

**NOTICE OF PROPOSED AMENDMENT (NPA)
AVIS DE PROPOSITION DE MODIFICATION (APM)**

NPA / APM :	2011-010
Reference / référence:	103 Schedule II; 605.33, 625.33, 625 Appendix C, 551.101
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OPI COORDINATION

OTI COORDINATION/ COORDINATION DU BTR	CHECK APPROPRIATE FIELD(S)/ COCHER LE(S) CHAMP(S) APPROPRIÉ(S)	OTI SIGN-OFF / SIGNATURE DU BTR
A/AARTC	X	
A/AARTF	X	
AARTM	X	
AARTE	X	
AARBH	X	

OPI SIGN-OFF / SIGNATURE DU BPR	
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Does this NPA require the filing with ICAO of a Difference or the amendment of an existing Difference? Yes No

Suite à la présentation de cet APM, doit on déposer une différence ou une modification d'une différence existante auprès de l'OACI? Oui Non

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NPA / APM :	2011-010
Reference / référence:	103 Schedule II, 605.33, 625.33, 625 Appendix C, 551.101
English Title / titre anglais:	Cockpit Voice Recorder
French Title / titre français:	Enregistreurs de la parole dans le poste de pilotage
Sponsor (indicate if not the OPI Branch or TC) / Bureau responsable (indiquer si ce n'est pas la direction du BPR ou TC)	
Language (E – F - Both) Langue (A – F – les deux)	Both/Les deux

Issue / Objet :

On 09 March 1999, the Transportation Safety Board of Canada (TSB) released interim safety recommendations as part of its investigation (A98H0003) into the 02 September 1998 fatal accident of Swissair Flight 111.

Of the shortcomings identified during the investigation, one was the limited recording capacity of the aircraft's cockpit voice recorder (CVR). The CVR was able to record only 30 minutes, and therefore did not capture the timeframe when the fire started. Another of the shortcomings identified was the lack of a dedicated independent power supply to power the cockpit voice recorder (CVR) and the cockpit area microphone in the event that normal aircraft power sources to the CVR are interrupted.

In part as a response to the findings of the Swissair accident investigation, international standards for cockpit voice recorders (CVRs) have evolved over the past several years. The *International Civil Aviation Organization* (ICAO) has published revisions to Annex 6 of the Convention on International Civil Aviation, and the U.S. Federal Aviation Administration (FAA) has published amendments to the Federal Aviation Regulations (FARs) for both aircraft design and certification standards and operating regulations.

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Justification for Change / Justification de la modification :

Objectives

This NPA proposes to amend the cockpit voice recorder (CVR) regulations and standards for air carriers and operators of certain aircraft, as well as for the design and installation approval of CVR equipment. This proposed amendment would increase the duration of CVR recordings; require physical separation of the CVR and flight data recorder (FDR) when both are required; require a dedicated independent power supply for the CVR, to power the CVR and cockpit area microphone for a period of 10 minutes whenever normal aircraft power sources to the CVR are interrupted; and if data-link communication equipment is installed, require that all data-link communications received on an aircraft be recorded.

This proposed amendment is intended to enhance the capture of CVR information needed for accident investigation purposes. It is based upon recommendations of the TSB following the investigation of several accidents, principally that of Swissair Flight 111, and includes other revisions to adopt in Canada the most recent requirements relating to CVRs adopted 9 March 2001 by the International Civil Aviation Organization (ICAO) in Annex 6, Parts I, II and III, to the Convention on International Civil Aviation.

In addition, this proposed amendment recognizes the update of the provisions pertaining to all flight recorders, including the recording of digital communications, which were adopted into ICAO Annex 6, Parts I, II and III on 9 March 2001. The new requirements concerning crash protected flight recorders intended for installation in aircraft engaged in international air navigation included four systems: an FDR, a CVR, an airborne image recorder (AIR) and a data-link recorder (DLR). The AIR and FDR followed recommendations (not discussed in this NPA) from the TSB and National Transportation Safety Board (NTSB) of the United States to provide additional information to accident investigators. AIRs are recommended in order to provide additional information than can be provided by FDRs and CVRs (e.g. visual confirmation of switch positions, messages being displayed / instrument readings, ambient visual conditions, etc.). However, there remain both technical and social questions regarding implementation of AIRs. Consequently, Transport Canada is not addressing AIRs in this NPA. The FDR recommendations and ICAO requirements will be addressed in a future NPA. However, DLR is addressed by this NPA in order to adopt the related ICAO Annex 6 requirements in Canada and to harmonize the CARs with the corresponding new DLR requirements of the U.S. Federal Aviation Regulations (FAR).

These proposed requirements would affect certain Canadian commuter and transport category aeroplanes, transport category rotorcraft, and multi-engine turbine-powered aeroplanes configured for 6 or more passenger seats and for which more than one pilot is required by the aeroplane type certificate or by the subpart of the Canadian Aviation Regulations (CARs) under which the aeroplane is operated.

This NPA is presented to the Canadian Aviation Regulation Advisory Council (CARAC) Technical Committee for consultation prior to formal assessment of the risk. The contents of

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this NPA remain open to further changes following consultation and the results of the assessing of the risk, cost/benefit analysis and other tools that may be used to confirm the approach. This NPA represents a draft of how Transport Canada proposes to address the issues described herein.

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.

One of the shortcomings identified during the investigation was the limited recording capacity of the aircraft's CVR. The CVR was able to record only 30 minutes, and therefore did not capture the timeframe when the fire started.

Another of the shortcomings identified during the investigation was the lack of a dedicated independent power supply to power the CVR and the cockpit area microphone in the event that normal aircraft power sources to the CVR are interrupted.

Transportation Safety Board Recommendation A99-02 (09 March 1999)

A lack of recorded voice and other aural information can inhibit safety investigations and delay or prevent the identification of safety deficiencies. Given the need for longer periods of recorded sound to capture the initiating events of aviation accidents, and the availability of two-hour CVRs, the TSB believed that such recorders should be mandated by regulatory authorities worldwide. However, it also recognized that a period of several years may be reasonably required for manufacturers and operators to implement this change. The Board believed that, with appropriate lead time, a retrofit program was warranted for aircraft already in service. Therefore, the Board recommended that:

As of 01 January 2005, all aircraft that require both an FDR and a CVR be required to be fitted with a CVR having a recording capacity of at least two hours.

Transportation Safety Board Recommendation A99-03 (09 March 1999)

With maintenance-free independent power sources now available, the TSB asserted that it is currently feasible to power new-technology CVRs and the cockpit area microphone independently of normal aircraft power for a specific period of time in the event that aircraft power sources to the CVR are interrupted or lost. Therefore, to enhance the capture of CVR information needed for accident investigation purposes, the TSB recommended that:

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As of 01 January 2005, for all aircraft equipped with CVRs having a recording capacity of at least two hours, a dedicated independent power supply be required to be installed adjacent or integral to the CVR, to power the CVR and the cockpit area microphone for a period of 10 minutes whenever normal aircraft power sources to the CVR are interrupted.

The work of the TSB was coordinated with the National Transportation Safety Board (NTSB) of the United States, which issued similar recommendations. The NTSB's recommendations were directed specifically to the United States' Federal Aviation Administration (FAA), while the TSB recommendations were directed to aviation regulators in Canada and Europe. Both Boards hoped that the recommended actions would be adopted by civil aviation regulation authorities worldwide.

Cockpit Voice Recorder Duration

In line with recommendation A99-02, the ICAO adopted amendments to Annex 6, Parts I, II and III to require a phased-in aircraft retrofit and manufacturing cut-in of CVRs that are capable of retaining the information recorded during at least the last two hours of their operation.

Transport Canada has already adopted amendments into the *Airworthiness Manual* (AWM) that apply to new aircraft types and new design approvals of CVRs and FDRs. These requirements are intended to improve the quality and quantity of information recorded and increase the potential for retaining important information needed during accident and incident investigations. However, these design standards are not applicable to the in-service fleet unless made mandatory by operating rules. This NPA is intended to address specifically the retrofit and manufacturing cut-in requirements with respect to CVRs by adopting provisions from the current ICAO Annex 6 (2 hour CVR recording, and if data-link communications equipment is installed, a recording of the data-link communications) and harmonizing certain technical aspects with the United States Federal Aviation Regulations (FAR). Notably, where the FAR requirements have not so far mandated retrofit of an independent power supply for the CVR, this NPA proposes to adopt this requirement into CAR Standard 625.33 following TSB recommendation A99-03.

It should be noted here that Transport Canada has already addressed through codification into CAR Standard 625.33 (amended 2003/09/01) a related TSB recommendation A99-01 to require, as of 01 January 2003, a CVR recording capacity of at least two hours for any CVR installed on an aircraft as a condition of receiving its original certificate of airworthiness.

Each change proposed by this NPA would be applicable to aircraft currently operating (a retrofit) or to newly manufactured aircraft. The aircraft retrofits apply to all aircraft currently operating or that are manufactured before [1 January 2016, or 4 years from the effective date of the amendment]. Aircraft that are manufactured on or after [1 January 2016, or 4 years from the effective date of the amendment] would have to comply at the time of manufacture.

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In addition to the 2-hour recording length, this proposed amendment would require the use by applicable aircraft of a CVR that meets the standards of Technical Standard Order TSO-C123a, or later revision.

Cockpit Voice Recorder Independent Power Supply (10 minutes)

Power interruptions have resulted in CVR information not being captured during the last minutes of several recent accidents. Accident investigators found that the CVR onboard Swissair Flight 111 did not record the last 6 minutes of the flight as a result of its electrical bus being switched off by the flight crew in an attempt to clear smoke from the cockpit. The TSB reported that the absence of the CVR (and FDR) information from the critical last minutes of the aircraft flight hampered the investigation.

The TSB further noted that power interruptions have resulted in flight recorder information not being captured during the last minutes of several other recent aircraft occurrences. These include ValueJet Flight 592 (Miami, Florida; DC-9-32; 11 May 1996), TWA Flight 800 (East Moriches, New York; Boeing 747-131; 17 July 1996), SilkAir Flight 185 (Palembang, Indonesia; Boeing 737-300; 19 December 1997), Delta Air Lines (Shannon, Ireland; MD-11; 08 October 1998), and Delta Express Flight 2461 (Orlando, Florida, Boeing 737-232; 15 December 1998).

The TSB believes the CVR and its cockpit area microphone must continue to be powered for short periods regardless of the availability of normal aircraft electrical power. This independent power source would allow the continued recording of the acoustic environment of the flight deck, including cockpit conversations and ambient noises, for a specific period.

Recommendation A99-03 was made in light of the availability of maintenance-free independent power sources, leading to the feasibility to power new-technology CVRs and the cockpit area microphone independently of normal aircraft power for a specific period of time in the event that aircraft power sources to the CVR are interrupted or lost. This would serve to enhance the capture of CVR information needed for accident investigation purposes.

In response to recommendation A99-03, this NPA proposes a 10-minute independent backup power supply for the CVR. The CVR would automatically be switched to this 10-minute independent power supply in the event all power to the CVR is interrupted. The anticipated power interruption may be from normal shutdown or any other loss of power to the electrical power bus. No specific power source—such as a battery or a capacitor—is identified in this proposed amendment. Manufacturers may develop the 10-minute independent power supply as best suits the needs of an individual aircraft installation and issues of safety and reliability. This 10-minute independent power supply is proposed as a retrofit and new manufacture requirement for aeroplanes and rotorcraft.

Transport Canada's standard for equipment approval of an independent power supply is specified in AWM section 537.103 as CAN-TSO-C155 *Recorder Independent Power Supply*. This CAN-TSO applies to equipment intended to provide back-up power to an installed

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cockpit crash protected recorder, whether it is voice, image, data, voice/data, voice/image or image/data. However, Transport Canada is in the process of amending AWM section 537.103 via the Simplified Process for Adoption of Design Standards of Airworthiness (CARAC Management Charter & Procedures, Division II, Section 3.11.1) to specify CAN-TSO-C155a as the applicable standard for new applications for approval of independent power supplies. CAN-TSO-C155a will be based upon EUROCAE ED-112, *Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems*. ED-112 itself contains the standard for a CVR as well as the minimum specifications to be met for all aircraft required to install a Recorder Independent Power Supply (RIPS) to support a flight recorder. Any CVR that is approved as meeting CAN-TSO-C123b would, in order to meet the operating requirements proposed by this NPA, be supported by a RIPS meeting CAN-TSO-C155a. Older 2-hour CVRs, including those approved as meeting FAA TSO-C123 or TSO-C123a, would require a RIPS meeting CAN-TSO-155, or later revision.

Separate Containers

In the FAA's recent Final Rule [73 FR 12542, March 7, 2008, amended July 9, 2009 and April 5, 2010] relating to CVRs and FDRs, new requirements in Title 14 CFR Parts 91, 121, 125, 129 and 135 were promulgated to specify that the CVRs installed in currently operating and newly manufactured aeroplanes must be in a separate container from the FDR when both are required, in accordance with FAR §23.1457(d)(6) or §25.1457(d)(6), as applicable.

The FAA stated in the NPRM [70 FR 9756, February 28, 2005] to this Final Rule that the then current CVR and FDR regulations did not specify that the two recorders must be in separate containers. The FAA indicated that they have historically maintained this position, even without explicit regulation, and have not approved any installation that has replaced two recorders in separate boxes with a single unit that has combined recorder functions. To codify this policy, the FAA promulgated new rules for aeroplanes, requiring that the CVR and FDR must be installed in separate containers, each meeting the crashworthiness requirements already in the regulations (i.e., meets the crashworthiness requirements of TSO-C123a or TSO-C124a). Rotorcraft may have a combined CVR/FDR unit, but must still meet all of the requirements for both CVRs and FDRs, which are determined by aircraft age. This rule was not expected to result in any change or cost to operators or manufacturers, since there was no change in policy. The FAA stated that, if developed, combination units would be allowed to be installed in rotorcraft because of weight and size constraints in these aircraft. If a single combination unit is installed, however, it would still be required to meet the applicable airworthiness requirements for reliability, single electrical failures, and an independent power source for CVRs. This language is included in the aircraft certification rules for rotorcraft and states that if a single combination unit is installed, it must meet all of the requirements of that section. Consequently, an operator that wishes to change to a single unit installation would be required to retrofit its rotorcraft to address the new aircraft certification power and wiring requirements as well. No single unit installation will be approved without meeting these requirements regardless of the age of the aircraft or its original date of certification.

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Transport Canada agrees with this policy identified by the FAA and believes that, in addition to these same requirements already in the Airworthiness Manual for new designs, a retrofit of in-service aeroplanes and a manufacturing cut-in for new aeroplanes is appropriate for any CVR and FDR installations that may not already maintain the two recorders in separate containers. This would harmonize on the technical aspects with, but would have delayed compliance times as compared to, the FAR §§ 91.609(h)(1), 121.359(i)(1), 125.227(g)(1) & (h)(1), 129.24, and 135.151(f)(1).

Data-Link Communications (DLC)

A discussion on the current status of data-link communication in air traffic control may be found in the FAA's NPRM [70 FR 9752, February 28, 2005], along with a disposition of comments received in their Final Rule [73 FR 12542, March 7, 2008].

As in the U.S. and throughout the world, the traditional communication with aircraft in Canada is by voice. However, as the aeronautical community works to provide communication systems that enhance safety, efficiency, and capacity, a key element is the introduction of data-link communication. Data-link communication provides text message exchanges between aircraft, air traffic service facilities, air traffic controllers, and pilots. Data-link communication can act as an alternative to voice communication and as a replacement when voice communication is not adequate to meet the performance needed for the information exchanged.

In anticipation that text communication may eventually replace voice communication to a significant degree, this NPA proposes that, if data-link communication equipment is installed, all data-link communication messages received on an aircraft be recorded. This would provide accident and incident investigators with crucial information to better enable an understanding of the flight deck dynamics, flight crew workload, and flight crew use of avionics that are initiated by the actual data transmitted to and received by the flight crew. The transmitted data to the aircraft may include air traffic controller textual instructions, clearances, and other safety related information to an aircraft.

The recording requirements would apply to all aircraft manufactured on or after 1 January 2016, or 2 years from the effective date of this amendment, whichever is later, on which data-link communication equipment is installed. Data-link communication equipment would not be required on any aircraft; the requirement is to record it if the equipment is voluntarily installed. Similarly, any aircraft on which data-link communication equipment is voluntarily installed on or after 1 January 2016, or 2 years from the effective date of the final rule, whichever is later, as a retrofit would also be required to record all data-link communications as of the date of installation. Hence, each operator would need to evaluate whether the costs to install a data-link communication system and recorder is outweighed by the benefits.

Transport Canada's standard for equipment approval of a data-link recorder (DLR) is specified in AWM section 537.103 as CAN-TSO-C177 *Data Link Recorder Systems*, which is based upon EUROCAE ED-112, *Minimum Operational Performance Specifications (MOPS)*

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for Crash Protected Airborne Recorder Systems. This CAN-TSO allows the certification of a stand-alone recorder or a recorder that combines this function with the CVR or FDR recorder functions. Two hours of data-link communication would be required to be recorded, as is proposed for the recording of the cockpit aural environment on the CVR.

Where an aircraft is equipped with data-link technology, the associated data-link recorder system will require operational and/or functional checks in accordance with manufacturer's recommended maintenance instructions. The test procedures would be expected to focus on the overall data-link recording system comprising of onboard recording, ground recording and correlation (message content and time stamp) of both recording domains. Maintenance calibration tasks may also be prescribed to detect any otherwise undetectable degradation in serviceability or accuracy of the installed equipment. This NPA proposes to establish these additional maintenance requirements for the data-link recorder system in CAR Standard 625 Appendix C.

No specific proposal is made by this NPA to require an independent power supply for any installed DLR. However, it is noted that it may be desirable to do so if the loss of power to the aircraft has not rendered the data-link communications system inoperative (i.e. text messages continue to be displayed on the cockpit display and/or downlink messages continue to be generated and sent by the flight crew). In many cases, where the DLR function may be combined with the CVR, the independent power supply required for the CVR would have the consequence of also continuing to power the DLR for 10 minutes.

Transport Canada is requesting specific comments concerning the option of requiring an independent power supply for any installed DLR, and an indication of the costs associated with such a proposal.

Transport Canada, in concert with the FAA, EASA and other authorities, recognizes that as text communication replaces voice communication, the need arises to define the text message sets being used and to record the actual text messages received on an aircraft. Transport Canada understands that work remains to develop and agree upon an internationally harmonized message set. Consequently, this NPA proposes to harmonize on the performance-based operating rules promulgated in the FAR, with the message set to be recorded and approved at the time of aircraft certification. No specific message set is proposed by this NPA. Therefore, the proposed requirement would be adaptable to any future regulatory definition of the message set. Transport Canada would approve each DLC system with its manufacturer defined message set, meeting standards such as those found in ICAO Annex 10, volume III, section 3, document 9705, "Manual of Technical Provisions for the Aeronautical Telecommunications Network (ATN)," section 2.3.4, Controller Pilot Data Link Communication Application: Formal Definitions of Messages; or those established using RTCA, Inc., Document No. RTCA/DO-219, "Minimum Operational Performance Standards for ATC Two-Way Data Link Communications," Appendix A (August 27, 1993).

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Recordation of Cockpit Communication or Audio Signals

Internal voice communication between the pilots is either spoken directly or through boom microphones attached to headsets. Where provided, each flight crew oxygen mask has a built-in microphone that is activated with a push-to-talk rocker switch. One position of the rocker switch is used for internal communication, and the other position is used for transmitting over the external VHF and HF radios. For large aeroplanes, additional internal communication can be provided through a flight interphone system that connects all cabin attendant stations and the cockpit, and a passenger address (PA) system that enables the pilots and cabin crew to address passengers throughout the cabin and in the lavatories.

The present requirements of CAR Standard 625.33 II(1)(b) require the recording on the CVR of the flight deck aural environment, including:

- (i) the audio signals received from each microphone being used by a flight crew member;
- (ii) voice communications of flight crew members using the aircraft's interphone system and the public address system, and
- (iii) voice communications or audio signals identifying navigation or approach aids detected by a headset or speaker.

This NPA proposes to expand the aircraft applicability criteria, in line with ICAO Annex 6 requirements, of the CAR to require additional aircraft types to be equipped with a CVR than is the case today. In doing so, it is recognized that some aircraft types may be required to incorporate aircraft modifications beyond new installation of a 2-hour CVR, or replacement of an existing CVR with a 2-hour CVR, in order to accommodate the recording of the flight deck aural environment.

Discontinuation of Magnetic Tape or Wire CVR

This NPA proposes to require that all CVRs, as of 1 January 2016 or 48 months after the effective date of this amendment, whichever is later, be required to have a recording capacity of two hours. It is anticipated that the 2-hour recording duration will effectively drive the use of solid state memory recording technology in lieu of tape or wire. In view of the increased cost for CVR tape or wire as compared to solid state memory, further use of these older technologies after the entering into force of this amendment will effectively be precluded. Consequently, this NPA does not propose an explicit requirement for discontinuation of magnetic tape or wire CVRs.

Definition of Cockpit Voice Recorder and Data-Link Recorder (AWM 551.101(b))

The definition of CVR for use in the context of 551.101 of the AWM is revised to align with the definition of CVR provided in EUROCAE Document ED-112, *Minimum Operational Performance Specification for Crash Protected Airborne Recorder System*, Amdt. 2,

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September 22, 2003. While a definition of CVR has been provided in 551.101(b) of the AWM since the First Edition of Chapter 551, 1 December 1998, it somewhat erroneously defines a CVR as a system of flight data recording equipment. The provided definition was identical to the definition provided in 551.100(b) of the AWM for a flight data recorder (FDR). Although Transport Canada does not believe any specific difficulty has ever arisen in interpreting the intent, this NPA proposes to amend the definition to one that is more appropriately distinguishable from that of the flight data recorder.

A definition of Data-Link Recorder is added and aligns with the general equipment design specification description provided in ED-112.

Interpretation of ICAO Annex 6 Date Terminology

When describing date thresholds for aircraft compliance, ICAO terminology in Annex 6 of the Convention refers to the ‘date of issuance of the individual certificate of airworthiness’ for an aircraft. Since this can be difficult to ascertain, Transport Canada interprets this to mean aircraft “date of manufacture” for this NPA because:

- The two dates are typically within days of each other; and,
- The date of manufacture is readily available on the aircraft’s data plate.

ICAO terminology also refers to the date on which the ‘prototype was certificated by the appropriate national authority’. Since this can be difficult to ascertain, Transport Canada interprets this to mean “date of issuance of the original (state-of-design) type certificate” for the aircraft because:

- The date of issuance of a type certificate is readily available on the aircraft’s type certificate data sheet.

Administration and Compliance – Designated Provisions

Both subsections 605.33(1) and (2) of the CAR, providing rules of conduct for FDR and CVR respectively, are currently identified as designated provisions, pursuant to section 103.08 of the CAR. Maximum amounts payable in respect of a contravention are as provided in Schedule II of subpart 103 of the CAR. The maximum amounts payable in respect of a contravention to these regulations are proposed to be amended to \$3,000 (individual) or \$15,000 (corporation). This revision is proposed in order to recognize a maximum amount for contravention in line with other provisions that do not directly affect aviation safety and create a risk of their own. The proposed amounts are commensurate with other similar CAR dispositions, intended to bring an appropriate deterrent when a person is not putting in place a system/item required by the Minister.

Implementation Timeframes

Compliance times for new requirements contained in this proposed amendment are generally set to 48 months following the effective date of the amendment. Anticipating an effective date in 2012, the compliance date is therefore provisionally set to January 1, 2016, which

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aligns with the ICAO recommendations for revised CVR standards currently reflected in Annex 6. Should the effective date of this proposed amendment occur later than this, it is envisioned that the compliance date could be later than January 1, 2016. Transport Canada notes that ICAO Annex 6 contained some phased requirements for 2-hour CVR recording capacity, with a final compliance date of 1 January 2016 for all CVRs. Transport Canada also acknowledges the experience of the FAA in mandating their revised CVR requirements for operators by 7 April 2012, where their phase-in was over a 4-year period. Consequently, Transport Canada believes that Canadian industry should be well prepared for these changes and that four years provides sufficient time to comply with this amendment.

The Cabinet Directive on Streamlining Regulation

The *Cabinet Directive on Streamlining Regulation* (CDSR) issued by the Treasury Board of Canada Secretariat (TBS), which came into effect on April 1, 2007, introduces specific requirements for the development, implementation, evaluation and review of regulations with which federal departments must comply.

One of the requirements that the CDSR re-affirms is the obligation federal departments have to identify and justify the appropriateness of regulatory and non-regulatory instrument(s) they choose to achieve policy objectives. This is achieved through an assessment of the risk resulting from the chosen policy instruments and the evaluation of their associated costs and benefits.

Summary of Risk Assessment

Following Civil Aviation policy to apply risk management techniques and processes consistently in all its decision-making and in view of the *Cabinet Directive on Streamlining Regulation*, a risk assessment will be conducted including a review of the background, issues, assumptions and constraints pertaining to cockpit voice recorders and to confirm the regulatory instrument of choice. In conducting the risk assessment, many factors are to be considered relating to the affected Canadian fleet, designs, compliance costs and compliance times. These factors, combined with the standard measurement factors developed by the Treasury Board of Canada will be used in determining the economic costs and benefits of the proposed rulemaking.

This NPA is supported by a risk assessment conducted in 2008 (RDIMS # 4527683) following the process of TP 13905B *Risk Management and Decision Making in Civil Aviation Type 2A*. This risk assessment examined both CVRs and FDRs, although this NPA is concerned only with CVRs. It found that:

The *Canadian Aviation Regulations* (CARs) and standards for flight data recorders (FDRs) and cockpit voice recorders (CVRs) have not kept pace with Annex 6 to the Convention on International Civil Aviation (ICAO), nor with international standards, specifically with those published in the Federal Aviation Regulations (FARs).

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The recommended risk control option was to harmonize [the CVR requirements contained in] the CARs with ICAO Annex 6 standards and with the FAR.

Estimated Impact

It is anticipated through preliminary estimates that the impact of this file will be Medium.

Further analysis for CDSR is required and will take into consideration any feedback obtained through early stakeholder consultation. It is anticipated that the analysis will be completed and presented to the Civil Aviation Regulatory Committee (CARC) together with this NPA early in 2012 (following the CARAC Management Charter and Procedures).

At this time, it is estimated that the overall cost to Canadian industry will be in the area of \$15 to \$20 million for the implementation of the measures required by the proposed regulatory amendments. This estimate of cost, as well as the net benefit of this regulatory activity, will be refined prior to presentation to CARC.

Environmental or Aboriginal Rights Impact

There is no impact with respect to environmental issues or aboriginal rights anticipated as a result of this proposed amendment.

Enforcement Plan

Although the affected provisions of the CARs will be modified, the general requirements already exist and are enforced by Transport Canada. There is no significant change to enforcement plans anticipated.

Service Standards

There is no change to fees and service standards anticipated.

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Current Text / Texte actuel :

PART I – GENERAL PROVISIONS		
Subpart 3 – Administration and Compliance		
Schedule II		
Column I	Column II	
	Maximum Amount of Penalty (\$)	
Designated provision	Individual	Corporation
Part VI - General Operating and Flight Rules Subpart 5 - Aircraft Requirements		
Subsection 605.33(1)	\$5,000	\$25,000
Subsection 605.33(2)	\$5,000	\$25,000

PART VI – GENERAL OPERATING AND FLIGHT RULES
Subpart 5 – Aircraft Requirements
Division II – Aircraft Equipment Requirements
605.33 – Flight Data Recorder and Cockpit Voice Recorder
<ul style="list-style-type: none"> • • •
<p>(2) Subject to section 605.34, no person shall conduct a take-off in a multi-engined turbine-powered aircraft that is configured for six or more passenger seats and for which two pilots are required by the aircraft type certificate or by the subpart under which the aircraft is operated, unless the aircraft is equipped with a cockpit voice recorder that conforms to section 551.101 of Chapter 551 of the <i>Airworthiness Manual</i> and section 625.33 of Standard 625 — <i>Aircraft Equipment and Maintenance of the General Operating and Flight Rules Standards</i>.</p>

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STANDARD 625 – AIRCRAFT EQUIPMENT AND MAINTENANCE STANDARDS

Subpart 5 – Aircraft Requirements

625.33 – Flight Data Recorders and Cockpit Voice Recorders

In this section, a reference to the date on which an aircraft is manufactured is a reference to the date on which the manufacturer has signed the statement of conformity certifying that the aircraft conforms to the approved type design.

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II - Cockpit Voice Recorders (CVRs)

(1) A CVR installed on board an aircraft pursuant to subsection 605.33(2) of the CARs, shall continuously record:

- (a) voice communications transmitted from, or received by, the aircraft concerning the operation of the aircraft;
- (b) the aural environment of the flight deck, including:
 - (i) the audio signals received from each microphone being used by a flight crew member;
 - (ii) voice communications of flight crew members using the aircraft's interphone system and the public address system, and
 - (iii) voice communications or audio signals identifying navigation or approach aids detected by a headset or speaker.

(2) A CVR installed on board an aircraft with a date of manufacture after October 11, 1991 and brought onto the register after the coming into force date of this section, shall record continuously the information specified in (1) with reference to a time scale.

(3) A CVR installed on board an aircraft manufactured after December 31, 2002, shall retain all information recorded during the aircraft's operation, or all information recorded during the last two hours of the aircraft's operation, whichever is less.

(4) A CVR installed on board any aircraft other than one referred to in subsection (3), shall retain all the information recorded during the aircraft's operation, or all the information recorded during the last 30 minutes of the aircraft's operation, whichever is less.

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(5) An aircraft with a date of manufacture after October 11, 1991, or on which a CVR has been installed after the coming into force of this section, shall be equipped to record the uninterrupted audio signals received by a boom or mask microphone.

(6) Each flight crew member of an aircraft equipped to record the uninterrupted audio signals received by boom or mask microphone in accordance with subsection (5), shall use the boom or mask microphone when operating below 10,000 feet mean sea level.

(7) An aircraft in respect of which a type certificate has been issued authorizing the transport of more than 30 passengers shall have an approved underwater locating device on or adjacent to the recorder container which is secured in such a manner that they are not likely to be separated during crash impact, unless the FDR and CVR required by this section are installed adjacent to each other in such a manner that they are not likely to be separated during crash impact.

Standard 625 APPENDIX C - Out of Phase Tasks and Equipment Maintenance Requirements

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15. Cockpit Voice Recorder (CVRs)

(a) Cockpit Voice Recorders (CVR), where installed for compliance with the basis of certification listed on the type certificate, or where required by operating rule, shall be subject to the following maintenance, in accordance with a maintenance schedule meeting the following requirements:

- (i) an operational check;
- (ii) a functional check;
- (iii) an intelligibility check; and
- (iv) unit overhaul, at the interval recommended by the CVR manufacturer.

(c) A functional check shall be completed in accordance with manufacturers maintenance instructions at 3,000 hours, or 12 months, whichever comes first.

(d) An intelligibility check shall be performed by means of a test procedure which, when completed under operational conditions, shall enable verification of intelligible recorded audio information from all the various input sources required by the regulations:

- (i) upon initial installation;
- (ii) at every 3,000 hours, or 12 months, whichever comes first.

(e) CVR maintenance and overhaul shall be performed in accordance with manufacturer's recommendations.

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Information Note:

EUROCAE ED-56 (refer to its latest revision) document provides guidelines for CVR maintenance in general; it also provides information relative to equipment required to adequately evaluate the quality of voice recording.

Copies of ED56 may be obtained from:

EUROCAE, 11 rue Hamelin 75783 Paris CEDEX 16, France

PART V – AIRWORTHINESS

Airworthiness Manual Chapter 551 – Aircraft Equipment and Installation

Subchapter C – Avionic Systems

551.101 – Cockpit Voice Recorder

(a) Introduction

This section contains standards of airworthiness for installation approval of Cockpit Voice Recorder (CVR) required by CAR 605.33.

(b) Definitions

In this section,

“Initial installation” means the first installation of a particular type of CVR in an aircraft of a particular type and model, for which approval is sought;

“Cockpit Voice Recorder (CVR)” means a system of flight data recording equipment; and

“Follow-on series CVR installation” means an installation that is accomplished in conformity with approved data derived from the initial installation of the same type and model of CVR and aircraft.

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(c) Equipment

The design standards in the following documents apply:

Standard	Criteria for Acceptance for Installation
Current - as contained in Chapter 537: CAN-TSO C123a	Acceptable
Other: CAN-TSO C123 CAN-TSO C 84	Acceptable May remain in use for existing installations, approved prior to 1 December 1998 (the date of issue of CAR 551)

(d) Installation

(1) Installation and Installed Performance

CVR system installation and installed performance must be in accordance with European Organisation for Civil Aviation Equipment (EUROCAE) document ED-56A, “Minimum Operational Requirements for Cockpit Voice Recorder System”, Chapter 6, dated October, 1993. In the event of any conflict between the ED 56A document and the certification basis of the aircraft, the basis of certification applies.

Information Note:

For normal and transport category rotorcraft, the installation location requirements for record container of a CVR is set out in section 527.1457(e) and 529.1457(e) of Chapter 527 and 529 of the Airworthiness Manual.

Normally, for aeroplanes, a CVR installation location at the aft would satisfy the requirements. However, for rotorcraft, the forward locations are generally less susceptible to fire and it may be preferable to install the record containers in a forward location. In addition, a forward location may avoid a significant weight penalty in comparison to an aft location.

It is therefore acceptable to install CVR record containers in forward locations of rotorcraft provided that the recorders are certified to CAN-TSO-C123a or CAN-TSO-C123 crash survivability standards.

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(2) Initial Installation

Each initial installation must be tested in the aircraft in which it is installed to demonstrate compliance with the system recording requirements of Standard 625.33. The tests must be conducted in accordance with the procedures specified in EUROCAE ED-56A.

In order to obtain approval for initial installations, the following information is required:

- (i) A test recording made under the noise conditions of flight operations, together with a report from a recognised CVR playback facility demonstrating that the quality and the intelligibility of the recorder information are satisfactory;

Information Note:

It is acceptable to use a copy of the original recording for demonstrating compliance with this requirement.

- (ii) For CVRs that utilise solid-state recording media, software documentation including conversion and logic data for retrieval of the recorded information;
- (iii) A maintenance plan; and
- (iv) Two copies of the operating, servicing, and maintenance instructions.

Information Note:

If a Supplement to the Aircraft Flight Manual or equivalent publication is produced, it must be submitted to Transport Canada for approval.

(3) Follow-on Series CVR Installation

Each follow-on series CVR installation must be subjected to testing to confirm conformity with the data applicable to the initial installation.

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New Text / Nouveau texte :

<p>New text shown with revision marks: deleted text = strikethrough / inserted text = underline</p>	<p>Foreign/ICAO Reference or TSB Rec.</p>																		
<p>PART I – GENERAL PROVISIONS Subpart 3 – Administration and Compliance</p>																			
<p>Schedule II</p>																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Column I</th> <th colspan="2" style="width: 50%; text-align: center;">Column II</th> </tr> <tr> <td></td> <th colspan="2" style="text-align: center;">Maximum Amount of Penalty (\$)</th> </tr> <tr> <th style="text-align: center;">Designated provision</th> <th style="text-align: center;">Individual</th> <th style="text-align: center;">Corporation</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Part VI - General Operating and Flight Rules Subpart 5 - Aircraft Requirements</td> <td></td> <td></td> </tr> <tr> <td>Subsection 605.33(1)</td> <td style="text-align: center;">\$5,000 <u>\$3,000</u></td> <td style="text-align: center;">\$25,000 <u>\$15,000</u></td> </tr> <tr> <td>Subsection 605.33(2)</td> <td style="text-align: center;">\$5,000 <u>\$3,000</u></td> <td style="text-align: center;">\$25,000 <u>\$15,000</u></td> </tr> </tbody> </table>	Column I	Column II			Maximum Amount of Penalty (\$)		Designated provision	Individual	Corporation	Part VI - General Operating and Flight Rules Subpart 5 - Aircraft Requirements			Subsection 605.33(1)	\$5,000 <u>\$3,000</u>	\$25,000 <u>\$15,000</u>	Subsection 605.33(2)	\$5,000 <u>\$3,000</u>	\$25,000 <u>\$15,000</u>	
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<p>Division II – Aircraft Equipment Requirements</p>																			
<p>605.33 – Flight Data Recorder and Cockpit Voice Recorder</p>																			
<ul style="list-style-type: none"> • • • 																			

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<p>(2) Subject to section 605.34, no person shall conduct a take-off in <u>any of the following aircraft, a multi-engined turbine-powered aircraft that is configured for six or more passenger seats and for which two pilots are required by the aircraft type certificate or by the subpart under which the aircraft is operated</u>, unless the aircraft is equipped with a cockpit voice recorder that conforms to section 551.101 of Chapter 551 of the <i>Airworthiness Manual</i> and section 625.33 of Standard 625 — <i>Aircraft Equipment and Maintenance of the General Operating and Flight Rules Standards</i>:-</p> <p><u>(a) a multi-engined turbine-powered aircraft that is configured for six or more passenger seats and for which more than one pilot is required by the aircraft type certificate or by the subpart under which the aircraft is operated;</u></p> <p><u>(b) all turbine powered aeroplanes manufactured on or after 1 January 2016 and for which more than one pilot is required by the type certificate or by the subpart under which the aircraft is operated;</u></p> <p><u>(c) all turbine-powered aeroplanes operated under Subpart 4 of Part VI or Subparts 2, 3, 4 or 5 of Part VII of the CARs of a maximum certificated take-off weight of over 5700 kg (12,500 lbs), which were type certificated after 30 September 1969 and manufactured before 1 January 1987;</u></p>	<p>Existing 605.33(2)</p> <p>ICAO Annex 6, Part I 9thEd, 6.3.2.1.2; Part II 7thEd, 3.6.3.2.1.2</p> <p>ICAO Annex 6, Part I 9thEd, 6.3.2.1.6</p>
<p><u>(d) all aeroplanes of a maximum certificated take-off weight of over 5700 kg (12,500 lbs) manufactured on or after 1 January 1987; and</u></p> <p><u>(e) all helicopters of a type-certificated maximum mass (weight) of over 7000 kg (15,400 lbs) (internal loading) manufactured before 1 January 1987.</u></p> <p><u>(f) all helicopters of a type-certificated maximum mass (weight) of over 3180 kg (7,000 lbs) (internal loading) manufactured on or after 1 January 1987.</u></p>	<p>ICAO Annex 6, Part I 9thEd, 6.3.2.1.4 and 6.3.2.3.2</p> <p>ICAO Annex 6, Part III 7thEd, 4.3.2.1.3 and 4.7.2.1.3</p> <p>ICAO Annex 6, Part III 7thEd, 4.3.2.1.1 and 4.7.2.1.2</p>
<p>STANDARD 625 – AIRCRAFT EQUIPMENT AND MAINTENANCE STANDARDS</p> <p>Subpart 5 – Aircraft Requirements</p>	
<p>625.33 – Flight Data Recorders and Cockpit Voice Recorders</p>	
<p>In this section, a reference to the date on which an aircraft is manufactured is a reference to the date on which the manufacturer has signed the statement of conformity certifying that the aircraft conforms to the approved type design.</p> <p>•</p>	

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<ul style="list-style-type: none"> • • 	
II - Cockpit Voice Recorders (CVRs)	
<p>(1) A CVR installed on board an aircraft pursuant to subsection 605.33(2) of the CARs, shall continuously record:</p> <p style="padding-left: 40px;">(a) voice communications transmitted from, or received by, the aircraft concerning the operation of the aircraft;</p> <p style="padding-left: 40px;">(b) the aural environment of the flight deck, including:</p> <p style="padding-left: 80px;">(i) the audio signals received from each microphone being used by a flight crew member;</p> <p style="padding-left: 80px;">(ii) voice communications of flight crew members using the aircraft's interphone system and the public address system, and</p> <p style="padding-left: 80px;">(iii) voice communications or audio signals identifying navigation or approach aids detected by a headset or speaker.</p>	
<p>(2) A CVR installed on board an aircraft with a date of manufacture after October 11, 1991 and brought onto the register after the coming into force date of this section, shall record continuously the information specified in (1) with reference to a time scale.</p>	
<p>(3) A CVR installed on board an aircraft manufactured after December 31, 2002, shall retain all information recorded during the aircraft's operation, or all information recorded during the last two hours of the aircraft's operation, whichever is less.</p>	
<p>(4) <u>Except as provided in subsection (8) below</u>, a CVR installed on board any aircraft other than one referred to in subsection (3), shall retain all the information recorded during the aircraft's operation, or all the information recorded during the last 30 minutes of the aircraft's operation, whichever is less.</p>	
<p>(5) An aircraft with a date of manufacture after October 11, 1991, or on which a CVR has been installed after the coming into force of this section, shall be equipped to record the uninterrupted audio signals received by a boom or mask microphone.</p>	

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<p>(6) Each flight crew member of an aircraft equipped to record the uninterrupted audio signals received by boom or mask microphone in accordance with subsection (5), shall use the boom or mask microphone when operating below 10,000 feet mean sea level.</p>	
<p>(7) An aircraft in respect of which a type certificate has been issued authorizing the transport of more than 30 passengers shall have an approved underwater locating device on or adjacent to the recorder container which is secured in such a manner that they are not likely to be separated during crash impact, unless the FDR and CVR required by this section are installed adjacent to each other in such a manner that they are not likely to be separated during crash impact.</p>	
<p>(8) By <u>[1 January 2016, or 4 years after the effective date of this amendment, whichever is later]</u>, all aircraft required to have a CVR under 605.33(2), shall be equipped with a CVR capable of retaining all information recorded during at least the last two hours of the aircraft operation. For rotorcraft not equipped with an FDR, at least main rotor speed shall be recorded on the CVR.</p>	<p>TSB A99-02; ICAO Annex 6, Parts I 9thEd, II 7thEd, III 7thEd; FAR §§91.609(i)(2)&(3) , 121.359(i)(2) and (j)(2), 125.227(g)(2) and (h)(2), 129.24, 135.151(g)(1)(iii)</p>
<p>(9) All aeroplanes required to have an FDR and a CVR under 605.33(1) and (2), that are manufactured before 1 January 2016, shall by <u>[1 January 2018, or 2 years after the effective date of this amendment, whichever is later]</u>, have a CVR installed so that it is in a separate container from the FDR, meeting the requirements of 523.1457(d)(6) [Change 523-9 + associated corrections pending adoption through NPA] or 525.1457(d)(6) [Change 525-16 + associated corrections pending adoption through NPA] of the <i>Airworthiness Manual</i>, as applicable.</p>	<p>FAR §§91.609(h)(1), 121.359(i)(1), 125.227(g)(1) and (h)(1), 129.24, 135.151(f)(1)</p>
<p>(10) By <u>[1 January 2016, or 4 years after the effective date of this amendment, whichever is later]</u>, for all aircraft required to have an FDR and a CVR under 605.33(1) and (2) of the CARs, a dedicated independent power supply is required to be installed adjacent or integral to the CVR that meets the requirements of 523.1457(d)(5), 525.1457(d)(5), 527.1457(d)(5) or 529.1457(d)(5) of the <i>Airworthiness Manual</i> in effect on <u>[31 December 2011 est.]</u>, as applicable.</p>	<p>TSB A99-03; FAR §§91.609(i)(3) (new mfgr), 121.359(j)(1) (new mfgr), 125.227(h)(1) (new mfgr), 129.24 (new mfgr), 135.151(g)(1)(i) (new mfgr)</p>
<p>(11) A CVR installed on board an aircraft manufactured on or after <u>[1 January 2016 or 4 years after the effective date of this amendment, whichever is later]</u> shall also meet all the requirements of 523.1457, 525.1457, 527.1457 or 529.1457 of the <i>Airworthiness Manual</i> in effect on <u>[31 December 2011 est.]</u>, as applicable.</p>	<p>FAR §§91.609(i)(3), 121.359(j)(4), 125.227(h)(4), 129.24, 135.151(g)(2)(iv)</p>

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<p><u>(12) For all aircraft that are modified on or after 1 January 2016 to install and utilize data-link communications applications as specified in ICAO Annex 6 – Operation of Aircraft shall have a CVR that meets the requirements of 523.1457(a)(6), 525.1457(a)(6), 527.1457(a)(6) or 529.1457(a)(6) of the Airworthiness Manual in effect on [31 December 2011], as applicable.</u></p>	<p>ICAO Annex 6, Parts I 9thEd, II 7thEd, and III 7thEd.</p>
<p>Standard 625 APPENDIX C - Out of Phase Tasks and Equipment Maintenance Requirements</p>	
<ul style="list-style-type: none"> • • • 	
<p>15. Cockpit Voice Recorder (CVRs) and Data-Link Recorder (DLR)</p>	
<p><u>(a) Each Cockpit Voice Recorders (CVR) and each Data-Link Recorder (DLR), where installed for compliance with the basis of certification listed on the type certificate or supplemental type certificate, or where required by operating rule, shall be subject to the following maintenance, in accordance with a maintenance schedule meeting the following requirements:</u></p> <ul style="list-style-type: none"> (i) an operational check; (ii) a functional check; (iii) an <u>CVR intelligibility check for each CVR;</u> (iv) <u>a DLR system message recording accuracy and synchronisation check for each DLR; and</u> (v) <u>unit overhaul, at the interval recommended by the CVR and/or DLR manufacturer(s), as applicable.</u> 	
<p><u>(c) A functional check of each CVR, including its recorder independent power supply, shall be completed in accordance with manufacturer's maintenance instructions at 3,000 hours, or 12 months, whichever comes first.</u></p>	
<p><u>(d) An intelligibility check of each CVR shall be performed by means of a test procedure which, when completed under operational conditions, shall enable verification of intelligible recorded audio information from all the various input sources required by the regulations:</u></p> <ul style="list-style-type: none"> (i) upon initial installation; (ii) at every 3,000 hours, or 12 months, whichever comes first. 	

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<p><u>(e) A DLR system, comprised of both aircraft and ground equipment, message recording check for each DLR installed shall be performed in accordance with manufacturer's maintenance instructions to confirm adequate message recording accuracy and synchronisation with other recording devices, both on the aircraft and on the ground:</u></p> <p><u>(i) upon initial installation;</u></p> <p><u>(ii) at every 3,000 hours, or 12 months, whichever comes first.</u></p>	
<p><u>(f) CVR and DLR maintenance and overhaul shall be performed in accordance with manufacturer's recommendations.</u></p>	
<p><i>Information Note:</i></p> <p><i>EUROCAE Document ED-56 (refer to its latest revision) document provides guidelines for TSO-C123 CVR maintenance in general; ED-56A provides guidelines for TSO-C123a CVR maintenance in general; ED-112 provides guidelines for CAN-TSO-C123b CVR maintenance in general; it they also provides information relative to equipment required to adequately evaluate the quality of voice recording.</i></p> <p><i>Copies of ED-56, ED-56A and ED-112 may be obtained from:</i></p> <p><i>EUROCAE, 11 rue Hamelin 75783 Paris CEDEX 16, France</i> <i>EUROCAE, 102 rue Etienne Dolet, 92240 Malakoff France</i></p>	

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<p>PART V – AIRWORTHINESS Airworthiness Manual Chapter 551 – Aircraft Equipment and Installation</p>	
<p>Subchapter C – Avionic Systems</p>	
<p>551.101 – Cockpit Voice Recorder</p>	
<p>(a) Introduction</p> <p>This section contains standards of airworthiness for installation approval of Cockpit Voice Recorder (CVR) required by CAR 605.33.</p>	
<p>(b) Definitions</p> <p>In this section,</p> <p>“Initial installation” means the first installation of a particular type of CVR in an aircraft of a particular type and model, for which approval is sought;</p> <p>“Cockpit Voice Recorder (CVR)” means a system of flight data recording equipment <u>a device that uses a combination of microphones and other audio and digital inputs to collect and record the aural environment of the cockpit and communications to, from and between the flight crew members;</u></p> <p>“Data-Link Recorder” means <u>equipment intended to receive, process, record, preserve, and retrieve communication, navigation, surveillance/air traffic management (CNS/ATM) digital messages transmitted to and from the aircraft flight deck;</u> and</p> <p>“Follow-on series CVR installation” means an installation that is accomplished in conformity with approved data derived from the initial installation of the same type and model of CVR and aircraft.</p>	

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<p>(c) Equipment</p> <p>The design standards in the following documents apply:</p> <table border="1" data-bbox="266 415 1224 1234"> <thead> <tr> <th data-bbox="266 415 662 449">Standard</th> <th data-bbox="662 415 1224 449">Criteria for Acceptance for Installation</th> </tr> </thead> <tbody> <tr> <td data-bbox="266 449 662 674"> Current - as contained in Chapter 537: CAN-TSO-C123ab CAN-TSO-C177 </td> <td data-bbox="662 449 1224 674"> Acceptable for new and existing CVR installations provided that: (1) the CVR has a recording capacity of at least two hours; (2) a recorder independent power supply that meets CAN-TSO-C155a, or later revision, is installed to support the CVR. Acceptable for a new or existing data-link recorder installation </td> </tr> <tr> <td data-bbox="266 674 662 1234"> Other: FAA TSO-C123a CAN-FAA TSO-C123 CAN-FAA TSO-C84 </td> <td data-bbox="662 674 1224 1234"> Acceptable for new and existing CVR installations provided that: (1) the CVR has a recording capacity of at least two hours; (2) a recorder independent power supply that meets CAN-TSO-C155, or later revision, is installed to support the CVR. Acceptable May remain in use for existing CVR installations, approved prior to <u>1 January 2016 or 48 months after the effective date of this amendment, whichever is later</u> provided that: (1) the manufacturer provides a statement that the specific CVR model and serial number meets the requirements of TSO-C123a; (2) the CVR has a recording capacity of at least two hours; and (3) a recorder independent power supply that meets TSO-C155, or later revision, is installed to support the CVR. May remain in use for existing CVR installations, approved prior to 1 December 1998 (the date of issue of CAR 551), unless otherwise required by CAR 605.33. </td> </tr> </tbody> </table>	Standard	Criteria for Acceptance for Installation	Current - as contained in Chapter 537: CAN-TSO-C123 a b CAN-TSO-C177	Acceptable for new and existing CVR installations provided that: (1) the CVR has a recording capacity of at least two hours; (2) a recorder independent power supply that meets CAN-TSO-C155a, or later revision, is installed to support the CVR. Acceptable for a new or existing data-link recorder installation	Other: FAA TSO-C123a CAN-FAA TSO-C123 CAN-FAA TSO-C84	Acceptable for new and existing CVR installations provided that: (1) the CVR has a recording capacity of at least two hours; (2) a recorder independent power supply that meets CAN-TSO-C155, or later revision, is installed to support the CVR. Acceptable May remain in use for existing CVR installations, approved prior to <u>1 January 2016 or 48 months after the effective date of this amendment, whichever is later</u> provided that: (1) the manufacturer provides a statement that the specific CVR model and serial number meets the requirements of TSO-C123a; (2) the CVR has a recording capacity of at least two hours; and (3) a recorder independent power supply that meets TSO-C155, or later revision, is installed to support the CVR. May remain in use for existing CVR installations, approved prior to 1 December 1998 (the date of issue of CAR 551), unless otherwise required by CAR 605.33.	<p>ICAO Annex 6, Parts I 9thEd, II 7thEd, and III 7thEd.</p> <p>FAR §§91.609(i)(2)&(3), 121.359(i)(2) and (j)(2), 125.227(g)(2) and (h)(2), 129.24, 135.151(g)(1)(iii)</p>
Standard	Criteria for Acceptance for Installation						
Current - as contained in Chapter 537: CAN-TSO-C123 a b CAN-TSO-C177	Acceptable for new and existing CVR installations provided that: (1) the CVR has a recording capacity of at least two hours; (2) a recorder independent power supply that meets CAN-TSO-C155a, or later revision, is installed to support the CVR. Acceptable for a new or existing data-link recorder installation						
Other: FAA TSO-C123a CAN-FAA TSO-C123 CAN-FAA TSO-C84	Acceptable for new and existing CVR installations provided that: (1) the CVR has a recording capacity of at least two hours; (2) a recorder independent power supply that meets CAN-TSO-C155, or later revision, is installed to support the CVR. Acceptable May remain in use for existing CVR installations, approved prior to <u>1 January 2016 or 48 months after the effective date of this amendment, whichever is later</u> provided that: (1) the manufacturer provides a statement that the specific CVR model and serial number meets the requirements of TSO-C123a; (2) the CVR has a recording capacity of at least two hours; and (3) a recorder independent power supply that meets TSO-C155, or later revision, is installed to support the CVR. May remain in use for existing CVR installations, approved prior to 1 December 1998 (the date of issue of CAR 551), unless otherwise required by CAR 605.33.						
<p>(d) Installation</p> <p>(1) Installation and Installed Performance</p> <p>CVR system installation and installed performance must be in accordance with European Organisation for Civil Aviation Equipment (EUROCAE) document ED-56A, “Minimum Operational Requirements for Cockpit Voice Recorder System”, Chapter 6, dated October, 1993. In the event of any conflict between the ED-56A document and the certification basis of the aircraft, the basis of certification applies.</p> <p><u>(i) For CVRs approved under CAN-TSO-C123b, CVR system installation and installed performance must be in accordance with European Organisation for Civil Aviation Equipment (EUROCAE) document ED-112, “Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems”, Chapter I-6, dated March, 2003. In the event of any conflict between the ED-112 document and the certification basis of the aircraft, the basis of</u></p>	<p>ICAO Annex 6, Parts I 9thEd, II 7thEd, and III 7thEd.</p>						

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<p><u>certification applies.</u></p> <p><u>(ii) For all other CVRs, CVR system installation and installed performance must be in accordance with European Organisation for Civil Aviation Equipment (EUROCAE) document ED-56A, “Minimum Operational Requirements for Cockpit Voice Recorder System”, Chapter 6, dated October, 1993. In the event of any conflict between the ED-56A document and the certification basis of the aircraft, the basis of certification applies.</u></p> <p><u>(iii) DLR installation and installed performance must be in accordance with CAN-TSO-C177, which references ED-112, “Minimum Operational Performance Specifications (MOPS) for Crash Protected Airborne Recorder Systems”, dated March, 2003, and where:</u></p> <p style="padding-left: 40px;"><u>(A) the minimum recording duration shall be equal to the duration of the CVR; and</u></p> <p style="padding-left: 40px;"><u>(B) data-link recording shall be able to be correlated to the recorded cockpit audio.</u></p> <p>Information Note:</p> <p><i>For normal and transport category rotorcraft, the installation location requirements for record container of a CVR is set out in section 527.1457(e) and 529.1457(e) of Chapter 527 and 529 of the Airworthiness Manual.</i></p> <p><i>Normally, for aeroplanes, a CVR installation location at the aft would satisfy the requirements. However, for rotorcraft, the forward locations are generally less susceptible to fire and it may be preferable to install the record containers in a forward location. In addition, a forward location may avoid a significant weight penalty in comparison to an aft location.</i></p> <p><i>It is therefore acceptable to install CVR record containers in forward locations of rotorcraft provided that the recorders are certified to CAN-TSO-C123a or CAN-TSO-C123 crash survivability standards.</i></p>	<p>FAR §§91.609(i)(2)&(3), 121.359(i)(2) and (j)(2), 125.227(g)(2) and (h)(2), 129.24, 135.151(g)(1)(iii)</p> <p>ICAO Annex 6, Parts I 9thEd, II 7thEd, and III 7thEd.</p>
<p>(2) Initial Installation</p> <p>Each initial installation must be tested in the aircraft in which it is installed to demonstrate compliance with the system recording requirements of Standard 625.33. The tests must be conducted in accordance with the procedures specified in <u>EUROCAE ED-112, for CVRs meeting CAN-TSO-C123b or later revision, or EUROCAE ED-56A for all other CVRs.</u></p>	

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<p>In order to obtain approval for initial installations, the following information is required:</p> <p>(i) A test recording made under the noise conditions of flight operations, together with a report from a recognised CVR playback facility demonstrating that the quality and the intelligibility of the recorder information are satisfactory, <u>including the data-link recording if data-link communications applications are installed and utilized</u>;</p> <p>Information Note:</p> <p><i>It is acceptable to use a copy of the original recording for demonstrating compliance with this requirement.</i></p> <p>(ii) For CVRs, <u>including any data-link recorders</u>, that utilise solid-state recording media, software documentation including conversion and logic data for retrieval of the recorded information;</p> <p>(iii) A maintenance plan; and</p> <p>(iv) Two copies of the operating, servicing, and maintenance instructions.</p> <p>Information Note:</p> <p><i>If a Supplement to the Aircraft Flight Manual or equivalent publication is produced, it must be submitted to Transport Canada for approval.</i></p>	
<p>(3) Follow-on Series CVR Installation</p> <p>Each follow-on series CVR installation must be subjected to testing to confirm conformity with the data applicable to the initial installation.</p>	