



## ASSESSMENT OF THE RESPONSE TO AVIATION SAFETY RECOMMENDATION A16-07

### Emergency locator transmitter: Prohibiting the use of hook-and-loop fasteners

#### Background

On 31 May 2013, at approximately 0011 Eastern Daylight Time, the Sikorsky S-76A helicopter (registration C-GIMY, serial number 760055), operated as Lifelight 8, departed at night from Runway 06 at the Moosonee Airport, Ontario, on a visual flight rules flight to the Attawapiskat Airport, Ontario, with 2 pilots and 2 paramedics on board. As the helicopter climbed through 300 feet above the ground toward its planned cruising altitude of 1000 feet above sea level, the pilot flying commenced a left-hand turn toward the Attawapiskat Airport, approximately 119 nautical miles to the northwest of the Moosonee Airport. Twenty-three seconds later, the helicopter impacted trees and then struck the ground in an area of dense bush and swampy terrain. The aircraft was destroyed by impact forces and the ensuing post-crash fire. The helicopter's satellite tracking system reported a takeoff message and then went inactive. The search-and-rescue satellite system did not detect a signal from the emergency locator transmitter (ELT). At approximately 0543, a search-and-rescue aircraft located the crash site approximately 1 nautical mile northeast of Runway 06, and deployed search-and-rescue technicians. However, there were no survivors.

The Board concluded its investigation and released report A13H0001 on 15 June 2016.

#### TSB Recommendation A16-07 (June 2016)

In this occurrence, the aircraft's ELT unit was secured to its mounting tray by a strap with a hook-and-loop fastener. During the crash sequence, the ELT became dislodged from this strap, and was found hanging by the wire that connects the unit to the antenna. There have been a number of cases in which hook-and-loop fasteners have failed to retain an ELT unit in its mounting tray. In several instances, the units were compromised as a result of breaking free from the fastener, which prevented a distress signal from being transmitted to the Cospas-Sarsat search-and-rescue (SAR) satellite system. The vulnerability of this type of fastener was previously identified during TSB aviation investigation A11W0151, and resulted in the issuance of a TSB Safety Advisory to Transport Canada (TC) and the manufacturer of the ELT. Despite the known vulnerability of hook-and-loop fasteners, they continue to be an approved means of attaching an ELT unit to an airframe.

There are a large number of ELT systems in use in Canada, and in other parts of the world, that rely on hook-and-loop fasteners to secure an aircraft's ELT to the airframe. According to the ELT manufacturer, there are approximately 2000 registered Kannad ELTs in Canada that rely on hook-and-loop fasteners. In the United States, there are more than 7000. According to the

company, only 2 of those registered in Canada are fitted with a new type of non-hook-and-loop fastener in accordance with TSO-C126b.

The problems associated with hook-and-loop fasteners are well documented, and some national regulatory bodies have already taken action to address these problems. In the United States, the Federal Aviation Administration (FAA) adopted TSO-C126b, which prohibits the use of hook-and-loop fasteners for new ELT installations. However, this revised TSO is not retroactive, so these fasteners will continue to be used in the United States in existing installations for the foreseeable future. Likewise, the European Aviation Safety Agency (EASA) has recently issued a Notice of Proposed Amendment (NPA) stating its intent to adopt ETSO-C126b, which mimics the requirements specified in TSO-C126b.

Although the TSB has identified the risk of using hook-and-loop fasteners for securing an ELT to an airframe, they are still permitted for use in Canada. In June 2015, TC issued a Preliminary Issue and Consultation Assessment (PICA) Form indicating the Department's intent to review its maintenance/installation and airworthiness standards for ELTs. According to TC, it intends to adopt TSO-C126b; like the FAA and EASA, however, it has indicated that the requirement will not be retroactive. There is no timeline for these potential changes to the maintenance/installation and airworthiness standards, nor is it certain whether the changes will be adopted in the *Canadian Aviation Regulations* (CARs) or the airworthiness standards. As a result, the risks associated with hook-and-loop fasteners will persist.

While hook-and-loop fasteners continue to be permitted for ELT installations, there is a significant risk that signals originating from these ELTs will not be transmitted due to damage associated with an ELT coming free from its mounting tray during a crash sequence. This lack of transmission could result in delays in life-saving SAR services.

Therefore, the Board recommended that

The Department of Transport prohibit the use of hook-and-loop fasteners as a means of securing an emergency locator transmitter to an airframe.

**TSB Recommendation A16-07**

### **Transport Canada's response to Recommendation A16-07 (September 2016)**

Transport Canada agrees in principle with the intent of this recommendation. As concluded in 2012, Transport Canada agrees with both FAA and EASA that inconsistent installation and reinstallation practices can lead to the hook-and-loop style fastener not having necessary tension to perform its intended function. Additionally, the retention characteristics of the hook and loop style fastener may degrade over time due to wear and environmental degradation from vibration, temperature, or contamination. Concern increases further when the ELT instructions for continued airworthiness (ICA) do not have specific instructions for inspecting the hook-and-loop style fasteners or a replacement interval. ELTs mounted with hook-and-loop style fasteners have detached from their aircraft mounting, causing the antenna connection to sever and rendering the ELT ineffective. Commensurately, the use of hook-and-loop fasteners to secure ELTs is no longer permitted for ELTs meeting the minimum performance specifications of TSO-C126b.

Further, Transport Canada understands that manufacturers of ELT designs incorporating hook-and-loop fasteners that have failed to perform their intended function in accidents either have revised or are in the process of revising their designs, minimizing the need to cancel the airworthiness approval of previously approved ELTs. Similarly, designs incorporating hook-and-loop fasteners have not been determined to represent an unsafe condition in the fleet, to the extent that an Airworthiness Directive is warranted.

On May 23, 2012, the FAA issued [Special Airworthiness Information Bulletin] SAIB HQ-12-32 to provide recommendations for previously installed ELTs. The Transport Canada Feedback magazine, at issue 3/2012, advised Canadian industry on the publication of the SAIB, providing ELT installation and maintenance guidance and advising of the new TSO-C126b to eliminate hook-and-loop fasteners from future TSO designs. On March 10, 2015, the U.S. Federal Register published an FAA Notice recommending voluntary change to the securing of existing ELTs, asking those aircraft owners/operators with ELTs secured with hook-and-loop fasteners in their aircraft to voluntarily switch to a metal strap type restraint method.

In response to this safety recommendation, Transport Canada will carry out further safety promotion to educate the Canadian aviation community with respect to the risks with hook-and-loop fasteners.

### **Transport Canada Update (December 2016)**

Transport Canada has adopted FAA TSO-C126b into [Airworthiness Manual] AWM 537.103, effective 04 August 2015, as the eligible minimum performance standard for issuance of a new CAN-TSO design approval.

Transport Canada will no longer issue a new design approval (appliance-only or installation approval) for ELTs meeting CAN-TSO-C126a and predecessor minimum performance standards (MPS). New installations of previously approved designs continue to satisfy CAR 605.38, so long as the ELTs meet standard specified in AWM 551.104 (i.e. CAN-TSO C91, CAN-TSO-C91a, CAN-TSO-C126 or later).

AWM 551.104 provides the design and installation standards of airworthiness applicable to ELTs required by CAR 605.38. Presently, AWM 551.104 allows ELTs to meet either CAN-TSO-C91, CAN-TSO-[C]91a or CAN-TSO-C126. An amendment to AWM 551.104 is being developed, following the withdrawal of NPA 2010-019 and that is intended to parallel the proposed amendments to CAR 605.38 and 571.04(4), that will specify the latest minimum performance standards appropriate for ELTs that have a 406 MHz capability; the latest standards (CAN-TSO-C126b) do not permit hook-and-loop fastener installation.

In the medium term, as part of NPA 2015-013, the installation standards in AWM 551.104 are being revised and TC will be proposing the proscription of installation using hook-and-loop fasteners. This will be subject to public comment as part of the Canada Gazette, Part I review.

No Airworthiness Directives have been issued against hook-and-loop fastened ELTs. Transport Canada has engaged in awareness activities (e.g. TP 185 Aviation Safety Letter, Issue 2/2013, TCCA Feedback Magazine 3/2012 Page 12).

## **Board assessment of Transport Canada's response to Recommendation A16-07 (December 2016)**

The Board is encouraged that TC has adopted FAA TSO-C126b into AWM 537.103 for the issuance of new ELT CAN-TSO design approvals. As a result, new 406 MHz ELT designs will be prohibited from using hook-and-loop fasteners.

In addition, TC has indicated that a new NPA is being developed proposing an amendment to AWM 551.104 that would require ELTs to meet standards that include 406 MHz signals and prohibit the use of hook-and-loop fasteners.

The Board believes that, once fully implemented, these efforts, combined with TC's awareness activities related to the use of hook-and-loop fasteners, will significantly reduce the safety deficiency associated with Recommendation A16-07.

Therefore, the response to Recommendation A16-07 is assessed as **Satisfactory Intent**.

### **Next TSB action**

The TSB will monitor the progress of TC's actions to mitigate the risks associated with the safety deficiency identified in Recommendation A16-07.

This deficiency file is **Active**.