

For more than 40 years, NASA has supported both national and international search and rescue efforts through technology development and enhancement. Emergency Locator Transmitters (ELTs), originally developed by NASA, are beacons designed to automatically transmit distress signals to satellites in the event of a plane crash. A recent study resulted in several recommendations to improve ELT survivability and reliability. Through the work of an international committee of experts, the Federal Aviation Administration (FAA) recently issued Technical Standards Order (TSO)-126C, which incorporates these recommendations and establishes improvements to ELT design and installation.

 VIBRATION AUTOMATIC CRASH ACTIVATION

CRASH SAFETY FLAME TEST

COAXIAL CABLE

## SEARCH AND RESCUE ELT SURVIVABILITY RECOMMENDATIONS

**EXTERNAL** 

ANTENNA

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ΤΟΡΙϹ	RECOMMENDATIONS
MANUFACTURER INSTRUCTIONS	1. Require inclusion of specific ELT System installation requirements within ELT Manufacturer-supplied documentation.
VIBRATION	<ol> <li>Require vibration testing in accordance with robust levels defined in DO-160G § 8.2.1.2.</li> <li>Require pre- and post-test verification of crash-sensor performance.</li> <li>Perform vibration testing in the sequence of tests required to be performed with a single unit, before shock and crash safety.</li> </ol>
AUTOMATIC CRASH ACTIVATION	<ol> <li>Require verification of performance in the "no activation" region for pulses of less than 10-msec duration.</li> <li>Define crash activation sensor response curves with increased activation thresholds in directions other than normal flight.</li> <li>If crash safety testing is updated to include multi-axis load conditions and automatic activation is required as applicable, the "cross-axis inputs" test may be optional.</li> </ol>
CRASH SAFETY	<ol> <li>Require demonstration of functionality (including automatic activation, as applicable) for all tests performed.</li> <li>Require 6 additional test cases with the beacon oriented at ±45° with respect to each of the 3 primary directions.</li> <li>Require an additional test case for each of the 3 primary beacon directions using a pulse of no less than 15-g and no less than 50-msec duration.</li> </ol>
FLAME TEST	<ol> <li>Require the duration of exposure to support system functionality, i.e., no less than the time between automatic activation and the first 406 MHz transmission.</li> <li>Require demonstration of full system functionality after exposure to the environment, i.e. successful VSWR test of the antenna and coaxial cable (outfitted with a firesleeve, if necessary).</li> </ol>
external Antenna	<ol> <li>The antenna should be located at the same longitudinal location as the beacon. In the event this is not possible, a strain relief loop in accordance with FAA AC 43-13-1B requirements for minimum bend radius of coaxial cables should be required.</li> </ol>
	<ol> <li>Require application of fire resistant material in accordance with SAE AS1072.</li> <li>Replace the requirement for "vibration-proof RF connectors" with "MILDTL-17 cables and connectors or equipment that is appropriate for the vibration profile at the installation location."</li> <li>In addition to the requirement to include "some slack" in the cable, require a strain relief loop of minimum bend radius 6 times the outer diameter of the cable whenever the beacon and antenna are not located at the same longitudinal station in the aircraft.</li> <li>In addition to the requirement for the cable to "be secured to the aircraft structures for support and protection," require that such support be provided at intervals of not more than 24".</li> <li>Provide additional clarification to the definition of "aircraft production breaks."</li> </ol>
<b>REMEMBER:</b> ELTs operating at 121.5 MHz are not supported by the search and rescue satellite constellation. For satellite support, upgrade to a beacon that transmits a 406 MHz frequency.	