Transport Canada Transports Canada

Advisory Circular

Subject: **Maintenance of Emergency Locator Transmitters (ELTs)**

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1.0 Introduction

(1) This Advisory Circular (AC) is provided for information and guidance purposes. It describes an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

(1) The purpose of this document is to provide guidance on the maintenance requirements for emergency locator transmitters (ELTs) required to be installed pursuant to section 605.38 of the *Canadian Aviation Regulations* (CARs).

1.2 Applicability

(1) This document applies to aircraft owners, operators, pilots, Approved Maintenance Organizations (AMOs), Aircraft Maintenance Engineers (AMEs) and maintainers.

1.3 Description of Changes

(1) Not applicable.

2.0 References and Requirements

2.1 Reference Documents

(1) It is intended that the following reference materials be used in conjunction with this document:

- (a) *Aeronautics Act* (R.S.C., 1985, c. A-2)
- (b) Part I, Subpart 1 of the CARs — *Interpretation*;
- (c) Part V, Subpart 71 of the CARs — *Aircraft Maintenance Requirements*;
- (d) Part VI, Subpart 5 of the CARs — *Aircraft Requirements*;
- (e) Airworthiness Manual Chapter 551 — *Aircraft Equipment and Installation*
- (f) Standard 571 of the CARs — *Maintenance*;
- (g) Standard 625 of the CARs — *Aircraft Equipment and Maintenance Standard*;
- (h) Advisory Circular AC 605-002 — Reliability Methods for Maintenance Schedule Amendment
- (i) Transport Canada Publication, TP 13094 — Maintenance Schedule Approval Policy and Procedures Manual;
- (j) TP 14371 - Transport Canada Aeronautical Information Manual (TC AIM)

2.2 Cancelled Documents

(1) Not applicable.

(2) By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void.

2.3 Definitions and Abbreviations

(1) The following **definitions** are used in this document:

(a) **Elementary Work**: specific tasks listed in Appendix A of Standard 625 of the CARs. It is a form of maintenance that requires a technical record entry in accordance with sections 571.03 and 605.94 of the CARs but does not require a maintenance release pursuant to section 571.10 of the CARs;

(b) **Emergency Locator Transmitter (ELT)**: aircraft equipment that broadcasts a distinctive signal on designated radio frequencies to facilitate a search and rescue operation following an aircraft emergency. The types of ELTs required are described in section 605.38 of the CARs and the Transport Canada Aeronautical Information Manual (TC AIM) TP 14371.

(c) **Maintenance**: overhaul, repair, required inspection or modification of an aeronautical product, or the removal of a component from or its installation on an aeronautical product, but does not include elementary work, servicing; or work performed on an aircraft by the manufacturer prior to the issuance of whichever of the following documents is issued first:

(i) a certificate of airworthiness,

(ii) a special certificate of airworthiness, or

(iii) an export airworthiness certificate;

(d) **Aircraft Maintenance Schedule:** a schedule required by section 605.86 of the CARs for the performance of inspections and other required maintenance; depending on type of aircraft and operation, the schedule may be pre-approved or formally approved by TCCA.

(e) **Operational Test:** a verification of the operating features of an ELT through on-aircraft testing such as an ELT self-test.

(f) **Performance Test:** a verification of the ELT functionality through inspections and tests in a shop environment utilizing specialized equipment.

(g) **Programming Dongle:** a device installed in the aircraft that contains the identification information of the aircraft. When connected, the ELT is updated with the aircraft information. The Programming Dongle may also be referred to as a configuration module or Nav-Interface unit.

(h) **Scheduled Maintenance**: any maintenance performed at predetermined intervals required by an aircraft maintenance schedule or an airworthiness directive.

(i) **121.5 MHz ELT**: ELTs capable of transmitting on 121.5 Mega Hertz (MHz) frequency and includes ELTs that transmit simultaneously on 121.5 MHz and 243.0 MHz frequencies. For example ELTs conforming to CAN-TSO-C91a.

(j) **24-bit Aircraft Address**: Canadian registration marks converted to a binary format used as part of the registration of an ELT.

(k) **406 MHz ELT**: ELTs capable of transmitting on 406 MHz frequency and includes ELTs that transmit simultaneously on 406 MHz and 121.5 MHz frequencies. For example ELTs conforming to CAN-TSO-C126b or later revision.

(2) The following **abbreviations** are used in this document:

(a) **AME**: Aircraft Maintenance Engineer

(b) **AMO:** Approved Maintenance Organization

(c) **CAN-TSO:** Canadian Technical Standards Order

(d) **CARs**: Canadian Aviation Regulations

(e) **CBR**: Canadian Beacon Registry

(f) **CBRV**: Canadian Beacon Registry Verifier

(g) **ELT**: Emergency locator transmitter

(h) **MHz**: Mega Hertz

(i) **STD**: Standard

(j) **TCCA**: Transport Canada Civil Aviation

(k) **UTC**: Coordinated universal time

3.0 Background

(1) An Emergency Locator Transmitter (ELT) is a radio transmitter device which broadcasts distinctive signals on designated frequencies and, depending on application, may be automatically activated by impact or be manually activated. To maintain an ELT's reliability, maintenance is required to be performed as part of an aircraft's maintenance schedule.

(2) The ELT maintenance requirements are based on several decades of service experience taking into consideration the harsh and remote Canadian environment. With the passage of time, common ELT failure modes were identified and were subsequently addressed in the new maintenance requirements standards in Appendix C of Standard (STD) 625 and Appendix G of STD 571 of the CARs.

(3) These new maintenance requirements came into effect on August 1, 2019. They were updated to distinguish between 121.5 Mega Hertz (MHz) capable ELTs and 406 MHz capable ELTs, and to update the applicable standards of airworthiness to maintain ELTs.

(4) This AC provides information and details on each section of the updated maintenance requirements found in Appendix C of STD 625 and Appendix G of STD 571 of the CARs. Additional information is also included on ELT system maintenance, shipping, ELT registration and disposal.

4.0 Scheduled Maintenance Requirements

(1) All aircraft except for ultra-light aeroplanes, hang gliders and remotely piloted aircraft require an aircraft maintenance schedule that meets the requirements of section 605.86 of the CARs.

(2) Whether the schedule is pre-approved or formally approved by TCCA, installed ELTs required by section 605.38 of the CARs must be maintained in accordance with Appendix C of STD 625 of the CARs including the inspection of the installed system in accordance with the aircraft's maintenance schedule. Section 8.0 of this AC relates to on-aircraft ELT system maintenance.

(3) The new initial intervals in Appendix C of STD 625 of the CARs depend on the frequency transmitted by the ELT.

(a) 121.5 MHz ELT – non-water-activated batteries **(no-change):**

(i) Performance test every 12 months;

(ii) Battery replaced at ELT manufacturer's recommended interval.

(b) 121.5 MHz ELT – water-activated batteries **(no change):**

(i) Performance test every 5 years;

(ii) Battery replaced at ELT manufacturer's recommended interval.

(c) 406 MHz ELT – non-water-activated batteries **(new):**

(i) Operational test every 12 months;

(ii) Performance test every 24 months;

(iii) Battery replaced at ELT manufacturer's recommended interval.

(d) 406 MHz ELT – water-activated batteries **(new):**

(i) Performance test every 5 years;

(ii) Battery replaced at ELT manufacturer's recommended interval.

(4) Aircraft owners who utilize the pre-approved aircraft maintenance schedule in accordance with Appendix B and C of STD 625 of the CARs wishing to utilize the new intervals for 406MHz ELTs can simply make a journey log entry describing that the ELT is now maintained to the new intervals and indicate when the next tests and battery replacement are due.

Note: Journey Log entry example: 406 MHz ELT [make, model and serial number] is now being maintained to the new STD 625 Appendix C intervals. Next operational test is due on 2019-12-31. Next performance test is due on 2020-06-30. ELT battery is due to be replaced by 2022-06-30.

(5) Aircraft owners who have a formally approved aircraft maintenance schedule and who wish to utilize the new intervals for their installed 406MHz ELTs will need to submit a request in writing for a deviation in accordance with subsection 605.86(3) of the CARs to their TCCA Principle Maintenance Inspector.

(6) The request will need to include a reason for the request (utilize the new intervals in STD 625 Appendix C of STD 625 of the CARs for 406 MHz ELTs), a copy of the approved maintenance schedule and identified task, ELT model(s) affected and the need for additional maintenance to transfer the ELTs onto the new interval.

(7) If satisfactory, TCCA will grant the authorization and include that the operator must apply for an amendment to their approved maintenance schedule within 90 days as a deviation does not constitute a permanent amendment to an operator's approved maintenance schedule.

(8) Operators having a TCCA formally approved aircraft maintenance schedule are required to use initial ELT maintenance intervals in Appendix C of STD 625 of the CARs. However, once experience has been gained, operators may submit a request for amendment to their schedule to increase the ELT interval provided the request is supported by substantiating data such as reliability data from the operator. For more information on reliability programs and amendments to a maintenance schedule, please refer to AC 605-002 and TP 13094.

5.0 Operational Test

(1) The operational test provides a Go-No-Go indication that the ELT is, amongst other things, transmitting its emergency signal. This test is completed with the ELT installed in the aircraft.

(2) An operational test is required:

a) at the interval specified in Appendix C of STD 625 of the CARs or in the aircraft approved maintenance schedule;

b) when an ELT battery has been replaced or recharged; and

c) to confirm operation of the ELT following maintenance such as when the ELT is reinstalled or connectors disturbed.

5.1 Elementary Work or Maintenance

(1) The operational test may be performed as a maintenance task or an elementary work task.

(2) If performed as an elementary work task in accordance with paragraph 18 of Appendix A of STD 625 of the CARs and the test is successfully completed, only a technical record entry is required as per section 571.03 of the CARs.

(3) If performed as a maintenance task and the test is successfully completed, a technical record entry and maintenance release is required in accordance with sections 571.03, 571.10 and 605.85 of the CARs.

(4) If a person other than a qualified AME is performing the operational test as an elementary work task, prior experience in recognizing an ELT audio sweep and correct 406MHz signal information may be required to ensure the person can properly identify an acceptable emergency signal. Less experienced persons conducting operational tests should consult an experienced AME or AMO.

(5) Persons who will be performing the operational test as an elementary work task under a maintenance control system pursuant to Subparts 406, 604 or 706 of the CARs will be required to meet the training requirements of the organization prior to being authorized to perform the operational test.

5.2 121.5MHz Only ELT Operational Test

(1) The operational test is completed by following the steps in Paragraph 1 of Appendix G of STD 571 of the CARs.

(2) Ensure the test is conducting during the first five minutes of any coordinated universal time (UTC) hour and restrict the duration of the transmission to no more than 5 seconds. If not respected, it is a contravention to subsection 605.40(2) of the CARs.

(3) A successfully completed test is one where the ELT transmits when activated, a recognized ELT audio sweep is heard and the ELT ceases to transmit the audio sweep when deactivated.

5.3 406 and 121.5MHz ELT Operational Test

(1) The operational test is completed by following the steps in Paragraph 3 of Appendix G of STD 571 of the CARs. If the aircraft is equipped with a programming dongle, ensure that it is connected to the ELT prior to the operational test.

(2) The terms “operational test” and “self-test” are often interchanged. While the self-test is a main component of the operational test it may not address all the requirements of the operational test. The operational test is completed by following the manufacturer’s self-test procedure as well as verifying; the proper operation of the transmitter, the proper aircraft 24 bit address, and the 121.5 MHz signal (if it is activated by the self-test).

(3) When conducting a self-test, follow the ELT manufacturer’s instructions on how to put the ELT into self-test mode properly so as not to damage the ELT or transmit a false ELT signal.

(4) The 24-bit aircraft address can be verified using the ELT manufacturer recommended test procedure and equipment, a third party service such as the ELT manufacturer or the Canadian Beacon Registry Verifier (CBVR) developed by the Canadian Beacon Registry (CBR).

(5) To utilize the CBVR, the ELT needs to be properly registered with the CBR in order to receive an email message acknowledging that a self-test was performed verifying the status of the registration. If the self-test is successful and the registration is up to date, an email notification will be sent to the email address associated to the ELT registration file.

Note: If the 24-bit aircraft address is not correctly programmed, consult the ELT manufacturer's instructions.

(6) Confirm if the self-test function of the ELT being tested activates the 121.5 MHz transmission. If it does, the operational test should only be conducted during the first five minutes of any UTC hour and restricted in duration to not more than five seconds.

Note: Live testing of the 406 MHz transmission is not permitted for routine testing. Beacons activated in the live mode impact Rescue Coordination Centres worldwide and may inhibit the processing of genuine alerts. Under the limited circumstances that live testing may be performed, it must be coordinated with the appropriate authority prior to testing.

(7) An aural alert should sound whenever the ELT is activated. It may be integral to the ELT unit or a buzzer may be mounted remotely. It should be loud enough to be heard upon ELT activation when the aircraft engines are not running. Ensuring this alert functions correctly will reduce the chance of an inadvertently activated ELT going unnoticed.

(8) If the ELT fails the self-test it may, depending on the installation, provide an indication of the reason for the failure such as low battery voltage, low transmission power, no identification programmed, etc. Any fault detected by the self-test it is considered a failure of the operational test. Please refer to the ELT manufacturer's instructions for further information on ELT failures.

(9) A successfully completed test is one where the ELT self-test initiates when activated, the aural alert is heard, a recognized ELT audio sweep is heard, the 24-bit aircraft address is correct, the ELT ceases to transmit the audio sweep when deactivated and no fault is indicated by the ELT system.

6.0 Performance Test

(1) All ELTs require removal from the aircraft for a performance test in order to verify proper functionality of the ELT.

(2) The performance test is not elementary work and is classified as specialized maintenance. Specialized maintenance is performed and certified by a maintenance release by an organization meeting section 571.04 of the CARs (i.e. an AMO with a category of Avionics, a rating of Radio Systems and with the capability of performing ELT testing for the particular make and model).

Note: Performance testing is carried out in a suitable Radio Frequency shielded environment such as a screen room or shielded box.

6.1 121.5MHz Only ELT Performance Test

(1) The performance test is completed by following the steps in Paragraph 2 of Appendix G of STD 571 of the CARs.

(2) 121.5 MHz ELTs require a measurement of peak power and frequency after 3 minutes of operation. This is to ensure any older technology circuitry such as frequency crystals have time to stabilize for an accurate measurement.

(3) The performance test includes an inspection of the ELT and current draw verification. The ELT will need to be disassembled as necessary to complete these items. Follow the ELT manufacturer instructions if other preventative maintenance is required due to the disassembly of the ELT.

(4) A successfully completed test is one where the ELT passes the inspection and performance test criteria in paragraph 2 Appendix G of STD 571 of the CARs. Following the satisfactory completion, the date the test was performed is marked on the external casing in a legible and permanent manner. It should be in a location where it will be visible when the ELT is installed in the mounting tray. Whether marking is applied by using a sticker or other method, “in a legible and permanent manner” means it is expected to be easily readable until at least the next time the performance test is due.

6.2 406 and 121.5MHz ELT Performance Test

(1) The performance test is completed by following the steps in Paragraph 4 of Appendix G of STD 571 of the CARs.

(2) Some 406 MHz ELTs incorporate an internal antenna, so using a non-radiating load in place of the antenna may not be sufficient to prevent signal radiating which may cause a false alert and/or prevent signal reception at the satellite.

(3) The performance test includes an inspection of the ELT and current draw verification, so the ELT will need to be disassembled as necessary. Follow the ELT manufacturer instructions if other preventative maintenance is required due to the disassembly of the ELT.

(4) A performance test requires verification of the 406 MHz digital message i.e. identification and position. If the ELT model aircraft installation has a Programming Dongle installed, the 24 bit aircraft address may not be able to be confirmed during the test. It will need to be confirmed as part of the operational test of the ELT upon reinstallation. This must be noted on the Authorized Release Certificate for the ELT as additional maintenance to be performed upon installation.

(5) A successfully completed test is confirmed when the ELT passes the inspection and performance test criteria in paragraph 4 Appendix G of STD 571 of the CARs. Following the satisfactory completion, the date the test was performed is marked on the external casing. It should be in a location where it will be visible when the ELT is installed in the mounting tray. Whether marking is applied by using a sticker or other method, “in a legible and permanent manner” means it is expected to be easily readable until at least the next time the performance test is due.

7.0 Battery Maintenance

(1) ELT manufacturers establish a useful life for their batteries and provide an expiration date indicating when the battery will no longer meet its design requirements.

(2) In order to ensure the batteries continue to meet the in-service requirements, they need to be maintained in accordance with the ELT manufacturer’s instructions and replaced when any of the conditions requiring battery replacement listed in Paragraph 5, Appendix G of STD 571 of the CARs are met. 406MHz ELT’s may record time in use and give an error indication during a self-test when the maximum time in use is exceeded.

(3) While some batteries are designed for simple replacement others may require additional precautions. This could include wearing a grounded wrist strap and not touching the exposed circuit board and connector pins on the board to avoid damaging electrostatic discharge to sensitive components.

(4) When the battery is replaced or maintained, an inspection of the battery compartment needs to be conducted. This should include inspecting items such as the battery compartment, battery case and connectors for physical damage, fluid contamination and corrosion as well as wiring for breaks or damaged insulation. The manufacturer may specify replacing the battery case seal and any desiccant capsule along with the cells.

(5) Following each battery replacement, the date when the next replacement or prescribed maintenance becomes due needs to be marked on the external casing of the ELT in a way that will remain legible until at least the next replacement date, preferably where it is visible when the ELT is installed in the mounting tray. If the ELT is installed in a life raft the date needs to be marked on the outside of the raft.

(6) In the case of an ELT with rechargeable batteries, the batteries must be recharged when any of the conditions requiring battery recharging listed in Paragraph 5, Appendix G of STD 571 of the CARs are met.

(7) Only batteries specified in the approved type design of the ELT or which have been approved as an alternative part by TCCA may be used.

(8) If the remote/switch indicator installation includes a battery verify the maintenance/replacement interval. There may be more than one possible interval depending on the type of battery and could include conditions such as replacement if the ELT is activated for an unknown period of time.

(9) An operational test of the ELT needs to be performed following a battery replacement or recharging.

8.0 Aircraft ELT System Maintenance

(1) In reference to the aircraft manufacturer's instructions, the inspection of the installed ELT system may include the following inspections:

(a) ELT. Inspect for condition, security and freedom from corrosion.

(b) Antenna. Inspect for condition, mounting security and freedom from corrosion.

(c) System Interconnects. Inspect antenna coax cable, system wiring and connectors for corrosion and damage, proper support, routing, security, bend radii and strain relief.

(d) Remote switch/indicator. Inspect for condition, security and corrosion. Where applicable, inspect the installed battery and verify maintenance/replacement interval from the ELT manufacturer.

(e) Placards and markings. Inspect ELT markings for part number, serial number, battery due date and performance test date details. Ensure markings for controls and annunciators and any required placards required by the installation approval and regulation are installed and legible.

(f) Mounting tray. Inspect mounting structure, mounting tray and hardware for cleanliness, cracks and other damage. Inspect the retaining mechanism to ensure it holds the ELT securely.

Note: For mounting systems using a hook and loop fastener, it is very important to follow the manufacturer's instructions including published recommendations such as service bulletins to ensure proper installation. Inconsistent installation and reinstallation practices can lead to the fastener not having necessary tension to perform its intended function. Additionally, the retention characteristics of the fastener may degrade over time due to wear and environmental degradation from vibration, temperature, or contamination.

(g) Operational test. If the ELT was removed from the aircraft, following reinstallation of the ELT or when any part of the ELT system is disturbed, an operational test is carried out in accordance with the applicable Paragraph in Appendix G of STD 571 of the CARs.

(2) Airworthiness directives (ADs) that are applicable to an ELT must be complied with in accccordance with section 605.84 of the CARs.

9.0 General Information

9.1 Shipping of an ELT

(1) When shipping an ELT, it is important that it is properly packaged so it is not activated while in transit. Rough handling could actuate the ELT G-switch if it is not secured in the off position or remains in the armed position. Disconnecting the battery is the most effective way to avoid inadvertent actuation. Refer to the ELT manufacturer's instructions to determine if this is a practical option or if they provide any other shipping instructions.

(2) ELT batteries may be considered dangerous goods that are subject to the *Transportation of Dangerous Goods Act* and Regulations. Ensure that you are able to ship the ELT with the installed batteries and that your shipment is in compliance with the regulations prior to shipping. Please consult the Transport Canada website for more information on shipping dangerous goods.

9.2 Registration of an ELT

(1) Registration of a 406MHz ELT with the CBR is crucial. It provides Search and Rescue with the necessary information on the owner of the Canadian registered aircraft and their contact information for when an emergency situation arises. Furthermore, when an ELT is properly registered, the CBRV can be used to verify the 24-bit aircraft address as part of the operational test requirement.

(2) When an aircraft or owner information changes, the ELT programming or ELT registration needs to be verified. The following are some examples:

- (a) When an aircraft is bought/sold/leased and the aircraft registration marks do not change, ELT registration information with the CBR needs to be updated;
- (b) When an aircraft is sold/leased and the aircraft registration marks change, the ELT programming and the ELT registration information with the CBR needs to be updated;
- (c) When an aircraft is sold and is exported out of the country, the ELT needs to be re-programed to remove the 24-bit address and needs to be de-registered with the CBR.

(3) Registration with the CBR does not expire but it is recommended that it be verified at least once per year. Users should update their registration information when any of the required information changes. This includes a change in status of an ELT such as when no longer in use, in storage, stolen, lost, broken, or decommissioned.

(4) When an ELT requires reprogramming, consult the ELT manufacturer's instructions.

9.3 Disposal of an ELT

(1) It is very important to ensure that ELTs being disposed of are properly decommissioned, including removing the battery from the unit and disabling the electronics. The ELT should also be clearly labeled as deactivated so that it cannot be used for a real emergency. When disposing of a 406 MHz ELT be sure to inform the CBR in order to update the ELT information.

(2) ELT batteries contain chemically-aggressive substances which could be hazardous to the environment and cause injury. Always handle batteries in accordance with manufacturer's instructions and local disposal regulations.

10.0 Information Management

(1) Not Applicable

11.0 Document History

(1) Not Applicable

12.0 Contact Us

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