LOG 2396

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: January 6, 1993

In reply refer to: A-92-134 thru -136

Honorable Thomas C. Richards
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On April 12, 1992, about 1045 eastern daylight time, a two-place home-built Stileto MKII airplane operated by a noninstrument rated pilot, the sole occupant, departed Lakeland, Florida, for a pleasure flight to Smoketown, Pennsylvania. The pilot departed under visual flight rules, although marginal weather conditions were known to exist. The pilot did not file a flight plan and did not establish radio contact with an air traffic control (ATC) facility, nor was he required to. The airplane was equipped with an Emergency Locator Transmitter (ELT) in accordance with Federal Aviation Regulations (FARs). En route, the flight encountered adverse weather, and the pilot attempted a precautionary landing on a grass airstrip near Cross City, Florida.

The plane crashed after the pilot became spatially disoriented when he encountered fog during the attempted landing. The airplane was substantially damaged, and the pilot sustained a fractured pelvis. The airplane's ELT transmitted on the 121.5 and 243 MHz. frequencies. The ELT signal was received by a satellite about 1 hour 12 minutes after the accident. The approximate latitude and longitude of the accident site was transmitted via satellite to the Air Force Rescue Coordination Center (AFRCC) at Scott Air Force Base, Illinois. The AFRCC received a second ELT signal 3 hours and 3 minutes after the first one. A composite solution[1] was derived and the AFRCC contacted the U.S. Coast Guard (USCG) Rescue Coordination Center (RCC) at Miami, Florida. The Miami RCC advised that it would conduct the search, and approximately 2 hours and 44 minutes after the second signal was received, a helicopter was dispatched, and the crash site was located. About 50 minutes later, the injured pilot was hoisted into the helicopter. The rescue took place 6 hours and 48 minutes after the first ELT signal was received--8 hours after the accident.

[1] A composite solution is verification by a second and/or third ELT signal received by a search and rescue satellite that identifies the general location from which the signal is emanating.

On November 12, 1991, about 1635 eastern standard time, a Piper PA-34-200T with the pilot and 4 passengers was ditched in the Atlantic Ocean about 14 miles east-southeast of Bimini, Bahamas, 60 miles from the coast of the United States, following near-total loss of engine power from one engine and partial loss of power from the other. Weather was not a factor, and a defense visual flight rules flight plan had been filed. The pilot had not been in contact with any ATC facility nor was he required to be. According to the pilot and the 2 surviving passengers, the airplane had been minimally damaged during the ditching and had stayed afloat about 3 or 4 minutes. All of the occupants had escaped with no reported injuries; however, two of the passengers died during the time between the accident and the rescue, which took place 2 days after the ditching. The pilot and surviving passengers suffered from hypothermia due to prolonged immersion. A few minutes before the ditching, the pilot had placed the remote ELT switch (that was located in the cockpit) to the "on" position, which was verified by an individual who dove on the wreckage. No ELT signals had been received by any of the rescue ground stations. The ELT was recovered, and examination by its manufacturer revealed that it had not operated because its battery had leaked acid onto a circuit board.

About 0937 Alaskan daylight time, on June 2, 1990, a Boeing 737-2X6C combination passenger/cargo airplane operated by MarkAir, Inc., under 14 CFR Part 121, descended into terrain approximately 7.5 miles short of the Unalakleet Airport, Unalakleet, Alaska. Instrument meteorological conditions prevailed and an instrument flight rules flight plan had been filed. The flightcrew was not in contact with the nearest ATC facility at Anchorage. The captain, the first officer, and a flight attendant sustained serious injuries, the other flight attendant on board sustained minor injuries, and the airplane was destroyed on impact. No passengers were on board.

An hour after it was determined by company personnel that the airplane was overdue, search and rescue (SAR) operations by the USCG began, and the wreckage was located about 15 minutes later by the crew of a USCG helicopter. According to the trauma surgeon who attended to the survivors, their injuries were exacerbated because of the delay in the rescue effort. Additionally, the surgeon believed that the safety of the USCG helicopter crew had been unnecessarily jeopardized because they had searched a large mountainous area that was shrouded in heavy fog. Had there been an ELT signal, an air search would not have been necessary.

The Safety Board and the SAR community have documented deficiencies with ELTs that have been manufactured to the FAA's Technical Standard Order (TSO) C91 and the more recent TSO-C91A. The omission of maintenance and inspection requirements for these ELTs, as well as their demonstrated failure rate and frequent accidental activation, represent a few of the deficiencies that exist. Accidental and unintentional activation of approximately 44,000 ELTs annually have degraded the efficiency of the SARSAT/COSPAS systems. In 1991 alone, there were 1,976 false alarms (97 percent of all signals received), which required deployment of SAR assets. As a result of this problem and the absence of significant improvements in ELT performance, a mind-set has developed within the SAR

community that an ELT activation is merely another false alarm and not a crash-activated ELT.

A 1990 National Aeronautics and Space Administration (NASA) study, titled "Current Emergency Locator Transmitters (ELT) Deficiencies and Potential Improvements Utilizing TSO-C91A ELTs," found that periodic inspections would improve the performance of ELTs. The study found that of the 3,270 general aviation accidents that occurred between 1983 and 1987, there were 2,451 (75%) in which ELTs did not activate. Using information from the Safety Board's accident data base, NASA found that the average elapsed time to search and locate aircraft was 12.4 hours for aircraft with operating ELTs, and 103.0 hours for aircraft without operating ELTs.

The biggest problem with the TSO-C91 and TSO-C91A ELTs is the frequencies they operate on. Both operate on the 121.5 and 243 MHz. frequencies, which are not compatible with the international satellite system for search and rescue (SARSAT/COSPAS). SARSAT/COSPAS systems were deployed in the mid-1970s to improve worldwide SAR operations. The SARSAT/COSPAS systems are intended primarily to receive and process signals transmitted on 406 MHz and then identify and locate aircraft and vessels in distress. Although the satellite can receive 121.5 and 243 MHz. signals, a second or third orbit by the satellite(s) is necessary to confirm the signal and locate the signal source, which can delay SAR response for several hours. For many years, this necessary time delay has been the single "weak link" in the aviation accident alerting system.

The marine counterpart of the aircraft ELT is called the Emergency Position Indicating Radio Beacon (EPIRB). The EPIRB operates on the 406 MHz. frequency. Unlike the SAR response to 121.5 and 243 MHz. signals, the SAR community's policy is to launch on the first signal received from the 406 MHz. frequency. This is due to demonstrated performance of the 406 MHz. EPIRB, which has provided reliable notification to the SAR community as well as specific identification and a more precise location of the vessel in distress.

On April 2, 1990, the FAA issued a Notice of Proposed Rulemaking (NPRM), Docket No. 26180, which requested comments on the proposed minimum standards for the TSO-C126 406 MHz. ELTs. The Safety Board's response supported the proposed TSO-C126 and, in addition, supported the mandated use of ELTs meeting that standard. The Board also supported "mandatory periodic inspections" and maintenance requirements. The Safety Board believes that the proposed TSO-C126 represents the most significant improvement in SAR alerting since the advent of the SARSAT/COSPAS systems.

On February 6, 1992, the Chairman of the Interagency Committee on Search and Rescue (ICSAR) urged the Executive Director for Systems Operations of the FAA to finalize TSO-C126. The letter also addressed the frustration of the ICSAR over the lack of progress on various FAA regulations, standards, and related safety initiatives for ELTs, since these matters directly and significantly affect the ability of the SAR system to save lives. For instance, the ICSAR Chairman urged the FAA to:

> Halt the manufacture of TSO-C91 ELTs that are installed in smaller aircraft and those that are used as handheld survival homing devices;
>
> Allow no further installation of TSO-C91 ELTs on new or existing aircraft;
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> Impose meaningful periodic inspection, testing, and maintenance requirements to ensure ELTs are properly installed and functional; and
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> Require that ELTs that do not pass appropriate inspections be replaced by ELTs that meet TSO-C91A or TSO-C126 within 4 years of rule publication.

The ICSAR letter continued: "Until problems are dealt with, they will cost lives, allow the SAR system to be falsely alerted many times per day, result in the lack of alerting in real crashes, cause strains on operating facilities and personnel, waste a lot of operational funding, prevent important potential enhancements in SAR system effectiveness, and divert on false alarms rescue units that may be needed elsewhere for real emergencies."

The Safety Board agrees with the ICSAR concerns and has, since 1978, advocated that the FAA improve ELTs. The international aviation community supports improvements as well. In a 1990 International Civil Aviation Organization (ICAO) questionnaire on whether ELTs that transmit on 406 MHz. should be an international standard, 59 foreign aviation authorities responded that they would support the new 406 MHz. ELT and only the United States was opposed.

In response to the ICSAR recommendation that TSO-C91 ELTs be replaced with TSO-C91A or TSO-C126 ELTs if they cannot pass inspection, the FAA responded that it will allow TSO-C91 ELTs to be repaired. However, on May 6, 1992, the Executive Director for Systems Operations of the FAA withdrew authorization to manufacture TSO-C91 ELTs beginning 6 months after the effective date of the final rule on NPRM Docket No. 26180, which is expected to be issued in the first half of 1993.

In response to the ICSAR recommendation that ELTs be inspected, the FAA, on July 23, 1992, replied that FAR Part 91, subpart E, "require(s) the inspection and maintenance of all components, including ELTs, to provide for continued airworthiness of the aircraft." However, 14 CFR Part 43, Appendix D, which details the scope of annual and 100-hour inspections, does not specify inspection of ELTs.

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

> Expedite the issuance of TSO-C126. (Class II, Priority Action) (A-92-134)

Amend 14 CFR Part 43, Appendix D to require mandatory periodic inspection of ELTs. At the minimum, the inspection should include the mounting and security of the ELT and its antenna; examination of the battery and its compartment for corrosion; inspection of the G switch, the electrical wiring, and the terminal connections; and functional testing of the ELT and its frequency alignment. (Class II, Priority Action) (A-92-135)

Amend 14 CFR Part 91.207 to require the installation of a TSO-C126 406 MHz. ELT in turbojet powered aircraft that are operated into uncontrolled airports. (Class II, Priority Action) (A-92-136)

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HART, and HAMMERSCHMIDT concurred in these recommendations.

By: Carl W. Vogt
Chairman