TSB Recommendation A03-08

Image (video) recording

The Transportation Safety Board of Canada recommends that regulatory authorities develop harmonized requirements to fit aircraft with image recording systems that would include imaging within the cockpit.

Air transportation safety investigation report	A98H0003
Date the recommendation was issued	27 March 2003
Date of the latest response	November 2013
Date of the latest assessment	March 2026
Rating of the latest response	Satisfactory in Part
File status	Closed

Summary of the occurrence

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.

Rationale for the recommendation

The TSB believes that image recording in the cockpit will substantially benefit safety investigations. It will provide investigators with a reliable and objective means of expeditiously determining what happened. This will assist safety investigators in focusing on why events took the course they did, what risks exist in the system, and how best to eliminate those risks in the future.

The TSB endorses the National Transportation Safety Board (NTSB) recommendations issued in April 2000 (A-00-30 and A-00-31), and advocates the development of international Minimum Operational Performance Specifications for image recording systems by European Organisation for Civil Aviation Electronics (EUROCAE) Working Group 50.

Therefore, the Board recommended that

> Regulatory authorities develop harmonized requirements to fit aircraft with image recording systems that would include imaging within the cockpit.
>
> **TSB Recommendation A03-08**

Previous responses and assessments

June 2003: response from Transport Canada

In response to Recommendation A03-08, Transport Canada (TC) provided the following comments:

- TC supports the recommendation concerning the installation of image recording systems to supplement the current flight recording requirements.
- TC will work with other Civil Aviation Authorities to develop a harmonized approach to image recorder system standards.
- TC will take regulatory action to implement the requirement to install video imaging equipment in cockpits of transport category aeroplanes in commercial service.

October 2003: TSB assessment of the response (Satisfactory Intent)

TC's response details actions that, if fully implemented, will satisfy the aim of Recommendation A03-08.

Consequently, the response is assessed as **Satisfactory Intent**.

December 2005: response from Transport Canada

In its activity update dated 14 December 2005, TC stated that any future rulemaking activity is contingent on international harmonized requirements.

June 2006: TSB assessment of the response (Satisfactory Intent)

In response to several NTSB "image recorder" recommendations on 26 February 2006, the Federal Aviation Administration (FAA) proposed a Technical Standard Order for Aircraft Image Recorder Systems. Additionally, the FAA is working with the NTSB to develop a "proof-of-concept" test that will install an image recorder system in a simulator and on an FAA airplane. Presumably, these activities may result in FAA rulemaking. TC's letter of 14 December 2005 indicates that future rulemaking activity will be contingent on internationally harmonized requirements. The stated action, if fully implemented, will substantially reduce the risks associated with Recommendation A03-08.

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

February 2007: response from Transport Canada

TC's response repeats its support for the installation of image recording systems as suggested in Recommendation A03-08. TC states that it will continue to participate with other CAAs in harmonization activities addressing the requirements for imaging recording systems. Finally, it states that once harmonization is achieved it will initiate, through its rule making process, an NPA regarding the requirement to install video imaging equipment in cockpits of transport category aeroplane in commercial service.

July 2007: TSB assessment of the response (Satisfactory Intent)

The Board is aware that TC has adopted a harmonized approach to the development of requirements as suggested in Recommendation A03-08. This latest response confirms that TC's action plan if fully implemented will substantially reduce the risks associated with Recommendation A03-08.

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

March 2008: response from Transport Canada

In its response of 11 March 2008, TC states that image recording of the flight deck environment is a new technology that is approaching maturity. TC has been closely monitoring this development through its membership in the European Organization for Civil Aviation Equipment working group, and will continue to work with ICAO and other civil aviation authorities to ensure that a harmonized rule is introduced when appropriate.

TC intends to harmonize with the FAA once the equipment standards and installation requirements have been defined and found acceptable by certification authorities. Once a harmonized approach is achieved, TC will submit an NPA regarding the requirement to install video imaging equipment in cockpits of transport category aeroplanes in commercial service.

TC considers this recommendation closed as future rule marking activity contingent on internationally harmonized requirements.

August 2008: TSB assessment of the response (Satisfactory Inent)

The Board appreciates that TC has adopted a harmonized approach to the development of image recording systems requirements as suggested in Recommendation A03-08. Its latest response confirms that TC's action plan if fully implemented will substantially reduce the risks associated with Recommendation A03-08.

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

January 2010: response from the U.S. Federal Aviation Administration

In January 2010 the FAA provided an update with respect to its activity related to TSB Recommendation A03-08. In July 2005, the FAA partnered with the NTSB, Securaplane, and Physical Optics to do a proof-of-concept test of a video imaging system on an FAA King Air aircraft at the FAA Technical Center in Atlantic City, NJ.

The focus of the test was to see if accurate parametric data could be collected from a video at different frame rates and resolutions. The images collected during the test were evaluated by the NTSB and parametric data derived for over 50 parameters that were equivalent to the data collected by the Digital Flight Data Recorder. The test also revealed several weaknesses of image recording which need to be addressed before any mandate is feasible. The results and analysis of this test are being compiled into a report to be completed in 2010.

The FAA has been participating on an international workgroup (EUROCAE WG50) which has just completed work on ED112 entitled *Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems*. This document defines the performance specifications for all flight recorders including image recorders. Several issues make promulgating a regulation requiring the installation of a camera in the cockpit a challenge, including concerns about the use of the recordings for other than accident investigation purposes.

July 2010: TSB assessment of the response (Satisfactory Intent)

The Board appreciates the FAA's update. The details identify the various FAA initiatives designed to support regulatory change to fit aeroplanes with image recording systems.

Its latest response confirms that FAA action plan, if fully implemented, will substantially reduce the risks associated with Recommendation A03-08.

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

January 2011: response from Transport Canada

TC states that, since November 2010, the International Civil Aviation Organization (ICAO) has required the installation of Airborne Image Recorders, which is considered a component of Flight Data Recorders. Under the Canadian CVR/FDR rulemaking initiative, TC will consider harmonization of CAR requirements with this ICAO requirement. Presentation of NPAs is planned for the September 2011 Canadian Aviation Regulation Advisory Council (CARAC) Technical Committee meeting.

March 2011: TSB assessment of the response (Satisfactory Intent)

The Board believes that, if TC harmonizes with the ICAO requirement, the risk associated with Recommendation A03-08 will be substantially reduced.

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

May 2011: response from Transport Canada

An Issue Paper will be presented at the September 2011 Technical Committee to discuss the Transport Canada proposal with regards to amending requirements for CVR/FDR.

September 2011: update to the response from Transport Canada

There remain both technical and social questions regarding implementation of Aircraft with Image Recording Systems. As a result, TCCA will not pursue a domestic requirement until an internationally harmonized solution resolves both the technical and social issues that remain.

March 2012: TSB assessment of the response (Unsatisfactory)

TC's latest response indicates that it will not initiate a domestic Image Recording Systems rulemaking initiative until an internationally harmonized solution resolves both the technical and social issues that remain. However, the response does not indicate what, if any, international regulatory forum has been mandated to resolve these outstanding issues.

While there has been progress in developing internationally acceptable specifications for the design of image recorders (e.g., TSO-C176, *Aircraft Cockpit Image Recorder Systems*) and their installations (e.g., EUROCAE ED-112, *Minimum Operational Performance Specifications for Crash Protected Airborne Recorder Systems*), regulatory amendments to require their use in aircraft have yet to be enacted. The inclusion of airborne image recorders as part of ICAO's Annex 6, *Standards and Recommended Practices for the Operation of Aircraft*, Parts I, II and III, is gratifying but limited as an optional installation for turbine-powered aeroplanes of a maximum certificated take-off mass of 5 700 kg or less for which a type certificate is first issued on or after 1 January 2016.

Given that airborne image recorder technical specifications are published, the obstacle to mitigating the residual risk associated with Recommendation A03-08 would appear to be the lack of a harmonized approach by civil aviation authorities to deal with the barriers associated with implementing regulatory change. TC offers no action plan to mitigate this residual risk.

The response is considered **Unsatisfactory**.

December 2012: response from Transport Canada

In concurrence with the recommendation made by the ICAO Air Navigation Commission on 16 November 2010, where it was agreed upon to defer the initial proposal for airborne image recorders (AIR) pending the work of the multidisciplinary task force on the protection of safety information, TC will not pursue further actions in addressing the recommendation made for image recording in the cockpit.

March 2013: TSB assessment of the response (Unsatisfactory)

TC reiterates its position that it will not pursue any actions related to image recording in the cockpit. Instead it has deferred such action to ICAO and specifically to a multidisciplinary task force on the protection of safety information.

The TSB believes the ICAO entity referred to in TC's response is the Safety Information Protection Task Force (SIP TF). Information provided by ICAO indicates that the SIP TF was formed to provide recommendations for new or enhanced ICAO provisions and guidance material related to the protection of safety information, including standards 5.12 and 8.3 as well as Attachment E to Annex 13. Its activities began in May 2011 and to date it has established working groups to review existing ICAO provisions related to the protection of safety information; reviewed States' legal frameworks and practices related to this subject; and developed a strategy to promote the coordination among safety, administrative, judicial and prosecutorial authorities when dealing with the protection of safety information.

While airborne image recorder technical specifications are published and available to the industry, the lack of a harmonized approach by civil aviation authorities to implement regulatory change regarding the use of image recorders remains the challenge. ICAO's SIP TF initiative would appear to be a logical first step in any move toward requiring image recorders in an effort to mitigate the residual risk associated with Recommendation A03-08; however, no further action is being taken by TC for the time being.

The response is considered **Unsatisfactory.**

November 2013: response from Transport Canada

As per the ICAO Air Navigation Commission report, Transport Canada will not currently pursue further actions in addressing this recommendation and no further updates will be provided.

April 2014: TSB assessment of the response (Unsatisfactory)

In the absence of other details, the Board assumes that the ICAO Navigation Commission report cited in TC's latest response is the Technical Commission's 27 Aug 2013 working paper A38-WP/173 entitled *Current and Future Work on the Appropriate Use and Protection of Safety Information*.

Working paper A38-WP/173 summarizes the work of ICAO's SIP TF and proposes amendments to Assembly Resolutions A37-2 and A37-3 that incorporate the SIP TF findings and recommendations. These resolutions propose changes to ICAO Annexes 13 and 19 that take into account the importance of addressing critical safety concerns whilst striking a balance between the need for protection of safety information and the proper administration of justice.

Additionally A38-WP/173 expresses hope that ICAO will produce substantive proposals for new and/or amended provisions to the relevant body of ICAO standards, recommended

practices, and guidance materials, if at all possible before the 39th Session of the Assembly when it convenes in 2016.

TC has stated that it will not pursue further actions in addressing the risks associated with Recommendation A03-08 and consequently no further updates will be provided to the TSB.

Although the CTAISB Act and ICAO Annex 13 have been amended to provide for the protection and non-disclosure of image/video recordings, resistance against legislation that would require the installation of cockpit image recording systems remains strong.

In addition to TC, the Federal Aviation Administration (FAA) also appears reluctant to act. Since 1999 the National Transportation Safety Board (NTSB) has issued 14 recommendations to the FAA related to the installation of cockpit image recording systems. To all but a single recommendation, the NTSB has assessed the FAA responses as unacceptable. Presently, 5 of these unacceptable recommendations remain open with no further action planned by the FAA. It seems that the FAA's unwillingness to act is based on their belief that there is no compelling evidence to require installation of cockpit image recording systems.

The multinational Air Line Pilots Association has a long established position regarding the installation of such equipment that minimizes any contribution such equipment might make to improving the quality of accident investigations.

After more than a decade of intense debate between investigative and regulatory authorities, the regulators remain unconvinced of the enhancements that cockpit image recorders would bring to aviation safety.

The TSB continues to believe that image recording in the cockpit will substantially benefit safety investigations. It will provide investigators with a reliable and objective means of expeditiously determining what happened. This will assist safety investigators in focusing on why events took the course they did, what risks exist in the system, and how best to eliminate those risks in the future.

The response rating remains as **Unsatisfactory.**

Latest response and assessment

March 2026: TSB assessment of the overall response (Satisfactory in Part)

The Board notes that Recommendation A03-08, issued in 2003, called for regulatory authorities to develop harmonized requirements to fit aircraft with image recording systems that include capturing imaging within the cockpit. Over the past two decades, Transport Canada (TC), the U.S. Federal Aviation Administration (FAA), the U.S. National Transportation Safety Board (NTSB), the International Civil Aviation Organization (ICAO), and international standards organizations, such as the European Union Aviation Safety Agency (EASA), have extensively studied this issue.

Since the issuance of the recommendation, progress has been made in developing internationally recognized technical standards for cockpit image recording systems. EUROCAE Working Group 50 (WG-50) completed ED-112, *Minimum Operational Performance Specifications for Crash Protected Airborne Recorder Systems*, which defines performance requirements for all airborne recorders, including image recorders. Complementary certification standards, such as FAA Technical Standard Order TSO-C176a[1] and EASA European Technical Standard Order ETSO-2C176a,[2] demonstrate that the technology required to support cockpit image recording systems is mature and technically feasible.

ICAO has formally recognized airborne image recorders within its regulatory framework. Amendments to ICAO Annex 6 permit the optional fitment of airborne image recorders in limited circumstances, while ICAO annexes 13 and 19 have been updated to strengthen provisions related to the protection and non-disclosure of safety information, including image and video recordings. ICAO's Air Navigation Commission deferred proposals to mandate airborne image recorders pending the work of the Safety Information Protection Task Force (SIPTF) and its successor groups. While this work has enhanced guidance on the protection of safety information, it has not led to internationally harmonized regulatory requirements. Several States, including Australia, have filed differences against ICAO provisions, and no major civil aviation authority has mandated cockpit image recording systems for transport category airplanes.

Historically, the FAA has been reluctant to mandate cockpit image recorders. Although the NTSB has long advocated for their installation due to the investigative value they provide, the FAA has consistently cited concerns related to pilot privacy, data security, and cost as reasons not to implement a mandate.

More recently, in 2023, the FAA established the Investigative Technologies Aviation Rulemaking Committee (ARC) to explore cockpit image recorders (CIR), airborne image recorders (AIR), safety management systems, and flight data monitoring. The ARC's mandate is to support FAA responses to multiple NTSB recommendations. In its interim report of January 2025,[3] the ARC emphasized the investigative value of CIRs as part of a suite of data sources while carefully considering:

- privacy and data misuse concerns before implementing CIR requirements;
- handling CIR data for events outside the United States, particularly in States lacking a Just Safety culture; and

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1 Federal Aviation Administration (FAA), *Technical Standard Order, TSO-C176a, Cockpit Image Recorder Equipment* (2013). Available at https://drs.faa.gov/browse/TSO/doctypeDetails (last accessed on 22 April 2026).

2 European Union Aviation Safety Agency (EASA), *EASA CS-ETSO – Amendment 16. Appendix 1 to ETSO-C176a – MPS for Crash-Protected Airborne Recorder Systems* (2020). Available at: https://www.easa.europa.eu/download/etso/ETSO-2C176a.pdf (last accessed on 22 April 2026).

3 Federal Aviation Administration (FAA), *Investigative Technologies, Aviation Rule Making Committee Interim Report* (22 January 2025). Available at https://www.faa.gov/media/90686 (last accessed on 02 February 2026).

- legal frameworks and provisions to ensure CIR data are used solely for accident investigation, not for criminal or disciplinary purposes.

While the ARC reflects a structured and collaborative approach to addressing longstanding concerns, its work remains at an early, exploratory stage and has not resulted in any regulatory requirements. Any further developments can be monitored outside of this recommendation.

Despite over two decades of discussion and technical progress, no internationally harmonized requirement exists to mandate CIRs in transport category aircraft. Concerns related to pilot privacy, data protection, security, cost, and the potential misuse of recordings continue to prevent regulatory consensus. TC has maintained that it will not pursue unilateral domestic rulemaking in the absence of such an internationally harmonized approach.

The Board continues to recognize that CIR systems would substantially enhance accident and incident investigations by providing objective information on crew actions and cockpit conditions. However, after more than 20 years, further progress remains dependent on international consensus beyond the control of the TSB or any single regulatory authority.

Therefore, the Board considers the overall response to be **Satisfactory in Part.**

File status

Given the age of the recommendation, the development of technical standards, and TC's consistent position that no regulatory changes will be made without international harmonization, the Board considers that the risk associated with the safety deficiency in Recommendation A03-08 has been partially addressed and that further progress is unlikely. While the absence of mandated cockpit image recorders limits the availability of certain investigative data, other sources of recorded information continue to support investigations. Consequently, the residual risk is considered to be low.

This deficiency file is **Closed**.