



# Advisory Circular

U.S. Department  
of Transportation

**Federal Aviation  
Administration**

D R A F T

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**Subject:** ONBOARD RECORDING OF  
DATA LINK COMMUNICATION IN CRASH  
SURVIVABLE MEMORY

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**Date:**

**AC No:** 20-DLK (V-3)  
**Initiated by:** AIR-100

## 1. **PURPOSE.**

a. This advisory circular (AC) offers one way to achieve an acceptable level of performance for an aircraft data link communication recording system. 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 data link communication message sets for retrieval from crash-survivable memory.

b. This AC is not mandatory and does not constitute a regulation. In this AC, we describe one acceptable means to gain design approval, but it is not the only means. However, if you are seeking to gain FAA approval of your data link communication recording system by using the means described in this AC, you must follow it in its entirety.

2. **FOCUS.** In this AC, we focus on aircraft recording performance and logical recording point locations for storing data link communication information 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.

3. **WHY WE NEED CRASH SURVIVABLE MEMORY.** We increasingly rely on data link communication technology; yet one specific shortcoming of this technology is the lack of airborne recording of data link communication messages in crash-survivable memory. Retrievable data link communication information in crash survivable memory gives investigating authorities the tools for post-accident or -incident reconstruction.

4. **RELATED FEDERAL AVIATION REGULATIONS.** The regulations in Title 14 of the Code of Federal Regulations (14 CFR) applying to the certification and approval of data link communication recording equipment are listed in Figure 1 below.

**FIGURE 1.** Table of Applicable 14 CFR Parts

Description	14 CFR Part 23	14 CFR Part 25	14 CFR Part 27	14 CFR Part 29
<b>Subpart F—Equipment</b>				
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

**5. MEANS OF COMPLIANCE.** You may satisfy the requirements of the regulations listed in Figure 1 above by satisfactorily addressing the instructions contained in the following sections of EUROCAE document ED-93, Minimum Aviation System Performance Specification for CNS/ATM Message Recording Systems, dated November 1998.

**a.** EUROCAE document ED-93, Sections 2.3.2.1 and 2.3.2.2, Choice of Data to be Recorded Onboard the Aircraft. These sections identify crew communication recording requirements and recording points.

**b.** EUROCAE document ED-93, Appendix D.2, Controller-Pilot Data Link Communications (CPDLC). This appendix specifies the data message set identified as “mandatory” for recording.

**NOTE 1:** We use the term “mandatory” only within the context of your need to satisfactorily demonstrate the performance specifications of EUROCAE document ED-93. For the purpose of CPDLC, ED-93, Appendix D, defines “mandatory.”

**NOTE 2:** For the purposes of this AC, we consider the use of “CPDLC” to be defined by ICAO Document 4444, Procedures for Air Navigation Services/Air Traffic Management, Appendix 5, CPDLC Message Sets. When applicable, we also consider other proposed message sets that satisfy the Message Use/Intent column of the tables contained in ICAO Document 4444, Appendix 5, “mandatory” for recording.

**c.** EUROCAE document ED-93, Section 3.2.1, Digital Message Capacity/Duration. This section applies in its entirety *except* the second sentence which states “No erasure of the digital data shall be allowed.”

**NOTE:** 14 CFR §§ 91.609, 121.359, 125.227, and 135.151 allows bulk erasure of recorded information.

**d.** EUROCAE document ED-93, Section 3.2.3.2. Recorder Delay/System Applications. This section identifies the performance objective for minimum delay between aircraft data link communication applications and recorder input.

(1) For the purpose this AC, a data link *message* is the data link communication message content. Examples of a data link *event* may include system queues, content status, message display status, and message disposition status.

(2) Added recording delays greater than 250 milliseconds may accumulate under the conditions listed below:

(a) When multiple data link messages are received in a burst (less than 250 milliseconds between the end of a data link message and the start of the next message) on either the same or different air-ground sub-networks.

(b) When multiple data link events occur in a burst (less than 250 milliseconds between the end of one data link event and the start of the next.)

(c) When a data link event and message occur in a burst (less than 250 milliseconds between the end of one and the start of the next.)

**e.** EUROCAE document ED-93, Section 3.2.4, Voice/Data Synchronization. This section identifies the performance objective for synchronization of recorded voice and data link communication messages. The synchronization accuracy should be less than or equal to 1 second.

**f.** EUROCAE document ED-93, Section 3.2.6, Frequency of Recording. This section identifies the performance objective for applicable frequency of data link communication message recording.

**7. 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.

**8. MAINTENANCE PROGRAM.** Maintenance tasks related to the continued operation of a data link communication recording system are not defined in this AC. See AC 20-141, Airworthiness and Operational Approval of Digital Flight Data Recorder Systems, dated October 10, 1999, for guidance on how to develop and obtain approval for a flight recorder maintenance program.

**9. RELATED FAA PUBLICATIONS.**

**a.** AC 20-140, Guidelines for Design Approval of Aircraft Data Communication Systems, dated August 16, 1999.

**b.** AC 20-141, Airworthiness and Operational Approval of Digital Flight Data Recorder Systems, dated October 10, 1999.

**c.** AC 120-70, Initial Air Carrier Operational Approval for Use of Digital Communication Systems, dated February 17, 2000.

**d.** International Civil Aviation Organization (ICAO) International Standards and Recommended Practices--Operation of Aircraft, Annex 6, specify onboard recording requirements. These sections apply:

(1) Part I -- International Commercial Air Transport -- Aeroplanes, §§ 6.3.1.5 and 6.3.1.5.1, Amendment 26. Recording requirements for commercial air transport.

(2) Part II -- International General Aviation -- Aeroplanes, §§ 6.10.1.5, and 6.10.1.5.1 Amendment 19. Recording requirements for general aviation.

(3) Part III -- International Operations -- Helicopters, §§ 4.9.1.5 and Amendment 6. Recording requirements for helicopters.

**e.** ICAO Document 9705/third edition, Manual of Technical Provisions for the Aeronautical Telecommunication Network, dated April 19, 2002.

**f.** EUROCAE document ED-93, Minimum Aviation System Performance Specification for Communication, Navigation and Surveillance (CNS)/Air Traffic Management (ATM) Message Recording Systems, dated November 1998.

**g.** EUROCAE document ED-112, Minimum Operation Performance Specification for Crash Protected Airborne Recorder Systems, dated March 2003.

**h.** RTCA/DO-219, Minimum Operational Performance Standards (MOPS) for ATC Two-Way Data Link Communications, dated August 27, 1993.

**10. HOW TO GET REFERENCED DOCUMENTS.**

**a.** You can order ACs from: U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover MD 20785. You can also see ACs at the FAA website at [www.airweb.faa.gov/rgl](http://www.airweb.faa.gov/rgl).

- b.** 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 [www.icao.org/](http://www.icao.org/) .
  
- c.** You can examine copies of EUROCAE documents ED-93 and 112 at any FAA regional office, or buy them from: EUROCAE, 17 rue Hamelin, F-75783 PARIS CEDEX 16, France. You can also order copies on the Internet by using website address [www.eurocae.org/](http://www.eurocae.org/).
  
- d.** You can order RTCA documents from RTCA, Inc., 1828 L Street NW, Suite 805, Washington D.C. 20036; or online at <http://www.rtca.org/> .

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