



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Onboard Recording of Controller
Pilot Data Link Communication (CPDLC) in
Crash Survivable Memory

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AC No: 20-160A

Initiated By: AIR-130

This advisory circular (AC) provides guidance on compliance with the airworthiness standards for onboard recording of Controller Pilot Data Link Communication (CPDLC) messages in crash survivable memory with aircraft that incorporate a CPDLC system. This guidance is applicable to requests for a new, amended, or supplemental type certificate for Part 23, 25, 27 and 29 aircraft.

If you have suggestions for improving this AC, you may use the Advisory Circular Feedback form at the end of this AC.

A handwritten signature in cursive script, appearing to read "Richard E. Jennings".

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1 **WHAT IS THE PURPOSE OF THIS ADVISORY CIRCULAR (AC)?**

1.1 This advisory circular (AC) provides guidance material for applicants seeking an airworthiness approval for aircraft with an installed Data Link Recording (DLR) system that records Controller Pilot Data Link Communications (CPDLC). This AC describes an acceptable means, but not the only means, to gain design approval of your data link communication recording system. However, if you use the means described in the AC, you must follow it in its entirety.

1.2 In this AC, we focus on data to be recorded and logical recording point locations for storing CPDLC messages in onboard crash-survivable memory. These logical point locations, also called observation points, are physical locations within airborne avionic architectures deemed ideal for recording system data sources, as defined in Section 7.1 of this AC.

2 **WHO DOES THIS AC APPLY TO?**

We wrote this AC for aircraft equipment installers and type certificate applicants to identify design approval requirements for data link communication recording equipment. This AC will also help Federal Aviation Administration (FAA) staff to standardize the approval process for the data link communication recording equipment.

3 **DOES THIS AC CANCEL ANY PRIOR AC?**

This AC supersedes and therefore cancels AC 20-160, dated February 21, 2008.

4 **WHAT ARE THE IMPORTANT CHANGES TO THIS AC?**

4.1 The AC now refers to the applicable interoperability criteria specified in AC 20-140C, *Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS)*, or later approved revision, to identify the CPDLC message set(s) that the DLR system must record.

4.2 This AC refers to the March 2, 2015 policy update and clarification to the data link recording rules of Title 14, Code of Federal Regulations (14 CFR), parts 91, 121, 125, and 135 (80 FR 11108).

4.3 This AC updates cross-referenced policy and guidance to the latest applicable revisions.

5 **WHY DO DATA COMMUNICATIONS NEED TO BE RECORDED IN CRASH SURVIVABLE MEMORY?**

In the event of an accident or incident, it is vital to be able to retrieve the communications to and from the aircraft to aid in reconstruction of the accident/incident sequence and determine probable causes to prevent recurrence of the accident. Recording those communications in crash survivable memory (such as a cockpit voice

recorder (CVR)) onboard the aircraft captures a record of what communications the aircraft itself actually transmitted and received. This may provide a more complete picture of the accident/incident sequence than relying solely on recordings of communications captured at communications facilities on the ground. We are increasingly relying on data link communication technology to provide more advanced air traffic management operations that otherwise could not be provided with voice communications. Therefore, in order to capture all relevant communications associated with an accident or incident, it is necessary to record both voice communications and data link communication messages in crash-survivable memory onboard the aircraft. Retrievable data link communication messages in crash survivable memory gives investigating authorities information that contributes to post-accident or -incident reconstruction.

6 WHAT ARE THE RELATED FEDERAL AVIATION REGULATIONS?

6.1 Table 1 below lists the regulations in Title 14 of the Code of Federal Regulations (14 CFR) that apply to certification and approval of data link communication recording equipment.

Table 1. Table of Applicable 14 CFR Parts

Description	14 CFR Part 23	14 CFR Part 25	14 CFR Part 27	14 CFR Part 29
Subpart F-Equipment				
Function and installation	§ 23.1301	§ 25.1301	§ 27.1301	§ 29.1301
Equipment, systems, and installations	§ 23.1309	§ 25.1309	§ 27.1309	§ 29.1309
Cockpit Voice Recorders	§ 23.1457	§ 25.1457	§ 27.1457	§ 29.1457

Note: 14 CFR § 91.609, § 121.359, § 125.227, and § 135.151 are the applicable operating rules that specify what aircraft must record CPDLC messages and what CPDLC messages they must record. The FAA published a policy update and clarification to these rules in the Federal Register on March 2, 2015 (80 FR 11108). This has additional information on the definition of datalink communication equipment and on what aircraft must comply with these rules. The complete policy update and clarification is at Docket No. FAA-2015-0289, which you may view online at <https://www.federalregister.gov/articles/2015/03/02/2015-04158/policy-regarding-datalink-communications-recording-requirements>. Subject to the March 2, 2015 policy update and clarification, an operator must demonstrate compliance to these regulations. Furthermore, the FAA has published AC 120-70C and InFO 16004 to provide additional guidance on datalink recording requirements to operators. Applicants should consider the guidance in these documents when seeking design approval using this AC.

6.2 Table 2 below defines the terms “must” and “should” when used in this AC. If not following the recommended guidance in this AC, applicants will need to discuss alternative airworthiness approval methods meeting equivalent criteria in this AC.

Table 2. Definition of Terms

Terminology	Meaning	Functional Impact
Must	Indicates a mandatory requirement driven by regulation that is to be followed when using the guidance in this AC	Alternative means of compliance has to be accepted by the FAA
Should	Indicates a recommendation and not a requirement when using the guidance in this AC	Since this AC represents an accepted means of compliance, alternative methods to obtain a compliance finding will need to be discussed with the Aircraft Certification Office (ACO) in order to achieve a common performance level with the AC.

7 WHAT ARE THE MEANS OF COMPLIANCE TO THE REGULATIONS OF THIS AC?

You may satisfy the requirements of the regulations listed in Table 1 above by satisfactorily addressing the instructions contained in the following paragraphs.

7.1 EUROCAE document ED-93, *Minimum Aviation System Performance Specification for CNS/ATM Message Recording Systems*, Sections 2.2.1 and 2.2.2, Choice of Data to be Recorded Onboard the Aircraft. These sections identify crew communication recording requirements and recording points.

7.2 The DLR system must record the CPDLC messages for each data link type (i.e. Interop Designator) contained in AC 20-140C, or later approved revision, that is installed on the aircraft.

Note 1: CPDLC message set differs for each CPDLC system identified in AC 20-140C (or later).

Note 2: The system may also record messages supporting data link applications other than CPDLC (e.g., ADS-C), but this AC does not specify them as necessary for recording.

7.3 This AC utilizes Technical Standard Order (TSO) C177a, *Data Link Recorder Equipment*, or latest approved revision, to establish the proper equipment compliance criteria, except with one additional requirement:

The data link recorder equipment should not use the data compression allowance in EUROCAE document ED-112A, Section IV-2.1.2 "Recording technique". That is, it should not employ any data compression methods.

8 WHAT IS THE FAILURE CONDITION CLASSIFICATION?

Failure of the data link communication recording equipment is a minor failure condition. An applicant should develop the data link communication recording equipment to, at least, the design assurance level equal to this classification.

9 WHAT ARE THE MAINTENANCE PROGRAM REQUIREMENTS?

This AC does not define maintenance tasks related to the continued operation of a data link communication recording system. See AC 20-141B, *Airworthiness and Operational Approval of Digital Flight Data Recorder Systems*, for guidance on how to develop and obtain approval for a flight recorder maintenance program when CPDLC messages are recorded in a Flight Data Recorder (FDR) system. See AC 20-186, *Airworthiness and Operational Approval of Cockpit Voice Recorder Systems*, for guidance on how to develop and obtain approval for a flight recorder maintenance program when CPDLC messages are recorded in a combined CVR and FDR system.

10 ARE THERE ANY RELATED PUBLICATIONS I SHOULD LOOK AT?

- 10.1 AC 20-140C, *Guidelines for Design Approval of Aircraft Data Communication Systems*.
- 10.2 AC 20-141B, *Airworthiness and Operational Approval of Digital Flight Data Recorder Systems*.
- 10.3 AC 20-186, *Airworthiness and Operational Approval of Cockpit Voice Recorder Systems*.
- 10.4 AC 120-70C, *Operational Authorization Process for Use of Data Link Communication System*.
- 10.5 InFO 16004, *Datalink Communications (DLC) Recording Requirements -- Clarification*.
- 10.6 TSO-C177a, *Data Link Recorder Equipment*.
- 10.7 International Civil Aviation Organization (ICAO) *International Standards and Recommended Practices--Operation of Aircraft*, Annex 6, specify onboard recording requirements. These sections apply:
 - 10.7.1 Part I -- *International Commercial Air Transport -- Aeroplanes*, §§ 6.3.1.5 and 6.3.1.5.1, Recording requirements for commercial air transport.

- 10.7.2 Part II -- *International General Aviation -- Aeroplanes*, §§ 6.10.1.5, and 6.10.1.5.1, Recording requirements for general aviation.
- 10.7.3 Part III -- *International Operations -- Helicopters*, §§ 4.9.1.5, Recording requirements for helicopters.
- 10.8 EUROCAE document ED-93, *Minimum Aviation System Performance Specification for Communication, Navigation and Surveillance (CNS)/Air Traffic Management (ATM) Message Recording Systems*.
- 10.9 EUROCAE document ED-112A, *Minimum Operation Performance Specification for Crash Protected Airborne Recorder Systems*.

11 HOW CAN I GET THIS AND OTHER FAA PUBLICATIONS?

- 11.1 You can obtain ICAO documents by writing to ICAO Document Sales, 999 University, Montreal Quebec, Canada H3C 5H7. You may also contact the document sales office at (514) 954-8022 or visit the ICAO website at <http://www.icao.int/>.
- 11.2 You can order RTCA documents from RTCA Inc., 1150 18th Street NW, Suite 910, Washington, D.C. 20036-4001. Telephone (202) 833-9339, fax (202) 833-9434. You can also order through the RTCA Internet website at <http://www.rtca.org/>.
- 11.3 You can order EUROCAE documents from EUROCAE, 102 rue Étienne Dolet, 92240 Malakoff France. Telephone 33 (0) 1 4505 7188, fax 33 (0) 1 4505 7230. You can also order from the EUROCAE Internet website at <http://www.eurocae.net/>.
- 11.4 You can get copies of the 14 CFR parts referenced in this AC online at the U.S. Government Publishing Office (GPO) electronic CFR Internet website at <http://www.ecfr.gov/>.
- 11.4.1 You can get a copy of the March 2, 2015 policy update and clarification to the data link recording rules of Parts 91, 121, 125, and 135 (80 FR 11108) from the Federal Register website at <https://www.federalregister.gov/articles/2015/03/02/2015-04158/policy-regarding-datalink-communications-recording-requirements>.
- 11.5 You can obtain copies of Advisory Circulars (ACs) and Technical Standard Orders (TSOs) referenced in this AC online at FAA's Regulatory and Guidance Library (RGL) website at <http://rgl.faa.gov/>.
- 11.6 You can find a current list of Information for Operators (InFOs) referenced in this AC online at http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/info/all_infos/. At the site you will be able to view and download all referenced FAA InFOs.

Advisory Circular Feedback

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by (1) complete the form online at <https://ksn2.faa.gov/avs/dfs/Pages/Home.aspx> or (2) emailing this form to 9-AWA-AVS-AIR-DMO@faa.gov

Subject: AC 20-160A

Date: _____

Please check all appropriate line items:

An error (procedural or typographical) has been noted in paragraph _____ on page _____.

Recommend paragraph _____ on page _____ be changed as follows:

In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

Other comments:

I would like to discuss the above. Please contact me.

Submitted by: _____ Date: _____