded or screened test room to prevent the broadcast of signals which could trigger a false alert. If this can not be done, or if an operational test such as recommended in paragraph 5 is to be performed, the individual should keep the following criteria in mind:

- (1) Tests should not be longer than three audio sweeps (one audio sweep is defined as amplitude modulating the carrier with an audio frequency sweeping downward over a range of not less than 700 Hz, within the range 1600 to 300 Hz.
- (2) If the antenna is removable, a dummy load should be substituted for the test.
- (3) Tests should be conducted only in the first five minutes of any hour. If the operational tests must be made at a time not included within the first five minutes after the hour, the tests should be coordinated with the nearest FAA tower or flight service station.

b. Numerous cases of inadvertent ELT activations have occurred as a result of acrobatics, hard landings, or aircraft maintenance. To minimize this, the following procedure is recommended:

- (1) Prior to engine shutdown at the end of each flight, pilots should tune the aircraft's VHF receiver to 121.5 MHz and listen for ELT audio sweeps.
- (2) If an ELT signal is heard, turn off your aircraft's ELT to determine if your transmitter is the one in operation. If you find that it has been activated, maintenance may be required before the activated unit is returned to the "ARMED" position.

c. Any time maintenance is performed in the vicinity of the ELT, the mechanic should tune the VHF communications receiver to 121.5 MHz and listen for ELT sweeps using the same procedure as above.



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