

**DEPARTMENT OF CIVIL AVIATION
MALAYSIA
AIRWORTHINESS NOTICE**

No: 57A	Issue: 1	Page: 1
----------------	----------	---------

Date: 01 October 2002

AIRCRAFT FIELD LOADABLE SOFTWARE (FLS)

1. INTRODUCTION

- 1.1 The DCA is aware that the lack of adequate control of Field Loadable Software (FLS) by operators can potentially result into safety related occurrences.
- 1.2 The purpose of this Airworthiness Notice is to provide guidance for operators and maintenance organisations on the configuration management, procurement, embodiment and tracking of aircraft Field Loadable Software to ensure continued airworthiness and operating safety standards are met.

2. BACKGROUND

- 2.1 This Notice identifies what aircraft Field Loadable Software is required to be controlled and provides guidance on achieving this. Operators and maintenance organisations are advised to implement procedures to satisfactory meet the intent of this Notice.
- 2.2 Recommended Reference Material:

Table 1:

USA	Europe	Description
RTCA DO 178B	EUROCAE Doc. ED12B	Software Considerations in Airborne Systems and Equipment Certification
RTCA DO 201A	EUROCAE Doc~ ED77	Standards for Aeronautical Information
RTCA DO 200A	EUROCAE Doc. ED 76	Standards for Processing Aeronautical Information
RTCA DO 236A	EUROCAE Doc. ED 75A	Minimum Aviation System Performance Standards (MASPS): Required Navigation Performance (RNP) for Area Navigation

3. DEFINITIONS

- 3.1 For the purpose of this Airworthiness Notice the following definitions apply:
 - (a) **Aircraft Configuration List (ACL):**
A list of Line Replaceable Units (LRU) and modules with Loadable Software Airplane Part (LSAP) that are applicable to a specific aircraft. This list may be contained on a drawing supplied by the Type Certificate Holder, in a Service Bulletin, Service Information Letter, IPC or separate tracking system.
 - (b) **Field Loadable Software (FLS):**
Software, including data tables, which can be loaded without removing the system or equipment from its installation. For example it is software that can be loaded on an aircraft by a maintenance personnel.
 - (c) **Loadable Software Aircraft Part (LSAP):**
FLS that is considered to be part of the aircraft approved design and therefore an aircraft part requiring release documentation (JAA Form One, FAA 8130-3) or an equivalent agreed with DCA.
 - (d) **Databases:** LSAP in database form e.g. Navigational Data Base (NDB), Terrain/Airport Database (TDB), Model/Engine Database (MEDB) containing information such as navigation, route, engine performance and Terrain used by the Flight Management Computer (FMC), Terrain. Awareness Warning System (TAWS) etc to accomplish aircraft navigational and manoeuvring tasks.

- (e) Software Media: Device that contains a copy of the software such as a diskette, (Personal Computer Memory Card International Association) PCMCIA card, CD ROM, On-board Replaceable Modules (OBRM), file servers or portable data loaders.
- (f) Target Hardware: The hardware such as Line Replaceable Units (LRU) and modules that is intended to be loaded with new FLS.
- (g) User Modifiable Software (UMS): Software declared by the aircraft Type Design Organisation as being intended for modification by the aircraft operator usually without review by the CAA, the aircraft Type Design Organisation or the equipment manufacturer.
- (h) Electronic Distribution of Software (EDS): A process whereby FLS is moved from the producer or supplier to a remote site (generally the operator) without the use of a physical media.

4. TARGET HARDWARE

NOTE: The following list contains typical examples, it is recognised that due to the wide range of aircraft configurations the list is not exhaustive.

- 4.1 Typical Target Hardware for LSAP:
 - Display Electronics Unit (DEU)
 - Flight Management Computer (FMC)
 - Flight Control Computer (FCC)
 - Digital Flight Data Acquisition Unit (DFDAU)
 - Digital Flight Data Acquisition Management Unit (DFDAMU)
 - Auxiliary Power Unit (APU) Electronic Control Unit (ECU)
 - Electronic Engine Control (EEC)
- 4.2 Typical Target Hardware for Databases:
 - Enhanced Ground Proximity Warning System (EGPWS)
 - Flight Control Computer (FCC)
 - Flight Management Computer (FMC)
- 4.3 Typical Target Hardware for UMS:
 - Aircraft Communication and Reporting System (ACARS)
 - Aircraft Condition Monitoring System (ACMS)
 - SATCOM
 - In-Flight Entertainment System (IFE)

5. FIELD LOADABLE SOFTWARE (FLS) PROCUREMENT AND DOCUMENTATION

- 5.1 LSAP, Databases and UMS are firstly delivered with the new aircraft and contained in the Target Hardware and in media sets in binders or storage bins. It must be realised however, that the part number of Target Hardware does not necessarily indicate the loaded software part number, this aspect needs to be borne in mind when replacing affected LRUs.
- 5.2 Loadable Software Aircraft Part (LSAP):
Procured LSAP and its associated Storage Media must be obtained from an approved source using the part number specified and be accompanied by a JAA Form One or FAA8130-3. These can typically be found in documents such as the illustrated Parts Catalogue (IPC), Service Bulletin, Service Letter or Approved Modification.
- 5.3 Databases:
Software updates such as NDB, TDB and MEDB must be acquired from a source that is acceptable to the Target Hardware Manufacturer and accompanying documentation and Transport Storage Media containing the modified software should clearly identify this. The Transport Storage Media must also be annotated with the originator identification and quality/conformity markings. The responsibility of

obtaining appropriate documentation confirming the authenticity, performance specification and accuracy of the software rests with the operator. It is also recommended that a "confidence" check of the received navigation/performance data be accomplished to ensure that the changes made satisfy their intended use.

5.4 User Modifiable Software (UMS):

UMS is normally generated by the operator, their contracted maintenance organisation or approved vendor. The responsibility for obtaining adequate documentation confirming the appropriateness of the software rests with the operator.

5.5 Electronic Distribution of Software (EDS):

EDS is increasingly being utilised to transfer FLS from the supplier to an operator. The obvious advantages of this are the speed of distribution and the removal of the need for physical transport media. This must be accomplished to a standard acceptable to DCA. It is also recommended that a 'confidence' check of the received navigation/performance data be accomplished to ensure that the changes made satisfy their intended use.

6. FLS STORAGE MEDIA HANDLING

6.1 In order to ensure FLS and Storage Media reliability, Storage Media should be sealed in dust and lint free material in a closed box, be clearly labelled as containing software media and the following avoided:

Moisture, dust or airborne contaminants.

Magnetic fields.

Direct sunlight for prolonged periods.

Rate of temperature change greater than 20°C/hour.

Temperature outside the range of -20° to +50° C.

X-ray

Magnetic or electro-magnetic source.

FLS and Storage Media known to contain defects must not to be used and must be placed in quarantine for suitable disposal.

7. FLS LOADING AND CERTIFICATION

7.1 FLS is loaded into the Target Hardware using a portable data loader (PDL), airborne data loader (ADL) or off aircraft data loader (workshop). After loading, the software must be verified on board using the established processes and procedures detailed in the maintenance manual or associated approved maintenance or modification data.

7.2 Any FLS loading must be recorded in the Aircraft Configuration List (ACL), which should be kept on board the aircraft with a further copy also kept in the operator's aircraft maintenance records system.

7.3 After any loading of LSAP a Certificate of Release to Service must be Issued by an appropriately authorised Line/Base Maintenance Certifying personnel.

8. REPLICATION OF FLS

8.1 If LSAP copies are to be made this must be accomplished using the aircraft type design organisation approved FLS Storage Media replication process. The copying must be recorded in an Aircraft Software Replication Register and be traceable to the original source from which copies were made. This is to ensure that this activity can be audited.

8.2 A copy of the original JAA Form One, FAA 8130-3 or accepted release documentation, as appropriate, must accompany all LSAP Storage Media containing software copy.

9. PROCEDURE

9.1 It is essential that operators have appropriate procedures in place such that at any time it is possible to determine the equipment and software configuration of each aircraft in their fleet.

9.2 Operators involved in the procurement, modification and embodiment of FLS shall produce a

documented procedure within their Company Procedures, Maintenance Management Exposition (MME) or equivalent that describes their means of compliance with this Notice. It is expected that the procedure would cover the complete cycle from procurement specification, distribution methodology (e.g. EDS, media type etc.), receipt inspection/assessment through to embodiment, subsequent testing and release to service. This process must also be included in the internal audit programme.

- 9.3 There are Instances when a change to UMS may modify aircraft performance information presented to the flight crew, in such cases DCA advice should be sought as approval maybe required.
- 9.4 Operators are required to ensure that competent staff are retained in order to ensure that the intent of this Notice is met.

NOTE: Documents referenced in this Notice can be obtained from:

-EUROCAE, 17 Rue Hamelin, 75783 Paris, France. Web site: www.uerocae.org

-RTCA Inc. 1140 Connecticut Avenue, N.W. Suite 1020, Washington DC. 20036-4001
USA. Web site: www.rtca.org

DIRECTOR GENERAL
DEPARTMENT OF CIVIL AVIATION
MALAYSIA.