EAC No. 91-18

TABLE OF CONTENTS

Operational Authorization Process for Use of Data Link Communication System

1. Purpose:

This advisory circular (AC) presents various methods for operators of different data link systems to meet international standards set by the International Civil Aviation Organization (ICAO) and the regional airspace authorities. Egyptian Civil Aviation Authority (ECAA) notes that there is presently no requirement in Egyptian Civil Aviation Regulations (ECAR) to have data link communications when operating in the National Airspace System (NAS). Instead, the regulations in ECAR govern radio communication systems, and nothing in this AC relieves an operator from the requirement to have and use a voice communication system when operating in international airspace or the NAS. However, operators that choose to operate in a reduced separation standard that requires the use of a data link system (in addition to the required voice communication system) must obtain ECAA design approval and a revision to their ECAR part 121, 125 operation specifications (OpSpecs), part 91 subpart K (part 91K) management specifications (MSpecs) or part 91 letter of authorization (LOA), as applicable. The Future Air Navigation System (FANS) 1/A system used in oceanic and remote airspace is an analog system which communicates over Aircraft Communications Addressing and Reporting System (ACARS). Guidance is needed for the operation of all systems.

2. Applicability:

This AC applies to aircraft and operators operating under parts 91,91K, 121, 125. 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.

   a.   **Exceptions.** This AC does not address the use of data link communications for Aeronautical Operational Control (AOC) and certain specific Air Traffic Service (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 ADS-B which is not a data link system. It is a transponder based 1090 Mhz squitter which transmits position information for surveillance only. The communication is line of sight on frequency h1090 M z.

   b.   **Compliance.** 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.

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

3. Related reading material (current editions).

a. **ECAR.** The following ECAR parts are applicable to the communications systems and applications covered in this document: parts 21, 23, 25, 27, 29, 43, 91, 91K, 121, 125.

b. **ACs.** The following ACs provides additional information that may assist in the operational authorization of data link communications systems:

    (1) AC 20-140, Guidelines for Design Approval of Aircraft Data Link Communication Systems.

    (2) AC 120-160, Onboard Recording of Controller-Pilot Data Link Communication in Crash Survivable Memory.

c. **ICAO Documents.**

    (1) Document 4444 (PANS/ATM). Procedures for Air Navigation Services - Rules of the Air and Air Traffic Services.

    (2) Global Operational Data Link Document (GOLD). ICAO Global Guidelines for data link operations.

    (3) Annex 6. Operation of Aircraft.

    (4) Annex 10. (Standards and Recommended Practices-SARPs), Volume III, Part 1, Data link Communications Systems.

    (5) Annex 11. Air Traffic Services.

    (6) Document 7030, Regional Supplementary Procedures.

    (7) Document 9869, Manual on Required Communication Performance (RCP) First Edition -2008.

d. **FANS Interoperability Team and FANS Interoperability Group Global Document.**

    (1) FOM (current edition); and

    (2) North Atlantic (NAT) guidance material.

4. Background and Definitions.

a. **History.** This AC is applicable to ATN VHF data link (VDL) Mode 2 communication systems. The FANS 1/A system used in oceanic and remote airspace is a data link system which communicates over Aircraft Communications Addressing and Reporting System (ACARS) which uses a variety of sub-networks, such as satellite, VDL Mode 0/A, VDL Mode 2, and HFDL.

b. **Data Link Implementation.** Data link applications are being implemented in flight operations utilizing FANS-1/A (which includes CPDLC and Automatic Dependent Surveillance- Contract (ADS-C). 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 data link (HFDL) sub-network 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 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 ECAA 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.

c. **Definitions.** Certain definitions in this AC are taken from other ECAA materials. Other definitions are unique to this AC, and their application is limited to use with data link systems.

    (1) Aircraft Certification Office (ACO). ECAA offices responsible for the determination of aircraft airworthiness and other issues related to parts 21, 23, 25, 33, and other airworthiness rules. ACOs issue type certificates (TC), and Supplemental Type Certificates (STC), and are responsible for the technical assessment of service difficulties and Airworthiness Directives (AD).

(2) **Aircraft Evaluation Group (AEG).** AEG has a variety of responsibilities, which include the following:
- Providing operational input to Egyptian Civil Aviation Authority engineering offices and to the manufacturer during the aircraft design and type certification process.
- Evaluating the aircraft, its system, and the manufacturer's recommended procedures from unique operational characteristics.
- Determining recommended minimum flight crewmember training, checking, and currency requirements.
- Establishing pilot type rating needs and requirements.
- Participating in crew complement determinations.
- Establishing special training requirements (such as dutch roll training in a B-727).
- Developing and revising master minimum equipment lists (MMEL).
- Developing maintenance program requirements and reviewing maintenance programs to determine whether there are adequate instructions for the procedures being used.
- Providing operational guidance for airworthiness directives (AD), service difficulty reports (SDR), and supplemental type certificates (STC0.
- Convening and providing a chairperson to flight standardization boards (FSB), flight operations evaluation boards (FOEB), and maintenance review boards (MRB).
- Conducting initial flight checks of Flight Standards operations inspectors, the aircraft manufacturer's initial pilot cadre, initial operator pilots, and ECAA engineering flight test pilots, if necessary, for a new type of aircraft type.
- Coordinating with the National Simulator Team on evaluation of data packages for flight simulator acceptance.

(3) **Certificate-Holding District Office (CHDO).** An AFS office responsible for the administration of ECAR part 119 certificate authority for operations conducted under parts 121,125 for a particular certificate holder.

(4) **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.

(5) **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:
- (i) 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.
- (ii) Near mid-air collisions (NMAC) in which the use of a data link service is suspected to be a contributing cause.
- (iii) Data link system performance below that of normal operation or required by the operational procedure (e.g., RCP 240).
- (iv) ATC operational error involving the use of data link associated with a data link procedure or operation.
- (v) 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.
- (vi) Use of the data link service that caused excessive crew workload.

- (vii) A data link service that provides reasonable information but is subsequently verified to be erroneous.

(viii) 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.

(6) 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, RCP types, 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.

(7) 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.

(8) Data Link System. The different systems include ATN-Baseline 1, a digital system and FANS-1A, which is basically an analog based system. At the present time the digital operation is known as 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 ACARS convergence function (ACF) for transmission over a character-oriented network.

(9) Flight Standards District Office (FSDO). An ECAA field office serving an assigned geographical area and staffed with Flight Standards (AFS) personnel who serve the aviation industry and the general public on matters relating to the licensing of aviation personnel, certification of aircraft and operational authorization of air carriers, commuter and general aviation operations.

(10) Flight Standards Board (FSB). The FSB's primary responsibilities are to determine the requirements for pilot type ratings, to develop minimum training recommendations, and to ensure initial flight crewmember competency in accordance with AC 120-53, Crew Qualification and Pilot Type Rating Requirements for Transport Category Aircraft Operated under ECAR Part 121. This information is published in a report that is sent to AFS-200 for coordination. After approval, it is to be used by the principal operations inspector (POI) as guidance in approving operator training, checking, and currency programs. The report is distributed to field offices through the master minimum equipment list (MMEL) subsystem of the Aviation Safety Analysis System (ASAS) data base. Specific functions of the FSB are as follows:

(i) Determination of Pilot Type Ratings. The FSB determines the requirement for a pilot type rating for new aircraft usually during certification flight tests. The FSB also evaluates differences in follow-on aircraft to determine if a new pilot type rating is required.

(ii) Development of Training Objectives. The FSB develops training objectives for normal and emergency procedures and maneuvers and reviews training device requirements.

(iii) Training Recommendations. The FSB publishes recommendations for use by POIs during approval of an operator's training program. In developing training objectives and procedures, the FSB considers unique requirements of an aircraft such as the fly-by-wire electronic flight control system and the side-stick controller of the Airbus 320.

 (iv) Initial Training/Checking. Board members usually conduct initial training and checking of the manufacturer's pilots and ECAA operations inspectors.

(v) Review of Existing Training Programs. When required, the FSB may review training programs for existing aircraft to evaluate the effectiveness of the training.

(vi) Accidents. In case of an accident, FSB members may be consulted on training or crewmember competency issues involving aircraft assigned to the board.

(11) Follow-on STC (as related to data link communications). A data link communications STC other than as described in item (12) below for an "Initial TC/STC." The following examples are considered to be "follow-on" STCs:

(i) A previously approved data link communications installation, installed in a subsequent type or model aircraft.

(ii) 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.).

(12) Initial TC/STC (as related to data link communications). The first ECAA data link communications airworthiness approval (in accordance with a TC or STC) of any one or combination of the following components: a data link processor and/or management unit, 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.

(13) Maintenance Review Board (MRB). An ECAA board responsible for establishing maintenance requirements for a specific aircraft type. MRB requirements are usually formulated in conjunction with information provided by the manufacturer and prospective operators through industry working groups. ECAA CHDOs apply MRB requirements in reviewing and approving each carrier's proposed maintenance program.

(14) Master Minimum Equipment List (MMEL). A ECAA document listing stipulations in accordance with ECAR §§ 121.628 that provides authorization for the continuation of flight beyond a terminal point with certain equipment inoperative. AEGs develop MMELs 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 MELs, which are associated with an air carrier's operation of that aircraft type.

(15) NAS. Information on the NAS related to operations and use of air traffic data link services can be found in AIP, airmen's information manual, NOTAM, Jeppesen Charts, or similar resources. The common network of U.S. airspace is comprised of the following:

- Air navigation facilities,
- Equipment and services,
- Airports,
- Aeronautical charts,
- Rules,
- Regulations,
- Procedures,
- Technical information,
- Manpower,
- Materials, and
- System components shared jointly with the military.

(16) National Simulator Evaluation Team (NSET). Team of ECAA operations specialists responsible for evaluating flight simulators to aid principal operations inspectors (POI) in approving those simulators in accordance with regulatory requirements (e.g., NSET evaluations support POI approval of a particular simulator for use in a specific part 121 program).

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

(i) PAI. The ECAA inspector assigned responsibility for overseeing all avionics issues relative to a specific operator, including input to training programs, OpSpecs, MEL requests, etc.

(ii) POI. The ECAA 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.

(iii) PMI. The ECAA 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.

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

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

5.   RCP CONCEPT.

a. **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, 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.

b. **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.

(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.

(2) **Continuity.** The probability that an operational communication transaction can be completed within the communication transaction time**.**

(3) **Availability.** The probability that an operational communication transaction can be initiated when needed.

(4) **Integrity.** The probability of one or more undetected errors in a completed communication transaction.

c.   **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:

(1) Assess viability of different technologies to meeting operational requirements;

(2) Approve the provision of air traffic services supported by communication systems;

(3) Determine when to initiate contingency procedures;

(4) Design, implement and qualify communication services;

(5) Design, implement, qualify and approve aircraft type designs;

(6) Approve aircraft operators for RCP operations when required; and

(7) Operationally monitor, detect and resolve non-compliant performance.

d. 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, for example:

(1) Specific message set or phraseology and transaction types;

(2) Interactive capability of voice communication;

(3) Air-ground integration capability of data communication;

(4) Interoperability criteria for a data link system, including its sub-networks; and

(5) Procedures for non-compliant performance and contingency.

e. 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.

f. Actual Communications Performance (ACP).

(1) ACP is the dynamic assessment of the actual operational performance a communication system, with human performance and technical performance included in the assessment. Human performance considers such factors as training, procedures and Human Machine Interaction (HMI). Technical performance comprises the installed elements of communication performance operating together and is used to demonstrate that the technical part of the operational communication system meets the intended function. ACP is assessed in the same terms and parameters as an RCP type, its allocations and other relevant operational criteria provided by an RCP specification.

(2) 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.

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

6. Authorization to use data link communications in flight operations.

a. General.

(1) Installation of a data link communication system requires ECAA design approval of changes to the aircraft's type design by amending the TC or issuing an 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 their OpSpec or a LOA to ensure that the system is used in accordance with international standards and requirements and in a manner that is acceptable to the ECAA. A revision to the OpSpec 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. 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.

(2) Responsibilities of various ECAA offices regarding data link communications. ECAA ACOs approve changes to a type design or issuance of STCs. ECAA AEGs formulate operational criteria for specific aircraft types related to training, checking, maintenance, MMELs or other operational issues, as necessary. The ECAA uses information developed by AEGs to review a particular operator's programs. CHDOs or FSDOs approve particular OpSpecs, LOAs, operator's training, maintenance programs, operational procedures, and MELs, if they are consistent with criteria specified in this AC, AIM, MMELs, FSB reports, MRB reports, and policy guidance from AFS-200, AFS-300, AFS-400, and AFS-800.

b. **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 ECAA AC 20-140 (current edition) or equivalent. Evidence should be submitted that the aircraft equipment has a type design approval per AC 20-140 (current edition). 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, per Table 1, Appendix 6. This evidence is used to determine the operator's eligibility for their specific operation.

c. **Operational Authorization.** Criteria for data link operational authorization are determined by the communication requirements specified for the intended operation per Table 1, Appendix 6. Operations that are not defined in Table 1 may require special criteria. 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. 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.

(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 6, 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 ECAA-approved maintenance instructions identified in conjunction with an STC or manufacturer's service bulletin.

(2) **Data Link Communications Authorization Methods.** ECAA 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.

(3) **Data link Communications Authorization Procedures.**

(i) Operational authorization to use data link communications is provided by an ECAA Inspector. Operators should make early contact with their respective POI's to permit timely ECAA response. Usually such contact is initiated at the time preparations are being made for data link communications system selection or purchase.

(ii) Installations, training, maintenance programs, MELs, and other data link communications program elements are reviewed and approved by the ECAA.

(iii) Prior to issuance of a 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 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 against the SPR and INTEROP standards, and/or RCP specifications, per Table 1 in Appendix 6 which may be demonstrated in an operational flight check. See Appendix 5 for application checklist.

(iv) 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., FMS ACARS interface, printers, CSP and air traffic facilities along the intended route of flight). The PAI will review the test results for conformance with international standards and ECAA policy and procedures.

7.   Flightcrew qualification for use of data link communications.

a. **General.** Parts 91, 91K, 121, 125.

(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, and/or other compliance air carriers should address the following issues and objectives to ensure appropriate flightcrew data link communications qualification:

(i) Provide necessary flightcrew knowledge of data link communication concepts, systems, RCP and procedures (data link communications academic training).

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

(iii) Assess each pilot's ability to properly use data link communications (data link communications initial evaluation).

(iv) 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, loss of party-line information and response time in the RCP specification).

(v) Maintain appropriate data link communication knowledge and skills which may include data link communications recurrent training.

(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 programs. Data link communications training could be included in specific aircraft qualification programs during transition, upgrade, or differences training (e.g., during MD-11 to B747-400 transition) or operators could conduct data link communications training in conjunction with general training (e.g., during initial "new hire" indoctrination, recurrent proficiency checks proficiency tests or line-oriented flight training. Data link communication training programs may also be developed as separate training programs (e.g., 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).

(3)   **Credit for Use of Other Programs.** Operators may receive credit for existing data link communications training programs that are already approved in a different application. 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. The POI will determine whether and how much credit an operator should receive, considering whether the training program is used in another ECAA approved application, and whether the operator has demonstrated that the training program is relevant to the new application. The Flight Technology and Procedures Divison (AFS-400), NSET, or the assigned AEG may assist the POI in determining the suitability of a proposed data link training program for a particular operator's procedures and aircraft capability.

b.   **Data Link Communications Academic Training.** The following subjects should be addressed in an approved program of data link communications academic training during the initial introduction of a crewmember to data link communication systems. For subsequent programs, only the new, revised, or emphasized items need be addressed.

(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.

(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 require 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 surveillance performance criteria, 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.

(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).

(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.

(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.

(6) **Interfaces and Compatibility with other Aircraft Systems.** Training should include the management of any applicable data link air/ground, including; VHF data link, satellite communications (SATCOM) data link and HF data link. This training should also address voice integration with other cockpit systems, FMS inputs to data link, and electronic flight instrument system (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.

(7) **Aircraft Flight Manual (AFM) Information.** AFM 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.

(8) **MMEL Provisions for Systems Related to CPDLC/ADS-C Operations.** Flightcrews, 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. 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.

(i) 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).

(ii) 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."

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

(iv) 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.

(9) **Pilot & Dispatcher Training.** FANS 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.

(i) 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 crewmembers are adequately trained to perform their assigned duties

(ii) 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.

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

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

(v) Special Data Link Event Reports. The air carrier's reporting policies for flightcrews regarding data link non-normal events should be as follows. The operator will send the reports to the IFO, CHDO, CMO or FSDO, which will be forwarded to AFS-470. These reports from the operators will then be forwarded by AFS-470 to the coordinator for the FIT and the FANS Interoperability Group (FIG).

(vi) 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.

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

c.   **Data Link Communications Operational Use Training.** In addition to the academic training described in paragraph 9b, 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.

(1) Operational use training should include the following:

(i) Receiving and interpreting messages;

(ii) Accepting, rejecting or canceling messages;

(iii) Storing and retrieving messages;

(iv) Loading messages into appropriate controls/displays for use (e.g., FMS, FGCS) formulating and sending messages;

(v) Loading message requests from the FMS (e.g., flight plan waypoints into data link for transmission if applicable);

(vi) Managing the communications systems;

(vii) Establishing and terminating system operation;

(viii) Switching use of radio frequency (RF) media (if this is a crew-controllable feature); and

(ix) Re-establishing system operation after loss of network log-on.

(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 training devices or simulators, or by using suitable CBI. Criteria for programs intending to address proper data link communications through the use of simulators or training devices are listed in paragraph 9c(1). Criteria for programs intending to address proper data link communications use through CBI, and not using approved simulators or

(3) Programs addressing data link communications that use approved simulators or training device programs based on use of ECAA-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 9a. Any simulator or training device used should have the characteristics described in paragraph 9m.

(4) Data link communications programs may be approved which do not require using approved simulators or training devices 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. Such programs should include the issues identified in 9c(1), and be consistent with the following criteria:

(i) Accepted ECAA and industry guidelines.

(ii) There should be no significant adverse training experience related to the particular data link communications system(s).

(iii) 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.

(iv) The program should realistically depict data link communications scenarios.

(v) The training subject should be made aware of the normal delivery delays to be expected.

(vi) Scenarios should demonstrate correct indications for messages, display annunciations, aural alerts, and require proper pilot responses.

d. **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:

(1) Provisions of paragraphs 9b and 9c are shown to be met, or

(2) 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.

e. **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:

(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.

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

(4) Other alternate methods acceptable to the Administrator. Alternate methods should demonstrate the equivalent effectiveness of methods (1) through (3).

NOTE: Instructors should evaluate initial data link crewmember communications for certificate holders that are authorized to use data link systems in their operations.

f.   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 9c and address any significant issues identified by line Operating Experience (OE), system changes, procedural changes, or unique characteristics.

g.   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 check programs.

h.   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 9f the certificate holder will not be obligated to develop additional currency requirements.

i.   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.

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

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

l.   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, a combination of ground instruction, manual information, flightcrew bulletins, and other such means as appropriate to address academic topics specified by paragraph 9b, Data Link Communications Academic Training.

m. Characteristics of Simulated Data Link Communications Systems for Training. Examples include data link communications in simulators or training devices.

(1) **Acceptable Characteristics.** Training devices and simulators 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, simulators or training devices used for data link communications training should have the following characteristics:

(i) The ability to functionally represent data link communication displays, controls, indications, and annunciations.

(ii) Ability to depict selected message traffic exchange scenarios including data link communications displays and audio advisories.

(iii) Ability to show proper data link communications reaction to depicted scenarios and advisories, crew or ATC response errors, etc.

(iv) Ability to interactively respond to pilot inputs regarding data link communication advisories, including responses to failures or abnormal situations.

(2) **Simulator and Data Link Communications System Fidelity.** 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. For the purposes of data link communications training, simulators or training devices 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.

(3) Training Device or Simulator Approval. Training devices or simulators meeting ECAA criteria are qualified by the NSET and approved for use by the POI or Training Center Program Manager (TCPM). Any one or combination of the following devices or simulators that meet characteristics of paragraph 8m(1) above, acceptable characteristics may be used:

(i) Level A through D simulators,

(ii) Level 4 through 7 flight training devices, or

(iii) Dedicated data link communications training devices acceptable to the ECAA (Including those devices described in ECAA Order 8900.1, Volume 3, Chapter 19, Section 5, Flightcrew Training Programs: Flightcrew Aircraft Ground Training Curriculum Segments, suitable for data link communications training).

NOTE: Training device and simulator levels are defined by AC 120-40B, Airplane Simulator Qualification; AC 120-54, Advanced Qualification Program; and ECAA Order 8900.1.

8.   OTHER OPERATIONAL ISSUES.

a.   **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.

b.   **MMEL/MEL.** Operators formulate necessary data link communications revisions to their MEL(s) for each particular fleet (e.g., B777, 747-400). Title ECAR require MEL revisions to be consistent with the ECAA'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 are provided in Appendix 2.

c.   **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 part 121, or as otherwise specified in applicable ECAA FSB reports concerning crew qualification pertaining to a particular airplane type.

d.   **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:

(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).

(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 controller-pilot data link communication 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.

(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.

9.   MAINTENANCE.

a.   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 ECAA 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.

b.   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.

c. 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.

d.   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.

10.   DATA LINK COMMUNICATIONS OPERATIONAL USE.

a.   General. Operationally, those skills addressed and the guidance provided in the data link communications training paragraph 9 should be followed and implemented by each operator electing to use data link communications.

b.   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:

 (1) Prompt initiation of messages where needed.

 (2) Prompt response to messages where appropriate (e.g., RCP-240).

 (3) Appropriate crew coordination so that each crewmember 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.

c. **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.

d. **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.

e. **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 flightcrew 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 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.

(5) Advise pertinent ECAA 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.

(6) Advise ECAA of other hazardous conditions, situations, or events which may be related to data link communications.

11. DATA LINK EVENT REPORTING.

a. **General.** Operators and manufacturers are encouraged to develop procedures to ensure effective identification, tracking, and follow up of data link-related events, as appropriate. 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 ECAA informed on the performance of data link in the NAS and international operations.

b. **Pilot Reports.**

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

(i) 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 Aeronautical Information Manual (AIM), Section 4, ATC Clearances, for guidance regarding recommended phraseology, and Appendix 4 of this AC for acronyms and abbreviations.

(ii) 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, and
- Other record 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 1.

(2) **Other Reports Incidental to Data Link.**

(i) Near Mid-Air 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).

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

(iii) 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, and/or data link vendors to the PAI or PMI, as appropriate.

(iv) ECAA ATC. Report the following:
1. Data link events to FSDOs or CMOs as necessary; and
2. Any exceptional data link-related events regarding NAS performance to the Air Traffic Procedures Division.

(v) 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(e) should be reported to the Aircraft Engineering Division, AIR-200 (Production/Airworthiness).

APPENDIX 1.
SAMPLE DATA LINK EVENT REPORTING INFORMATION

Date_____   Time_____

Operator/Flight #_____   Origination_____   Destination_____

Submitted to: ATC Inquiry_____   Other_____

Phase of Flight_____   Position_____   Altitude_____

(Optional for Aircrew:)
Name_____

Describe Event: Phone (W)_____   Phone (H)_____

APPENDIX 2.
DATA LINK COMMUNICATIONS MEL AND MMEL PROVISIONS

1.   EXAMPLE OF A MINIMUM EQUIPMENT LIST (MEL). 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 Egyptian Civil Aviation Authority (ECAA) MMEL for that type. When proposed, MEL provisions are consistent with the ECAA 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 ECAA 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.

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	(0) May be inoperative on the flying pilot side provided that: (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. (0) May be in-operative on the non-flying pilot side, provided that: (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).

2.   EXAMPLE OF A DATA LINK MMEL PROVISION.

Boeing 747-400

```
23  COMMUNICATIONS     |   |   |   |                               |
|                      |   |   |   |                               |
-XX-1 Digital Data Link   |D  | - | - |  Any in excess of those required by|
Communications Systems    |   |   |   | Regulation may be inoperative.     |
|                         |   |   |   |                                    |
-XX-2 Analog Data Link    |D  | - | - |  Any in excess of those required by|
Communications Systems              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 3.
ACRONYMS AND ABBREVIATIONS

AC   Advisory Circular
ACARS   Aircraft Reporting and Communications 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 Procedures Service
ATS   Air Traffic Service
CAA   Civil Aviation Authority CBI   Computer-Based   Instruction   CFR
                Code of Egyptian Civil Aviation 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
ECAR   Egyptian Civil Aviation Regulations
EFIS   Electronic Flight Instrument System
EICAS   Engine Indicating and Crew Alerting System EUROCAE European
Organization for Civil Aviation Equipment ECAA   Egyptian Civil Aviation Authority
FANS   Future Air Navigation System FIG Fans   Inoperability   Group**   FIR
                Flight Information Region
FIT   Fans Inoperability Team
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 MSecs Management Specifications NAS
National Airspace System NAT	North Atlantic Tracks
NM	Nautical Mile
NMAC	Near Mid-Air Collision
NOTAM	Notices to Airmen
NSET	National Simulator Evaluation Team
OCD	Oceanic Clearance Delivery OE Operating Experience OpSpecs Operation 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
RF	Radio Frequency
RNP	Required Navigation Performance
RSP	Required Surveillance Performance
RTCA	Radio Technical Commission for Aeronautics SARPS 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	Vhf Data Link
VHF	Very High Frequency (radio)

APPENDIX 4.
APPLICATION AND TRAINING GUIDANCE

1. The operator's application to obtain authorization to use data link must address and contain the following subjects including those identified in this advisory circular (AC). The applicable AC 120-70B paragraphs are referenced below.

    a. List of Source Documents Used:

       (1) For generic data link Operations (e.g., aircraft/avionics manufacturer documents)

       (2) For area of operations specific policy/procedures. See "d" below

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

    c. General Information.

    d. Area of Operations/Routes Where Operator Intends to Use Data Link.

       (1) List of areas and/or routes where operator intends to conduct data link operations.

       (2) List of air traffic centers/service providers with which operator intends to communicate via data link.

       (3) 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) ECAA chart supplements (e.g., Pacific and Alaska Chart Supplement).

         (v) Flightcrew Qualification Programs.

    f. Manuals and Other Publications.

    g. MMEL/MEL.

    h. Issues Unique to a Particular Operator.

    i. Maintenance Programs.

2. Content of Flightcrew Qualification Programs.

    a. Academic Training Subjects. 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).

       (1) AC 120-70B, Operational Authorization Process for use of Data Link Communication System, calls for the following areas to be addressed: Acronyms. Source: FOM Part 2.

       (2) General Concepts of Digital and Analog Communications.

       (3) Expected Flightcrew Response.

       (4) ATS Coordination.

       (5) Aircraft Digital or Analog Communication Equipment Components, Displays, Alerts. Sources:

         (i) Aircraft manufacturer documents,

         (ii) Interface with other aircraft systems,

         (iii) Aircraft Flight Manual (AFM) information, (d) Minimum equipment list (MEL) provisions, (e) Data Link Events Reports,

         (iv) Data Link Malfunction or Irregularity Reports, and

         (v) Human Factors-Lessons learned.

    b. Operational Use Training:

       (1) General requirement,

       (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).

APPENDIX 6.
DATA LINK SYSTEMS AND OPERATING ENVIRONMENT

Table-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 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-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 develop the interoperability standard per paragraph 3.c. in AC 20-140A, Guidelines for Design Approval of Aircraft Data Communications Systems.

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.

TABLE-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	Supplemental ATC communications: CM application supports DLIC data link service CPDLC application supports ACM, ACL, and AMC data link services Note 1: DCL, DSC, D-ATIS, and FLIPCY data link services are	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 Table-1a).
2	FANS 1/A+	Continental (Domestic)	ATN B1-FANS 1/A	Same as Row 1, except: Uses AFN application for DLIC data link service For CPDLC application, UM 215, TURN [direction] [degrees] is	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

				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	(Applies only to aircraft) Sub-network standards for VDL M2 (See Table-1a).
3	FANS 1/A+ or FANS 1/A	Oceanic and remote	FANS 1/A	Normal means of ATC communication uses AFN and CPDLC applications for DCPC Eligible for: RCP 240 operations via any sub-network listed for any of the RCP types, per DO-306/ED-122, paragraph 5.2.6.a) and 5.2.6.b). Uses ADS-C application for automatic position	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
4	FANS 1/A+ or FANS 1/A	Oceanic and remote	CADS	No CPDLC application Uses ADS-C application for automatic position reporting. See required performance for ADS-C application per DO-306/ED-122.	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
5	FMS WPR	Oceanic and remote	CFRS	No CPDLC application Uses FMS WPR application for automatic position reporting. See required performance for FMS WPR application per	DO-306/ED-122, Oceanic SPR Standard ARINC 702A, Advanced Flight Management Computer System (Applies only to aircraft). CFRS Common
6	FANS 1/A ADS-C	Oceanic and remote	FANS 1/A or CADS	Same as row 4.	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
7	ACARS	Continental /Oceanic and remote	ACARS	Departure clearance or pre-departure clearance. Data link – automated terminal information service.	ED85 ED-89 ED-106 A623 Sub-network standards same as row 3. Note 5: Allows one or more

TABLE-1A. DEFINITIONS FOR SUB-NETWORKS

Sub-network designator	Applicable sub-network standards
VDL M0/A	A618-6 for air/ground protocol
VDL M2	
HFDL	a) DO-265 Minimum Aviation System Performance Standard (MASPS) b) A753-3
SATCOM (Inmarsat)	a) DO-270A (MASPS) b) A741P2-7
SATCOM (Iridium)	a) DO-270A (MASPS) b) A741P2-7 c) A761-2