Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

REASSESSMENT OF THE RESPONSE TO TSB RECOMMENDATION A03-06

Accident investigation issues: quality of cockpit voice recorder recording

Background

On 02 September 1998, Swissair Flight 111, a McDonnell Douglas MD-11 aircraft, departed John F. Kennedy Airport in New York, New York, en route to Geneva, Switzerland. Approximately one hour after take-off, the crew diverted the flight to Halifax, Nova Scotia, because of smoke in the cockpit. While the aircraft was manoeuvring in preparation for landing in Halifax, it struck the water near Peggy's Cove, Nova Scotia, fatally injuring all 229 occupants on board. The investigation revealed that the flight crew had lost control of the aircraft as a result of a fire in the aircraft's ceiling area, forward and aft of the cockpit bulkhead.

The Board concluded its investigation and released report A98H0003 on 27 March 2003.

TSB Recommendation A03-06 (March 2003)

Frequently, the cockpit voice recorder (CVR) recording of cockpit conversations is of poor quality, particularly when the conversations are recorded through the cockpit area microphone. The voice quality on CVR recordings is dramatically improved when voices are recorded through boom microphones. However, pilots are not required to wear headsets with boom microphones at cruising altitudes. The ability to decipher internal conversations between flight crew members is an important element of effective accident investigation. Therefore, the TSB recommended that

> Regulatory authorities, in concert with the aviation industry, take measures to enhance the quality and intelligibility of CVR recordings.
>
> **Recommendation A03-06**

Transport Canada's response to Recommendation A03-06 (October 2003)

In response to Recommendation A03-06, Transport Canada (TC) provided the following comments:

- TC agrees with the intent of the recommendation.
- TC agrees that boom microphone usage will improve the quality of recordings but that the issue of pilot fatigue must be addressed.
- TC intends to start regulatory action to harmonize the altitude at which the crew must use boom microphones with that specified by the Federal Aviation Regulations (FARs) (18 000 feet above sea level).

- TC will consult with stakeholders to evaluate the technical issues to improve the quality of the CVR recordings and to assess the need for advisory material and standardization with other Civil Aviation Authorities (CAAs).

TSB assessment of Transport Canada's response to Recommendation A03-06 (October 2003)

TC's response details initiatives that should, if adopted, enhance the quality and intelligibility of CVR recordings. Consequently, the response is assessed as **Satisfactory Intent**.

Transport Canada's response to Recommendation A03-06 (December 2005)

TC's update, dated 14 December 2005, advised that it has introduced regulations (CAR 625 Appendix C, paragraph 14(d)) that require an annual intelligibility check conducted under flight conditions to verify the proper functioning of the CVR system. The evaluation of the CVR recordings is intended to identify any corrective actions needed to bring the CVR system into compliance.

Additionally, TC's update restates its position with respect the usage of boom microphone as a measure to improve the quality of voice recordings. Current operational regulations (625.33(II)(5)) mandate the use of the boom or mask microphone only during operation of the aircraft below transition altitude (10 000 feet above means sea level). This is consistent with International Civil Aviation Organization Annex 6, Chapter 6, paragraph 6.20. While TC acknowledges that the use of boom microphones would improve the quality of voice recordings, it is felt that full-time use would lead to increased fatigue on long flights and that any regulation mandating full-time use would be virtually impossible to enforce and likely to be ignored by most pilots. It is noted that the United States FARs require the wearing of boom microphones below an altitude of 18 000 feet.

TC will not pursue Notice of Proposed Amendment action to harmonize the transition altitude from (10 000 feet above means sea level) to that of 18 000 feet.

TSB reassessment of Transport Canada's response to Recommendation A03-06 (June 2006)

TC's letter of 14 December 2005 indicates that it has introduced regulations (CARs 625 Appendix C, paragraph 14(d)) that require an annual intelligibility check conducted under flight conditions to verify the proper functioning of the CVR system. As far as the increased usage of boom microphones is concerned, TC agrees that this would enhance quality and intelligibility of recordings. However, contrary to its original response, TC now has no intention of increasing the use of boom microphones for Canadian operators. The planned action or the action taken will reduce but not substantially reduce or eliminate the deficiency.

Therefore, the assessment is assigned **Satisfactory in Part.**

TSB review of Recommendation A03-06 deficiency file status (September 2009)

As TC has stated that it plans no action to address any residual risk associated with the deficiency identified in Recommendation A03-06, the Board concludes that continued reassessment will not likely yield further results.

Therefore, the assessment remains **Satisfactory in Part.**

TSB review of Recommendation A03-06 deficiency file status (May 2017)

The Board requested that Recommendation A03-06 be reviewed to determine if the deficiency file status was appropriate. After an initial evaluation, it was determined that the safety deficiency addressed by Recommendation A03-06 still needed to be reassessed.

A request for further information was sent to TC and a reassessment will be conducted upon receipt of TC's response.

Therefore, the assessment remains **Satisfactory in Part**.

The status of Recommendation A03-06 is changed to **Active.**

Transport Canada's response to Recommendation A03-06 (November 2017)

TC agrees in principle with the recommendation.

Following TC's update of December 14, 2005, no further activity has taken place. TC considers this item closed.

International Civil Aviation Organization (ICAO) Annex 16, Part I, Chapter 6, section 6.21 remains unchanged in its Standards and Recommended Practices (SARPs) with respect to microphones. For operational reasons provided in TC's earlier response, any new regulations for constant wear of boom microphones is not assessed to be practical or enforceable. *Canadian Aviation Regulation* (CAR) 625 provides that installation of Cockpit Voice Recorder (CVR) systems requires an intelligibility check at time of installation and on an annual basis thereafter.

No further TC regulatory action is underway or planned.

TSB reassessment of Transport Canada's response to Recommendation A03-06 (March 2018)

TC has taken a number of actions to address the safety deficiency identified in Recommendation A03-06, regarding the quality and intelligibility of cockpit voice recorders (CVR). These include the following:

- TC introduced regulations (*Canadian Aviation Regulations* (CARs) 625 Appendix C, paragraph 15(d)) that require an intelligibility check to be carried out at the time of installation, and every 3000 hours or 12 months thereafter, whichever comes first, to verify the proper functioning of the CVR system; and
- TC adopted standards (CARs 625.33(II)(6)) requiring the use of a boom or mask microphone while the aircraft is operated below 10 000 feet above sea level (ASL).

While the Board has encouraged TC in the past to increase the mandatory use of boom or mask microphones up to 18 000 feet ASL, the Board acknowledges that CARs 625.33(II)(6) complies with the International Civil Aviation Organization's Standards and Recommended Practices under Annex 6, Chapter 6, paragraph 6.21, and will improve the quality of CVR recordings.

The Board considers that the requirements for using boom or mask microphones below 10 000 feet ASL, combined with the CVR intelligibility check requirements introduced in the

CARs, have reduced the risks associated with the safety deficiency identified in Recommendation A03-06.

Therefore, the response to Recommendation A03-06 is assessed as **Fully Satisfactory**.

Next TSB action

The deficiency file is **Closed.**