Irish Aviation Authority The Times Building 11–12 D'Olier Street Dublin 2, Ireland www.iaa.ie **Safety Regulation Division**	**Údarás Eitlíochta na hÉireann** Foirgneamh na hAmanna 11–12 Sráid D'Olier Baile Átha Cliath 2, Éire **Rannán na Rialachán Sábháilteachta**	AAM No. 04 Revision: 00 Date: 18.10.17	IAA

Title: Testing of Emergency Locator Transmitters (ELT)

1. INTRODUCTION

The purpose of the advisory memorandum is to provide guidance for industry on the testing of Emergency Locator Transmitters. (ELT)

2. REFERENCES

This Advisory Memorandum supersedes and replaces Airworthiness Advisory Memorandum 01/11.

3. PROCEDURE

In reply to recent enquiries on changes to the policy for the testing of Emergency Locator Transmitters, the whole subject is necessarily being reviewed as a result of two factors the increasing use of ELTs in the 406 MHz band and the recently adopted practice of some states to commence Search and Rescue action immediately on receipt of a first alert message on the 121.5 and 243 MHz frequencies. This explains the reasons why a review of ELT testing policy is needed. Most of the comment applies equally to maritime Position Indicating Radio Beacons (EIPRBs) and Personal Locator Beacons (PLBs).

Since distress radio was first introduced there has been a requirement for them to be serviced and tested. A Standard Operating Procedure (SOP) has long been established where beacons should ideally be tested in a shielded environment, usually a Faraday cage. If it was not possible to shield the beacon, test should have been conducted over the top of the hour after first checking with ATC that the test would not interfere with any ongoing SAR operation. After the introduction, in the mid-80s of the Cospas-Sarsat system for the detection of active distress beacons by satellite, the continuance of the SOP relied on the existence of two factors. These factors were, first that beacons on 121.5 and for 243 MHz could only be detected by satellites in "Local mode", and secondly, that first alerts on these frequencies were disregarded by most countries. For reasons explained below, these criteria no longer apply.

Cospas-Sarsat satellites detect beacons transmitting on 3 frequencies: 121.5MHz, 243 MHz and those operating on the 406.0 to 406.1 MHz band. Until recently, ELTs and PLBs operated only on 121.5 and/or 243 MHz. A satellite detecting an active beacon on these frequencies needs to have both the beacon and a ground station in its visibility window in order that the alert can be downloaded to earth. This is known as "Local mode" where only ground stations in the field of view of the satellite detecting a beacon will receive the alert data.

When a satellite detects a beacon, Doppler is used to calculate the beacon position. The satellite can calculate how far away from itself the beacon is but cannot determine on which side of its track the beacon lies. Consequently, for each beacon alert, two positions are initially reported, the real position and a mirror image solution. This is known as Doppler Ambiguity. This ambiguity can be resolved by either a second satellite pass, reports from high-flying aircraft or by there being a known incident in progress. Until recently SAR agencies have been content to wait until the ambiguity has been resolved before commencing SAR action due to the high cost of sending SAR vehicles to both positions.

The factors that have changed to affect the validity of the SOP are, firstly, the requirement of some countries to now act upon first alerts and, secondly, the increasing use of ELTs and EIPRBs operating within the 406 MHz band.

A 121.5/243 beacon tested live and unshielded could, depending on the position of the satellite track, be reported to ground stations throughout the whole of Europe and the eastern seaboard of Canada and the USA. Likewise, the Doppler image position of the beacon could lie anywhere in a similarly large area. Most countries within this area now react to first alerts and would therefore start SAR action on receipt of such an alert. It is therefore imperative that every effort should be made to reduce all possible causes of false alarms and the resultant SAR action.

Beacons operating in the 406 MHz band are different from those on the 121.5 and 243 MHz. They are coded with a unique code, which amongst other data, includes the country code and unique identity of the beacon. The beacons must be registered and a database maintained in the same country as that coded into the beacon. 406 beacons are capable of being detected not only be the orbiting satellites, but also by the Compas-Sarsat geostationary satellites. When this class of beacon is detected by an orbiting satellite, the digitally encoded information, together with the beacon's real and mirror image positions are down-linked to every ground station in the world. The geostationary satellites in the system instantly detect and report active 406 beacons and SAR action is initiated immediately. The combination of coding and registering allows the emergency services to respond to an instant alert.

To enable 406 MHz beacons to be tested without generating false alerts, the beacons are usually fitted with a test facility which, when selected, alters the signal so that it is not reported as indicating genuine distress. Beacons should therefore be tested by using this facility. The volume of ELTs being installed in aircraft and marine vehicles is now so great that the Search and Rescue organisations and the distress and diversion cells distributed throughout the world are no longer able to deal with requests for live testing. **As a consequence of this live testing of ELTs is now prohibited**.

It is accepted that aircraft operators do need to test their ELTs on a regular basis to demonstrate their continued serviceability and the IAA has established that the following options exist.

- For ELTs that can be removed for the aircraft (e.g. Survival ELTs and Automatic Portable ELTs) the operator can remove the ELT from their aircraft and test it either in a shielded room or a shielded bag. Shielded bags can be obtained from most ELT manufacturers.
- For ELTs that cannot be removed from aircraft (or those which the operator wishes to test in situ) an antenna cap should be used to prevent the ELT transmission going beyond the aircraft. Antenna caps can be obtained from either the antenna manufacturer or in some cases from the ELT manufacturer. Operators may also use self-manufactured caps provided that it can be shown to prevent transmission form the aircraft.
- Some ELTs have test functions that do not actively transmit on emergency frequencies or which send codes that are not recognised by the COSPAS-SARSAT satellites. In these cases live testing can be performed as long as the operator can demonstrate that it will not cause an interaction with any of the SAR services.

In all cases, procedures for testing ELTs should be based on the manufacturer's recommended testing practices and, where applicable should be performed using their recommended test equipment unless this would result in unshielded testing.

4. Additional Contact Information

ARCC,
Aviation Rescue Co-ordination Centre,
Irish Aviation Authority,
Air Traffic Services,
Shannon Airport,
Co. Clare.
Phone: 061 474339 / 471233
Facsimile: 061 474340

MRCC,
Duty Officer,
MRCC Dublin,
Department of Marine and Natural Resources,
Leeson Lane,
Dublin 2.
Phone: 01 6620922
Facsimile: 01 6620795

UKMCC,
Duty Operator,
United Kingdom Mission Control Centre,
Aeronautical Rescue Co-ordination Centre,
Royal Air Force Kin loss,
FORRES,
Morayshire,
IV 36 3UH.
Phone +44 1309 672161 Ext. 6223/6204
Facsimile +44 1309 690717
e-mail manager@ukmcc.free-online.co.uk