

“DRAFT”



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for Use of Data Link Communication System

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This advisory circular (AC) applies to all operators conducting data link operations and presents various methods for operators of different data link systems to meet Federal Aviation Administration (FAA) standards. The AC introduces U.S. domestic Controller-Pilot Data Link Communication Departure Clearances (CPDLC-DCL) and the European LINK 2000+ program. This revision also incorporates an expanded description of event reporting and defines the roles and responsibilities during the authorization process. It provides operational approval information for operators conducting operations under Title 14 of the Code of Federal Regulations (14 CFR) parts 91, 91 subpart K (part 91K), 121, 125, 129, 133, 135, and 137. For complete airworthiness guidance for new aircraft and systems, refer to the current edition of AC 20-140, Guidelines for Design Approval of Aircraft Data Communications Systems Supporting Air Traffic Services (ATS). Authorizations to conduct data link operations approved under previous versions of AC 120-70 do not require further evaluation.

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1 PURPOSE. This advisory circular (AC) applies to all operators conducting data link operations and presents various methods for operators of different data link systems to meet Federal Aviation Administration (FAA) standards. The AC introduces U.S. domestic Controller-Pilot Data Link Communication Departure Clearances (CPDLC-DCL) and the European LINK 2000+ program. This revision also incorporates an expanded description of data link event reporting and defines the roles and responsibilities during the authorization process. It provides operational approval information for operators conducting operations under Title 14 of the Code of Federal Regulations (14 CFR) parts 91, 91 subpart K (part 91K), 121, 125, 129, 133, 135, and 137. For complete airworthiness guidance for new aircraft and systems, refer to the current edition of AC 20-140, Guidelines for Design Approval of Aircraft Data Communications Systems Supporting Air Traffic Services (ATS). Authorizations to conduct data link operations approved under previous versions of AC 120-70 do not require further evaluation.

1.1 Scope. AC 120-70C only incorporates FAA domestic data communications clearances (CPDLC-DCL), the European LINK 2000+ program, updated data link event reporting, the FAA operational authorization process, and editorial corrections. A complete revision of AC 120-70C into a 90-series AC will begin shortly after this AC is published.

2 APPLICABILITY. This AC applies to aircraft and operators operating under parts 91, 91K, 121, 125, 125M, 129, and 135. This AC describes the process for obtaining operational authorization for data link communication systems, acceptable methods for training and maintenance, and operational policies for use. In addition, it describes appropriate actions in the event of an air traffic control (ATC) data link communications event.

NOTE: Part 91 operators do not require operational authorization for CPDLC-DCL See paragraph 5.4.3 for additional guidance.

2.1 Exceptions. This AC does not address the use of data link communications for Aeronautical Operational Control (AOC) and certain specific ATS applications, such as the following:

- Pre-Departure Clearance (PDC),
- Digital Automatic Terminal Information Service (D-ATIS),
- Terminal Weather Information for Pilots (TWIP),
- Oceanic Clearance Delivery (OCD),
- Graphics/Text Weather Server (G/TWS), and
- Digital Delivery of Expected Taxi Clearance (DDTC).

NOTE: This AC is not applicable to Automatic Dependent Surveillance-Broadcast (ADS-B), which is not a data link system. It is a transponder-based 1090 megahertz (MHz) squitter which transmits

position information for surveillance only. The communication is line of sight on frequency 1090 MHz.

2.2 Compliance. The data link system should comply with the following:

- Applicable international Standards and Recommended Practices (SARP);
- Procedures for Air Navigation Service (PANS);
- International Civil Aviation Organization (ICAO) Regional Supplementary Procedures Amendment (Doc 7030);
- ICAO Annex 10, Aeronautical Telecommunications, Volume II to the Convention on International Civil Aviation; and
- RTCA DO-306, DO-306 Change 1 ED-122, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard).

NOTE: In addition, this AC is consistent with ICAO, Volume III, Part I, Digital Communication Systems, Chapter 3, Aeronautical Telecommunication Network (ATN).

3 CANCELLATION. AC 120-70B, Operational Authorization Process for Use of Data Link Communication System, dated August 24, 2010, is cancelled.

4 RELATED DOCUMENTS (current editions).

4.1 Title 14 CFR. The following 14 CFR parts are applicable to the communications systems and applications covered in this document:

- Parts 21, 23, 25, 27, 29, 43, 91, 91K, 121, 125, 129, and 135.

4.2 ACs. You can find ACs on the MyFAA employee Web site at <https://employees.faa.gov>. Operators and the public may find this information at http://www.faa.gov/regulations_policies/advisory_circulars.

- AC 20-140, Guidelines for Design Approval of Aircraft Data Link Communication Systems Supporting Air Traffic Services (ATS).
- AC 20-160, Onboard Recording of Controller Pilot Data Link Communication in Crash Survivable Memory.

4.3 ICAO Documents. Operators and the public may find this information at the ICAO Publications and Resources Web site, <http://www.icao.int/anb/safetymanagement/Documents.html>.

- Global Operational Data Link Document (GOLD). ICAO Global Guidelines for data link operations.
- Document 4444 (PANS/Air Traffic System Management (ATM)), Procedures for Air Navigation Services - Rules of the Air and Air Traffic Services.
- Annex 6, Operation of Aircraft.

- Annex 10 (SARPs), Volume III, Part 1, Data link Communications Systems.
- Annex 11, Air Traffic Services.
- Document 7030, Regional Supplementary Procedures Amendment.
- Document 9869, Manual on Required Communication Performance (RCP) First Edition, 2008.
- North Atlantic Document 007, North Atlantic Operations and Airspace Manual. This document is published on behalf of the North Atlantic Systems Planning Group by the European and North Atlantic Office of ICAO and includes data link material.
- North Atlantic Oceanic Errors Safety Bulletin (OESB).

4.4 RTCA. The following RTCA Documents (RTCA/DO) and European Organization for Civil Aviation Equipment (EUROCAE) documents are available from RTCA Inc., 1140 Connecticut Avenue, NW, Suite 1020, Washington, DC 20036:

- DO-258A/ED-100A, Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications, dated April 7, 2005.
- DO-264/ED-78A, Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications, dated December 14, 2000.
- DO-280B/ED-110B, Volume 1 & 2 Interoperability Requirements Standard for ATN Baseline 1 (INTEROP ATN B1), dated June 26, 2007.
- DO-290, Changes 1 and 2/ED-120 Changes 1 and 2, Safety and Performance Requirements Standard for Air Traffic Data Link Services in Continental Airspace (Continental SPR Standard), dated April 29, 2004.
- DO-305A/ED-154A, Future Air Navigation System 1/A Aeronautical Telecommunications Network Interoperability Standard, dated March 21, 2012.
- DO-306 Change 1/ED-122 Change 1, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard), dated March 17, 2011.
- EUROCAE ED-93, Minimum Aviation System Performance Standard for CNS/ATM Message Recording Systems-Amendment 1, dated November 23, 1998.

4.5 Other Sources.

- **FAA Oceanic Notices to Airmen (NOTAM) and State Aeronautical Information Publications (AIP).** Specific policy and procedures related to CPDLC and ADS operations in individual flight information regions (FIR) are published in International NOTAMs and in individual state AIPs.
- **FAA Pacific/Alaska Chart Supplements and North Atlantic Doc 001.** These publications currently contain policy and procedures for use of Satellite Voice (SATVOICE) and will be updated as needed.
- **FAA Asia Pacific Operational Authorization Information Package.** Shows area specific information and summarizes “lessons learned” in the Asia Pacific region.

5 BACKGROUND.

5.1 History. The original AC 120-70 was developed to address ATN, a very high frequency (VHF) data link (VDL) Mode 2 communication system. AC 120-70A was developed to include the addition of the Future Air Navigation System 1/A (FANS 1/A), an analog system communicating over the Aircraft Communications Addressing and Reporting System (ACARS) using a variety of subnetworks such as satellite, VDL Mode 0/A, VDL Mode 2, and High Frequency Data Link (HF DL). AC 120-70B was developed to provide updated guidance for both systems.

5.2 Data Link Implementation. Data link applications are being implemented in flight operations utilizing FANS 01/A(+) (which includes CPDLC and Automatic Dependent Surveillance-Contract (ADS-C)) and ATN (which includes CPDLC). Data link applications operate without any specific knowledge by the user as to whether a satellite, VHF (VDL M0/A or VDL M2), or HF DL subnetwork service is in use. However, these applications may be limited by the level of end-to-end data link service implementation in use (e.g., ACARS, FANS 1/A, or ARINC 622). This AC provides information for U.S. operators, aircraft and data link manufacturers, various inspectors, foreign air carriers operating in U.S. airspace, and other aviation organizations regarding a means acceptable to the FAA for the use of data link systems in ATS communications. This information is intended to facilitate the operational authorization of data link systems, promote timely and comprehensive program implementation, encourage development of standard practices for the application of data link techniques, and provide an appropriate response to special data link events.

5.3 LINK 2000+.

5.3.1 The LINK 2000+ program is the European Implementation of CPDLC using the ATN infrastructure and is the key element of the Single European Sky Concept. It was implemented in 2009 by Data Link Services Implementing Rule EC Reg. 29/2009.

5.3.2 Minimum equipage: ATN Baseline 1 (B1) and VDL Mode 2 radios.

5.3.3 CPDLC has been operational in European continental airspace since 2003, and LINK 2000+ implements and enhances three basic ATS services by automating routine tasks that currently take up to 50 percent of controllers’ time:

- ATC Communications Management – handles repetitive frequency changes (transfer of communications).
- ATC Clearances – provides standard clearances (e.g., climb to flight level (FL) 350).
- ATC Microphone Check – enables communication in the case of blocked voice frequencies.

NOTE: LINK 2000+ is only operational in continental Europe and not in the U.S. National Airspace System.

5.4 Departure Clearance (CPDLC-DCL).

5.4.1 Departure Clearance (CPDLC-DCL) is the initial phase of U.S. domestic airspace implementation of data communication and is limited to tower services. CPDLC-DCL provides automated assistance for requesting and delivering initial and revised departure clearances using CPDLC. The supported information includes flight plan route, climb via and/or initial/requested altitude, beacon code assignment, and departure frequency. An unlimited number of clearances can be sent and, if aircraft systems are capable, can be “push-to-load” directly into the flight management system. The information is exchanged using CPDLC messages from those already used in FANS-equipped aircraft. The CPDLC-DCL service, when available, is designed for use in surface operations and replaces PDC for properly-equipped aircraft.

NOTE: CPDLC-DCL is different than current European and Asian DCL operations. European and Asian DCL use communication via ARINC 623 ACARS/EUROCAE ED-85A, not FANS/CPDLC.

5.4.2 Minimum equipage: FANS 1/A and VDL Mode 0/A.

5.4.3 All 14 CFR parts (except part 91) require authorization to use this service. Part 91 operators do not require a letter of authorization (LOA) to use this service but must have received acceptable training on the CPDLC-DCL ground system and how it interacts with their specific avionics equipment, and have the preferred Original Equipment Manufacturer (OEM) annotation in their Aircraft Flight Manual (AFM). An example of preferred annotation is shown in Table C-3.

6 RCP CONCEPT.

6.1 The RCP Concept. The concept of RCP relates to the communications component of the communication, navigation, and surveillance/air traffic system management (CNS/ATM) framework and complements Required Navigation Performance (RNP) and Required Surveillance Performance (RSP). In general, the requirements for operation in a defined airspace or performance of a defined procedure include elements of CNS functionality and performance, as well as ATM functionality and performance. The guidance provided

in this AC regarding RCP is consistent with ICAO Doc 9869, Manual on RCP. RCP is a statement of the performance requirements for operational communication in support of specific ATM functions. The RCP is determined by cognizant authorities in consideration of air traffic operations, target levels of safety, separation assurance, Flight Standards Service (AFS), and functional hazard analysis associated with the airspace, operation, or procedure. Thus, RCP is operationally derived and not based on any specific technology, or combination of technologies, that may be utilized for communications. The performance of a communications is generally accepted as comprising communication transaction time, integrity, continuity, and availability.

6.2 RCP Type. An RCP type is a label (e.g., RCP 240) that represents the values assigned to RCP parameters for communication transaction time, continuity, availability, and integrity.

6.2.1 Communication Transaction Time. The maximum time for the completion of the operational communication transaction, after which the initiator should revert to an alternative procedure.

6.2.2 Continuity. The probability that an operational communication transaction can be completed within the communication transaction time.

6.2.3 Availability. The probability that an operational communication transaction can be initiated when needed.

6.2.4 Integrity. The probability of one or more undetected errors in a completed communication transaction.

6.3 RCP Type Allocation. RCP type allocation is the process of apportioning the various RCP type values to the various parts of the system. The results of this process are RCP type allocations that are used to:

- Assess the viability of different technologies to meeting operational requirements;
- Approve the provision of ATS supported by communication systems;
- Determine when to initiate contingency procedures;
- Design, implement, and qualify communication services;
- Design, implement, qualify, and approve aircraft type designs;
- Approve aircraft operators for RCP operations when required; and
- Operationally monitor, detect, and resolve noncompliant performance.

6.4 Performance-Based Communications. Performance-based communications is based on one or more RCP type(s) and their allocations, and any other functional and performance criteria for the intended operation, such as:

- Specific message set or phraseology and transaction types;
- Interactive capability of voice communication;

- Air-ground integration capability of data communication;
- Interoperability criteria for a data link system, including its subnetworks; and
- Procedures for noncompliant performance and contingency.

6.5 RCP Specifications. An RCP specification provides the criteria for a particular RCP type, its allocations, and any other specific criteria. RCP specifications can be found in international standards and guidance material, such as RTCA DO-306/ED-122 as augmented by regional documentation.

6.6 Actual Communications Performance (ACP). ACP is the dynamic assessment of the actual operational performance of a communication system, with human performance and technical performance included in the assessment. Human performance considers such factors as training, procedures, and Human

6.6.1 Initially, for aircraft type design approval and ATS provider approval, the expected communication performance is determined based on validating any assumptions and demonstrating with representative elements of the complete system that the aircraft’s or ATS unit’s actual performance complies with appropriate allocations provided in the RCP specification.

6.6.2 The results of these activities are provided as evidence of compliance, which is used to qualify for the different types of approvals.

7 AUTHORIZATION TO USE DATA LINK COMMUNICATIONS IN FLIGHT OPERATIONS.

7.1 General. Installation of a data link communication system requires FAA design approval of changes to the aircraft’s type design by amending the type certificate (TC) or issuing a Supplemental Type Certificate (STC). However, approval to install a TC’d or STC’d data link communications system does not constitute authorization to use the system. Prior to using the system, the operator must request a revision to its operations specifications (OpSpecs) or an LOA to ensure that the system is used in accordance with international standards and requirements and in a manner that is acceptable to the FAA. A revision to the OpSpecs includes specific authorizations, training and maintenance programs, manuals, operational procedures, minimum equipment lists (MEL), and other such areas necessary for safe and effective use of data link communications. In addition, the service must be capable of meeting international standards for a specific route. Some RCP specifications are now in place and may be implemented regionally for specific airspaces and routes. Operators intending to operate in these airspaces or routes must ensure their aircraft and operations, procedures, training, and maintenance comply with the applicable RCP specification(s) to obtain operational authorization to use the data link communication system.

7.1.1 Responsibilities of Various FAA Offices Regarding Data Link Communications. FAA Aircraft Certification Offices (ACO) approve changes to a type design or issuance of STCs. FAA Aircraft Evaluation Groups (AEG) formulate operational criteria for

specific aircraft types related to training, checking, maintenance, Master Minimum Equipment Lists (MMEL), or other operational issues, as necessary. The FAA uses information developed by AEGs to review a particular operator’s programs. Certificate-holding district offices (CHDO) or Flight Standards District Offices (FSDO) approve particular OpSpecs, LOAs, operators’ training, maintenance programs, operational procedures, and MELs, if they are consistent with criteria specified in this AC, Aeronautical Information Manuals (AIM), MMELs, Flight Standardization Board (FSB) reports, Maintenance Review Board (MRB) reports, and policy guidance from the Air Transportation Division (AFS-200), Aircraft Maintenance Division (AFS-300), Flight Technologies and Procedures Division (AFS-400), and General Aviation and Commercial Division (AFS-800).

- 7.2 Design Approval of Aircraft Data Communications Systems.** Guidelines of design approval of aircraft data link communications and applications primarily used for ATS are provided in FAA AC 20-140 or equivalent. Evidence should be submitted that the aircraft equipment has a type design approval per AC 20-140. The evidence should include the Rotorcraft/Aircraft Flight Manual (RFM) wording to indicate the aircraft and subnetwork designators that define a specific data link capability and intended use for that aircraft type, per Appendix E, Table 1. This evidence is used to determine the operator’s eligibility for their specific operation.
- 7.3 Operational Authorization.** Criteria for data link operational authorization are determined by the communication requirements specified for the intended operation per Appendix E, Table 1. Operations that are not defined in Table 1 may require special criteria. When the operator establishes its contracts with the Communication Service Providers (CSP), it is imperative that they include the required criteria for the different operations such as RCP 240 and RCP 400. When the operator configures its aircraft equipage that affects performance or capability, maintenance procedures should also be in place to ensure the configuration change does not affect the intended operations.
- 7.3.1 Data Link Communications Authorization Criteria.** Operational authorizations are based on criteria in this AC or by reference to industry standards as per Table 1 in Appendix E, and may also include criteria outlined in training, maintenance, MMEL, or other operationally related criteria formulated by AEGs. If criteria for training or checking are other than as specified in this AC, the criteria may be found in FSB reports applicable to a particular aircraft type. Provisions for dispatch with inoperative equipment are specified by the MMEL for each aircraft type. Maintenance requirements are identified by this AC, unless otherwise described by a MRB report for a specific aircraft type, or in FAA-approved maintenance instructions identified in conjunction with an STC or manufacturer’s Service Bulletin (SB).
- 7.3.2 Data Link Communications Authorization Methods.** FAA AFS provides operational approval of data link communications training programs, checklists, operations manuals, training manuals, maintenance programs, MELs, and other pertinent documents or document revisions applicable to the particular operator. Operators’ data link communication programs are usually approved for each specific aircraft type. However,

programs common to one or more types may be approved if data link communications program elements are common to different aircraft types.

7.3.3 Data Link Communications Authorization Procedures. Operational authorization to use data link communications is provided by an FAA inspector. Operators should make early contact with their respective principal operations inspectors (POI) to permit timely FAA response. Usually such contact is initiated at the time preparations are being made for data link communications system selection or purchase. An outline of roles and responsibilities during this process is shown in Appendix E.

7.3.3.1 Installations, training, maintenance programs, MELs, and other data link communications program elements are reviewed and approved by the FAA.

7.3.3.2 Prior to issuance of an LOA or OpSpec, or the addition of an area, route, or procedure to an existing OpSpec, the operator should demonstrate that the aircraft data link system is compatible with that of the systems being used by the ATC facility when communicating with the chosen service provider(s) and has been shown to meet any performance specifications for the intended airspace or route. The results of prior interoperability demonstrations performed as part of a design approval may suffice. Under international standards, the service provider(s) and air/ground data link communications subnetworks used in the performance demonstrations for design approval must be operationally equivalent to those in the proposed operating approval. Operational equivalence is determined by an assessment against the SPR and INTEROP standards, and/or RCP specifications, per Table 1 in Appendix E which may be demonstrated in an operational flight check. See Appendix D for the application checklist.

7.3.3.3 Following determination of aircraft eligibility to use data link services, the operator should conduct an interoperability test to demonstrate that the specific combination of data link communication system elements perform as intended (e.g., flight management system (FMS) ACARS interface, printers, CSP, and air traffic facilities along the intended route of flight). The principal avionics inspector (PAI) will review the test results for conformance with international standards and FAA policy and procedures.

8 FLIGHTCREW QUALIFICATION FOR USE OF DATA LINK COMMUNICATIONS.

8.1 General. Parts 91, 91K, 121, 125, 125M, or 135.

8.1.1 Data Link Communications Qualification Issues and Objectives. Separate qualification issues and training should be addressed depending on the system being used by the air carrier. Air carriers should address the following issues and objectives to ensure appropriate flightcrew data link communications qualification:

- Provide necessary flightcrew knowledge of data link communication concepts, systems, RCP, and procedures (data link communications academic training).
- Develop necessary flightcrew knowledge and skills to properly respond to data link communications clearances or advisories (data link and RCP communication procedures training). Knowledge of applicable RCP types and their performance requirements should be part of the training curriculum.
- Assess each pilot's ability to properly use data link communications (data link communications initial evaluation).
- Identify human factor issues specific to flightcrew operation and interaction with the communication software, hardware, and operating environment (e.g., head-down time, situational awareness, or loss of party-line information and response time in the RCP specification).
- Maintain appropriate data link communication knowledge and skills, which may include data link communications recurrent training.

8.1.2 Data Link Communications Training. Flightcrew training for first-time use of data link services should be included in initial, transition, upgrade, recurrent, differences, or stand-alone qualification curriculums. Data link communications training could be included in specific aircraft qualification programs during initial, transition, upgrade, or differences training (e.g., during MD-11 to Boeing 747-400 transition); or operators could conduct data link communications training in conjunction with general training (e.g., during “new hire” indoctrination or Line-Oriented Flight Training (LOFT)), or recurrent proficiency checks and tests. Data link communication training programs may also be developed as separate training curriculums (e.g., by completion of a standardized curriculum covering the general use of data link services at an operator’s training facility or at designated crew bases).

8.1.3 Credit for Use of Other Training. Operators may receive credit for existing data link communications trainings that are already approved in a different application. For example, an operator may receive credit for training based on previous use of data link services, such as on different routes, for a different type of operation, or (except for part 121 or 135) training conducted by another operator, training center, or manufacturer. The POI will determine whether and how much credit an operator should receive, considering whether the training is used in another FAA-approved application and whether the operator has demonstrated that the training is relevant to the new application. AFS-400, the National Simulator Project (NSP), or the assigned AEG may assist the POI in determining the suitability of proposed data link training for a particular operator’s procedures and aircraft capability.

- 8.2 Data Link Communications Academic Training.** The following subjects should be addressed in an approved curriculum of data link communications academic training during the initial introduction of a crewmember to data link communication systems. For subsequent training, only the new, revised, or emphasized items need be addressed.
- 8.2.1 General Concepts of Data Link Communications Operation.** Academic training should cover, in general terms, data link communications system theory to the extent appropriate to ensure proper operational use. Flightcrews should understand basic concepts of operations involving data link services, nominal and unacceptable performance, normal and non-normal use, and other limitations.
- 8.2.2 Level of Capability Provided by Data Link Communications and Expected Flightcrew Response.** Academic training should explain the normal expected pilot response to data link messages, including acknowledgment, acceptance, rejection, or cancellation of a data link message. Operating in the 30 nautical miles (NM) separation standard requires Global Navigation Satellite System (GNSS) with RNP-4 operational authorization. 30 NM lateral and longitudinal separations and 50 NM longitudinal separation requires Direct Controller Pilot Communications (DCPC), such as CPDLC and ADS-C. For operational implementation of reduced distance-based longitudinal separation, the airspace may require that the data communication system complies with RCP 240 and Required Surveillance Performance 180 (RSP 180) or other equivalent means. More information on the criteria for data link communication systems supporting reduced separations can be found in RTCA DO-306/ED-122.
- 8.2.3 Data Link Communications Language, Terms and System Information.** Flightcrews should be familiar with data link message sets, abbreviations, conventions, contractions, terms, message addressing, facility, and capability depiction on charts or in manuals, and terminology associated with applications (e.g., CPDLC and ADS-C reporting contracts).
- 8.2.4 ATS Communication, Coordination, and Credits for Use of Data Link Communications.** Crews and dispatchers should be advised of proper flight plan classifications to use and any ATS separation criteria, procedures, or MEL credits that are based on data link communications use. Training should include procedures for transitioning to voice communication and other contingency procedures related to the operation in the event of abnormal behavior of the data link services. This would include any necessary coordination with ATC related to or following a special data link exceptional event. Ensure an acceptable transition to a new type of operation, such as procedures related to the transition to a different separation standard when data link services fail.
- 8.2.5 Data Link Communications Equipment Components, Controls, Displays, Auto Alerts, and Annunciations.** Procedural training should include discussion of operations, terminology, symbology, optional controls, and display features. This training should also include any items particular to an air carrier’s implementation or the uniqueness of its aircraft capability and/or procedures. Applicable message sets, expected transmission times, failure annunciations, constraints, and limitations should be addressed.

8.2.6 Interfaces and Compatibility with other Aircraft Systems. Training should include the management of any applicable air/ground data link, including VHF data link, satellite communications (SATCOM) data link, and high frequency (HF) data link. This training should also address voice integration with other cockpit systems, FMS inputs to data link, and Electronic Flight Instrument Systems (EFIS) interfaces, including any items particular to an air carrier's implementation or uniqueness of its system. The priority selection of the media software by the operator needs to be addressed and trained so that the proper selection is made by maintenance and crews report any related performance degradation resulting from media selection. The priority for ATS data link is VHF (Mode 0/A or Mode 2), SATCOM data link (Inmarsat or Iridium), and HF data link. Flightcrew procedures should be established for crews to report to ATC when media switching causes system performance to degrade below that which is required for the intended operation. For example, excessive VHF/SATCOM switching and SATCOM/HFDL switching can lead to unacceptable performance, (e.g., RCP 240, required for the airspace or route). The priority for ATS data link is VHF, SATCOM data link, and last HF data link.

8.2.7 Manual Information. Provisions should be addressed, including information on data link communication modes of operation, normal and non-normal flightcrew operating procedures, response to failure annunciations, and any AFM limitations. Aircraft with a statement of compliance with the criteria in this AC in their AFM, AFM Supplement, pilot operating handbook (POH), or the operating manual for their avionics meet the performance and functional requirements of this AC. An example of preferred annotation is shown in Table C-3.

8.2.8 MMEL Provisions for Systems Related to CPDLC/ADS-C Operations. Flightcrews and dispatch and maintenance personnel must be familiar with the MEL requirements. For flights that intend to use data link, operators will adopt provisions for certain specific systems to be operational at dispatch, when required for the intended operation. The MEL/dispatch deviation guide (DDG) must be amended to highlight the effect that loss of each associated system/subsystem has on data link operational capability.

8.2.8.1 Equipment required in current FANS 1/A-capable models is as follows:

1. VHF, SATCOM, or HFDL radios, as appropriate;
2. ACARS management unit (MU)/certificate management unit (CMU);
3. Flight management computer (FMC) integration; and
4. Printer (if company procedures require its use).

8.2.8.2 Equipment required in current ATN B1 capable models is as follows:

1. VHF, SATCOM, or HFDL radios, as appropriate;
2. ACARS MU/CMU; and
3. Printer (if company procedures require its use).

8.2.8.3 Maintenance Training. Operators are reminded of basic provisions contained in ICAO Annex 6, Paragraph 8.3: “An operator shall ensure that all maintenance personnel are instructed regarding the maintenance methods to be employed, in particular when new or unfamiliar equipment is introduced into service.”

8.2.8.4 Maintenance Training Requirements. Operators unsure of required maintenance procedures for data link-related equipment should contact their aircraft manufacturer field service representatives.

8.2.8.5 Configuration Control. Operators should maintain their aircraft in an avionics configuration which has been shown to provide acceptable data link performance. Data link service providers will provide operators with information on poor performance by individual aircraft. Operators are requested to provide the FANS Interoperability Team (FIT) with information on their current aircraft avionics configurations and provide updates when the configuration changes.

8.2.9 Pilot and Dispatcher Training. Data communication operations have shown that system performance is extremely sensitive to the use of correct procedures. It is essential, therefore, that crews be properly trained prior to their using the CPDLC and/or ADS-C functions. Deterioration in system performance as a result of improper use of procedures can lead to noncompliance of RCP specifications and delay in realization of expected benefits of the functionality.

8.2.9.1 Pilot Training. An operator shall establish and maintain a ground and flight training program, approved by the FAA, which ensures that all flightcrew members are adequately trained to perform their assigned duties.

8.2.9.2 Dispatcher Training. A flight operations officer/flight dispatcher should not be assigned to duty unless the officer/dispatcher has demonstrated to the operator knowledge of the communication equipment used in the airplanes.

8.2.9.3 General Provision for ICAO Annex 6 Training. Operators are reminded of basic provisions contained in ICAO Annex 6.

8.2.9.4 Flightcrew Response. Appropriate pilot response to data link, RCP specification, and other such issues.

8.2.9.5 Special Data Link Event Reports. Operators should follow the GOLD problem reporting procedures, which include notifying the Central and/or Regional Monitoring Agency for the region where the problem occurred (e.g., Data Link Monitoring Agency (DLMA) for North Atlantic Tracks (NAT) operations). This information can be found in GOLD Appendix D.3 and GOLD Appendix E. Operators should also send a data link non-normal event report to their International Field Office (IFO), CHDO, certificate management office (CMO), or FSDO as applicable. An example can be found in Appendix A.

8.2.9.6 Data Link Malfunction or Irregularity Reports. Data link malfunction or system irregularity reporting procedures as used by aircrews, if not otherwise addressed by routine maintenance procedures of that operator.

8.2.9.7 Human Factors. Flightcrew human factors are issues specific to the operating environment and operation of the installed communication system.

8.3 Data Link Communications Operational Use Training. In addition to the academic training described in paragraph 8.2, appropriate operational use training (e.g., to ensure use of proper procedures and response to data link advisories) should also be given. Data link use training should expose the pilot to the typical messages expected.

8.3.1 Operational use training should include the following:

- Receiving and interpreting messages;
- Accepting, rejecting, or canceling messages;
- Storing and retrieving messages;
- Loading messages into appropriate controls/displays for use (e.g., FMS or FGCS) formulating and sending messages;
- Loading message requests from the FMS (e.g., flight plan waypoints into data link for transmission if applicable);
- Managing the communications systems;
- Establishing and terminating system operation;
- Switching use of radio frequency (RF) media (if this is a crew-controllable feature); and
- Reestablishing system operation after loss of network log-on.

8.3.2 Training programs should cover the proper use of data link communication controls, procedures, and limitations. Correct assessment must be done on displays, aural advisories, annunciations, timely and correct responses to data link communication failures, and appropriate interaction with ATC following data link messages that are not acceptable. Recognition of data link communications system failures and data link issues unique to that air carrier or operator should be part of the curriculum. Such training may be conducted using data link communication-equipped flight simulation training devices (FSTD) or by using suitable computer-based instruction (CBI). Criteria for programs

intending to address proper data link communications through the use of FSTDs are listed in paragraph 8.3. Criteria for programs intending to address proper data link communications use through CBI (and not using approved FSTDs or programs addressing data link communications that use approved FSTD programs based on use of FAA-approved FSTDs) should realistically depict relevant aspects of data link communication procedures, clearances, and pilot responses. This may be accomplished using one or a combination of training methods described in paragraph 8.2.9. Any FSTD used should have the characteristics described in paragraph 8.13.

8.3.3 Data link communications programs may be approved which do not require using approved FSTDs if the proposed program meets certain criteria as described below. These programs are based on CBI adequately depicting data link communications procedures, clearances, desired pilot responses, and resulting crew interactions with aircraft FMSs and/or CMUs. Such programs should include the issues identified in paragraph 8.3, and be consistent with the following criteria:

- Accepted FAA and industry guidelines.
- There should be no significant adverse training experience related to the particular data link communications system(s).
- Differences from or compatibility with other data link communications systems (digital versus analog), that use different presentation methods, language, abbreviations, etc., should be considered in the design to ensure minimum adverse human factor difficulties.
- The program should realistically depict data link communications scenarios.
- The student should be made aware of the normal delivery delays to be expected.
- Scenarios should demonstrate correct indications for messages, display annunciations, and aural alerts, and require proper pilot responses.

8.4 Training Center Approval. Training centers may conduct data link communication training for an operator if accepted by the POI. The POI will consider the following factors:

- Provisions of paragraphs 8.2 and 8.3 are shown to be met, or
- Equivalence to a previously accepted program can be established. In this instance, circumstances, assumptions, and conditions for the program's use should also be equivalent to those applicable to the previously accepted program.

8.5 Initial Evaluation of Data Link Communications Knowledge and Procedures.

Individual crewmember data link communications knowledge and procedures should be evaluated prior to data link communications use. Acceptable means of initial assessment include:

8.5.1 Evaluation by an authorized instructor or check airman using an FSTD capable of depicting data link communication exchanges.

8.5.2 Evaluation by an authorized instructor or check airman during line operations or training.

8.5.3 Computer-based testing in which data link communication scenarios and advisories are depicted and records acceptable pilot performance.

8.5.4 Other alternate methods acceptable to the Administrator. Alternate methods should demonstrate the equivalent effectiveness of the methods in paragraphs 8.5.1 through 8.5.3.

8.6 Data Link Communications Recurrent Training. Data link communications training should be integrated as other established training programs and conducted on a recurrent basis. Recurrent training for data link communications should incorporate the recommendations of paragraph 8.3 and address any significant issues identified by line operations, system changes, procedural changes, or unique characteristics.

8.7 Data Link Communications Recurrent Evaluation. Recurrent data link communications checking should be incorporated as necessary, as an element of routine proficiency training (PT) or proficiency checks.

8.8 Data Link Communications Currency (Recency of Experience). Unless otherwise required in an OpSpec or LOA, once crews have completed initial data link communications training and as long as recurrent training is accomplished in accordance with paragraph 8.7 the certificate holder will not be obligated to develop additional currency requirements.

8.9 Line Checks and Route Checks. When data link communications-equipped aircraft are used during line or route checks, check airmen should routinely incorporate proper data link communications use as a discussion item.

8.10 Line-Oriented Flight Training (LOFT). LOFT using full-flight simulators (FFS) equipped with data link communications should be enhanced by interaction with data link communications. In addition, LOFT should consider proper crew use of data link along with other communication methods (e.g., SATCOM voice, VHF voice, or HF voice).

8.11 Crew Resource Management (CRM). CRM training should address effective teamwork in responding to data link exchanges.

8.12 Data Link Communications Academic Training Methods. Appropriate methods may be suited to each operator’s program. No special methods related to academic training for data link communications are identified. Typically, these are a combination of ground

instruction, manual information, flightcrew bulletins, and other such means as appropriate to address academic topics specified by paragraph 8.2.

8.13 Characteristics of Simulated Data Link Communications Systems for Training. Examples include data link communications in FSTDs.

8.13.1 Acceptable Characteristics. FSTDs should have certain characteristics to be effective. This is due to the interactive nature of data link communications, the variety of exchange scenarios possible, the immediate and standardized pilot response required, and the correct display interpretation that is necessary. Thus, FSTDs used for data link communications training should have the following characteristics:

- The ability to functionally represent data link communication displays, controls, indications, and annunciations.
- The ability to depict selected message traffic exchange scenarios, including data link communications displays and audio advisories.
- The ability to show proper data link communications reaction to depicted scenarios and advisories, crew or ATC response errors, or other incidents.
- The ability to interactively respond to pilot inputs regarding data link communication advisories, including responses to failures or abnormal situations.

8.13.2 FSTD and Data Link Communications System Fidelity. For a particular data link communication system, training may be accomplished in FSTDs that represent the specific aircraft, or an aircraft with similar characteristics. For the purposes of data link communications training, FSTDs may use simplified algorithms or abbreviated message set capability. Data link communication displays do not have to be identical, but should be functionally equivalent to the air carrier operator's specific aircraft in use.

8.13.3 FSTD Approval. Level 5 and higher FSTDs are qualified by the NSP and approved for use by the POI or Training Center Program Manager (TCPM). Any one or combination of the following FSTDs that meet characteristics of paragraph 8.13.1 above, may be used:

- Level A through D FFS,
- Level 4 through 7 flight training devices (FTD), or
- Dedicated data link communications training devices acceptable to the FAA, suitable for data link communications training.

NOTE: FSTD levels are defined by 14 CFR part 60.

9 OTHER OPERATIONAL ISSUES.

9.1 Manuals and Other Publications. Airplane flight, operating, maintenance, general policy, or other manuals, publications, or written materials (e.g., operating bulletins) that may relate to data link communications use must be appropriately amended to describe data link communications equipment, procedures, and operational policies according to the appropriate guidance material in this AC.

9.2 MMEL/MEL. Operators formulate necessary data link communications revisions to their MEL(s) for each particular fleet (e.g., Boeing 777 or 747-400). Title 14 CFR requires MEL revisions to be consistent with the FAA’s MMEL established for each aircraft type. A summary of the process for addressing the necessary changes to MEL items, as well as examples of MMEL and acceptable MEL provisions for data link communications, is provided in Appendix B.

9.3 Aircraft with Data Link Communications System Differences. Operators having aircraft with data link communication systems differences in displays, controls, or procedures, or operators involved with interchange operations, must account for those data link communications systems differences. This is accomplished as part of approved differences training in accordance with part 121 or 135, or as otherwise specified in applicable FAA FSB reports concerning crew qualification pertaining to a particular airplane type.

9.4 Issues Unique to a Particular Operator. Operators should address any data link communications issues that may be unique to their particular route environment, aircraft, procedures, or data link communication displays and control features. Examples include the following:

9.4.1 Examples of Route Environment Issues. Operators should describe any peculiarities associated with a particular route that may involve either end-user application issues or communications performance issues. For example, on North Atlantic routes, it is necessary for data link oceanic clearance message verification to include the track message serial number in the response. A particular route may be subject to propagation disturbances (e.g., with HF radio or HF data link at particular locations, times of day, seasons, or sunspot cycles).

9.4.2 Example of a Procedural Issue. Operators should describe any data link precautions that may be appropriate when operating in states where data link communications policies are uncertain. As an example, certain modes of direct CPDLC may not be supported in certain States. In those cases, carriers should conform to the laws and regulations that govern the airspace being used and use only authorized communications equipment and methods. This guidance should be reflected in company flight operations manuals.

9.4.3 Example of a Unique Data Link Communications System Issue. Operators should describe any differences in particular data link communications systems, or their versions, that may have operational impact.

10 MAINTENANCE.

10.1 General. Maintenance procedures for data link communications are approved or accepted as part of an operator’s initial maintenance manual approval or as a revision to that manual. To obtain FAA authorization, an operator must demonstrate that its data link communications maintenance procedures are consistent with the data link

communications systems manufacturer’s maintenance procedures and/or aircraft manufacturer’s maintenance procedures for data link communications.

- 10.2 Maintenance Training.** Operators should provide adequate data link communication maintenance training to ensure that their maintenance personnel or contract maintenance personnel at facilities not staffed by the operator are able to properly implement data link communications-related maintenance programs. This includes but is not limited to installation, modification, correction of reported system discrepancies, and use of test equipment, procedures, MEL relief, and return to service authorizations. The training procedures should address testing data link communications on the ground in such a way that correctly evaluates data link communications functions while not introducing hazards with respect to simulated message traffic with an air traffic facility.
- 10.3 Data Link Communications System Software Updates.** Operators should assure that appropriate data link communication software updates are incorporated when necessary and that both air and ground systems are able to identify and properly respond to the installed level of data link communication capability.
- 10.4 Data Link Communications Return to Service Policies.** Data link communications return to service policies should be established to ensure proper data link communication functions when an aircraft is returned to service after a data link communication failure or maintenance action.

11 DATA LINK COMMUNICATIONS OPERATIONAL USE.

- 11.1 General.** Operationally, those skills addressed and the guidance provided in paragraph 8 should be followed and implemented by each operator electing to use data link communications.
- 11.2 Pilot Responsibilities.** Data link communications are intended to serve as either a primary or supplementary communication means as designated for the operations being conducted. For data link communications to work as designed, prompt and correct initiation response to data link advisories is important. Flightcrews using data link communications should respond in accordance with the following guidelines:
- Prompt initiation of messages where needed.
 - Prompt response to messages where appropriate (e.g., RCP 240 and 60-second Pilot Operational Response Time (PORT) allocation).
 - Appropriate crew coordination so that each crewmember receives pertinent information needed.
 - Appropriate retention of messages (archive) requiring later action (such as printer copies of oceanic clearances).
 - Appropriate resolution of message uncertainty.

- Appropriate use of data link and voice, respectively, where circumstances or operations dictate (such as voice for backup or clarification of non-normal situations).
- If an ATC data link clearance contradicts a voice clearance, comply with the voice clearance and query the controller.

11.3 Data Link Communications Good Operating Practices. The following data link communications good operating practices have been identified:

11.3.1 To preclude unnecessary communication and possible interference with ground facilities, data link communications should be used only in conjunction with facilities specified for the route or procedure to be flown. An example would be as follows: data link communications with other than designated ground facilities should be accomplished only as necessary to support flight plan or flight operations requirements.

11.3.2 Free text data link messages should be avoided. If it is necessary to send a free text message, write it in English and use standard aeronautical terminology and accepted abbreviations.

11.3.3 When appropriate, verify data link communication functions prior to departure.

11.4 Operator Responsibilities. Operators have the following general responsibilities regarding data link communications:

11.4.1 Verify data link communications functionality for each environment to be used and when new or modified components or software are introduced.

11.4.2 Assure followup and evaluation of exceptional data link events.

11.4.3 Periodically assess data link communications training, checking, and maintenance programs to ensure their correctness, pertinence, timeliness, and effectiveness.

11.5 ATC Responsibilities. The operator can expect ATC to adhere to the following procedures.

11.5.1 Ensure that controllers do not knowingly issue data link instructions that are contrary to voice instructions when data link is being used.

11.5.2 Be aware of pertinent data link communication program changes.

11.5.3 Train ATC specialists about data link expected flightcrew responses to data link advisories, and permit familiarization flights for specialists on data-link-equipped aircraft to the extent possible.

11.5.4 When requested by the flightcrew, provide clarification or confirmation of data link messages and assist in returning to the assigned clearance, if appropriate. Issue additional clearance instructions when necessary.

11.5.5 Advise pertinent FAA offices via data link communications questionnaires about airspace or airports where data link communication problems occur. This facilitates initiation of corrective actions related to data link communication enhancements, procedures, and airspace adjustments.

11.5.6 Advise FAA of other hazardous conditions, situations, or events which may be related to data link communications.

12 DATA LINK EVENT REPORTING.

12.1 General. Operators and manufacturers are encouraged to develop procedures to ensure effective identification, tracking, and followup of data-link-related events. Such procedures should focus on providing useful information to:

- Properly assess the importance of data link events.
- Follow up on information related to specific data link events as necessary.
- Keep the industry and FAA informed on data link performance in the National Airspace System (NAS) and international operations.

12.2 Pilot Reports.

12.2.1 Data-Link-Specific Reports. Pilots should make the following reports for unusual data link events, as necessary:

12.2.1.1 Upon query from ATC, or after an inadvertent deviation from an ATC clearance, make radio communications as appropriate to report the event. Refer to the AIM, Section 4, ATC Clearances, for guidance regarding recommended phraseology, and Appendix G of this AC for acronyms and abbreviations.

12.2.1.2 Reports, as specified by the operator, concerning data link anomalies, procedural difficulties, or system failures typically are made by pilots through one or more of the following methods:

- Pilot/observer questionnaire.
- Logbook entry.
- ACARS, etc.
- Other record(s) used by that operator (such as a “Captain’s Report”). An example of a typical reporting form for data link event information is shown in Appendix A.

12.2.1.3 Operators should follow the GOLD problem reporting procedures, which include notifying the CMA or Regional Monitoring Agency for the region where the problem occurred (such as DLMA for NAT operations). This information can be found in GOLD Appendix D.3 and Appendix E. Operators should also send a data link non-normal event report to their IFO, CHDO, CMO, or FSDO as applicable. An example can be found in Appendix A.

12.2.2 Other Reports Incidental to Data Link.

12.2.2.1 Near Midair Collision (NMAC) Reports. Flightcrews should continue to submit NMAC reports in accordance with existing policies and procedures. (Crews should be aware that there is no requirement to submit an NMAC report solely due to a data link event).

12.2.2.2 Aviation Safety Reporting System (ASRS) Reports. ASRS reports may be filed at the discretion of the flightcrew.

12.2.2.3 Operator/Maintenance Department Reports. Operator maintenance department personnel should make data link-related reports as necessary. Submit reports of frequent or systematic data link problems that may relate to system performance, manufacturers, or data link vendors to the PAI or principal maintenance inspector (PMI), as appropriate.

12.2.2.4 Data Link Manufacturer Reports. Data link avionics manufacturers report problems found with specific data link systems in accordance with established Service Difficulty Report (SDR) procedures. Generic problems, such as those that may relate to the definition of ARINC 622 or 745 characteristics or of documents listed in paragraph 4.5 should be reported to the Aircraft Engineering Division, AIR-200 (Production/Airworthiness).

13 FOREIGN AIR CARRIERS.

13.1 General. Foreign air carriers may use data link communications when operating in U.S. airspace. Foreign air carriers are not required to install and use data link communications for any aircraft or operations even though air traffic services may be provided by a U.S. ATC facility (e.g., in oceanic airspace), unless separation standards or a desired flight plan equipment code are based on its use.

13.2 Data Link Communications Approval for Foreign Air Carriers. FAA does not approve data link communications installations, training programs, MELs, or maintenance programs for foreign operators operating non-U.S. registered aircraft. Such authorizations are addressed as specified by the State of the operator. However, since compatibility of data link communications within U.S. airspace is essential, part 129 operations guidelines for data link communications are issued by this AC. Compliance with these data link communications provisions ensures both data link communication system and procedural compatibility. The issuance of OpSpecs or an amendment to existing OpSpecs for data link communications must take place prior to a foreign air carrier operating a data link communication-equipped aircraft in domestic U.S. airspace, or with U.S. domestic facilities. Standard provisions for foreign air carriers for data link communications are shown in Appendix F.

13.3 Application and Approval. Foreign air carriers should contact their FAA POI to obtain application information for part 129 data link communications OpSpecs in U.S. airspace. When a foreign air carrier submits the necessary information to the respective principal inspector (PI), showing that its aircraft comply, the PI approves those OpSpecs or

an amendment. Standard OpSpec provisions regarding data link communications for foreign air carriers are shown in Appendix F. Although not mandatory, foreign operators should comply with the provisions of this AC, or equivalent provisions specified by the State of the Operator or by ICAO.

APPENDIX A. SAMPLE DATA LINK EVENT REPORT

Date:	Time:	
Operator/Flight #:	Origination:	Destination:
Submitted to:	Air Traffic Control (ATC) Inquiry:	Other:
Phase of Flight (Optional for Aircrew)	Position:	Altitude:
Name:	Phone (W):	Phone (H):
Describe Event:		

APPENDIX B. DATA LINK COMMUNICATIONS MEL AND MMEL PROVISIONS

Each operator intending to have authority to dispatch an aircraft with a data link communication system or component temporarily inoperative must do so in accordance with provisions of a minimum equipment list (MEL). MELs are approved for each operator and type aircraft, within provisions of the Federal Aviation Administration (FAA) Master Minimum Equipment List (MMEL) for that type. When proposed MEL provisions are consistent with the FAA MMEL; principal operations inspectors (POI) may approve the MEL. If less restrictive MEL or different MEL provisions are requested, a proposal for consideration of an FAA MMEL change must be forwarded to the Aircraft Evaluation Group (AEG) assigned for that aircraft type. Enhanced features (those above and beyond the basic data link communication system) may be inoperative, provided that the inoperative features do not degrade the system (for example, data link printers).

TABLE B-1: MINIMUM EQUIPMENT LIST EXAMPLE

Equipment	Code	Condition
Data link system	C-0	(M) May be inoperative provided the system is deactivated and secured.
Dual data link or data link controls or displays	C-21	(0) May be inoperative on the flying pilot side provided that: <ul style="list-style-type: none"> (a) Appropriate data link elements and functions are operative on the nonflying pilot side, and (b) Display data link indications are visible to the flying pilot. (0) May be inoperative on the nonflying pilot side, provided that: <ul style="list-style-type: none"> (a) The required minimum voice communications are operative and that voice procedures are approved for the route or procedures to be flown, and (b) The required minimum voice command communications audio functions are operative, and voice procedures may be used for the route or procedures to be flown.
Data link printer	C-0	(0) May be inoperative provided all other data link display and control functions are operative. All elements of each data link transmission can be retrieved, displayed, and reviewed by the flightcrew or may be inoperative if relevant operations or functions are not predicated on data link use (e.g., print control function not authorized if the printer is inoperative).

TABLE B-2: EXAMPLE OF A DATA LINK MMEL PROVISION**Boeing 747-400**

23 COMMUNICATIONS				
-XX-1 Digital Data Link Communications Systems	D	-	-	Any in excess of those required by regulation may be inoperative
-XX-2 Analog Data Link Communications Systems	D	-	-	Any in excess of those required by regulation may be inoperative.

NOTE: The provisos and repair category intervals are intended to grant the operator sufficient relief during the initial stages of the data link implementation. This is intended to promote the installation process, as well as support the use of a partial system. Both equipment reliability and operational experience will dictate, if any, revision to this MMEL relief should be considered after the installation phase is completed.

APPENDIX C. DATA LINK SYSTEMS AND OPERATING ENVIRONMENT

Table C-1 provides the criteria for different types of data link systems and operations based on standards. For each type of data link system, a row is provided to assign a label to a particular aircraft capability and correlate it to the applicable operating environment. The applicable operating environment is characterized by the type of airspace, the capability of the Air Traffic Service (ATS) unit, and the use for which that aircraft capability is intended. The aircraft label is used in the Rotorcraft/Aircraft Flight Manual (R/AFM) to convey the functional and interoperability aspects of the aircraft data link system needed to support operations.

Use Table C-1 to identify the applicable operating environment(s) and intended uses for your specific aircraft data link system. An aircraft data link system may support any combination of aircraft labels in the table. For an aircraft data link system that combines Aeronautical Telecommunications Network (ATN) B1 and Future Air Navigation System (FANS) 1/A capabilities that can be used on the same flight, you will need to adhere to the interoperability standards in RTCA DO-305A/ED-154A.

Refer to the International Civil Aviation Organization (ICAO) Global Operational Data Link Document (GOLD) for the latest description of the intended data link operations. Special attention must be given to Chapter 2 of the GOLD document.

TABLE C-1: DEFINITION FOR DIFFERENT TYPES OF DATA LINK SYSTEMS AND OPERATIONS

Row #	Aircraft Data Link System	Operating Environment			Applicable Standards
		Type of Airspace	ATS Unit System	Capability and Uses	
1	ATN B1	Continental (Domestic)	ATN B1	<p>Supplemental Air Traffic Control (ATC) communications: CM application supports DLIC data link service. Controller-Pilot Data Link Communication (CPDLC) application supports ACM, ACL, and AMC data link services.</p> <p>Note 1: Departure Clearance (DCL), DSC, Digital Automatic Terminal Information Service (D-ATIS), and Flight Plan Consistency (FLIPCY) data link services are not supported.</p>	<p>DO-290/ED-120, Chg 1 and Chg 2, Continental Software Problem Report (SPR) Standard. DO-280B/ED-110B, ATN B1 Interoperability (INTEROP) Standard. Subnetwork standards for Very High Frequency Data Link (VDL) M2 (see Table C-2).</p>
2	FANS 1/A+	Continental (Domestic)	ATN B1- FANS 1/A	<p>Same as Row 1, except: Uses AFN application for DLIC data link service. For CPDLC application, UM 215, TURN [direction] [degrees] is not supported.</p> <p>Note 2: FANS 1/A aircraft will require use of DM67 [free text] to mimic certain message elements per DO-290/ED-120 Chg 1 and 2. See DO-305A/ED-154A, paragraph 4.2.13.2.</p> <p>Note 3: In accordance with DO-290/ED-120, Chg 1 and Chg 2, FANS 1/A aircraft will require use of a message latency timer per DO-258A/ED-100A, paragraph 4.6.6.9 and is denoted by a “+” appended to the “FANS 1/A” label.</p>	<p>Same as for Row 1, plus: DO-305/ED-154, FANS 1/A – ATN INTEROP Standard (Applies only to ATS Unit, except see Note 2). DO-258A/ED-100A, FANS 1/A INTEROP Standard. (Applies only to aircraft.) Subnetwork standards for VDL M2 (see Table C-2).</p>

Row #	Aircraft Data Link System	Operating Environment			Applicable Standards
		Type of Airspace	ATS Unit System	Capability and Uses	
3	FANS 1/A+ or FANS 1/A	Oceanic and remote Domestic	FANS 1/A	<p>Normal means of ATC communication uses AFN and CPDLC applications for Direct Controller Pilot Communications (DCPC).</p> <p>Eligible for: Required Communication Performance (RCP) 240 operations via any subnetwork listed in Table C-2 except for High Frequency Data Link (HF DL). RCP 400 operations via any subnetwork listed in Table C-2 No RCP operations via any subnetwork listed in Table C-2</p> <p>Note: Aircraft capability that supports multiple RCP type operations needs to include appropriate indications and/or alerts to enable the flightcrew to notify ATC when aircraft equipment failures result in the aircraft’s ability to no longer meet its criteria for any of the RCP types, per DO-306/ED-122, paragraph 5.2.6.a) and 5.2.6.b). Uses Automatic Dependent Surveillance-Contract (ADS-C) application for automatic position reporting. See required performance for ADS-C application per DO-306/ED-122. ADS-C application over HF DL (see Table C-2) not eligible for reduced longitudinal separation.</p>	<p>DO-306 Change 1/ED-122 Change 1, Oceanic SPR Standard. DO-258A/ED-100A (or earlier versions), FANS 1/A INTEROP Standard. Subnetwork standards for selected subnetworks (see Table C-2).</p> <p>Note: Allows use of one or more subnetworks. See Capability and Uses column for indications, alerts and subnetworks that are eligible for intended operations.</p>
4	FANS 1/A+ or FANS 1/A	Oceanic and Remote Domestic	Centralized ADS-C System (CADS)	<p>No CPDLC application. Uses ADS-C application for automatic position reporting. See required performance for ADS-C application per DO-306/ED-122.</p>	<p>DO-306 Change 1/ED-122 Change 1, Oceanic SPR Standard. DO-258A/ED-100A (or earlier version), FANS 1/A INTEROP Standard (Applies only to aircraft). CADS Common Specification, Version 2.0, approved ICAO NAT</p>

Row #	Aircraft Data Link System	Operating Environment			Applicable Standards
		Type of Airspace	ATS Unit System	Capability and Uses	
					FIG/10, Paris, March 29-April 2, 2004 (Applies only to ATS unit). Subnetwork standards same as row 3.
5	Flight Management System (FMS) waypoint position reporting (WPR)	Oceanic and remote	Certificated foreign repair station (CFRS)	No CPDLC application. Uses FMS WPR application for automatic position reporting. See required performance for FMS WPR application per DO-306/ED-122.	DO-306 Change 1/ED-122 Change 1, Oceanic SPR Standard. ARINC 702A, Flight Management Computer System (Applies only to aircraft). CFRS Common Specification, Version 2.0, approved ICAO NAT FIG/10, Paris, March 29-April 2, 2004 (Applies only to ATS unit). Subnetwork standards same as row 3.
6	FANS 1/A ADS-C	Oceanic and remote	FANS 1/A or CADS	Same as row 4.	DO-306 Change 1/ED-122 Change 1, Oceanic SPR Standard. DO-258A/ED-100A (or earlier version) FANS 1/A INTEROP Standard (If ATS unit is CADS, applies only to aircraft) CADS Common Specification, Version 2.0, approved ICAO NAT FIG/10, Paris, March 29-April 2, 2004 (Applies only to ATS unit when ATS unit is CADS). Subnetwork standards same as row 3.
7	Aircraft Communications Addressing and Reporting System (ACARS)	Continental/Oceanic and remote	ACARS	Departure clearance (DCL) or pre-departure clearance (PDC). Data link – automated terminal information service (ATIS). Oceanic clearance.	EUROCAE ED-85A EUROCAE ED-89A EUROCAE ED-106A A623 Subnetwork standards same as row 3.

TABLE C-2: DEFINITIONS FOR SUBNETWORKS

Subnetwork Designator	Applicable Subnetwork Standards
VDL M0/A	A618-6 for air/ground protocol
VDL M2	a) ICAO Annex 10, Vol. 3 b) ICAO Doc 9776, Manual on VDL Mode 2 c) RTCA DO-224 C (Minimum Aviation System Performance Standard (MASP)) d) ARINC 631-6 (Interoperability requirements standards (INTEROP))
HFDL	a) RTCA DO-265 MASPS b) A753-3
Satellite Communication (SATCOM) (Inmarsat)	a) RTCA DO-270A (MASPS) b) A741P2-7
SATCOM (Iridium)	a) RTCA DO-270A (MASPS) b) A741P2-7 c) A761-2

TABLE C-3: PREFERRED ORIGINAL EQUIPMENT MANUFACTURER ANNOTATION

"The FAA has approved the aircraft data link system to the criteria contained in AC 20-140B for the following data link capabilities:

Data Link Type	Aircraft-Allocated Performance	Subnetworks
ATN B1	CPDLC at Initial Continental Performance using →	VDL M2
FANS 1/A (+)	CPDLC at RCP 240 using → ADS-C at RSP 180 using →	VDL M0/A/2, SATCOM (Inmarsat), SATCOM (Iridium)
FANS 1/A (+)	CPDLC at RCP 400 using → ADS-C at RSP 400 using →	HFDL
ACARS ATS	None, using →	VDL M0/A/2, SATCOM (Inmarsat), SATCOM (Iridium)

This design approval does not constitute operational authorization."

NOTE: In actual use, the listed subnetworks should only reflect those that are included in a given aircraft installation.

APPENDIX D. ADMINISTRATIVE INFORMATION

- D.1 Definitions.** Certain definitions in this advisory circular (AC) are taken from other FAA materials. Other definitions are unique to this AC and their application is limited to use with data link systems.
- D.1.1 Air Traffic Data Link Service.** A data communication capability comprising air/ground and ground/ground data network services, specified data link message sets and protocols, aircraft equipment, Air Traffic Service (ATS) facility equipment, and operational procedures intended to provide primary or supplemental ATS communications.
- D.1.2 Certificate-Holding District Office (CHDO).** A Flight Standards Service (AFS) office responsible for the administration of Title 14 of the Code of Federal Regulations (14 CFR) part 119 certificate authority for operations conducted under 14 CFR parts 121, 125, or 135 for a particular certificate holder.
- D.1.3 Data Link Service Academic Training.** Training that exclusively addresses knowledge requirements (rather than skills), and is usually related to achieving satisfactory knowledge of data link service concepts, Required Communication Performance (RCP) types, systems, limitations, or procedures. The academic training on data link services is generally accomplished using a combination of classroom methods (such as stand up instruction, slide/tapes, computer-based instruction (CBI), or tutorial), flight manual information, bulletins, or self-study.
- D.1.4 Data Link Service Use Training.** This is training that addresses all of the skills related to the operational use of data link services, including knowledge and skills needed to receive information provided by data link services, and appropriately accept, reject, cancel, or defer a response to that information. In addition, this training includes the knowledge and skills needed to load, store, formulate, and request information from the data link service.
- D.1.5 Data Link System.** The different systems include Aeronautical Telecommunications Network (ATN)-Baseline 1 (B1), a digital system and Future Air Navigation System 1/A (FANS 1/A), which is basically an analog-based system. At the present time the digital operation is known as Very High Frequency Data Link (VDL)-Mode 2 system. The analog operation is known as the VDL-Mode 0/A. The FANS 1/A system uses both digital and analog components. The data link applications are digital and binary encoded, and then processed by the Aircraft Communications Addressing and Reporting System (ACARS) convergence function (ACF) for transmission over a character-oriented network.
- D.1.6 Flight Standards District Office (FSDO).** An FAA field office serving an assigned geographical area and staffed with AFS personnel who serve the aviation industry and the general public on matters relating to the licensing of aviation personnel, certification of aircraft, operational authorization of air carriers, and commuter and General Aviation operations.

D.1.7 Follow-On Supplemental Type Certificate (STC) (as related to data link communications). A data link communications STC other than as described in D.1.8 below for an initial type certificate (TC)/STC. The following examples are considered to be follow-on STCs:

D.1.7.1 A previously approved data link communications installation, installed in a subsequent type or model aircraft.

D.1.7.2 Changes of display configuration (flight management system (FMS)/data link display), supporting system engine indicating and crew alerting system (EICAS)/electronic centralized aircraft monitoring (ECAM), or other aircraft interface (digital flight data recorder (DFDR), etc.).

D.1.8 Initial Type Certificate (TC)/Supplemental Type Certificate (STC) (as related to data link communications). The first FAA data link communications airworthiness approval (in accordance with a TC or STC) of any one or a combination of the following components: a data link processor and/or management unit, or data link communications avionics.

NOTE: Previously approved data link communications systems may require an initial TC/STC, if the part number of any of the above components changes due to a significant modification that changes the system.

D.1.9 Master Minimum Equipment List (MMEL). An FAA document listing stipulations in accordance with 14 CFR §§ 121.628 and 135.179 that provides authorization for the continuation of flight beyond a terminal point with certain equipment inoperative. Aircraft Evaluation Groups (AEG) develop Master Minimum Equipment Lists (MMEL) in conjunction with a Flight Operation Evaluation Board (FOEB) established for each aircraft type. The MMEL, which is associated with a particular type of aircraft, serves as the basis for minimum equipment lists (MEL), which are associated with an air carrier’s operation of that aircraft type.

D.1.10 National Simulator Program (NSP). A team of FAA operations specialists responsible for evaluating flight simulation training devices (FSTD) to aid principal operations inspectors (POI) in approving those FSTDs in accordance with regulatory requirements (e.g., NSP evaluations support POI approval of a particular full flight simulator (FFS) for use in a specific part 121 training program).

D.1.11 Principal Inspector (PI). Refers to one of three FAA PIs: principal avionics inspector (PAI), POI, or principal maintenance inspector (PMI).

D.1.11.1 PAI. The FAA inspector assigned responsibility for overseeing all avionics issues relative to a specific operator, including input to training programs, operations specifications (OpSpecs), MEL requests, etc.

D.1.11.2 POI. The FAA inspector assigned responsibility for overseeing all operational issues relative to a specific operator, including approval of training programs, OpSpecs approval, maintenance programs, MEL change requests, etc.

D.1.11.3 PMI. The FAA inspector assigned responsibility for overseeing all maintenance issues relative to a specific operator, including input to training programs, approved maintenance programs, OpSpecs, MEL requests, etc.

D.1.12 Special Data Link Event. For the purpose of this AC, a special data link event is one or more of the following occurrences or situations related to data link:

D.1.12.1 In-flight traffic conflicts or potential conflicts, as determined by a flightcrew member, in which use of a data link service is suspected to be contributing cause.

D.1.12.2 Near midair collisions (NMAC) in which the use of a data link service is suspected to be a contributing cause.

D.1.12.3 Data link system performance below that of normal operation or required by the operational procedure (e.g., RCP 240).

D.1.12.4 Air traffic control (ATC) operational error involving the use of data link associated with a data link procedure or operation.

D.1.12.5 Other occurrences or situations in which use of a data link service is suspected to compromise continued operational safety. Loss of standard ATC separation resulting from a procedure or maneuver where a data link transaction, failure, or unmonitored error is suspected to be a factor.

D.1.12.6 Use of the data link service that caused excessive crew workload.

D.1.12.7 A data link service that provides reasonable information but is subsequently verified to be erroneous.

D.1.12.8 An excursion of 500 feet or more from an assigned flight level/altitude, or a lateral/longitudinal deviation exceeding ATS minimum separation criteria, in which use of a data link service is suspected to be a contributing cause.

D.1.13 Supplemental Type Certificate (STC). An FAA certificate certifying that modifications to the respective aircraft, engines, or other components meet airworthiness requirements of the regulations.

D.1.14 Type Certificate (TC). An FAA certificate certifying that the respective aircraft, engines, or other components meet the airworthiness requirements of the regulations.

APPENDIX E. ROLES AND RESPONSIBILITIES IN THE AUTHORIZATION PROCESS.

	Operator Actions	FAA Inspector Actions
1	Establishes need to obtain data link authorization.	
2	Reviews the current edition of Advisory Circular (AC) 120-70, Aircraft Flight Manual (AFM), AFM Supplement, Type Certificate Data Sheet (TCDS), or other appropriate documents (e.g., Service Bulletins (SB) or Service Letters (SL)) to determine aircraft eligibility for data link. Operator contacts airplane/avionics manufacturer, if necessary, to confirm airplane data link eligibility.	Reviews applicable guidance in the current edition of FAA Order 8900.1, Flight Standards Information Management System, and AC 120-70.
3	Contacts the FAA authority to arrange a preapplication meeting to discuss requirements for operational approval.	Principal inspector (PI): sends a copy of the compliance matrix and any other necessary information to applicant prior to the preapplication meeting.
4		During the preapplication meeting establishes: <ul style="list-style-type: none"> • The form and content of operator application (exhibits/documents) supporting data link authorization. • The date, prior to start of operations, when the operator application should be submitted for evaluation.
5	Submits application (exhibits/documents) to the appropriate FAA authority with sufficient time prior to the planned start of data link operations. (The FAA will specify the time prior to the planned start).	Inputs the application into the Next Generation Air Transportation System (NextGen) Tracker. This includes scanned copies of all attachments/exhibits, etc. Refer to FAA Order 8900.1, Volume 3, Chapter 1, Section 1, The General Process for Approval or Acceptance of Air Operator Applications.
6		PI: <ul style="list-style-type: none"> • Reviews the operator's application and requests additional information when needed. • When the application meets guidance requirements, inputs a comment into the tracker stating that the review is complete and recommending that authorization be issued. • Notifies the regional specialist that the application is ready for review and

	Operator Actions	FAA Inspector Actions
		<p>forwards the application to the region via the tracker.</p> <p>Region:</p> <ul style="list-style-type: none"> • Reviews the application and coordinates with the PI when additional information is required. • When complete, enters a tracker entry stating region approval/concurrence.
7	Provides revised material when requested.	
8		<p>PI:</p> <ul style="list-style-type: none"> • Issues operations specifications (OpSpecs)/management specifications (MSpecs)/letters of authorization (LOA), as appropriate, when airworthiness and operational requirements are fulfilled. • Ensures the tracker Process Complete date is entered, using the issue date of the authorization.

**APPENDIX F. PART 129 PROVISIONS FOR USE OF DATA LINK IN U.S.
AIRSPACE**

The issuance of operations specifications (OpSpecs) or an amendment to existing OpSpecs for data link communications must take place prior to a foreign air carrier operating a data link communication-equipped aircraft in domestic U.S. airspace, or with U.S. domestic facilities.

An appropriate data link must be installed and operated on suitable frequencies specified by air traffic control (ATC) during flight in U.S. airspace if procedures are predicated on its use. A unique and specific address, the International Civil Aviation Organization (ICAO) 24-bit aircraft identification, must be assigned to the airplane and the data link must recognize this address. When properly set, the unique address may not be altered, set to a duplicated address, or set to an address that potentially interferes with ATC or data link safety functions.

A data link capable of coordinating with air traffic facilities using RTCA DO-219, Minimum Operational Performance Standards (MOPS) for ATC Two-Way Data Link Communications, or other equivalent standards must be installed if operations will be predicated on its use. The data link system should be operated in an appropriate data link mode during flight in U.S. airspace using data link, except as provided for by the minimum equipment list (MEL) provisions acceptable to the State of the Operator.

Training and procedures for use of data link as specified by ICAO, this advisory circular (AC), or other equivalent criteria acceptable to the Federal Aviation Administration (FAA) should be used when operating in U.S. airspace.

Unsafe performance or conditions related to data link operations which potentially could affect continued safe operations in U.S. airspace (a data link event) should be reported to the FAA within 10 days of the time that such a hazard is identified.

APPENDIX G. ACRONYMS

Acronym	Meaning
14 CFR	Title 14 of The Code of Federal Regulations
AC	Advisory Circular
ACARS	Aircraft Reporting and Communication System
ACO	Aircraft Certification Office
ACP	Actual Communications Performance
AD	Airworthiness Directive
ADS	Automatic Dependent Surveillance
ADS-C	Automatic Dependent Surveillance-Contract
AEG	Aircraft Evaluation Group
AFM	Aircraft Flight Manual
AFS	Flight Standards Service
AIM	Aeronautical Information Manual
AIP	Aeronautical Information Publication
AOC	Aeronautical/Airline Operational Control
ASRS	Aviation Safety Reporting System
ATC	Air Traffic Control
ATIS	Automated Terminal Information Service
ATM	Air Traffic System Management
ATN	Aeronautical Telecommunication Network
ATN B1	Aeronautical Telecommunication Network Baseline 1
ATP	Air Traffic Rules and Procedures Service
ATS	Air Traffic Service
CAA	Civil Aviation Authority
CBI	Computer-Based Instruction
CFR	Code of Federal Regulations
CHDO	Certificate-Holding District Office
CMO	Certificate Management Office
CNS	Communications, Navigation, and Surveillance
CPDLC	Controller-Pilot Data Link Communication
CRM	Crew Resource Management
CSP	Communication Service Provider
D-ATIS	Digital Automated Terminal Information System
DCPC	Direct Controller Pilot Communication
DDG	Dispatch Deviation Guide
DDTC	Digital Delivery of Expected Taxi Clearance
DFDR	Digital Flight Data Recorder
DL	Data Link
ECAM	Electronic Centralized Aircraft Monitoring
EFIS	Electronic Flight Information System
EICAS	Engine Indicating and Crew Alerting System
EUROCAE	European Organization for Civil Aviation Equipment
FAA	Federal Aviation Administration

Acronym	Meaning
FANS	Future Air Navigation System
FIR	Flight Information Region
FMC	Flight Management Computer
FMS	Flight Management System
FOEB	Flight Operation Evaluation Board
FOM	FANS Operations Manual
FSB	Flight Standardization Board
FSDO	Flight Standards District Office
G/TWIS	Graphics/Text Weather Server
GNSS	Global Navigation Satellite System
HF	High Frequency (radio)
HFDL	High Frequency Data Link
HMI	Human Machine Interaction
ICAO	International Civil Aviation Organization
IFO	International Field Office
INTEROP	Interoperability Requirements Standards
LOA	Letter of Authorization
LOFT	Line-Oriented Flight Training
MASPS	Minimum Aviation System Performance Standard
MEL	Minimum Equipment List
MMEL	Master Minimum Equipment List
MNPS	Minimum Navigation Performance Specification
MRB	Maintenance Review Board
MSpecs	Management Specifications
NAS	National Airspace System
NAT	North Atlantic Tracks
NM	Nautical Mile
NMAC	Near Midair Collision
NOTAM	Notices to Airmen
NSP	National Simulator Program
OCD	Oceanic Clearance Delivery
OE	Operating Experience
OpSpecs	Operations Specifications
PAI	Principal Avionics Inspector
PANS	Procedures for Air Navigation Service
Part 91K	Part 91 Subpart K
PC	Proficiency Check
PDC	Pre-Departure Clearance
PI	Principal Inspector
PMI	Principal Maintenance Inspector
POI	Principal Operations Inspector
PT	Proficiency Training
R/AFM	Rotorcraft/Airplane Flight Manual
RCP	Required Communication Performance

Acronym	Meaning
RF	Radio Frequency
RNP	Required Navigation Performance
RSP	Required Surveillance Performance
RTCA	Radio Technical Commission for Aeronautics
SARP	Standards and Recommended Practices
SATCOM	Satellite Communication
SDR	Service Difficulty Report
SPR	Software Problem Report
STC	Supplemental Type Certificate
TC	Type Certificate
TCPM	Training Center Program Manager
TSO	Technical Standard Order
TWIP	Terminal Weather Information for Pilots
VDL	Very High Frequency Data Link
VHF	Very High Frequency (radio)