The New ELT System

Driving Toward the 406 MHz Requirement

BY GEORGE WILHELMSEN

The emergency locator transmitter, or ELT, holds a distinct position of disdain in the mind of many pilots, one equaled only by the feelings of pilots to the transponder. This feeling is driven by pure economics — the majority of pilots fail to see the value of an ELT. Pilots believe if they take their responsibilities seriously, an ELT likely would never be needed.

The drive for ELTs came from Congress, which enacted their requirement shortly after the loss of a Cessna 310 aircraft carrying Hale Boggs, the House majority leader, and Rep. Nick Begich of Alaska, in 1972. The flight between Juneau and Anchorage did not arrive as expected, and despite launching an extensive search, the two congressmen and their plane were never found.

Following the unsuccessful search, Congress enacted a law mandating the installation of ELTs on nearly every plane flying. There were some notable exceptions, including small jets. The original C91 technical service order resulted in products in which the G-switch — the device that is supposed to turn the ELT on when an accident occurs — had only a 25 percent success rate. This prompted a revision to the TSO to C91a, which improved the operation rate on a valid need into the 70 percent range.

Initial Frequency Selection Flawed

The original frequency chosen for the ELT to operate on was 121.5 MHz, which made sense because it was the emergency frequency used by aircraft. The thinking was, it would be readily available for use and pilots could use their radios to "triangulate" where a downed aircraft was located by the volume, in addition to the satellite and search-and-rescue organizations. With the combined support of all these resources, it was expected a downed aircraft could be found quickly.

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However, with all these improvements from the TSO, there was still the problem of false alarms. Cospas-Sarsat, a jointly operated organization using both the satellites of Russia and the United States to provide search-and-rescue services, encountered false alarm rates from 97 to 99 percent. System operators spend a majority of their time picking out false alarms from actual signals.

Studies were performed in an attempt to understand what was causing the false alarms. These studies found the number of false alarms from planes was relatively small, with some of these alarms resulting from hard landings or kids playing with switches. Cospas-Sarsat found the biggest problem was with other devices driven by electricity. Electric items ranging from electronic scoreboards at stadiums and pizza ovens to other ubiquitous electronic gear caused the majority of false alarms.

There was also an issue with the accuracy of the C91 series of ELTs. With its weak 0.1-watt analog signal, it only could be triangulated to an area of 576 square miles, which is based on the 12-mile radius of the triangulation ability. Trying to find an unknown target in an area that size is daunting, even with a good grid search pattern and proficient spotters.

The planet we live on and its many interesting features posses a problem. Even the best spotters and searchers can miss signs hidden by shadows or features such as forests, canyons, hilly terrain and water. When a plane has crashed, every minute counts. The delay encountered while trying to find a downed plane can mean the difference between completing a rescue or completing a task of recovery.

ELTs to Operate on Different Frequency

In an effort to eliminate false alarms and improve accuracy, a new TSO has been produced, which requires a new series of ELTs to operate on the 406 MHz frequency. Surveys of the frequency and initial testing and operations have shown it to be relatively free of the electronic background noise that plagued the 121.5 system.

This new C126 TSO has the backing of Cospas–Sarsat, which has set a deadline of Feb. 1, 2009 for personnel to convert their 121.5/243 MHz ELTs over to the new 406 MHz series. After that date, Cospas–Sarsat no longer will monitor the 121.5/243 MHz frequencies, leaving search-and-rescue to the Civil Air Patrol and its array of directional antennas.

With the new C406 ELTs, there are 5 watts of power and a burst of information that allows identification of the type of equipment in which the unit is installed. The result is a 2-mile radius, or less than 16 square miles, to search, and the searchers are equipped with the knowledge of what type of aircraft for which they are looking. This is a huge improvement over the C91 series of ELTs — less area to search means a better chance of finding a plane and saving its occupants.

In addition, if a customer opts for the GPS-improved C406 model, the search range shrinks even more. While a 12-mile search area is a vast improvement, a GPS-linked C126 ELT narrows that search range to a 100-meter radius. Searching a 100-meter radius could be done by walking, and even in challenging terrain, a group of searchers could find a downed aircraft — or a lost person —more easily. With such a small search radius, the GPS-linked ELT system virtually takes the "search" out of "search-and-rescue."

ELTs in the World

The world's ELT population is amazing. Currently, there are more than 700,000 ELTs estimated to be in use. These range from those onboard aircraft and those used to signal a ship in distress to the new personal locator beacon, or PRBs, which have been sold with the promise of rescue just about anywhere in the world if someone gets into trouble.

Presently, only Artex is offering C126, 406 MHz ELTs for aircraft in the United States. Manufacturers in Europe and Great Britain also are in production, with some units being TSO'd for use in the United States. Avionics shops now are faced with a simple problem: how to eliminate their current supply of C91a ELTs before they become worthless, and how to move their customers in the right direction toward a C126 ELT when they come in for an avionics retrofit.

406 MHz Value

The best points to bring up to customers when trying to help them make the right decision on their next ELT are in the areas of accuracy and search time. The average search time for a C91 series ELT has been quoted at four hours or more. The new C126 406 MHz ELT search time is a fraction of that, in the area of 40 minutes. Because the satellite takes two passes, or 45 minutes, just to identify the location of an activated ELT under the C91 series, but only 5 minutes for the location of the C126 series, search-and-rescue teams would be getting off to a better start with the C126.

Locating the ELT signal faster, combined with greater accuracy in detection and several orders of magnitude reduction in false alarms, means rescuers can be alerted and directed to the scene of an accident faster. In situations where the pilot and passengers have been injured in the crash, that reduced time to find the plane causes a direct, proportional increase in the probability of the survival of the occupants.

While having a GPS-linked C126 ELT onboard is an asset, current pricing makes the transition difficult. The price difference between the non-Nav system, which ranges from $900 to $1,400, to the Nav-equipped systems, which range from $1,600 to $1,900 and require a $1,400 Nav interface, will prove to be a hard sell to all but the most well-heeled of the aviation crowd. This echoes back to the thoughts of most pilots: They'll never need the unit.

Prices are expected to drop as production levels rise to meet increased demand. How much demand increases depends on how well avionics shops and various organizations can get the word out to their customers and members that as of Feb. 1, 2009 their existing ELT will have little value. As with any product, increased demand allows for increased production, which allows manufacturers to leverage better commodity prices and reduce their products' selling price. Competition also should be entering the market, which will further help drive prices down to more GA-tolerable levels.

Better Batteries

Another positive is the improved life of the battery. The new ELT units are using better batteries, which result in the battery life increasing from two years to five years. With this increase in battery quality and lifespan, however, has been a significant increase in price.

The standard battery to replace in an ELT costs between $30 and $180, depending on the model of ELT and where the battery is purchased. The

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price of the new five-year battery was found at one retailer marked at $309, which will be a bit of a shock to some pilots, even at an interval of five years.

Just as they did with the original ELT systems, battery prices should drop within the first five years of production as the aftermarket cranks up production of these new storage units. The question of when this would occur is as much driven by the market as anything else. The faster the population of new ELTs increases, and thus demand increases, the sooner production is likely to spool up and new, lower-cost battery models can be expected to hit the market.

Helping in a Pilot's Decision

Regardless of the personal feelings of the pilot community, and the drive against this effort by the major aviation alphabet groups, there is no sign Cospas–Sarsat is willing to reconsider its current "turn-off" date for receiving the old ELT signals. The progress on this project started in the early 1990s, with the system being tested, proven and, finally, readied for implementation.

With this mixed bag of higher cost but better accuracy and more expensive batteries but longer battery life, helping pilots make the right decision will be a challenge. You can direct pilots to the AEA's Avionics Intel on the subject, available at www.aea.net in the "Pilot Resources" section. Also, have your sales team download a copy and internalize the information to spread the news of the upcoming change and to help customers move in the right direction.

One final point to consider in helping customers make the transition is to remind them their old units won't help when they need them most. A review of various documents indicates that while satellite coverage of the older series of ELTs will be discontinued, ground-station monitoring and search-and-rescue will continue. However, in the absence of the satellite tracking to provide initial location information, the effectiveness of the system is expected to decrease significantly. The change essentially turns the C91 series of ELTs into virtual dead weight.

While most of the installed ELTs throughout the world never will be used, there is always a chance some will. If that day comes, the speed in which search-and-rescue personnel can reach a downed plane can make the difference between losing a customer or having a customer come back to thank you for telling them about the new ELTs and why they needed to install one in their plane. Any shop would prefer to take the latter of these events. ❑