LEAFLET No 40: OPERATIONAL CONSIDERATIONS FOR THE USE OF INITIAL SERVICES FOR AIR-GROUND DATA LINK COMMUNICATIONS IN EUROPEAN AIRSPACE

NOTE: The material contained in this leaflet has been issued in accordance with Chapter 10 of Administrative & Guidance Material, Section Four: Operations, Part Two: Procedures, and is therefore authorised for use on a voluntary basis.

1. Introduction

This operational guidance material is issued in response to the EUROCONTROL Link 2000+ initiative which is coordinating the implementation of operational air/ground data link services for Air Traffic Management (ATM) in the core area of Europe. It is complementary to, and should be used in conjunction with, EASA AMC 20-11 (*'Acceptable Means of Compliance for the Approval of Use of initial Services for Air-Ground Data Link in Continental Airspace')* which contains a set of assumptions relating to the implementation of these initial data link services[1] and also provides a guide to the airworthiness certification process.

2. Scope

This guidance material contains operational criteria applicable to initial data link services implemented in the core area of Europe through the Link 2000 + initiative. Equipment meeting the criteria for this initiative is not exclusive to Link 2000+. In consequence not all installed equipment data link message sets will be supported in Europe (see section 5 of this document). Further, air navigation service providers in Europe can implement initial data link services on a step by step basis to meet local operational constraints as published in appropriate Aeronautical Information Publications (e.g. AIP, AIC, NOTAM). Work is continuing between all interested parties (e.g. ICAO, Eurocontrol and the FAA) to achieve the global harmonization of data link services including the standardization of message sets.

Prior to using this material to guide operational use of data link services in Europe, the following criteria should have been met:

a. The data link installation on the aircraft should have been certified using the airworthiness considerations contained in Section 6 of EASA AMC 20-11.

b. The assumptions contained in EASA AMC 20-11, concerning the Air Navigation Service Provider (ANSP), Communications Service Provider (CSP), and the Aeronautical Information Service (AIS) should have been satisfied.

Currently, a formal Authority Operational Approval (i.e. a statement in the applicable Air Operator Certificate) is not required before data link services may be used. However, it is expected that an operator using such services in Europe will have established both a dialogue with Eurocontrol and the ANSP providing the service(s), and will have shown that he is capable of using the service(s). These expectations can be met by first satisfying the criteria in a) and b) above and the by the use of this operational guidance material in conjunction with *EUROCONTROL* document "Flight Crew Data Link Guidance for Link 2000+ Services".

[1] Initial (Data Link) Services comprise – Data Link Initiation Capability (DLIC), ATC Communication Management (ACM), ATC Clearances (ACL), ATC Microphone Check (AMC)

3. Operational Safety Aspects

3.1 In all cases flight crew should comply with the procedures published by the Aeronautical Information Service (AIS) of the region or State offering initial datalink services. These procedures may include but will not necessarily be limited to information to be included in the flight plan (e.g. aircraft address if so prescribed).

3.2 The flight crew should revert to voice communication in case of data link communication breakdown or in case of ambiguity or contradiction between voice and data link information. The crew should also revert to voice at any time when time or their situation necessitate a more rapid treatment/response than allowed for in data link communication.

3.3 In the event of voice radio communication failure the availability of a data link connection between the aircraft and the ATS Unit concerned does not relieve the flight crew and ATS Units from following the ICAO and any other national or airspace provisions applicable to loss of communications in the operating area concerned.

4. Operating Principles

The use of data link communication should be in accordance with the following operating principles:

4.1 Voice and data link will co-exist as means of ATS communication; however, voice communications has primacy (see also paragraph 3.2 above).

4.2 Controller Pilot Data Link Communications “CPDLC” is to be used in the context of non-time critical communications.

4.3 The flight crew and / or the air traffic controller involved have the discretion to use or discontinue the use of data link services (see paragraph 3.2).

4.4 The ICAO Annex 11 provisions stipulating that a controlled flight shall be under the control of only one air traffic control unit at any given time is to be applied also when using data link.

4.5 Messages received via data link should be replied to via data link. Conversely, messages received via voice should be replied to via voice.

4.6 The specific phraseology developed to be used in conjunction with data link operation generally is to be strictly applied. The specific phraseology to be used is also to be strictly applied when reverting from CPDLC to voice.

4.7 Clearances and instructions received via data link should be reacted to by the aircrew in a timely fashion. The reaction comprises both sending a CPDLC response and initiating the required action. A voice confirmation may be also required.

Note: Complete guidance to aircrew concerning the operating principles and procedures associated with European Data Link Initial Services can be found in the EUROCONTROL publication entitled “Flight Crew Data Link Guidance for Link2000+ Services”. ICAO Doc 9694 ‘Manual of Air Traffic Services (ATS) Data Link Applications’ contains further material and is written for global application.

5. Message Sets

5.1 The downlink message (message sent by aircraft to ground system) set supported by each ground system and the information related to their data link service provisions is notified by each State in the relevant Aeronautical Information Publication (AIP) and NOTAMs as appropriate. (Refer to Annex I 'Example of a relevant Aeronautical Information Publication. Maastricht AIP effective on 24 of November 2005', as example).

5.2 The uplink (message sent by ground system to aircraft) and downlink message set implemented in the airborne systems should be that specified in the appropriate documents. For Link 2000+ services these are contained in the EUROCONTROL document entitled "LINK2000+ Service and Message Sets for Airborne Implementation". A full set of internationally agreed messages is contained in ICAO Doc 9694.

5.3 Flight crew should only use messages supported by the ground system of the airspace in which they are flying and which have been promulgated for use by the ANSP concerned. The use of non-supported message sets by flight crew is likely to return a "Service Unavailable" message from the ground system.

6. Log-on and data link connection

6.1 Flight Crew wishing to utilize data link services in a given airspace should normally have logged-on to the data link system prior to airspace entry. This logging-on process will need to follow the procedures published in the relevant AIP, which may also specify time limits for the logging-on process. Log-on provides the ground system with the information necessary for flight plan and data link application association. This information is necessary before a functional data link connection can be established.

6.2 Flight crew should ensure that they enter the log-on information strictly adhering to the applicable provisions governing content and syntax. In particular, the aircraft identification entered should be identical to that used in Item 7 of the Filed Flight Plan.

6.3 Following successful log-on, the ground system will initiate the CPDLC connection automatically. The airborne system responds also automatically. Appropriate status information will be available to flight crew. Flight Crew should only initiate operational CPDLC downlinks with a specific ATC unit after:

- either receiving a data link message confirming the identity of the concerned ATC unit; or
- they are in voice communication with that unit.

Any messages initiated by flight crew for flights not yet transferred to or under the control of the concerned ATC unit will result in an uplinked error message.

6.4 When transferring from one CPDLC unit to another, the log-on information will be forwarded via the ground system. The CPDLC connection to the new unit will be automatic, and appropriate information displayed to the flight crew.

7. Operations Manual

7.1 The Operations Manual subpart B and D must be amended to include the operational and training procedures for use of data link services.

7.2 The Operational Manual section B should contain all the operational principles described in this TGL.

7.3 The operations manual should clearly define all aspect of the operational use of data link services including any additional pre-flight activity (e.g. flight plan annotation) required for data link use.

Note1: *Operators operating under the provisions of ICAO Annex 6 Part II "International General Aviation – Aeroplanes" are not required to have an operations manual. However, in order to use data link services in given airspace they would be expected by the ANSP to have met the provisions in this material and in EASA AMC 20-11. Before being permitted by the ANSP to use data link services, the State of Registry of the aeroplane may have to confirm to the ANSP that these provisions have been met and may provide confirmation to the ANSP, in accordance with national practice, that this has occurred.*

Note2: When the communications between flight crew and ATC will be done by means of data link communications in a given airspace, the aircraft operators should file the item 10 of the flight plan with the letter J. Moreover, the aircraft operators should file the item 18 of the flight plan with the equipment carried, preceded by DAT/ followed by one or more letters as appropriate: S, H, V and M, e.g. DAT/S for satellite data link, DAT/H for HF data link, DAT/V for VHF data link, DAT/M for SSR Mode S data link and so on...

8. Human Factors Considerations

8.1 During the development of the Standards Operating Procedures (SOPs), aircraft operators should ensure that global situation awareness is maintained.

8.2 The SOPs should consider all the Human Factors elements as defined by the certification requirements of the equipment.

8.3 The SOPs should reflect a non-ambiguous task sharing and call-out between the Pilot Flying (PF) and Pilot Non-Flying (PNF).

8.4 The SOPs should clearly explain how the arrival of a message is notified to the flight crew and how they can access and respond to the message as well as the selection of the appropriate Flight Management System (FMS) display page once the CPDLC message has been responded to.

8.5 The SOPs should emphasize applicable criteria for the decision to revert to voice communication in case of data link communication breakdown as well as the additional cases mentioned in paragraph 3.2 above.

9. Training Considerations

9.1 Aircraft operators should ensure that flight crew are thoroughly familiar with all relevant aspects of data link operations.

9.2 Flight crew training should address, in particular, the following areas:

- General understanding of data link operating principles
- Geographical area/airspace of data link use
- Uplink and downlink messages and their significance
- Specific data link related phraseology
- The message sets actually implemented in aircraft equipment
- The characteristics and limitations of the flight deck human-machine interface, annunciation, controls, displays, printing that will be used in working with data link
- Data conventions associated with data input (e.g. flight identification)
- Data link operational procedures including timers.

- Handling of errors (error messages)
- Data link system failures
- Incident reporting procedures
- Crew Resources Management (CRM) and the above HF issues

10. Incident reporting

10.1 Incidents associated with an ATS message transmitted via data link that affected or could affect the safe operation of the aircraft should be reported, like any other incidents, in accordance with JAR-OPS 1.420/3.420.

10.2 Incidents reported in accordance with the provisions in 10.1 above should also be reported to the air traffic services unit that was the data authority at the time of the incident.

Note 1: Operators may also report, in a voluntary basic, incidents reported in accordance with the provisions in 10.1 above to EUROCONTROL Link 2000+ Program.

11. Documents to be consulted

11.1 JAR-OPS 1 and JAR-OPS 3

11.2 EASA AMC 20-11 section 4

11.3 EURCOCONTROL Documents:

11.3.1 *EUROCONTROL* document “Flight Crew Data Link Guidance for Link2000+ Services”

10.3.2 EUROCONTROL document “LINK2000+ Service and Message Sets for Airborne Implementation”.

11.4 ICAO Documents:

11.4.1 ICAO ANNEX 6 ”Operation of Aircraft, Part I – International Commercial Air Transport – Aeroplanes”.

11.4.2 ICAO ANNEX 6 ”Operation of Aircraft, Part II – International General Aviation – Aeroplanes”.

11.4.3 ICAO Doc 9694 “Manual of Air Traffic Services (ATS) Data Link Applications”

Annex I: Example of a relevant Aeronautical Information Publications, AIP (Maastricht AIP effective on 24 of November 2005)

3.6 ATS data link

3.6.1 General

Data link services are available for aircraft operating within the upper airspace (above FL 245) of the Amsterdam FIR, under the responsibility of Maastricht UAC.

The following data link services are provided in this airspace:

- DLIC (data link initiation capability)
- ACL (ATC clearances and instructions)
- ACM (ATC communications management)
- AMC (ATC microphone check)

Use of CPDLC (controller pilot data link communications) is not mandatory in this airspace and is conducted at the discretion of ATC and the aircrew concerned. If either the aircrew or ATC consider that CPDLC should not be used in the prevailing circumstances then the operation shall be suspended or terminated and the other party informed by voice communication.

3.6.2 Register of aircraft operators

Aircraft operators wishing to conduct CPDLC in this airspace shall first register with Maastricht UAC. Registration shall be made a minimum of 4 weeks prior to the first intended CPDLC flight of an operator in the airspace.

Post:
Paul CONROY
OPS – Systems Implementation
Maastricht UAC
Horsterweg 11
6199 AC Maastricht Airport
The Netherlands
Tel:+31 43 366 1242
Fax:+31 43 366 1502
Email:paul.conroy@eurocontrol.int

3.6.3 Flight plan

To facilitate the association of DLIC with the flight plan, it is recommended that aircrew file their aircraft tail number (registration) or aircraft 24-bit address code in item 18 of their flight plan.

3.6.4 CPDLC use

In the airspace under the responsibility of Maastricht UAC, voice communications and voice instructions shall have precedence over data link communications at all times.
The data link messages concerning changes to aircraft profile require voice readback by the crew on reception.

Example – "Callsign – Confirming datalink climb FL 370".

Data link messages concerning SQUAWK, SQUAWK IDENT and CONTACT do not require voice readback prior to execution.

Clearances shall be executed when the WILCO message is sent.

If uncertainty arises regarding a data link message, voice communication shall be used.

If a downlink request receives a timeout aircrew should make the request again by voice.

Although DLIC log-on is normally initiated when an aircraft is outside Maastricht UAC airspace, CPDLC exchanges shall not be conducted until the aircraft is under the control and responsibility of Maastricht UAC.

3.6.5 DLIC log-on

The facility address for Maastricht UAC is **EDYY**.

Log-on shall be initiated by the aircrew. Aircrew shall log-on using their ICAO callsign as filed in their flight plan. Aircrews shall not use a two-letter IATA flight ID, or insert a leading zero (0) into a callsign, as these actions will result in a failed log-on.

Log-on should be initiated 30 minutes prior to entry into Maastricht UAC airspace. For aircraft departing from an aerodrome in close proximity to Maastricht UAC airspace, log-on can be initiated when the aircraft is on the ground.

Irrespective of the number of Maastricht sectors entered during their flight only one log-on per flight is required.

3.6.6 ATS data link services

3.6.6.1 ACL

Aircrew may receive, via data link, the uplink messages described. Aircrew may request, via data link, clearance direct to a point on their route. Aircrew are requested, until further advised, not to data link requests for a level change.

3.6.6.2 ACM

When an aircraft is transferred by data link to an adjacent sector/ATSU, aircrew shall acknowledge the instruction by WILCO, and shall then contact the next sector/ATSU by voice communication on the frequency given.

3.6.6.3 AMC

A 'Check Stuck Microphone' instruction may be sent by ATC in circumstances where an aircraft is inadvertently blocking a voice communication frequency. For FANS aircraft a ROGER response is expected to this instruction.

If the 'Check Stuck Microphone' instruction relates to the R/T frequency being used, then the aircrew shall check that their radio equipment is not causing the blockage. If the 'Check Stuck Microphone' instruction does not relate to the R/T frequency being used then no further aircrew action is required.

3.6.7 Message restrictions

Aircrew shall not use free-format free-text messages when communicating via CPDLC with Maastricht UAC. Use of such a free-text message will result in an error response.

3.6.8 Log-off

Log-off is automatic on exiting Maastricht UAC airspace. No aircrew action is required.

3.6.9 Data link failure

In the event of a scheduled outage or unexpected failure of the CPDLC system, ATC will instruct all data link equipped aircraft to revert to voice communications.
In the event of airborne CPDLC failure, the aircrew shall revert to voice communication and inform ATC.

3.6.10 Messages

The following uplink clearances and instructions may be expected by aircrew using CPDLC with Maastricht UAC.

ATC Uplink Clearances and Instructions [No voice readback required]
Contact [unit name] [frequency]
Squawk [code]
Squawk ident
Check stuck microphone [frequency]
ATC Uplink Clearances and Instructions [Voice readback required]
Proceed direct to (point)
Turn [direction] heading [degrees]
Turn [direction] [degrees]
Fly heading [degrees]
Continue present heading
Climb to [level]
Descend to [level]
Maintain [level]

Aircrew shall respond to a profile-changing clearance with a readback of the received clearance.

Example - “Callsign – Confirming datalink climb FL 370”

Aircrew should also respond to all uplink clearances / instructions with an appropriate data link operational response.

The following downlink requests may be sent by aircrew using CPDLC with Maastricht UAC.

Aircrew Requests
Request direct to
Request Climb to [level]
Request Level
Request Descent to [level]

If a downlink request receives a timeout aircrew should make the request again by voice.

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