



TSB Recommendation A18-01

Mandatory installation of lightweight flight recording systems

The Transportation Safety Board of Canada recommends that the Department of Transport require the mandatory installation of lightweight flight recording systems by commercial operators and private operators not currently required to carry these systems.

Air transportation safety investigation report	A16P0186
Date the recommendation was issued	26 April 2018
Date of the latest response	December 2024
Date of the latest assessment	March 2025
Rating of the latest response	Unsatisfactory
File status	Active

Summary of the occurrence

On 13 October 2016, a privately operated Cessna Citation 500 (registration C-GTNG, serial number 500-0169), departed Kelowna Airport (CYLW), British Columbia, on an instrument flight rules night flight to Calgary/Springbank Airport (CYBW), Alberta. The pilot and 3 passengers were on board. Shortly after departure, at about 2135 Pacific Daylight Time, the aircraft made a tight right turn as it was climbing through 8600 feet above sea level, and then entered a steep descending turn to the right until it struck the ground. All of the occupants were fatally injured. Impact forces and a post-impact fire destroyed the aircraft. No emergency call was made, and no emergency locator transmitter signal was detected.

The Board concluded its investigation and released report A16P0186 on 26 April 2018.

Rationale for the recommendation

Following a fatal accident with no survivors or witnesses, an investigation may never be able to determine the exact causes and contributing factors unless the aircraft is equipped with an on-board recording device. The benefits of recorded flight data in aircraft accident investigations are well known and documented.

Currently, flight data recorders (FDRs) and cockpit voice recorders (CVRs) are considered the most comprehensive methods of capturing large amounts of flight data and can assist investigators in determining the reasons for an accident. FDRs record information such as altitude, airspeed, heading, and other aircraft parameters, many times per second. CVRs record radio transmissions and ambient cockpit sounds, such as pilot voices, alarms, and engine noises.

In Canada, FDR and CVR regulations are specified in section 605.33 of the *Canadian Aviation Regulations* (CARs)—Flight Data Recorder and Cockpit Voice Recorder. Under this provision, the requirements for CVR and FDR equipment in aircraft are based primarily on the number and type of engines, number of passenger seats, and type of operation. Given the design characteristics and configurations, many aircraft flown by private operators, including the occurrence aircraft, are not required by regulation to be equipped with either an FDR or a CVR.

To provide an accessible and feasible means of recording valuable flight data information, regardless of the type of aircraft and operation flown, several lightweight FDR systems currently manufactured can record combined cockpit image, cockpit audio, aircraft parametric data, and/or data-link messages.

In 2016, the International Civil Aviation Organization (ICAO) amended Annex 6 of its Standards and Recommended Practices to recommend that certain categories of aircraft and helicopters flown by commercial operators carry lightweight flight recorders. ICAO Annex 6 also establishes the minimum specifications for such systems. To comply with recent amendments to ICAO Annex 6 and to address 12 safety recommendations issued by 7 different investigation bodies in Europe, the European Aviation Safety Agency published a Notice of Proposed Amendment in 2017, under which new regulations would prescribe lightweight flight recorders for some categories of commercially operated aircraft and helicopters.

Although there are currently no regulations in Canada requiring any aircraft to be equipped with lightweight FDR systems, these devices provide a potential cost-effective alternative for some sectors of the civil aviation industry.

In 2013, following its investigation into a fatal in-flight breakup occurrence in March 2011 northeast of Mayo, Yukon, the TSB concluded there was a compelling case for implementing lightweight FDR systems for all commercial operators, and recommended that

the Department of Transport work with industry to remove obstacles to and develop recommended practices for the implementation of flight data monitoring and the installation of lightweight flight recording systems by commercial operators not currently required to carry these systems.

TSB Recommendation A13-01

TC has acknowledged that flight data monitoring programs would enhance safety and has taken the following actions to address the safety deficiency identified in Recommendation A13-01:

- In 2013, after conducting a risk assessment to evaluate alternative approaches to flight-data monitoring (FDM), TC informed the TSB that it supported Recommendation A13-01. In 2015, TC informed the TSB that it intended to revisit this risk assessment.

- In 2013, TC informed the TSB that it would develop an Advisory Circular outlining recommended practices for FDM programs.
- In 2013, TC informed the TSB that it would incorporate its analysis and review of Recommendation A13-01 into its planned assessment for FDRs and CVRs, which was scheduled to begin in 2014–2015.
- In 2014, TC informed the TSB that it would consider adding FDM principles in future regulatory initiatives and amendments.
- In 2015, TC informed the TSB that it would prepare an issue paper on the use of FDM, providing factual information on FDM, including its benefits, costs, and challenges.

Due to other ministerial commitments, TC has not initiated its work for any of these undertakings.

In February 2018, TC conducted a focus group with industry stakeholders, including the Canadian Business Aviation Association, to evaluate the challenges and benefits of installing lightweight flight recording systems on aircraft that are not currently required to carry these systems.

However, until the focus group reaches conclusions concerning these challenges and benefits in small aircraft, and TC provides the TSB with its plan of action following those conclusions, it is unclear when or how the safety deficiency identified in Recommendation A13-01 will be addressed. The TSB is concerned that very few concrete actions are being taken to address Recommendation A13-01 and that this could lead to protracted delays, as observed on numerous other recommendations.

In a recent occurrence investigated by the TSB, a privately operated Mitsubishi MU-2B-60 aircraft struck terrain on its final approach to Îles-de-la-Madeleine Airport, Quebec. All 7 occupants were fatally injured. A lightweight FDR system was on board the occurrence aircraft, although it was not required by regulation. By recovering the recorder and extracting its data for analysis, the investigation was able to better understand the sequence of events that led to the aircraft's departure from controlled flight. Had a recording system not been on board, crucial information to understand the circumstances and events leading up to this occurrence would not have been available to the investigation.

In contrast, the information normally contained in FDR systems was not available to this investigation. The investigation could not determine why the aircraft departed controlled flight and collided with terrain. Because the occurrence aircraft was not equipped with any type of FDR or CVR, the lack of flight data precluded investigators from fully identifying and understanding the sequence of events and the accident's underlying causes and contributing factors.

Although Recommendation A13-01 targeted commercial operators, the contrast in available evidence demonstrated between the Îles-de-la-Madeleine accident and this occurrence highlights the value of installing lightweight FDR systems on privately operated aircraft. This investigation demonstrates that investigators are at a disadvantage in determining the root

causes of an occurrence when there are no flight data available, regardless of whether the investigation involves an aircraft operated commercially under CARs Part VII or a business aircraft operated privately under CARs Subpart 604.

There is compelling evidence that the lack of recording devices on board commercial aircraft and private aircraft operated under CARs Subpart 604 continues to impede the TSB's ability to advance transportation safety.

Therefore, the Board recommended that

the Department of Transport require the mandatory installation of lightweight flight recording systems by commercial operators and private operators not currently required to carry these systems.

TSB Recommendation A18-01

This new recommendation supersedes Recommendation A13-01, which has been closed.

Previous responses and assessments

July 2018: response from Transport Canada

Transport Canada (TC) agrees in part with the aviation safety recommendation (A18-01).

Aviation safety is of paramount importance to TC. To that end, TC is committed to continuing to strengthen aviation safety by working in consultation with our stakeholders to examine the potential use and installation of lightweight recording systems for Canadian aircraft that fall outside the scope of the current requirements under the Canadian Aviation Regulations (CARs). TC is committed to building upon its established regulatory aviation safety initiatives while striking a proper balance between the benefits and costs of any possible new requirements.

TC is addressing this recommendation by undertaking a number of initiatives:

TC's further policy analysis of flight data management

TC is undertaking a thorough policy analysis of the possible approaches to expanding safety data collection in Canadian aviation. This work includes extensive consultations with industry stakeholders, including the creation of a focus group to respond to a previous Transportation Safety Board (TSB) recommendation on the issue of flight data monitoring (Recommendation A13-01).

Over the course of this process, two principal approaches have been identified as most appropriate to achieve this objective:

Voluntary installation of flight data recorders (FDRs) and lightweight data recorders (LDRs)

This would include a TC-led advisory circular and ongoing guidance to operators looking to improve their data collection. This option would allow for timelier implementation and provide operators flexibility in the adoption of Flight Data Management (FDM) systems, building on existing industry practices. A voluntary approach would secure a high level of industry support and allow stakeholder associations to work with their members, while permitting the TSB to access more data during incident investigations in the future. This would allow for the opportunity to develop guidance material regarding FDM system parameters. These parameters will be fully compliant and aligned with International Civil Aviation Organization (ICAO) standard ED155 on FDM. The advisory circular will be made available through TC's website, the Global Aviation Safety Plan, and all relevant publications.

Industry groups have similarly been proactive in analyzing this issue in order to develop recommended practices on the voluntary adoption of FDM systems. The Air Transport Association of Canada (ATAC), for example, founded its own Flight Data Working Group focused solely on the subject of FDM. This internal working group is exploring the voluntary implementation of FDM by ATAC member's fleets of aircraft and is working to monitor the progress of the member aircraft involved thus far. TC is continuing to work with industry stakeholders to ascertain the full extent of operators that have voluntarily adopted FDM systems to date. As part of its cost benefit analysis, TC will also consult with insurance companies and underwriters regarding the possibility of implementing insurance benefits to operators who voluntarily adopt FDM systems.

Incorporation of FDRs or LDRs into newly-manufactured aircraft:

TC plans to introduce regulations to require that manufacturers incorporate FDRs/LDRs into all new aircraft. TC would determine which sectors of the Canadian aviation landscape would be subject to this certification requirement – including commercial and private operators – as well as an appropriate date by which new requirements would come into effect. All certification requirements will be, at minimum, fully aligned with ICAO standard ED155.

TC will also take into account the standards put in place by our international partners in other civil aviation authorities. This option represents a flexible, forward-looking approach to FDM and would guarantee new aircraft are equipped with FDRs/LDRs, while avoiding the burden to operators of retrofitting FDRs into current their aircraft.

As part of its continued engagement with the Canada aviation industry, TC is committed to re-evaluating these two principle approaches by further assessing the number of operators that have voluntarily adopted FDM systems and addressing any gaps which may be determined. Consideration would be given to other measures, including a regulatory solution, if the results of the voluntary approach prove insufficient.

TC's continued engagement and collaboration with the Canadian aviation industry

A crucial focus of TC's ongoing analysis of FDM involves engaging the Canadian aviation industry to develop recommended practices and determine key obstacles in the adoption and installation of flight data systems.

In February 2018, TC led a focus group of representatives from the aviation industry to address TSB Recommendation A13-01. The recommendation from the TSB called for TC to work with industry to remove obstacles and develop recommended practices for the implementation of FDM and the installation of LDRs for commercial operators not required to carry these systems. The focus group included representation from seven separate industry organizations. The concerted approach of the focus group has since been highlighted by participating organizations as a positive example of collaboration between TC and industry stakeholders.

Throughout this process, industry stakeholders raised several concerns related to the adoption and installation of flight data management systems, whether it be traditional FDRs or LDRs. The concerns centred on the economic burden of retrofitting aircraft with FDRs, which is extremely costly and, from a technical perspective, there is limited ability to physically retrofit aircraft to carry an FDR due to all the required sensors and instruments. In addition, LDRs, while less costly than traditional FDRs, are also less robust and less likely to survive a crash. Industry stakeholders expressed that there are limited safety benefits to LDRs, and that it would be more beneficial to use financial resources and efforts to prevent accidents at the outset.

Industry also raised concerns that any new requirements regarding FDM cannot be developed as a one-size-fits-all solution for the entire Canadian aviation industry. TC will continue its ongoing analysis with stakeholders on FDM and will build on the success of the focus group through continued engagement and collaboration with the Canadian aviation industry to promote voluntary adoption of FDRs and LDRs. TC will also continue to explore the possibility of mandating the installation of FDRs or LDRs into newly-manufactured aircraft. As part of TC's consultative process, it will engage in regular contact with the TSB throughout, in order to better ensure that the department is kept abreast of all developments moving forward.

Additional aviation safety measures underway

TC and the aviation industry are working together to promote aviation safety as part of the 'General Aviation Safety Campaign'. The campaign, launched by TC in 2017, represents the collaborative efforts between the aviation industry, government, and industry partners to provide input, advice, and to help TC reach out to the general aviation community in promoting aviation safety. This initiative involves several internal working groups whose recommendations will be used to advance aviation safety in private and commercial sectors of aviation.

Additionally, TC has begun incorporating private operators into its inspection plan and activities, both to promote compliance with existing safety regulations and to learn more about the safety practices of private operators in an effort to continue to advance the safety of private air operations. This inspection campaign will be administered to 66 private operators in 2018, with private operation inspections forming a key part of its planned activities every year moving forward.

TC undertook several additional measures to strengthen aviation safety in Canada. Working in consultation with the aviation industry, TC updated existing regulations to improve the use of Cockpit Voice Recorders (CVRs). This work was, in part, a response to TSB Recommendation A99-03. The amendments mandate that there must be a back-up power supply for CVRs and increases recording time from 30 minutes to 2 hours. This regulatory change was published in Canada Gazette, Part I (CGI) in December 2017 and is expected to be published in Canada Gazette, Part II (CGII) in the fall of 2018. These changes align with revised ICAO standards and measures taken by international partners.

TC will continue its ongoing work and collaboration with industry stakeholders to examine additional regulatory initiatives in response to emerging trends and technology, TSB recommendations, and ICAO standards moving forward.

September 2018: TSB assessment of the response (Satisfactory in Part)

Recommendation A18-01 supersedes Recommendation A13-01, which has been closed. Upon publishing Recommendation A18-01, the Board urged Transport Canada (TC) to build upon the work done on Recommendation A13-01 to expedite the implementation of safety actions in response to Recommendation A18-01.

In its response to Recommendation A18-01, TC indicated that it agrees in part with Recommendation A18-01, and that it would undertake the following actions:

- As a follow-up to its focus group held with industry in February 2018, in support of Recommendation A13-01, TC is undertaking a policy analysis of flight data management. Two approaches have been identified:
 - The voluntary installation of flight data recorders (FDRs) and lightweight data recorders (LDRs), as well as the publication of an advisory circular and guidance to operators; and
 - The possible introduction of regulations for the installation of FDRs and LDRs into newly-manufactured aircraft. TC indicated that the sectors of the Canadian aviation landscape that would be subject to this certification requirement are yet to be determined. TC also indicated that all certification requirements will be, at minimum, fully aligned with ED155, the European Organisation for Civil Aviation Equipment (EUROCAE) Minimum Operational Performance Specification for lightweight flight recording systems, referenced in ICAO Annex 6.

TC has indicated that it will re-evaluate these two approaches by further assessing the number of operators that have voluntarily adopted flight data monitoring systems. Consideration would be given to other measures, including a regulatory solution, if the results of the voluntary approach prove insufficient.

- TC intends to continue to engage and collaborate with industry to develop recommended practices and determine key obstacles in the adoption and installation of flight data systems.

In addition to TC's response, the TSB received information from the Canadian Business Aviation Association (CBAA) regarding actions taken following the publication of Recommendation A18-01. In its letter, the CBAA informed the TSB that it will continue to promote FDR fitment and analysis of data derived from the FDR through the CBAA Partners-in-Safety Program. Additionally, the CBAA has signed an agreement with a supplier to provide CBAA members with flight data analysis services. Finally, the CBAA informed the TSB that it will support a regulatory approach requiring FDRs on private aircraft, if supported by a cost-benefit analysis. However, it noted that the retro-fit of business aircraft may not always be possible due to cost and technical constraints.

The Board appreciates that TC is committed to working with industry to promote the voluntary installation of flight data recorders (FDRs) and lightweight data recorders (LDRs) for Canadian aircraft that fall outside the scope of the current Canadian Aviation Regulations (CARs) requirements. However, no specific timeline has been provided for the proposed actions. Although the proposed actions could mitigate the risk once implemented, until TC provides the TSB with a more detailed plan of action for moving forward, it is unclear when or to what extent the safety deficiency identified in Recommendation A18-01 will be addressed.

Therefore, the response to Recommendation A18-01 is assessed to be **Satisfactory in Part**.

October 2019: response from Transport Canada

TC agrees with the recommendation.

To date, three (3) focus groups with stakeholders have been completed.

The first focus group meeting took place from February 20-21, 2018 and was organized to address TSB Recommendation A 13-01.

Following the first focus group meeting and TSB recommendation A18-01, the group came together from November 6-7, 2018 to build upon the work from the first working group and to continue discussions and explore the following two principal approaches:

- Voluntary installation of Lightweight data recorders (LDRs); and
- Incorporation of LDRs into newly manufactured aircraft.

After careful consideration and discussion, the focus group modified the approach to meet the TSB Recommendation A18-01 and industry needs. The modified approach included:

- Development of guidance for operators, in consultation with industry. Once enabling regulations are developed, this will provide both expectations and criteria for industry implementation. This option could allow for early adoption of in-flight recording systems, capturing essential data parameters, and would provide operators flexibility in the adoption of in-flight recording systems prior to regulations coming into force; and
- Incorporation of LDRs into newly manufactured/newly certified aircraft by regulation. Manufacturers would be required, by regulation, to incorporate LDRs into all new generation aircrafts and newly certified aircraft.

On February 25, 2019, the third focus group built on the previous work on LDRs by discussing (1) the retrofitting of existing aircraft for the installation of LDRs, and (2) the incorporation of LDRs into new aircraft.

Requirements for Retrofitting

The approaches discussed to date include the development of guidance for operators, in consultation with industry, followed by enabling regulation. This could allow for early adoption of in-flight recording systems and provide operators flexibility in the adoption of in-flight recording systems prior to regulations coming into force.

Key Points of Agreement from the focus group:

- The regulations could apply to CARs 702, 703, 704, 604 and 406 operations;
- Requirements for the minimum level of parameters sets for these LDRs will match those of ED- 155 (recommended parameters), including crash-resistance standards.

Requirements for New Aircraft

Manufacturers would be required to incorporate LDRs into all newly manufactured aircraft and for new generation aircraft (i.e. new type aircraft), which are not necessarily fitted with flight monitoring systems.

Key Points of Agreement from the focus group:

- Requirements for newly manufactured aircraft should be fully Eurocae ED-155 compliant, meeting both the essential and recommended parameters listed, including crash-resistance standards;
- Requirements for new type aircraft should be fully Eurocae ED-155 compliant, meeting both the essential and recommended parameters listed, including crash-resistance standards.

Data protection and cost to individual operators continues to pose challenges to the expansion of recommendations for LDR requirements.

TC ACTION PLAN

- Short term: Industry and TC representatives have agreed to undertake additional analysis and research to costs, type of LDR equipment units available and requirements for data protection.
- Medium term: TC and industry are planning to hold another meeting in late fall 2019 or early 2020 to continue and build upon the work to date and move forward with the development of LDR regulations and standards.
- Long term: Potential development of regulations mandating installation of lightweight flight recording systems by commercial operators and private operators not currently required to carry these systems.

March 2020: TSB assessment of the response (Satisfactory in Part)

Transport Canada (TC) indicated that it agrees with this recommendation.

In its latest response, TC provided an update on the activities of the focus group on lightweight data recorders (LDR) and its next meeting, which is planned to take place in March 2020. With respect to requirements for new aircraft, the focus group agrees that newly manufactured aircraft and new type aircraft should be fully compliant with Eurocae ED-155.

TC's efforts to continue to work with industry through the focus group is considered to be a positive action. However, TC's long term objective of potentially developing regulations for commercial and private operators that are currently not required to carry LDRs indicates that TC may not regulate that requirement. Additionally, no specific timeline has been provided for the completion of the focus group activities and any subsequent regulatory implementation.

Therefore, the response to Recommendation A18-01 is assessed to be **Satisfactory in Part**.

September 2020: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

TC has had regular engagement with its stakeholders and TSB officials on the Lightweight Data Recorder (LDR) file and work is ongoing in conducting analysis and research related to: costs, type of LDR equipment units available, and requirements for data protection.

TC will develop regulations mandating the (1) installation of LDRs in existing aircraft; and (2) the incorporation of LDRs into newly manufactured aircraft in 2021. To this end, TC has developed a draft Notice of Proposed Amendment (NPA).

The next steps are to discuss the NPA with stakeholders and TSB officials through a focus group meeting, and then distribute it for wider consultation via the Canadian Aviation Regulation Advisory Council (CARAC). The NPA is expected to be published by December 2020.

The focus group meeting was planned for March 2020; however, it was canceled due to the COVID-19 pandemic. The focus group is set to take place in October 2020 in a virtual format.

Follow-up meetings may also take place in late 2020 in order to refine the NPA detailing new regulations for LDRs.

Timelines are dependent on circumstances related to COVID-19 and industries' ability to meet, assess and provide feedback.

December 2020: TSB assessment of the response (Satisfactory in Part)

In its latest response, Transport Canada (TC) indicated that it agrees with this recommendation and that a draft Notice of Proposed Amendment (NPA) has been developed. The next steps will include a focus group meeting and consultation via the Canadian Aviation Regulation Advisory Council (CARAC). TC expects that the NPA will be published by December 2020 barring any delays stemming from the COVID-19 pandemic.

TC's progress on the development of lightweight data recorder (LDR) regulations are considered as positive actions. However, until the regulations are finalized, the risks associated with the safety deficiency identified in Recommendation A18-01 will continue to exist.

Therefore, the response to Recommendation A18-01 is assessed to be **Satisfactory in Part**.

September 2021: response from Transport Canada

Transport Canada (TC) agrees in principle with the recommendation.

Since the recommendation was issued in 2018, TC undertook a thorough policy analysis of the possible approaches to expanding safety data collection in Canadian aviation. This work involved extensive consultations with industry stakeholders, including the creation of a focus group to respond to a previous Transportation Safety Board (TSB) recommendation on the issue of flight data monitoring (Recommendation A13-01). The recommended approach is to mandate the installation of LDRs in existing aircraft and the incorporation of LDRs into newly manufactured aircraft.

In our last update in September 2020, the Department committed to:

- Undertake additional analysis and research to costs, type of Lightweight Data Recorder (LDR) equipment units available and requirements for data protection;
- Develop regulations mandating the (1) installation of LDRs in existing aircraft; and (2) the incorporation of LDRs into newly manufactured aircraft in 2021; and,
- Discuss the proposed content of the NPA with stakeholders and TSB officials through a focus group meeting in October 2020, and then distribute it for wider consultation via the Canadian Aviation Regulation Advisory Council (CARAC).

A virtual focus group meeting was held on November 3, 2020. During this meeting, the focus group discussed its previous work on the LDR file and the proposed contents of the draft Notice of Proposed Amendment (NPA). Discussions centered on timing and the impact of the COVID-19 on the industry and ability of the industry to implement the LDR requirements. The aviation industry is currently under significant financial stress, and as a result, TC is taking a measured approach to ensure that any financial and administrative burden on the industry is minimized.

Based on the discussions at the focus group meeting, TC is proposing to introduce regulations that mandate (1) the installation of LDR systems into the aircraft of commercial operators and private operators not currently required to carry these systems in Canada, and (2) LDR requirements for all newly manufactured aircraft in Canada. The NPA¹ will be the subject of consultation with industry and experts. The anticipated approach is outlined below.

1. Retrofitting of Existing Aircraft

All commercial and private operators would be required to install LDR systems into their existing aircraft that do not currently carry data recording technology. The requirements for the minimum level of parameter sets for these LDR systems will match those of International Civil Aviation Organization (ICAO) Annex 6 parameters, including crash-resistance standards.

TC will develop guidance materials for operators, in consultation with industry, and regulations that would allow for early adoption of in-flight recording systems and provide operators flexibility in the adoption of in-flight recording systems prior to regulations coming into force. In order to provide stakeholders an appropriate amount of time to adjust, it is recommended that these measures come into force five-years (5) after regulations are published.

2. Requirements for New Aircraft

By regulation, all newly manufactured aircraft in Canada would be required to have LDR systems installed in them to be operated. LDRs will have to be incorporated into all newly manufactured aircraft and for new generation aircraft (i.e., new aircraft types), which are not necessarily fitted with flight monitoring systems.

Requirements for LDRs in both newly manufactured aircraft and new type aircraft are expected to be fully ICAO Annex 6 compliant, meeting the parameters listed, including crash-resistance standards. TC is recommending that these measures come into force two years (2) after regulations are published.

The NPA will be distributed in Fall 2021 and will be shared with the TSB at the same time as industry via CARAC. The TSB had a member of their team attend and participate at all the focus group sessions, providing input and feedback.

¹ Transport Canada (2021). Notice of Proposed Amendment (NPA) – *Lightweight Data Recorders*.

It is anticipated that the new regulations will be published in *Canada Gazette* Part I in early 2022 for a 90-day consultation and the regulatory development would occur in 2022 with a final publication in *Canada Gazette* Part II in early 2023.

The implementation period for the regulation will be, from the date the amendments are published in *Canada Gazette*, Part II:

- Five years after regulations are published for retrofitting existing aircraft with LDRs; and,
- Two years after regulations are published for new aircraft.

This would allow industry sufficient time to prepare and recover from COVID-19 impacts.

At this this time, there are no additional focus groups planned. However, TC remains engaged with industry stakeholders and the TSB officials on the LDR file.

March 2022: TSB assessment of the response (Satisfactory Intent)

In its latest response, Transport Canada (TC) indicated that it agrees in principle with the recommendation.

Following its response in September 2021, TC published the department's Civil Aviation initiatives planned for April 2022 – April 2024,² which include proposed amendments to the *Canadian Aviation Regulations* for lightweight data recorders (LDRs). TC started consultations with stakeholders through the Canadian Aviation Regulation Advisory Council in December 2021. As a result of significant industry input, the consultation period was extended until the end of March 2022. The proposed changes are now expected to be published in the *Canada Gazette*, Part I in late 2023, with a 30-day comment period, and a planned publication in the *Canada Gazette*, Part II between mid-to-late 2024.

The Board is encouraged by TC's Notice of Proposed Amendment to require that existing aircraft be retrofitted with LDRs and that LDRs be installed on newly manufactured aircraft, but is concerned by the recently announced delays. If regulations are implemented as proposed, the risks associated with the safety deficiency identified in Recommendation A18-01 should be addressed.

Therefore, the response to Recommendation A18-01 is assessed as **Satisfactory Intent**.

² Transport Canada (2022). Civil Aviation initiatives planned for April 2022 – April 2024. Regulations amending the Canadian Aviation Regulations (Lightweight Data Recorders). Available at: <https://tc.canada.ca/en/corporate-services/acts-regulations/forward-regulatory-plan/aviation-initiatives-planned#toc3>

January 2023: response from Transport Canada

Transport Canada (TC) agrees in principle with the recommendation.³

Since the recommendation was issued in 2018, over the course of the last five years, Transport Canada (TC) has been actively working with the aviation industry regarding the installation of Lightweight Data Recorders (LDRs) for smaller aircraft that fall outside the scope of the current flight data recorder carriage requirements under the *Canadian Aviation Regulations* (CARs). TC undertook a thorough policy analysis of the possible approaches to expanding safety data collection in Canadian aviation. This work involved extensive consultations with industry stakeholders, including the creation of a focus group to respond to a previous Transportation Safety Board (TSB) recommendation on the issue of flight data monitoring (Recommendation A13-01).

To date, a Preliminary Issue and Consultation Assessment (PICA), containing background information, analysis of the issue and the need for consultation, was published in November 2017 and updated in 2018. TC also set up and successfully completed four (4) focus groups (February 20-21, 2018, November 6-7, 2018, February 25, 2019, and November 3, 2020).⁴

In its previous update in September 2021, TC committed to develop regulations mandating the (1) installation of LDRs in existing aircraft; and (2) the incorporation of LDRs into newly manufactured aircraft in 2021 and aim for a publication in CG-I in late-2023 and in CG-II between mid to late 2024.

Since the previous update, TC published its Notice of Proposed Amendment (NPA) 2021-016 - *Lightweight Data Recorders*⁵ – in December 2021 and held a Questions and Answers session in February 2022. TC has reviewed all comments as part of the initial LDR NPA consultation period that spanned from December 2021 to March 2022. Over 40 written submissions were received on this first NPA. In addition, TC has also accounted for all comments received during the Questions and Answers session held in February 2022. A total of 130 stakeholders participated in the online session.

From an assessment of comments and discussions with the industry, there appears to have been some confusion and potential misinterpretation of critical NPA elements. This includes

³ All responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors and accessibility issues in the material it reproduces without indication but uses brackets [] to show other changes or to show that part of the response was omitted because it was not pertinent.

⁴ Note: Additional information on the focus group meetings summaries and PICA can be found on the CARAC website on the "CARAC Activity Details" section (<https://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/NPA-APM/actl.aspx?aType=1>) under the "Flight Data Recorders (FDRs) / 2017-009" activity name.

⁵ Transport Canada (2021). Notice of Proposed Amendment (NPA) No. 2021-016 – Lightweight Data Recorders. Available through the CARAC Website: <https://tc.canada.ca/en/corporate-services/acts-regulations/list-regulations/canadian-aviation-regulations-sor-96-433/canadian-aviation-regulation-advisory-council-carac>

elements related to the required equipment type and required parameter data sets to be collected. Industry members also expressed concerns regarding the cost of retrofitting and implementing LDRs, and contend the difficulty is compounded for all air operators due to the impacts of the COVID-19 pandemic on supply chains and labour shortage.

As a result of industry consultations and feedback, TC is now in the process of re-assessing its approach and scope of LDR requirements. TC is committed to promoting aviation safety and establishing a balance that does not impose an undue financial burden on the aviation industry. TC's work continues on the LDR file and is currently in the process of undertaking additional work and analysis.

TC is developing a new and revised NPA that will likely be published in early 2023 for consultation and will revise the Forward Regulatory Plan⁶ to update timelines for regulatory implementation accordingly. The proposed amendments to the *Canadian Aviation Regulations* are expected to be published in the *Canada Gazette*, Part I, in early 2024 with a 30-day comment period.

March 2023: TSB assessment of the response (Unable to Assess)

In its latest response, Transport Canada (TC) indicated that it agrees in principle with the recommendation.

Following the 2021 publication of the Notice of Proposed Amendment (NPA) on lightweight data recorders (LDRs), TC received significant industry input and comments that resulted in a re-assessment of the approach and scope of the LDR requirements. TC is developing a new and revised NPA, which is planned to be published in 2023 for consultation. The revision of the NPA and additional consultation will delay the timelines for regulatory implementation as detailed in TC's Forward Regulatory Plan.

The Board is encouraged by TC's continued efforts to require that existing aircraft be retrofitted with LDRs and that LDRs be installed on newly manufactured aircraft. However, the Board is concerned by the potential re-scoping of the LDR requirements and further delays. Until the revised NPA is available for review, it is unclear if the previously proposed requirements will be preserved.

Therefore, the Board is **unable to assess** the response to Recommendation A18-01.

December 2023: response from Transport Canada

Transport Canada (TC) agrees in principle with the recommendation.

Since the recommendation was issued in 2018, over the course of the last six years, TC has been actively working with the aviation industry on the installation of Lightweight Data Recorders

⁶ Transport Canada (2021). Forward Regulatory Plan. Available at: <https://tc.canada.ca/en/corporate-services/acts-regulations/forward-regulatory-plan>

(LDRs) for smaller aircraft that fall outside the scope of the current flight data recorder carriage requirements under the *Canadian Aviation Regulations* (CARs). TC undertook a thorough policy analysis of the possible approaches to expanding safety data collection in Canadian aviation. This work involved extensive consultations with industry stakeholders, including the creation of a focus group to respond to a previous Transportation Safety Board (TSB) recommendation on the issue of flight data monitoring (Recommendation A13-01).

To date, a Preliminary Issue and Consultation Assessment (PICA), containing background information, analysis of the issue and the need for consultation, was published in November 2017. TC also successfully completed four focus groups (February 20-21, 2018, November 6-7, 2018, February 25, 2019, and November 3, 2020). Additional information on the focus group meetings summaries and PICA can be found on the Canadian Aviation Regulation Advisory Council's website.⁷

In a previous update in September 2021, TC committed to develop regulations mandating (1) the installation of LDRs in existing aircraft; and (2) the incorporation of LDRs into newly manufactured aircraft in 2021 and aim for a publication in the *Canada Gazette*, Part I in late 2023 and in the *Canada Gazette*, Part II between mid to late 2024.

Since then, TC published its Notice of Proposed Amendment (NPA)⁸ in December 2021 and held a Questions and Answers session in February 2022. TC has reviewed all comments as part of the initial LDR NPA consultation period that spanned from December 2021 to March 2022. Over 40 written submissions were received on this first NPA. In addition, TC has also accounted for all comments received during the Questions and Answers session held in February 2022. A total of 130 stakeholders participated in the online session.

From an assessment of comments and discussions with the industry, there appears to have been some confusion and potential misinterpretation of critical NPA elements. This includes elements related to the required equipment type and required parameter data sets to be collected. Industry members also expressed concerns regarding the cost of retrofitting and implementing LDRs, and contend the difficulty is compounded for all air operators due to the impacts of the COVID-19 pandemic on supply chains and labour shortage.

As a result of industry consultations and feedback, TC is now in the process of re-assessing its approach and scope of LDR requirements. TC is committed to promoting aviation safety and establishing a balance that does not impose an undue financial burden on the aviation industry.

⁷ "CARAC Activity Details", "Flight Data Recorders (FDRs) / 2017-009", at <https://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/NPA-APM/actr.aspx?id=32&aType=1&GoCTemplateCulture=en-CA>

⁸ Transport Canada (2021). Notice of Proposed Amendment (NPA) No. 2021-016 – *Lightweight Data Recorders*. Available through the CARAC Website: <https://tc.canada.ca/en/corporate-services/acts-regulations/list-regulations/canadian-aviation-regulations-sor-96-433/canadian-aviation-regulation-advisory-council-carac>

In its previous update in January 2023, TC committed to developing a new and revised NPA, revising the Forward Regulatory Plan to update timelines for regulatory implementation, and publishing the proposed amendments to the CARs in the *Canada Gazette*, Part I.

As part of the work to develop a revised NPA, TC is conducting additional analysis on the proposed implementation of the lightweight data recorder requirements. Though the publication of the new NPA has been delayed while work on the additional analysis continues, TC has extended new deliverable dates for publishing the NPA for consultation with industry stakeholders into Fiscal Year 2024/25. After reviewing comments received through the NPA process, TC intends to establish a timeline for publication in the *Canada Gazette*, Part I and update the Forward Regulatory Plan⁹ as needed, once the review and analysis of industry input is complete.

February 2024: TSB assessment of the response (Unable to Assess)

In its latest response, Transport Canada (TC) indicated that it agrees in principle with the recommendation.

TC stated that it is reassessing the approach and scope of the lightweight data recorders (LDR) requirements and will produce a new revised Notice of Proposed Amendment (NPA). Additionally, TC has extended the deliverable dates for publishing the new NPA for consultation with industry stakeholders into fiscal year 2024–25.

TC also stated that it will establish a timeline for publication of the NPA in the *Canada Gazette*, Part I after the review of stakeholder comments. TC did not provide a timeline for the subsequent revision of the NPA and publication of the final NPA in the *Canada Gazette*, Part II. Based on the previous implementation periods identified in TC's September 2021 response, it is likely that any regulatory change would take many years to be implemented.

The Board remains concerned with the potential change in approach and scope of the LDR requirements and the lengthy delays in implementation. Until the revised NPA is available for review, it is unknown if the previously proposed requirements will be preserved.

Therefore, the Board is **unable to assess** the response to Recommendation A18-01.

Latest response and assessment

December 2024: response from Transport Canada

Since the recommendation was issued in 2018, TC has worked with the aviation industry on the installation of lightweight data recorders (LDRs) for smaller aircraft that fall outside the scope of the current flight data recorder carriage requirements under the *Canadian Aviation Regulations* (CARs). TC carried out a thorough policy analysis of the possible approaches to

⁹ Transport Canada (2021). *Forward Regulatory Plan*. Available at: <https://tc.canada.ca/en/corporate-services/acts-regulations/forward-regulatory-plan> (last accessed on 20 March 2024).

expanding safety data collection in Canadian aviation. This work involved extensive consultations with industry stakeholders, including the creation of a focus group to respond to a previous Transportation Safety Board (TSB) recommendation on the issue of flight data monitoring (Recommendation A13-01).

To date, a Preliminary Issue and Consultation Assessment (PICA) was published in November 2017. TC also successfully completed four focus groups (February 2018, November 2018, February 2019, and November 2020).¹⁰

In its September 2021 update, TC committed to develop regulations mandating:

- (1) the installation of LDRs in existing aircraft; and,
- (2) the incorporation of LDRs into newly manufactured aircraft in 2021 and aim for a publication in the *Canada Gazette*, Part I in late 2023 and in the *Canada Gazette*, Part II between mid to late 2024.

Since then, TC published its Notice of Proposed Amendment (NPA)¹¹ in December 2021 and held a Questions and Answers session in February 2022 with participation from 130 stakeholders. Over 40 written submissions were received on this first NPA (consultation period December 2021 to March 2022). In addition, TC has also accounted for all comments received during the Questions and Answers session.

From an assessment of comments and discussions with the industry, there appears to have been some confusion and potential misinterpretation of critical NPA elements. This includes elements related to the required equipment type and required parameter data sets to be collected. Industry members also expressed concerns regarding the cost of retrofitting and implementing LDRs, and contend the difficulty is compounded for all air operators due to the impacts of the COVID-19 pandemic on supply chains and labour shortage.

As a result of industry consultations and feedback, TC is currently reassessing its approach and scope of LDR requirements. TC is committed to promoting aviation safety and establishing a balance that does not impose an undue financial burden on the aviation industry.

Since the last update in December 2023, TC continued working to complete additional analytical steps necessary to determine the most appropriate course of action concerning a mandate to install LDRs and, if so, which aircraft types should be included. This work includes cost-benefit analysis and other quantifiable and non-quantifiable factors to ensure a balanced approach. Given these challenges, TC made the decision to remove the file from its Forward

¹⁰ Note: Additional information on the focus group meetings summaries and PICA can be found on the CARAC website on the "CARAC Activity Details. Title: Flight Data Recorders (FDRs) / 2017-009" <https://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/npa-apm/actr.aspx?id=32&aType=1&lang=eng> (last accessed on 03 February 2025).

¹¹ Transport Canada (2021). Notice of Proposed Amendment (NPA) No. 2021-016 – *Lightweight Data Recorders*. Available through the CARAC Website: <https://tc.canada.ca/en/corporate-services/acts-regulations/list-regulations/canadian-aviation-regulations-sor-96-433/canadian-aviation-regulation-advisory-council-carac> (last accessed on 03 February 2025).

Regulatory Plan pending confirmation that the file has sufficient readiness to be published in the *Canada Gazette* within 24 months.

March 2025: TSB assessment of the response (Unsatisfactory)

In its latest response, Transport Canada (TC) indicated that, since the recommendation was issued in 2018, it has been working with the aviation industry on the installation of lightweight data recorders (LDRs) for smaller aircraft that fall outside the scope of current regulatory requirements.

TC published Notice of Proposed Amendment (NPA) No. 2021-016 in December 2021 and received over 40 written submissions during the consultation period, which ended in March 2022. As a result of the feedback received, TC initiated a reassessment of the approach and scope of the LDR requirements. The latest response indicates this reassessment is continuing; however, there is no indication when this reassessment may be completed.

TC states that work is continuing to “determine the most appropriate course of action concerning a mandate to install LDRs and, if so, which aircraft types should be included.” The Board is concerned that TC may no longer be committed to LDR-mandating regulations as stated in its September 2021 update.

Equally concerning is the fact that TC has decided to remove the LDR regulatory file from its April 2024 – April 2026 Forward Regulatory Plan, which suggests that no regulatory action is planned before April 2026. There is no indication if or when the LDR regulatory file may be included in a future Forward Regulatory Plan.

The International Civil Aviation Organization (ICAO) introduced lightweight flight recorder requirements in Annex 6 to the *Convention on International Civil Aviation* in 2010 with an applicability date of 01 January 2016.

The standard in Annex 6 requires all turbine-engined airplanes with a certificated take-off mass of 5700 kg or less and type certificated on or after the applicability date to have a lightweight flight data recorder and, if operated by more than 1 pilot, to have a lightweight audio recorder (cockpit audio recording system [CARS]). ICAO recommends the same equipment for all turbine-engined airplanes manufactured on or after the applicability date. TC has not implemented ICAO’s standard or recommendation.

The Board is concerned with the potential change in scope or elimination of regulations mandating LDRs and the lengthy delays in revising the NPA in order to make progress. Until the revised NPA is available for review, it is unknown if the previously proposed requirements will be preserved.

Therefore, the Board considers the response to Recommendation A18-01 to be **Unsatisfactory**.

File status

The TSB will continue to monitor TC's development of the LDR regulations and their implementation, and it will reassess the deficiency on an annual basis or when otherwise warranted.

This deficiency file is **Active**.