



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: January 5, 2011

In reply refer to: A-10-169 and -170

The Honorable J. Randolph Babbitt
Administrator
Federal Aviation Administration
Washington, DC 20591

During its investigation of an amphibious float-equipped de Havilland Dash-3T (DHC-3T) airplane accident, the National Transportation Safety Board (NTSB) found that the emergency locator transmitter (ELT)¹ became dislodged from its mounting tray, detached from its antenna, and failed to transmit radio signals to alert personnel of the downed airplane. An ELT is activated automatically by crash forces and then transmits radio signals containing the airplane's identification and location, which are used by search and rescue organizations. These transmissions are a key component in the rapid location and rescue of passengers once an accident has occurred. This safety recommendation letter addresses the need for ELTs to remain secured to the airplane and operational during an accident.

On August 9, 2010, about 1442 Alaska daylight time, a single engine, turbine-powered, amphibious float-equipped de Havilland DHC-3T airplane, N455A, impacted mountainous tree-covered terrain about 10 miles northeast of Aleknagik, Alaska. Of the nine people aboard, the airline transport pilot and four passengers died at the scene, and four passengers sustained serious injuries. The airplane sustained substantial damage. The flight was operated by General Communication, Incorporated (GCI), Anchorage, Alaska, under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91. The flight originated at a GCI-owned remote fishing lodge on the southwest shoreline of Lake Nerka about 1427 and was en route to a remote sport fishing camp on the banks of the Nushagak River, about 52 miles southeast of the GCI lodge. At the time of the accident, marginal visual meteorological conditions were reported at the Dillingham Airport, in Dillingham, Alaska, about 18 miles south of the accident site; however, the weather conditions at the accident site at that time are not known. No flight plan was filed.

About 1815, GCI's onsite lodge manager contacted the fishing camp to inquire about the airplane's proposed return time and was told by fishing camp personnel that the airplane had not arrived. The lodge manager attempted to contact the pilot by phone and radio. Lodge management personnel were unable to locate the airplane and initiated an aerial search along the

¹ An ELT is required on all U.S.-registered civil airplanes, per 14 *Code of Federal Regulations* 91.207.

pilot's anticipated route. Additional personnel in airplanes and helicopters voluntarily joined the search for the missing airplane. The airplane was officially reported overdue to the FAA at 1859.

About 1930, volunteer airborne search personnel located the wreckage near the anticipated flight route, in steep, heavily wooded terrain, about 19 miles southeast of the GCI lodge. After the search team located the wreckage site, the weather deteriorated. Poor weather and night conditions prevented military pararescue personnel from reaching the accident site until the following morning when they transported the passengers from the scene.

The accident airplane was equipped with an Artex ME406 ELT, which was designed to broadcast a 406 megahertz (MHz) signal, via an externally mounted antenna, that contained contact information for the airplane owner and the global positioning system coordinates of the originating signal. When activated, the signal would be received by orbiting satellites and relayed to appropriate rescue organizations. In addition, the ME406 ELT would broadcast a 121.5 MHz "homing signal" that could be detected locally by other aircraft, air traffic control facilities, or rescue personnel who use a compatible receiver.

Following this accident, satellite and aircraft involved in the aerial search did not detect any ELT signals. During the rescue mission, a pararescuer found the ELT unit loose on the aft floor of the airplane and that it was switched to "on."² Upon further examination, the ELT showed evidence that the antenna and remote switch cable had been pulled out, likely when the ELT became detached.

The Artex ME406 ELT is a two-piece unit that consisted of a mounting tray affixed to the aircraft and an ELT module that "nested" in the tray. The mounting tray (including a webbed strap) for the accident airplane's ELT module was mounted on the right sidewall of the aft cabin (see figure 1).³ Once mounted, the ELT unit was connected to the external antenna. The module was secured to the tray by the webbed strap with a "hook and loop" (Velcro) fastener (see figure 2).

² The "on" position is indicative of the ELT being activated after a crash.

³ The ELT may be mounted on the floor or the sidewall of the airplane, within 10° of the longitudinal axis of the airplane.



Figure 1. ELT tray with webbed strap mounted on sidewall of accident airplane.



Figure 2. Artex ME406 ELT and separate mounting tray (left); ELT in mounting tray, secured by Velcro strap (right).

An NTSB investigator and Artex personnel examined the ELT unit at Artex facilities in Prescott, Arizona, on August 25, 2010, and found no physical damage to the ELT tray or module. Personnel also conducted electrical examinations of the ELT module, and determined that the

121.5 MHz and 406 MHz beacons and the G-switch⁴ operated normally. Artex personnel also noted that, in the photograph of the ELT tray mounted in the accident airplane (see figure 1), the retention strap “appeared to be slid toward the aft section of the tray, out of its molded groove.” They added that, under normal installation practices, it should not be possible to physically place the retention strap in this position. Other than through photographs, NTSB investigators did not examine the mounting tray before its removal from the wreckage; therefore, it is not known if the retention strap was incorrectly positioned in the airplane at the time of installation or whether it occurred before or after the accident. If the strap were aft of its normal location, it is unknown if this condition was because of improper installation or maintenance, or an artifact of the accident forces. Because the preimpact position of the retention strap is not known, the NTSB is concerned that the design and certification standards concerning ELT retention may not be adequate and should be reassessed.

ELTs assist in the rapid notification of airplane accidents and subsequent emergency response. Rapid notification and response allow critically injured passengers to be located, rescued, and treated as soon as possible following an accident, which increases the likelihood of survival. Further, prompt rescue of all passengers can assist in limiting secondary dangers, such as life-threatening environmental conditions at the crash site. In this accident, had the ELT remained attached to the mounting tray, it is likely that the signal would have been detected soon after the accident, and search and rescue personnel could have been dispatched directly to the accident site hours earlier.

Airplane logbook records indicated that the ELT was installed on March 1, 2008, and had “tested serviceable,” as defined in the Artex ME406 installation manual. According to 14 CFR 91.207, ELTs are required to be inspected every 12 months, and the inspections must include checking for “proper installation.” The maintenance records indicated that annual inspections for the airplane were conducted in April 2009 and May 2010; however, specific references to the ELT were not included in the records nor were they required to be.

The precise reason that the ELT did not remain attached to the airplane is not known. However, it is possible that the ELT was not installed correctly, either at the time of installation or after the periodic inspections. A number of ELT manufacturers⁵ employ mounting designs similar to the one used for the Artex ME406; the ELT unit is attached to a mounting tray by various types of straps. In all cases, the retention capabilities of each system are dependent on proper installation, and any looseness or misalignment of the retention strap would increase the chance of accidental detachment of the ELT. The NTSB concludes that proper installation and inspection of ELT units is imperative to ensure they remain connected to the antenna and maintain functionality for rapid notification of aircraft accidents and prompt emergency response.

Because so many ELTs employ a mounting strategy similar to the Artex ME406, the NTSB is concerned that others may not be properly mounted or are otherwise at risk of being

⁴ The G-switch within the ELT is used to detect crash forces and activate the unit, should an accident occur.

⁵ Other manufacturers included Kannad, Emerging Lifesaving Technologies, Ameri-King, Narco Avionics, and ACK Technologies.

thrown free of their mounting trays. Although the FAA requires an annual ELT inspection⁶ to check for proper installation, these inspections may not detect subtle changes in strap tightness or misalignment. The NTSB concludes that a thorough inspection of all installed ELTs could identify and correct any existing mounting problems. Because of the critical importance of having an operational ELT, the NTSB recommends that the FAA require a detailed inspection, during annual inspections, of all ELTs installed in general aviation aircraft to ensure that the ELTs are mounted and retained in accordance with the manufacturer's specifications.

Inspection and proper mounting and retention of the ELT may help prevent detachment during an accident. However, these actions would not be effective if the cause of the ELT detachment is due to design characteristics or issues associated with the mounting location that were not identified during ELT certification testing. In this situation, the inadvertent detachment problem that occurred in this accident could occur in others. For example, the NTSB is concerned that a sidewall-mounted ELT may be subject to additional vertical loads during landing or turbulence, which may progressively loosen the strap.

The ME406 ELT was granted Technical Standard Order (TSO) authorization by the FAA on July 11, 2005, after meeting the performance standards prescribed by FAA TSOs C91a and C126. One of the performance standards required for TSO approval is a crash safety test that is designed to ensure that the ELT will not break loose from its mounts under impact conditions. The NTSB is concerned that the TSO performance standards that govern ELT mounting and retention may not adequately address potential loosening of the retention strap on a sidewall-mounted ELT subject to additional vertical loads during normal operations such as landing or turbulence. Therefore, the NTSB recommends that the FAA determine if the ELT mounting requirements and retention tests specified by TSO C91a and TSO C126 are adequate to assess retention capabilities in ELT designs. Based on the results of this determination, the FAA should revise, as necessary, TSO requirements to ensure proper retention of ELTs during airplane accidents.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require a detailed inspection, during annual inspections, of all emergency locator transmitters installed in general aviation aircraft to ensure that the emergency locator transmitters are mounted and retained in accordance with the manufacturer's specifications. (A-10-169)

Determine if the emergency locator transmitter (ELT) mounting requirements and retention tests specified by Technical Standard Order (TSO) C91a and TSO C126 are adequate to assess retention capabilities in ELT designs. Based on the results of this determination, revise, as necessary, TSO requirements to ensure proper retention of ELTs during airplane accidents. (A-10-170)

In response to the recommendations in this letter, please refer to Safety Recommendations A-10-169 and -170. If you would like to submit your response electronically

⁶ 14 CFR 91.207(d).

rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our secure mailbox. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman HERSMAN, Vice Chairman HART, and Members SUMWALT, ROSEKIND, and WEENER concurred in these recommendations.

[Original Signed]

By: Deborah A.P. Hersman
Chairman