**REASSESSMENT OF RESPONSES TO**
**AVIATION SAFETY RECOMMENDATION A95-10**

**GROUND PROXIMITY WARNING SYSTEMS (GPWS)**

## Background

The flight departed Winnipeg, Manitoba, at 1438 Central Standard Time for Sandy Lake, Ontario. On arrival at Sandy Lake at approximately 1549, the crew attempted to land but were unable to because of the low ceiling and visibility. They then diverted to St. Theresa Point, Manitoba, landing at 1630. After a normal turnaround, the flight returned to Sandy Lake and landed at approximately 1745. The aircraft took off from Runway 29 at Sandy Lake at approximately 1805 and immediately entered a right turn. After turning through about 120 degrees, the aircraft descended into 100-foot trees and crashed. All seven occupants of the aircraft were fatally injured, and the aircraft was destroyed.

The Board determined that, after take-off, the crew most likely lost situational awareness and, as a result, did not detect the increasing deviation from their intended flight path. Contributing to the loss of situational awareness was the lack of alternating current (AC) power to some of the flight instruments; the reason for the lack of AC power could not be determined.

The Board concluded its investigation and released report A93H0023 on 14 March 1995.

## Board Recommendation A95-10 (14 March 1995)

In an effort to reduce controlled flight into terrain (CFIT) accidents in commercial operations, the United States Federal Aviation Administration (FAA) made ground proximity warning systems (GPWS) mandatory on all turbine-powered (that is, both turbo-jet and turbo-prop) aircraft capable of carrying 10 or more passengers, effective 20 April 1994. It is understood that similar measures are not being contemplated at this time for Canadian-registered turbo-prop aircraft.

Over the preceding 11 years, 68 commercially operated aircraft were involved in CFIT accidents; 13 of these were turbo-prop aircraft. The Board believes that the increased level of safety provided by GPWS should not be related to an aircraft's type of propulsion. Rather, GPWS installation should be based on the role of the aircraft and its passenger-carrying capacity. The Board commends the initiative of some operators to install GPWS in their aircraft, even though it is not required by Canadian regulations. However, most turbo-prop aircraft, some carrying dozens of passengers, continue to operate without the added safety protection of GPWS. Therefore, the Board recommended that:

> The Department of Transport require the installation of GPWS on all turbine-powered, IFR-approved, commuter and airline aircraft capable of carrying 10 or more passengers.
>
> A95-10

## Response to A95-10 (14 June 1995)

In its response of 14 June 1995, Transport Canada (TC) noted that the current Canadian regulations with respect to GPWS state that no person shall operate a turbo-jet powered aeroplane that has a maximum certificated take-off weight of more than 15 000 kg (33 069 pounds) or for which a type certificate has been issued authorizing the carriage of 10 or more passengers unless the aircraft is equipped with GPWS. These provisions are contained in the draft Canadian Aviation Regulations (CARs).

This regulatory requirement does not include all turbine-powered aeroplanes in the commuter and airline category. TC reported that it will refer the recommendation to the Canadian Aviation Regulation Advisory Council (CARAC), Part VII Technical Committee for analysis. The CARAC Regulatory Committee will review the analysis before making a decision on whether the regulations should be expanded to include all commuter and airline aircraft.

## Board Assessment of the Response to A95-10 (04 July 1995)

The reply does not indicate whether TC accepts or rejects this recommendation, but does promise to send it to the CARAC for analysis. The CARAC Regulatory Committee will decide whether the regulations should be expanded to include all turbine-powered aircraft.

TC has not provided rationale for its continued differentiation between turbo-jet and turbo-prop aircraft for GPWS installations, especially considering that large turbo-prop aircraft are comparable in most respects to their pure jet counterparts in the airline category.

The deficiency behind Recommendation A95-10 will apparently continue for the foreseeable future.

Therefore, the reply is assessed as **Unsatisfactory**.

## Next TSB Action (04 July 1995)

TSB staff will monitor TC's activity with respect to the risks associated with Recommendation A95-10.

## Response to A95-10 (14 December 2005)

In its 14 December 2005 response, TC noted that Terrain Awareness Warning System (TAWS) is the technology, which supersedes GPWS, and is certified to overcome the deficiencies inherent in GPWS.

Notices of Proposed Amendment (NPAs) for TAWS were presented at the Part VII Technical Committee's meeting in February and June of 2003. Dissents to these NPAs were dispositioned by the CARAC on 29 October 2003. The NPAs then advanced to the legal drafting stage. There is a strong possibility that the regulations will be published in Part I of the *Canada Gazette* in late 2005 or early 2006.

The proposed regulations will require TAWS installations regardless of power-plant type. Air Taxi (CAR 703) and Commuter (CAR 704) aeroplanes will require Class B TAWS when configured between 6 to 9 passenger seats. Any turbine-powered aeroplanes meeting these criteria will be required to be equipped with TAWS equipment. Commuter (CAR 704) aeroplanes configured with more than 10 passenger seats will require Class A TAWS and a Terrain Awareness Display (TAD). Most of these aeroplanes are turbine-powered. Aeroplanes in Airline (CAR 705) operations will require a Class A TAWS and a TAD. Most aeroplanes under CAR 705 operations are turbine-powered.

In the package of new regulations, there are also regulations under CAR 605 requiring turbine-powered aeroplanes configured with more than 6 passenger seats to be equipped with Class B TAWS.

The proposed regulations require that TAWS provide accurate alerting despite temperature and pressure deviations from standard atmosphere, which are common conditions in the Canadian operating environment, particularly during winter. The proposed regulations also provide alleviations for equipage to operators who operate exclusively under day visual flight rules conditions.

## Board Reassessment of the Response to A95-10 (12 July 2006)

On 14 December 2005, TC noted that TAWS will overcome the deficiencies of GPWS technology. TAWS-related NPAs were approved by the CARAC in February 2003 and advanced to the legal drafting stage. TC indicated a strong possibility that the regulations would be published in *Canada Gazette* by early 2006. A May 2006 review of the NPAs indicated that they were still either pending legal editing or publication in *Canada Gazette*.

Since 1995, there have been six TSB investigations (10 fatalities) involving aircraft not fitted, nor required to be fitted, with GPWS (TAWS), and in which the TSB's findings indicated that the use of GPWS (TAWS) could possibly have prevented the occurrences.

The Board is concerned that, until the changes to regulations are put into effect, the deficiency continues to exist. Because this proposed regulatory change, if fully implemented, will substantially reduce or eliminate the safety deficiency as described in Recommendation A95-10, the assessment is **Satisfactory Intent**.

## Next TSB Action (12 July 2006)

The TSB staff will monitor TC's activity with respect to the risks associated with Recommendation A95-10.

## Response to A95-10 (07 February 2007)

Notices of Proposed Amendment (NPA) for TAWS were presented at the Part VII technical committee's in February and June of 2003. Dissents to these NPAs were considered by CARC on October 29, 2003. The NPAs then advanced to the legal drafting stage. As of December 2006, the drafting of the regulations is complete. The regulations were expected to be pre-published in the Canada Gazette Part I by April or May 2007, but this date has been pushed back to sometime in the fall of 2007.

## Board Reassessment of the Response to A95-10 (24 July 2007)

The Board continues to be concerned that until the changes to regulations are put into effect, the deficiency will persist. This proposed regulatory change, if fully implemented, will substantially reduce or eliminate the safety deficiency as described in Recommendation A95-10, and thus the assessment is **Satisfactory Intent**.

## Next TSB Action (24 July 2007)

The TSB staff will monitor TC's activity with respect to the risks associated with Recommendation A95-10.

## Response to A95-10 (6 March 2008)

In its 6 March 2008 update, TC notes that the proposed regulations are still in the Canadian Aviation Regulation Advisory Council (CARAC) process, and states that it is possible that the regulations may be pre-published in the Canada Gazette Part I in 2008.

## Board Reassessment of the Response to A95-10 (13 August 2008)

The Board continues to be concerned that until the changes to regulations are put into effect, the deficiency will persist. This proposed regulatory change, if fully implemented, will substantially reduce or eliminate the safety deficiency as described in Recommendation A95-10.

Therefore, the assessment is **Satisfactory Intent**.

## Next TSB Action (13 August 2008)

TSB Air Branch staff will monitor TC's activity with respect to the risks associated with Recommendation A95-10.

## Response to A95-10 (15 February 2010)

TC's latest response indicates that its CARAC consultation of the TAWS-related NPAs and the drafting of regulations by the Department of Justice are complete.

Presently it is working towards attaining Treasury Board Secretariat's approval of the proposed Regulation. A cost/benefit analysis is in progress and once completed (estimated fall 2010) will be submitted to Treasury Board for approval as part of TC's Regulatory Impact Analysis Statement.

## Board Reassessment of the Response to A95-10 (28 July 2010)

The Board continues to be very concerned that until the changes to regulations are put into effect, the deficiency will persist. This is why this safety issue is included on the Board's Watchlist. This regulatory change is required to substantially reduce or eliminate the safety deficiency as described in Recommendation A95-10.

Therefore, the assessment remains as **Satisfactory Intent**.

## Next TSB Action (28 July 2010)

TSB staff will monitor TC's activity with respect to the risks associated with Recommendation A95-10.

## Transport Canada Response to A95-10 (21 January 2011)

TC advises that the proposed regulatory changes have been drafted by the Department of Justice and after approval of the Minister of Transport and Treasury Board, are expected to be pre-published in the *Canada Gazette*, Part 1 by spring 2011.

## Board Reassessment of the Response to A95-10 (09 March 2011)

This safety issue is included on the Board's Watchlist and the Board continues to be very concerned that until the changes to regulations are put into effect, the deficiency will persist. This regulatory change is required to substantially reduce or eliminate the safety deficiency as described in Recommendation A95-10.

Therefore, the assessment remains as **Satisfactory Intent**.

## Next TSB Action (09 March 2011)

TSB staff will monitor TC's activity with respect to the progress and content of the proposed regulatory changes which are intended to address the risks associated with Recommendation A95-10.

## Transport Canada's Response to A95-10 (03 December 2011)

*''May 2011 Input*
*April 27, 2011 - Transport Canada is pleased to confirm that proposed regulations will be published in the Canada Gazette Part I over the next few months. The proposed amendments will introduce requirements for the installation of TAWS in private turbine-powered aeroplanes configured with six or more seats, excluding pilot seats, and in commercial aeroplanes configured with six or more seats excluding pilot seats. These proposed amendments will also introduce requirements for the installation of*

*an Enhanced Altitude Accuracy (EAA) function in airline and commuter aeroplanes with ten or more seats, excluding pilot seats."*

In an email dated 05 December 2011, TC informed the TSB that proposed regulatory amendments for TAWS have been pre-published on 03 December 2011, in the *Canada Gazette*, *Part 1,* Volume 145, No. 49.

## Board Assessment of Transport Canada's Response to A95-10 (07 March 2012)

In its response, TC advises that the proposed regulatory changes were pre-published on 03 December 2011, in the *Canada Gazette*, *Part 1,* Volume 145, No. 49. The proposed regulatory amendments would introduce requirements for the installation of Terrain Awareness Warning Systems (TAWS) in private and commercial aircraft of a certain size. Operators would have two years from the date on which the regulations come into force to equip their aeroplanes with TAWS and five years to equip with EAA.

The proposed regulatory amendment brought forward by TC, if adopted and implemented, will exceed the criteria of this recommendation and will substantially reduce the safety deficiency identified in Recommendation A95-10.

The response is considered **Satisfactory Intent**.

## Next TSB Action (07 March 2012)

The TSB will monitor the progress of the proposed Regulations.

The deficiency file is assigned an **Active** status.

## Transport Canada's Response to A95-10 (04 July 2012)

Canadian Aviation Regulations Amendments were published on 04 July 2012, in the *Canada Gazette*, *Part 2,* Volume 146, No. 14. These regulatory amendments introduce requirements for the installation of Terrain Awareness Warning Systems (TAWS) equipped with an Enhanced Altitude Accuracy (EAA) function in private turbine-powered aircraft configured with six or more passenger seats, excluding pilot seats, and in commercial aircraft configured with six or more passenger seats, excluding pilot seats.

## Board Assessment of Transport Canada's Response to A95-10 (05 September 2012)

TC advises that amendments to the *Canadian Aviation Regulations* were published on 04 July 2012, in the *Canada Gazette*, *Part 2,* Volume 146, No. 14. The regulatory amendments require the installation of Terrain Awareness Warning Systems (TAWS) in private and commercial aircraft of a certain size. Operators have two years from the date on which the regulations come into force to equip their aircraft with TAWS and five years to equip them with Enhanced Altitude Accuracy (EAA) systems.

The regulatory amendment brought forward by TC exceeds the criteria of this recommendation and will substantially reduce the safety deficiency identified in Recommendation A95-10.

The response is considered **Fully Satisfactory**.

## TSB Action (05 September 2012)

The deficiency file is assigned an **Inactive** status.