



APPLICATION & PROCESS:
APPROVAL FOR DATA LINK COMMUNICATIONS

Purpose— This advisory circular provides information for Rwanda air carrier operators, foreign air carriers, and private aircraft operators operating in the Rwanda Airspace, other aviation organizations and data link manufacturers, regarding a means acceptable to the RCAA for the use of data link systems in ATS communications.

This AC does not address the use of data link communications for aeronautical operational control and certain specific Air Traffic Service (ATS) applications such as the following—

This AC is not applicable to ADS-B which is not a data link system.

- 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).

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- Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.
- Where an AC is referred to in a 'Note' below the regulation, the AC remains as guidance material,
- ACs should always be read in conjunction with the referenced regulations.

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SECTION 1 POLICY & GENERAL INFORMATION

1.1 STATUS OF THIS AC

This AC is an original issuance.

1.2 BACKGROUND

- A. Data link applications are being implemented in flight operations and other operations on a widespread basis (e.g., PDC, D-ATIS, FANS-1 CPDLC, FIS/TIS, and ADS).
- B. Data link applications operate without any specific knowledge by the user as to whether a satellite, VHF, or HF air/ground data link medium network service is in use.
- C. However, these applications may be limited by the level of end-to-end data link service implementation in use. (e.g., ACARS, FANS-1 ACARS/ARINC 622, CNS/ATM-1).
- D. The guidance in this advisory circular—
 - Outlines guidance for 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 exceptional data link events. .

1.3 APPLICABILITY

The requirement for RCAA approval before conducting any operations involving pilot-controller data link communications applies to all Rwanda operators.

1.4 RELATED REGULATIONS

- RCAR Part 6, Aircraft Instruments & Equipment
- RCAR Part 10, Operations of Aircraft
- RCAR Part 12, AOC Certification & Administration

1.5 RELATED PUBLICATIONS

For further information on this topic, operators are advised to review the following publications and regulatory requirements—

1) Rwanda Civil Aviation Authority (RCAA)

- ◆ AC 10-011, Application & Process: Required Communications Performance.

Copies may be obtained from the RCAA web-site.

2) International Civil Aviation Organization (ICAO)

- ◆ Global Operational Data Link Document (GOLD). ICAO Global Guidelines for data link operations.
- ◆ ICAO Doc. 9758-AN/966 - Human Factor Considerations In The Data Link Environment.
- ◆ Document 4444 (PANS/ATM), Procedures for Air Navigation Services - Rules of the Air and Air Traffic Services.
- ◆ Document 7030, Regional Supplementary Procedures.
- ◆ Annex 6, Operations of Aircraft.
- ◆ Annex 10, Volume III, Part 1, Data link Data Communications Systems.

Copies may be obtained from Document Sales Unit, ICAO, 999 University Street, Montreal, Quebec, Canada H3C 5H7.

- ◆ Annex 11, Air Traffic Services.
- 3) United States Federal Aviation Administration (FAA)
 - ◆ AC120-70A, Operational Authorization Process for use of Data Link Communication System
 - ◆ AC20-140, Guidelines for Design Approval of Aircraft Data Communications Systems
- 4) FAN's Interoperability Team and FAN's Interoperability Group Global Document
 - ◆ FAN's Operations Manual
- 5) Radio Technical Commission for Aeronautics (RTCA) Inc. Documents (RTCA/DO) and European Organization for Civil Aviation Equipment (EUROCAE) documents.
 - ◆ RTCA DO-306, ED-122, Safety and Performance Standards for Air Traffic Data Link Services in Oceanic and Remote Airspace.
 - ◆ DO-210C, Minimum Operational Performance Standards for Aeronautical Mobile Satellite Service (AMSS avionics)
 - ◆ DO-212, Minimum Operational Performance Standards for Airborne Automatic Dependent Surveillance (ADS) Equipment.
 - ◆ DO-215A, Guidance on Aeronautical Mobile Satellite Service (AMSS) End-to-End System Performance.
 - ◆ DO-219, Minimum Operational Performance Standards for ATC Two-Way Data Link Communications (Applications).
 - ◆ DO-224, Signal-in-Space Minimum Aviation System Performance Standards for Advanced VHF Data link Communications.
 - ◆ DO-231, Design Guidelines and Recommended Standards for the Internet working, Implementation and Use of AMS(R)S.
 - ◆ DO-239, Minimum Operational Performance Standards for Traffic Information Services (TIS) Data Link Communications.
 - ◆ DO-240, Minimum Operating Performance Standards for Aeronautical Telecommunication Network (ATN) Avionics.
 - ◆ DO-242, Minimum Aviation System Performance Standards for Automatic Dependent Surveillance Broadcast (ADS-B).
 - ◆ DO-243, Guidance for Initial Implementation of Cockpit Display of Traffic Information.
 - ◆ DO 264, Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications.

Copies may be obtained through the Internet address of www.faa.gov.

Copies may be obtained from RTCA Inc., 1140 Connecticut Avenue, NW, Suite 1020, Washington, DC 20036: RTCA documents.

1.6 DEFINITIONS & ACRONYMS

1.6.1 DEFINITIONS

The following definitions apply to this advisory circular—

- 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, ATS Facility equipment, and operational procedures intended to provide primary or supplemental ATS communications without reversion to voice procedures under most circumstances.
- 2) **Data Link Event.** For the purpose of this AC, a Data Link Event is one or more of the following occurrences or situations related to data link:
 - ◆ In-flight traffic conflicts or potential conflicts as determined by a flight crew member in which use of a data link service is suspected to be contributing cause.

- ◆ Near mid-air collisions (NMAC) in which the use of a data link service is suspected to be a contributing cause.
 - ◆ Data link system performance below that of normal operation.
 - ◆ ATC operational error involving a data link-equipped aircraft.
 - ◆ 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 un-monitored error is suspected to be a factor.
 - ◆ Use of the data link service that caused excessive crew workload.
 - ◆ A data link service that provides reasonable information but is subsequently verified to be erroneous.
 - ◆ An excursion of more than 500 feet 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.
- 3) **Data Link Services Academic Training.** This is training that exclusively addresses *knowledge* requirements (rather than skills), and is usually related to achieving satisfactory knowledge of data link service concepts, systems, limitations, or procedures.
- ◆ The academic training on data link services is generally accomplished using a combination of classroom methods (stand up instruction, slide/tapes, computer-based instruction (CBI), tutorial, etc.), flight manual information, bulletins, or self-study.
- 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 the knowledge and skills needed to receive information provided by data link services, and appropriately accept, reject, cancel, or defer a response to that information.
- ◆ This training includes the knowledge and skills needed to load, store, formulate, and request information from the data link service.
- 5) **Data Link System.** A general term referring to data link digital or analog based systems.
- ◆ At the present time the digital operation is known as VDL–Mode 2 system
 - ◆ The analog operation is known as the FANS system.
 - ◆ 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 ACARS convergence function (ACF) for transmission over a character-oriented network.
- 6) **Principal Inspector (PI).** Refers to one of three RCAA principal inspectors namely the principal operations inspector (POI), and the principal airworthiness inspector (PAI) and or the principal avionics inspector (PAI).
- (a) **Principal Avionics Inspector (PAI).** The RCAA inspector assigned responsibility for overseeing all avionics issues relative to a specific operator, including input to training programs, Operations Specifications, MEL requests, etc.
 - (b) **Principal Operations Inspector (POI).** The RCAA inspector assigned responsibility for overseeing all operational issues relative to a specific operator, including approval of training programs, Operations Specifications approval, maintenance programs, MEL change requests, etc.
 - (c) **Principal Maintenance Inspector (PMI).** The RCAA inspector assigned responsibility for overseeing all maintenance issues relative to a specific operator, including input to training programs approved maintenance programs, Operations Specifications, MEL requests, etc.

1.6.2 ACRONYMS & ABBREVIATIONS

The following acronyms apply to this advisory circular—

- 1) **AC** – Advisory Circular

- 2) **ACARS** – Aircraft Reporting and Communications System
 - 3) **AD** – Airworthiness Directive
 - 4) **ADS** – Automatic Dependent Surveillance
 - 5) **ADS-C** – Automatic Dependent Surveillance-Contract
 - 6) **AFM** – Aircraft Flight Manual
 - 7) **AIP** – Aeronautical Information Publication
 - 8) **AOC** – Air Operator Certificate
 - 9) **ASRS** – Aviation Safety Reporting System
 - 10) **ATC** – Air Traffic Control
 - 11) **ATM** – Air Traffic System Management
 - 12) **ATN** – Aeronautical Telecommunication Network
 - 13) **ATN B1** – Aeronautical Telecommunication Network Baseline 1
 - 14) **ATP** – Air Traffic Procedures Service
 - 15) **ATS** – Air Traffic Service
 - 16) **CBI** – Computer-Based Instruction
 - 17) **CNS** – Communications, Navigation, and Surveillance
 - 18) **CPDLC** – Controller Pilot Data Link Communication
 - 19) **CRM** – Crew Resource Management
 - 20) **CSP** – Communication Service Provider
 - 21) **DCPC** – Direct Controller Pilot Communication
 - 22) **DDG** – Dispatch Deviation Guide
 - 23) **DFDR** – Digital Flight Data Recorder
 - 24) **DL** – Data Link
 - 25) **EUROCAE** – European Organization for Civil Aviation Equipment
 - 26) **US-FAA** – United States Federal Aviation Administration
 - 27) **FANS** – Future Air Navigation System
 - 28) **FIR** – Flight Information Region
 - 29) **FMC** – Flight Management Computer
 - 30) **FMS** – Flight Management System
 - 31) **FOM** – FANS Operations Manual
 - 32) **FSS** – Flight Safety Services
 - 33) **GNSS** – Global Navigation Satellite System
 - 34) **HF** – High Frequency (radio)
 - 35) **HFDL** – High Frequency Data Link
 - 36) **HMI** – Human Machine Interaction
 - 37) **ICAO** – International Civil Aviation Organization
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- 38) **INTEROP** – Interoperability Requirements Standards
 - 39) **LOA** – Letter of Authorization
 - 40) **LOFT** – Line-Oriented Flight Training
 - 41) **MASPS** – Minimum Aviation System Performance Standard
 - 42) **MEL** – Minimum Equipment List
 - 43) **MMEL** – Master Minimum Equipment List
 - 44) **NAS** – National Airspace System
 - 45) **NM** – Nautical Mile
 - 46) **NMAC** – Near Mid-Air Collision
 - 47) **NOTAM** – Notices to Airmen
 - 48) **OpSpecs** – Operation Specifications
 - 49) **PAI** – Principal Avionics Inspector
 - 50) **PANS** – Procedures for Air Navigation Service
 - 51) **PC** – Proficiency Check
 - 52) **PI** – Principal Inspector
 - 53) **PMI** – Principal Maintenance Inspector
 - 54) **POI** – Principal Operations Inspector
 - 55) **PT** – Proficiency Training
 - 56) **R/AFM** – Rotorcraft/Airplane Flight Manual
 - 57) **RCAA** – Rwanda Civil Aviation Authority
 - 58) **RCAR** – Rwanda Civil Aviation Regulations
 - 59) **RCP** – Required Communication Performance
 - 60) **RF** – Radio Frequency
 - 61) **RNP** – Required Navigation Performance
 - 62) **RSP** – Required Surveillance Performance
 - 63) **RTCA** – Radio Technical Commission for Aeronautics
 - 64) **SARPS** – Standards and Recommended Practices (ICAO)
 - 65) **SATCOM** – Satellite Communication
 - 66) **SDR** – Service Difficulty Report
 - 67) **SPR** – Software Problem Report
 - 68) **STC** – Supplemental Type Certificate
 - 69) **TC** – Type Certificate
 - 70) **TSO** – Technical Standard Order
 - 71) **RCAR** – Rwanda Civil Aviation Regulations
 - 72) **VDL** – VHF Data Link
 - 73) **VHF** – Very High Frequency (radio)
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SECTION 2 AUTHORIZATION TO USE DATA LINK COMMUNICATIONS IN FLIGHT OPERATIONS

2.1 GENERAL

- A. Installation of a data link communication system requires RCAA design approval of changes to the aircraft's type design by amending the TC or issuing an STC.
- B. Prior to using the system, the operator must request a revision to their Operations Specifications to ensure that the system is used in accordance with international standards and requirements and in a manner that is acceptable to the RCAA.
- C. A revision to the Operations Specifications includes specific authorizations, training and maintenance programs, manuals, operational procedures, MELs, 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.

Approval to install a TC or STC for a data link communications system does not constitute approval to use the system.

2.2 DESIGN APPROVAL OF AIRCRAFT DATA COMMUNICATIONS SYSTEMS

- A. Guidelines of design approval of aircraft data link communications and applications primarily used for ATS are provided in international documents.
- B. The evidence should include the rotorcraft/aircraft flight manual (R/AFM) wording to indicate the aircraft and sub-network designators that define a specific data link capability and intended use for that aircraft type (Refer to Appendix C, Section 2).

Evidence should be submitted that the aircraft equipment has a type design approval.

- For example: FAA AC 20-140 (current edition) or equivalent.
- This evidence is used to determine the operator's eligibility for their specific operation.

2.3 REQUIREMENTS OF AIRCRAFT DATA COMMUNICATIONS SYSTEMS

- A. Requirements of Aircraft Data Communications Systems and applications primarily used for ATS are provided in the documents identified in paragraph 1.6 of this AC.
- B. The data link system should comply with the following—
- Applicable International Standards and Recommended Practices (SARPS);
 - Procedures for Air Navigation Services (PANS);
 - Regional Supplements (Doc 7030);
 - Annex 10, Aeronautical Telecommunications, Volume II to the Convention on International Civil Aviation;
 - FANS-1A FANS Operations Manual (FOM); and
 - RTCA DO-306, ED-122, Safety and Performance Standards for Air Traffic Data Link Services in Oceanic and Remote Airspace.

This AC is consistent with Volume III, Part I, Digital Communication Systems, Chapter 3, Aeronautical Telecommunication Network (ATN).

2.4 OPERATIONAL AUTHORIZATION

- A. Criteria for data link operational authorization are determined by the communication requirements specified for the intended operation per Appendix C, Section 2.
- B. When the operator establishes their 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.
- C. 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.

Operations that are not defined in Appendix C may require special criteria.

2.4.1 DATA LINK COMMUNICATIONS AUTHORIZATION CRITERIA

- A. Operational authorizations are based on criteria in Appendix C, Section 2, and may also include criteria outlined in, training, maintenance, MMEL, or other operationally related criteria.
- B. 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 RCAA approved maintenance instructions identified in conjunction with an STC or manufacturer's Service.

If criteria for training or checking are other than as specified in this AC, the criteria may be found in FCOM applicable to a particular aircraft type.

2.4.2 DATA LINK COMMUNICATIONS AUTHORIZATION METHODS

- A. Flight Safety Services (FSS) 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 air carrier.
- B. Operators' data link communications programs are usually approved for each specific aircraft type.

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

2.4.3 DATA LINK COMMUNICATIONS AUTHORIZATION PROCEDURES

- A. Operators should make early contact with their respective PI's to permit timely RCAA response.
- Usually such contact is initiated at the time preparations are being made for data link communications system selection or purchase.
- B. Installations, training, maintenance programs, MELs, and other data link communications program elements are reviewed and approved by the RCAA.

Operational authorization to use data link communications is provided by a RCAA POI.

2.4.4 DEMONSTRATION

- A. 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) prior to—
- 1) Issuance of Operations Specifications, or

The results of prior interoperability demonstrations performed, as part of a design approval may suffice.

- 2) The addition of an area, route or procedure to an existing Operations Specification.
- B. Under international standards, the service provider(s) and air/ground data link communications sub-networks 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 of the SPR and INTEROP standards, which may be demonstrated in an operational flight check.
- C. 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 systems elements perform as intended.
- The Principal Avionics Inspector will review the test results for conformance with international standards and RCAA policy and procedures.
- For example: FMS ACARS interface, printers, CSP and air traffic facilities along the intended routes of flight).

SECTION 3 CONTENTS OF THE APPLICATION

3.1 GENERAL CONTENTS

- A. The operator's application to obtain authorization to use data link must address and contain the following subjects, as expanded later in this AC—
- 1) General Information.
 - 2) Area of Operations/Routes Where Operator Intends to Use Data Link.
 - (a) List of areas and/or routes where operator intends to conduct data link operations.
 - (b) List of air traffic centers/service providers with which operator intends to communicate via data link.
 - (c) List policy/procedures source documents applicable to each area(s) of operations, such as:
 - (i). Operations manuals for specific areas of operations (e.g., Future Air Navigation System (FANS) Operations Manual (FOM) for operation in Asia Pacific FIR's).
 - (ii). State Aeronautical Information Publications (AIP).
 - (iii). State Notices to Airmen (NOTAM).
 - (iv). FAA chart supplements (e.g., Pacific and Alaska Chart Supplement).
 - 3) Flight Crew Qualification Programs.
 - 4) Manuals and Other Publications.
 - 5) MMEL/MEL.
 - 6) Issues Unique to a Particular Operator.
 - 7) Maintenance Programs
 - 8) List of Source Documents Used:
 - (a) For generic data link Operations (e.g., aircraft/avionics manufacturer documents)
 - (b) For area of operations specific policy/procedures.
 - 9) Description

- ◆ Description of aircraft data link systems including certification documents and current configuration (e.g., current avionics load).

3.2 CONTENT OF FLIGHT CREW QUALIFICATION PROGRAMS

- A. Academic Training Subjects, as expanded later in this AC, will include—
- 1) General Concepts of Digital and Analog Communications.
 - 2) Expected Flight Crew Response.
 - 3) ATS Coordination.
 - 4) Aircraft Digital or Analog Communication Equipment Components, Displays, Alerts Sources:
 - (a) Aircraft manufacturer documents,
 - (b) Interface with other aircraft systems,
 - (c) Aircraft Flight Manual (AFM) information,
 - (d) Minimum equipment list (MEL) provisions,
 - (e) Data Link Events Reports,
 - (f) Data Link Malfunction or Irregularity Reports, and
 - (g) Human Factors-Lessons learned.
- B. Operational Use Training, as expanded later in this AC will include—
- 1) General requirements
 - 2) Simulators,
 - 3) Computer-Based Instruction (CBI),
 - 4) Policy on Initial Pilot Evaluation, and
 - 5) Recurrent Training and Evaluation.
- C. Currency (Recency of Experience).
- D. Line Checks and Route Checks.
- E. Line-Oriented Flight Training (LOFT).

- Basic source document for data link procedures in Pacific Oceanic areas is the Future Air Navigation System (FANS) Operations Manual (FOM), Part 5.
- Policy/procedures applicable to specific flight information regions (FIR) are in the State Aeronautical Information Publication (AIP) and Notices to Airmen (NOTAM).

SECTION 4 FLIGHT CREW QUALIFICATION FOR DATA LINK COMMUNICATIONS

4.1 GENERAL

4.1.1 DATA LINK COMMUNICATIONS QUALIFICATION ISSUES & OBJECTIVES

- A. Air carriers should address the following issues and objectives to ensure appropriate flight crew data link communications qualification:
- 1) Provide necessary flight crew knowledge of data link communications concepts, systems, and procedures (data link communications academic training).

- Separate qualification issues and training should be addressed depending on the system being used by the operator, (digital or analog data link).

- 2) Develop necessary flight crew knowledge and skills to properly respond to data link communications clearances or advisories (data link communications procedure training).
- 3) Assess each pilot's ability to properly use data link communications (data link communications initial evaluation).
- 4) Identify human factors issues specific to flight crew operation and interaction with the communication software, hardware, and operating environment (e.g., head-down time, situational awareness, loss of party-line information and response time in the RCP specification).
- 5) Maintain appropriate data link communications knowledge and skills which may include data link communications recurrent training.

Knowledge of applicable RCP types and their performance requirements should be part of the training curriculum.

4.1.2 DATA LINK COMMUNICATIONS TRAINING

- A. Flight crew member training for first time use of data link services should be included in initial, transition, upgrade, recurrent, differences, or stand-alone qualification programs.
 - Data link communications training could be included in specific aircraft qualification programs during transition, upgrade, or differences training (e.g., during DC-10 to B747-400 transition)
 - Operators could conduct data link communications training in conjunction with general training (e.g., during initial "new hire" indoctrination, recurrent proficiency checks or proficiency tests, or line-oriented flight training).
- B. Data link communication training programs may also be developed as separate training programs.
 - For example, by completion of a standardized curriculum covering the general use of data link services at an operator's training center or at designated crew bases).

4.1.3 CREDIT FOR USE OF OTHER PROGRAMS

- A. Operators may receive credit for existing data link communications training programs that are already approved in a different application.
- B. For example, an operator may receive credit for programs based on previous use of data link services, such as—
 - On different routes; or
 - For a different type of operation; or
 - Training programs conducted by another operator, training center, or manufacturer.
- C. The Principal Operations inspector (POI) will determine whether and how much credit an operator should receive, considering whether the—
 - 1) Training program is used in another RCAA approved application; and
 - 2) Operator has demonstrated that the training program is relevant to the new application.

The Aircraft Engineering and Registration Division may assist the POI in determining the suitability of a proposed data link training program for a particular operator's procedures and aircraft capability.

4.2 DATA LINK COMMUNICATIONS ACADEMIC TRAINING

The subjects of this section should be addressed in an approved program of data link

Only the new, revised, or emphasized items need be addressed in subsequent programs.

communications academic training during the initial introduction of a crew member to data link communication systems.

4.2.1 GENERAL CONCEPTS OF DATA LINK COMMUNICATIONS OPERATION

- A. Academic training should cover, in general terms, data link communications systems theory to the extent appropriate to ensure proper operational use.
- B. Flight crews should understand basic concepts of operations involving data link services, nominal and unacceptable performance, normal and non-normal use, and limitations.

4.2.2 LEVEL OF CAPABILITY PROVIDED BY DATA LINK COMMUNICATIONS & EXPECTED FLIGHT CREW RESPONSE

- A. Academic training should explain the normal, expected pilot response to data link messages including acknowledgment, acceptance, rejection, or cancellation of a data link message.
- B. 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 require Direct Controller Pilot Communications (DCPC), such as CPDLC, and ADS-C.
- C. For operational implementation of reduced distance-based longitudinal separation, the airspace may require that the data communication system complies with RCP-240 and surveillance performance criteria, or other equivalent means.

More information on the criteria for data link communication systems supporting reduced separation can be found in RTCA DO-306/ED-122.

4.2.3 DATA LINK COMMUNICATIONS LANGUAGE, TERMS & SYSTEM INFORMATION

Flight crews should be familiar with data link message sets, abbreviations and conventions used, 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).

4.2.4 ATS COMMUNICATION, COORDINATION & CREDITS FOR USE OF DATA LINK COMMUNICATIONS

- A. 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.
- B. 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.
- C. This would include any necessary coordination with ATC related to or following a data link exceptional event, ensuring an acceptable transition to a new type of operation.

Procedures related to the transition to a different separation standard when data link services fail would involve coordination with ATC.

4.2.5 DATA LINK COMMUNICATIONS EQUIPMENT COMPONENTS, CONTROLS, DISPLAYS, AUDIO ALERTS & ANNUNCIATIONS

- A. Procedural training should include discussion of terminology, symbology, operation, and optional controls and display features, including any items particular to an air carrier's implementation or the uniqueness of its aircraft capability and/or procedures.

- B. Applicable message sets, expected transmission times, failure annunciations, constraints, and limitations should be addressed.

4.2.6 INTERFACES & COMPATIBILITY WITH OTHER AIRCRAFT SYSTEMS

- A. Training should include the management of any applicable data link air/ground communications systems and applications, including; VHF data link, SATCOM data link, HF data link, and Mode S.

- This training should also address voice integration with other cockpit systems, FMS inputs to data link, and electronic flight instrument system interfaces, including any items particular to an air carrier's implementation or uniqueness of its system.

- B. 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.

- C. Flight crew 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.

The priority for ATS data link is VHF, SATCOM data link and last HF data link.

- 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).

4.2.7 AIRCRAFT FLIGHT MANUAL (AFM) INFORMATION

AFM provisions should be addressed including information on—

- Data link communications modes of operation
- Normal and non-normal flight crew operating procedures
- Response to failure annunciations
- Any AFM limitations.

4.2.8 MEL PROVISIONS FOR SYSTEMS RELATED TO CPDLC/ADS-C OPERATIONS

- A. Flight crews, dispatch, and maintenance personnel should be familiar with the MEL requirements.

- B. 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.

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.

- C. Equipment required in current FANS-1/A-capable models is as follows—

- 1) VHF, SATCOM, HFDL radios, as appropriate,
- 2) ACARS MU/CMU,
- 3) Flight Management Computer (FMC) integration, and
- 4) Printer (if company procedures require its use).

4.2.9 CORRECT PROCEDURES ARE IMPORTANT

A. FANS operations have shown that system performance is extremely sensitive to the use of correct procedures.

It is essential that crews be properly trained prior to their using the CPDLC and/or ADS-C functions.

B. 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.

4.2.10 PILOT TRAINING

An operator shall establish and maintain a ground and flight training program, approved by the State of the Operator, which ensures that all flight crew members are adequately trained to perform their assigned duties

4.2.11 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.

4.2.12 GENERAL PROVISION FOR ICAO ANNEX 6 TRAINING

Operators are reminded of basic provisions contained in ICAO Annex 6.

4.2.13 FLIGHT CREW RESPONSE

Appropriate pilot response to data link, SATCOM voice and other such issues.

4.2.14 DATA LINK EVENT REPORTS

The air carrier's data link non-normal event reporting policies for flight crews.

4.2.15 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.

4.2.16 HUMAN FACTORS

Flight crew human factors are issues specific to the operating environment and operation of the installed communication system.

4.3 DATA LINK COMMUNICATIONS OPERATIONAL USE TRAINING

In addition to the recommended academic training, 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.

4.3.1 SKILL SETS

Operational use training should include the following—

- 1) Receiving and interpreting messages
- 2) Accepting, rejecting or canceling messages
- 3) Storing and retrieving messages
- 4) Loading messages into appropriate controls/displays for use (e.g., FMS, FGCS)
Formulating and sending messages

- 5) Loading message requests from the FMS
 - ◆ For example: Flight plan waypoints into data link for transmission if applicable)
- 6) Managing the communications systems
- 7) Establishing and terminating system operation
- 8) Switching use of RF media (if this is a crew-controllable feature)
- 9) Re-establishing system operation after loss of network log-on

4.3.2 EQUIPMENT TRAINING

In addition, training programs should cover the proper use of data link communication controls, procedures, and limitations.

- Correct assessment of 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 should be taught.

4.3.3 ACCEPTABLE METHODS

- A. Such training may be conducted using data link communication-equipped flight training devices or simulators, or by using suitable CBI.
- B. Operators may apply provisions of either paragraph 4.3.4 and 4.3.5, or combinations of these provisions to address necessary initial and recurrent data link communications use training, as approved by the RCAA for that operator's specific data link communication systems, training devices, and simulators.

- Criteria for programs intending to address proper data link communications use through the use of simulators or training devices are listed in paragraph 4.3.4.
- Criteria for programs intending to address proper data link communications use through CBI, and not using approved simulators or training devices, are listed in paragraph 4.3.5.

4.3.4 USE OF APPROVED SIMULATION

Programs addressing data link communications that use approved simulators or training device programs based on use of RCAA approved training devices or simulators should realistically depict relevant aspects of data link communication procedures, clearances, and pilot responses.

- This may be accomplished using one or more of a combination of training methods described in paragraph 4.1.
- Any simulator or training device used should have the characteristics described in paragraph 4.5.1.

4.3.5 USE OF APPROVED COMPUTER-BASED INSTRUCTION

- A. Programs addressing data link communications procedures through use of Computer-Based Instruction (CBI) may be approved which do not require using approved simulators or training devices if the proposed program meets certain criteria as described below.
- B. These programs are based on CBI adequately depicting data link communications procedures, clearances, desired pilot responses, and resulting crew interactions with aircraft flight management systems.
- C. Such programs should include the issues identified in paragraph 4.1, and be consistent with the following criteria—
 - 1) Accepted RCAA and industry guidelines

- 2) There should be no significant adverse training experience related to the particular data link communications system(s)
- 3) 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
- 4) The program should realistically depict data link communications scenarios
- 5) The training subject should be made aware of the normal delivery delays to be expected
- 6) Scenarios should demonstrate correct indications for messages, display annunciations, aural alerts, and require proper pilot responses

4.3.6 ATO SERVICE PROVIDERS

- A. ATO training organizations may conduct data link communication training for an operator if approved by the POI.
- B. The POI will consider the following factors—
 - 1) Provisions of paragraphs 4.1 and 4.2 are shown to be met, or
 - 2) Equivalence to a previously approved 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 approved program.

4.4 INITIAL EVALUATION OF DATA LINK COMMUNICATIONS KNOWLEDGE & PROCEDURES

- A. Individual crew member data link communications knowledge and procedures should be evaluated prior to data link communications use.

- RCAA-FSS inspectors must monitor the training and qualification of the initial cadre of crew members throughout the entire process.
- Any element of the training of the initial cadre which is not monitored by RCAA will be invalid for the purpose of final approvals.

- B. Acceptable means of initial assessment include—

- 1) Evaluation by an authorized instructor or check airman using a simulator or training device capable of depicting data link communication exchanges.
- 2) Evaluation by an authorized instructor or check airman during line operations, training flights, PC/PT events, supervised line flight, route checks or line checks.
- 3) Computer-based testing in which data link communication scenarios and advisories are depicted and records acceptable pilot performance.
 - Any proposed alternate method should demonstrate the equivalent effectiveness of methods (1) through (3).
- 4) Other alternate methods acceptable to the RCAA.

4.4.1 DATA LINK COMMUNICATIONS RECURRENT TRAINING

- A. Data link communications training should be integrated as other established training programs and conducted on a recurrent basis.
- B. Recurrent training for data link communications should incorporate the recommendations of paragraph 4.1 and address any significant issues identified by line operating experience, system changes, procedural changes, or unique characteristics.

4.4.2 DATA LINK COMMUNICATIONS RECURRENT EVALUATION

Recurrent data link communications checking should be incorporated as necessary, as an element of routine proficiency training or proficiency check programs.

4.4.3 DATA LINK COMMUNICATIONS CURRENCY (REGENCY OF EXPERIENCE)

Unless otherwise required in an operational specification, once crews have completed initial data link communications training and as long as recurrent training is accomplished in accordance with paragraph 4.4.1 of this AC, the operator will not be obligated to develop additional currency requirements.

4.4.4 LINE CHECKS & 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.

4.4.5 LINE-ORIENTED FLIGHT TRAINING (LOFT)

- A. LOFT programs using simulators equipped with data link communications should be enhanced by interaction with data link communications.
- B. In addition, LOFT programs should consider proper crew use of data link along with other communication methods (SATCOM voice, VHF voice, HF voice, etc.).

4.4.6 CREW RESOURCE MANAGEMENT (CRM)

CRM programs should address effective teamwork in responding to data link exchanges.

4.4.7 DATA LINK COMMUNICATIONS ACADEMIC TRAINING METHODS

- A. Appropriate methods may be suited to each air carrier's program.
- B. No special methods related to academic training for data link communications are identified.
- C. Typically, a combination of ground instruction, manual information, flight crew bulletins, and other such means as appropriate to address academic topics specified by paragraph 4.2 (data link communications academic training)

4.5 ACCEPTABLE SIMULATION FOR DLC TRAINING

4.5.1 ACCEPTABLE CHARACTERISTICS

- A. Training devices and simulators should have certain characteristics to be effective. This is due to the interactive nature of data link communications, the RCARiety of exchange scenarios possible, the immediate and standardized pilot response required, and the correct display interpretation that is necessary.
 - B. Simulation used for data link communications training should have the following characteristics—
 - 1) The ability to functionally represent data link communication displays, controls, indications, and annunciations.
 - 2) Ability to depict selected message traffic exchange scenarios including data link communications displays and audio advisories.
 - 3) Ability to show proper data link communications reaction to depicted scenarios and advisories, crew or ATC response errors, etc.
 - 4) Ability to interactively respond to pilot inputs regarding data link communication advisories, including responses to failures or abnormal situations.
-

4.5.2 SIMULATOR & DATA LINK COMMUNICATIONS SYSTEM FIDELITY

- A. For a particular data link communication system, training may be accomplished in simulators or training devices that represent the specific aircraft, or an aircraft with similar characteristics.
- B. For the purposes of data link communications training, simulators or training devices may use simplified algorithms or abbreviated message set capability.
- C. 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.

4.5.3 TRAINING DEVICE OR SIMULATOR APPROVAL

- A. Training devices or simulators meeting RCAA criteria are qualified and approved for use by the POI.
- B. Any one or combination of the following devices or simulators that meet characteristics of paragraph 4.5.1 of this AC (Acceptable Characteristics) may be used—
 - 1) Level A through D simulators
 - 2) Level 4 through 7 flight training devices, or
 - 3) Dedicated data link communications training devices found acceptable by RCAA which are shown to be suitable for data link communications training).

4.6 OTHER OPERATIONAL ISSUES

4.6.1 MANUALS & 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.

4.6.2 MMEL/MEL

Operators formulate necessary data link communications revisions to their MEL(s) for each particular fleet (e.g., B727, DC10). RCAA-required MEL revisions to be consistent with the State of Design MMEL established for each aircraft type.

4.6.3 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 an approved differences training program in accordance with RCAR Part 14.

4.6.4 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.

4.6.4.1 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, time of day, season, or sunspot cycles).

4.6.4.2 Example of a "Procedural" Issue

- A. 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 controller-pilot data link communication may not be supported in certain states.
- B. 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.

4.6.4.3 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.

- For example, Boeing FMS "Load 11" software requires a workaround solution for incorporating the aircraft tail number in data link messages, whereas "Load 12" does not.

SECTION 5 MAINTENANCE

5.1 GENERAL

- A. 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.
- B. To obtain RCAA authorization, an operator must demonstrate that their 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.

5.2 MAINTENANCE TRAINING

- A. 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.
- 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."
- B. This includes, but is not limited to, installation, modification, correction of reported system discrepancies, use of test equipment, procedures, MEL relief, and "return-to-service" authorizations.
- C. 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.
- Operators unsure of required maintenance procedures for data link-related equipment should contact their aircraft manufacturer field service representatives.

5.3 CONFIGURATION CONTROL

A. 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.

B. Operators are requested to provide their RCAA-assigned Principal Avionics Inspector with information on their current aircraft avionics configurations and provide updates when the configuration changes.

5.4 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 system are able to identify and properly respond to the installed level of data link communication capability.

5.5 DATA LINK COMMUNICATIONS "RETURN TO SERVICE" POLICIES

Data link communications "return to service" policies should be established to ensure proper data link communications functions when an aircraft is returned to service after a datalink communication failure or maintenance action.

SECTION 6 DATA LINK COMMUNICATIONS OPERATIONAL USE

6.1 GENERAL

Operationally, those skills addressed and the guidance recommended in the data link communications training should be followed and implemented by each operator electing to use data link communications.

6.2 PILOT RESPONSIBILITIES

- A. Data link communications are intended to serve as either a primary or supplementary communications means as designated for the operations being conducted.
- B. For data link communications to work as designed, prompt and correct initiation response to data link advisories is important. flight crews using data link communications should respond in accordance with the following guidelines—
 - 1) Prompt initiation of messages where needed.
 - 2) Prompt response to messages where appropriate.
 - 3) Appropriate crew coordination so that each crew member receives pertinent information needed.
 - 4) Appropriate retention of messages (archive) requiring later action (printer copies of oceanic clearances etc.)
 - 5) Appropriate resolution of message uncertainty.
 - 6) Appropriate use of data link and voice, respectively, where circumstances or operations dictate (e.g., voice for backup or clarification of non-normal situations).
 - 7) If an ATC data link clearance contradicts a voice clearance, comply with the voice clearance.

6.3 DATA LINK COMMUNICATIONS GOOD OPERATING PRACTICES

The following data link communications "good operating practices" have been identified—

- 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.
- 2) Free text data link messages should use standard aeronautical terminology, accepted abbreviations, and be written in English.
- 3) When appropriate, verify data link communication functions prior to departure.

6.4 OPERATOR RESPONSIBILITIES

Operators have the following general responsibilities regarding data link communications—

- 1) Verify data link communications functionality for each environment to be used and when new or modified components or software are introduced.
- 2) Assure follow-up and evaluation of exceptional data link events
- 3) Periodically assess data link communications training, checking, and maintenance programs to ensure their correctness, pertinence, timeliness, and effectiveness

6.5 ATC RESPONSIBILITIES

The operator can expect ATC to adhere to the following procedures—

- 1) Ensure that controllers do not knowingly issue data link instructions that are contrary to voice instructions when data link is being used.
- 2) Be aware of pertinent data link communication program changes.
- 3) Train ATC specialists about data link expected flight crew responses to data link advisories, and permit familiarization flights for specialists on data link equipped aircraft to the extent possible.
- 4) When requested by the flight crew, provide clarification or confirmation of data link messages and assist in returning to the assigned clearance, if appropriate. Issue additional clearance instructions when necessary.
- 5) Advise pertinent ATC organizations 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.
- 6) Advise RCAA and, through notifications, the operator of other hazardous conditions, situations, or events which may be related to data link communications.

SECTION 7 DATA LINK EVENT REPORTING

7.1 GENERAL

- A. Operators and manufacturers are encouraged to develop procedures to ensure effective identification, tracking, and follow up of data link-related events, as appropriate.
-

- B. Such procedures should focus on providing useful information to—
- 1) Properly assess the importance of data link events
 - 2) Follow up on information related to specific data link events as necessary
 - 3) Keep the industry and RCAA informed on the performance of data link in the NAS and international operations.

7.2 PILOT REPORT

7.2.1 DATA LINK-SPECIFIC REPORTS

Pilots should make the following reports for unusual data link events, as necessary—

- Upon query from ATC, or after an inadvertent deviation from an ATC clearance, make radio communications as appropriate to report the event and file a report with the operator..

7.2.2 OPERATOR-SPECIFIED REPORTS

Operators may specify additional reports concerning data link anomalies, procedural difficulties, or system failures typically are made by pilots through one or more of the following methods—

- 1) Pilot/Observer Questionnaire
- 2) Logbook entry, ACARS, etc., or
- 3) Other record used by that operator (e.g., "Captain's Report").

Refer to Appendix A for a sample report form.

7.2.3 OTHER REPORTS INCIDENTAL TO DATA LINK

7.2.3.1 Near Mid-Air Collision (NMA)C Reports

Flight crews 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.

7.2.3.2 Aviation Safety Reporting System (ASRS) Reports

ASRS reports may be filed at the discretion of the flight crew.

7.2.3.3 Operator/Maintenance Department Reports

- A. Operator maintenance department personnel should make data link-related reports as necessary.
- B. Submit reports of frequent or systematic data link problems that may relate to system performance, manufacturers, and/or data link vendors to the PAI or PAI, as appropriate.

7.2.3.4 RCAA ATC

ATC will report the following—

- 1) Data link events to RCAA-FSS as necessary
- 2) Any exceptional data link-related events regarding NAS performance to the En-Route Monitoring Agency.

7.2.3.5 Data Link Manufacturer Reports

- A. Data link avionics manufacturers report problems found with specific data link systems in accordance with established service difficulty report (SDR) procedures.

- B. Generic problems, such as those that may relate to the definition of ARINC 622 or 745 characteristics or of documents listed in paragraph 1.6 of this AC should be reported to the State of Design/Manufacture.

End of text - Appendices follow

APPENDIX A
Sample Data Link Event Reporting Information

DATA LINK COMMUNICATIONS REPORT			
Date		Phase of Flight	
Time:		Position	
Operator		Altitude	
Flight#		PIC Name	
Origination		PIC Phone	
Destination		PIC E-mail	
Submitted TO:		ATC Inquiry?	
Describe Event:			

End of Appendix A

APPENDIX B

Data Link Communications MEL & MMEL Provisions

1. Example Of A Minimum Equipment List (MEL)

- A. 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 an MEL. MEL's are approved for each operator and type aircraft, within provisions of the MMEL for that type.
- B. When proposed, MEL provisions are consistent with the MMEL; principal operations inspectors (POI) may approve the MEL.
- C. If less restrictive MEL or different MEL provisions are requested, the MEL should not be approved.

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.

EQUIPMENT	CONDITION
Data link system C-0	(M) May be inoperative provided the system is deactivated and secured.
Dual Data link or C-21 data link controls or displays	<p>(O) May be inoperative on the flying pilot side provided that:</p> <ul style="list-style-type: none"> (a) Appropriate data link elements and functions are operative on the non-flying pilot side, and (b) Display data link indications are visible to the flying pilot <p>(O) May be inoperative on the non-flying pilot side provided that:</p> <ul style="list-style-type: none"> (a) The required minimum voice communications are operative and the voice procedures are approved for the route and 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)	(O) May be inoperative on the flying pilot side provided that all other data link display and control functions are operative. All elements of each data link transmission can be retrieved, display and reviewed by the flight crew 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)

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 regulations may be inoperative.
-XX-2 Analog Data Link Communications Systems	D	-	-	Any in excess of those required by regulations may be inoperative.

- 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.

End of Appendix B

APPENDIX C

Data Link Systems & Operating Environment

1. General Instructions

- A. The DL Types, Capability & Standards Table (see header 2 below) 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 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.
- B. Use Capability & Standards Table 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 determine the interoperability standard.

- Refer to the 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.

2. Applicable Data Link Types, Capability & Standards

Row	Aircraft DL System	Type of Airspace	ATS Unit System	Capability & Uses	Applicable Standards
1	ATN B1	Domestic	ATN B1	<ul style="list-style-type: none"> ● Supplemental ATC communications: ● CM application supports DLIC data link service ● CPDLC application supports ACM, ACL, and AMC data link services <p><i>Note 1: DCL, DSC, D-ATIS, and FLIPCY data link services are not supported.</i></p>	<ul style="list-style-type: none"> ● DO-290/ED-120, Chg 1 and Chg 2, Continental SPR Standard ● DO-280B/ED-110B, ATN B1 INTEROP Standard ● Sub-network standards for VDL M2 (See Sub-NetWorks Table (Section 3 of this Appendix)).

2	FANS-1/A+	Domestic	ATN-B1 FANS 1A	<p>Same as Row 1 except:</p> <ul style="list-style-type: none"> ● Uses AFN application for DLIC data link service ● For CPDLC application, UM 215, TURN [direction] [degrees] is not supported <p><i>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-305/ED-154, paragraph 4.2.13.2.</i></p> <p><i>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.</i></p>	<p>Same as for Row 1, plus:</p> <ul style="list-style-type: none"> ● 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) ● Sub-network standards for VDL M2 (See Sub-NetWorks Table (Section 3 of this Appendix)).
3	FANS 1/A+ or FANS 1/A	Oceanic & Remote	FANS 1/A	<ul style="list-style-type: none"> ● Normal means of ATC communication uses AFN and CPDLC applications for DCPC <p>Eligible for:</p> <ul style="list-style-type: none"> ● RCP 240 operations via any sub-network listed in Sub-NetWorks Table (Section 3 of this Appendix), except for HFDL ● RCP 400 operations via any sub-network listed in Sub-NetWorks Table (Section 3 of this Appendix). ● No RCP operations via any sub-network listed in Sub-NetWorks Table (Section 3 of this Appendix). <p><i>Note 4: Aircraft capability that supports multiple RCP type operations needs to include appropriate indications and/or alerts to enable the flight crew 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).</i></p> <ul style="list-style-type: none"> ● Uses ADS-C application for automatic position reporting. See required performance for ADS-C application per DO-306/ED-122. ADS-C application over HFDL (See Sub-NetWorks Table (Section 3 of this Appendix)) not eligible for reduced longitudinal separation. 	<ul style="list-style-type: none"> ● DO-306/ED-122, Oceanic SPR Standard ● DO-258A/ED-100A (or earlier versions), FANS 1/A INTEROP Standard ● Sub-network standards for selected sub-networks. (See Sub-NetWorks Table (Section 3 of this Appendix)). <p><i>Note: Allows use of one or more sub-networks. See Capability and Uses column for indications, alerts and sub-networks that are eligible for intended operations.</i></p>

4	FANS 1/A+ or FANS 1/A	Oceanic & Remote	CADS	<ul style="list-style-type: none"> ● No CPDLC application ● Uses ADS-C application for automatic position reporting. See required performance for ADS-C application per DO-306/ED-122. 	<ul style="list-style-type: none"> ● DO-306/ED-122, 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 FIG/10, Paris, March 29-April 2, 2004 (Applies only to ATS unit) ● Sub-network standards same as row 3
5	FMS WPR	Oceanic & Remote	CFRS	<ul style="list-style-type: none"> ● No CPDLC application ● Uses FMS WPR application for automatic position reporting. See required performance for FMS WPR application per DO-306/ED-122. 	<ul style="list-style-type: none"> ● DO-306/ED-122, Oceanic SPR Standard ● ARINC 702A, Advanced 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). ● Sub-network standards same as row 3.
6	FANS 1/A ADS-C	Oceanic & Remote	FANS 1/A or CADS	<ul style="list-style-type: none"> ● Same as Row 4 	<ul style="list-style-type: none"> ● DO-306/ED-122, 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). ● Sub-network standards same as row 3.
7	ACARS	Domestic Oceanic or Remote	ACARS	<ul style="list-style-type: none"> ● Departure clearance or pre-departure clearance. ● Data link – automated terminal information service. ● Oceanic clearance. 	<ul style="list-style-type: none"> ● ED85 ● ED-89 ● ED-106 ● A623 ● Sub-network standards same as row 3. <p><i>Note 5: Allows one or more capability. a) through d) are applicable for selected capabilities and uses.</i></p>

3. Definitions for Data Link Sub-Networks

Sub-Network Designators	Applicable Sub-Network Standards
<ul style="list-style-type: none">● VDL M0/A	<ul style="list-style-type: none">● A618-6 for air/ground protocol
<ul style="list-style-type: none">● VDL M2	
<ul style="list-style-type: none">● HFDL	<ul style="list-style-type: none">● DO-265 Minimum Aviation System Performance Standard (MASPS)● A753-3
<ul style="list-style-type: none">● SATCOM (Inmarsat)	<ul style="list-style-type: none">● DO-270A (MASPS)● A741P2-7
<ul style="list-style-type: none">● SATCOM (Iridium)	<ul style="list-style-type: none">● DO-270A (MASPS)● A741P2-7● A761-2

End of Appendix C

APPENDIX D

Provisions For Use Of Data Link In Rwanda Airspace

- A. 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 Rwanda airspace, or with Rwanda domestic facilities.
- B. An appropriate data link must be installed and operated on suitable frequencies specified by air traffic control (ATC) during flight in Rwanda 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.
- C. A data link capable of coordinating with air traffic facilities using Radio Technical Commission for Aeronautics (RTCA) DO-219 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 Rwanda airspace using data link, except as provided for by the Minimum Equipment List (MEL) provisions acceptable to the State of the Operator.
- D. Training and procedures for use of data link as specified by ICAO, this advisory circular (AC), or other equivalent criteria acceptable to the RCAA should be used when operating in Rwanda airspace.

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

End of Advisory Circular
