ETSO-C157a
Date: 05.07.2012

European Aviation Safety Agency

European Technical Standard Order

Subject: Aircraft Flight Information Services-Broadcast (FIS-B) Data Link Systems and Equipment

1 - Applicability

This ETSO gives the requirements which Aircraft Flight Information Services-Broadcast (FIS-B) Data Link Systems and Equipment that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

2 - Procedures

2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

2.2 - Specific

None.

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

This standard apply to equipment intended to display weather and other non-control flight advisory information to pilots in a manner that will enhance their awareness of the flight conditions.

Standards set forth in the Radio Technical Commission for Aeronautics (RTCA) Document DO-267A, Minimum Aviation System Performance Standards (MASPS) for Flight Information Services-Broadcast (FIS-B) Data Link, Rev. A dated 29 April 2004. The standard applies to the equipment classes as defined in the following table 1. Demonstrate the required functional performance under the test conditions specified in RTCA/DO-267A Section 4.

Equipment Class	Equipment Name	Functionality
1	FIS-B Equipment using Universal Access Transceiver (UAT) and Interoperable with the Surveillance and Broadcast Services (SBS) Provider	RTCA/DO-267A Sections 2 and 3, with amendments per Appendix 1 of this ETSO.
2	FIS-B Equipment not Interoperable with the SBS Provider	RTCA/DO-267A Section 2 (except 2.1.4; 2.2.12; and 2.2.13) and Section 3.8.

Table 1. Equipment Classes for FIS-B

3.1.2 - Environmental Standard

See CS-ETSO Subpart A paragraph 2.1.

3.1.3 – Computer Software

See CS-ETSO Subpart A paragraph 2.2.

3.1.4 - Electronic Hardware Qualification

See CS-ETSO Subpart A paragraph 2.3.

3.2 - Specific

3.2.1 - Failure Condition Classification

See CS-ETSO Subpart A paragraph 2.4.

Loss or malfunction of the function defined in paragraph 3.1.1 of this ETSO has been determined to be a minor failure condition.

4 - Marking

4.1 - General

Marking as detailed in CS-ETSO Subpart A paragraph 1.2.

4.2 - Specific

None

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3.

APPENDIX 1. AMENDMENTS TO THE MINIMUM PERFORMANCE STANDARD FOR EQUIPMENT PROVIDING FIS-B VIA THE UNIVERSAL ACCESS TRANCEIVER

This Appendix prescribes addendums to the MPS for aircraft FIS-B systems and equipment when using the Surveillance Broadcast Services system.

1.1 RTCA/DO-267A. The applicable standard is RTCA/DO-267A Sections 2 and 3. We modified it as follows:

1.1.1 Page 19*,* 3.6.2.3, Reassembly of Linked Application Protocol Data Units (APDU) to Form an FIS-B Product File, Paragraph 3, Sentence 1, reads as follows:

Change from:

…Separate APDU sequences are maintained for each Product and ground station combination for which linked APDUs are transmitted.

To:

… Separate APDU sequences are maintained for each Product and *each Product File ID or* ground station combination for which linked APDUs are transmitted.

1.1.2 Appendix D, Page D-1, Paragraph 2, Sentence 1:

Change from:

… The APDU structure shall begin with an APDU Header consisting of data fields as shown in Table D-1.

To:

… The APDU structure shall begin with an APDU Header consisting of data fields as shown in Table D-1, except the UAT transmission of the APDU header does not include the 16-bit FIS-B APDU ID field.

1.1.3 Appendix D, Page D-1, Table D-1 FIS-B APDU Header Format, replace Header. Time rows as follows:

Change From:

Head Time	22 – 37 bits	Section D.4
Time Option Bits	2 bits	
Date (optional)	9 bits (if included)	
Month of Year	4 bits	
Day of month	5 bits	

UTC Time Hours	5 bits	
Time Minutes	6 bits	
Time Seconds (optional)	6 bits (if included)	

To:

Head Time	22 – 37 bits	Section D.4
Time Option Bits	2 bits	
Month of Year (optional)	4 bits (if included)	
Day of month (optional)	5 bits (if included)	
UTC Time Hours	5 bits	
Time Minutes	6 bits	
Time Seconds (optional)	6 bits (if included)	

1.1.4 Appendix D, Page D-1, amend the Segmentation Data Block entries and add a new Product File ID entry in Table D-1 to read as follows:

Change From:

Field	Number of Bits	Document Section
Product File Length	12 bits	
Number	12 bits	
Zero Padding Bits	0-7 bits to force octet-alignment	Section D.6

To:

Field	Number of Bits	Document Section
Product File ID	10 bits	ETSO-C157a Appendix 1 paragraph 1.1.9
Product File Length	9 bits	Section D.5.1
APDU Number	9 bits	Section D.5.2
Zero Padding Bits	0-7 bits to force octet-alignment	Section D.6

1.1.5 Appendix D, Page D-3, Table D-2 Format of the FIS-B Product Descriptor, reads as follows:

Change from:

Geographic Locator (region) (optional)	20 bits (if present)	Section D.2.4

To:

Geographic Locator (region) (optional)	20 bits (if present)	Section D.2.4
Latitude	7 bits	Section D.2.4
Longitude	8 bits	Section D.2.4
Extent	5 bits	Section D.2.4

1.1.6 Appendix D, Page D-15, Figure D-3, Block Reference Indicator Format, reads as follows:

Change from:

Byte #	Bit Number							
	7	6	5	4	3	2	1	0
0	Element Identifier	N/S	Spare		Block Number (MSb)			
1	Block Number							
2	Block Number (LSB)							

To:

Byte #	Bit Number							
	7	6	5	4	3	2	1	0
0	Element Identifier	N/S	Scale		Block Number (MSb)			
1	Block Number							
2	Block Number (LSB)							

1.1.7 Appendix D, Page D-15, Section 2.3.5.2.2 The Block Reference Indicator, after the "Hemisphere N/S" paragraph add new paragraph to read as follows:

"Scale: an encoded multiplier applied to the base size of the GBR block in both latitude and longitude dimensions. Values represented by the Scale encoding are either system or product specific. Any mathematical calculations that are needed to reduce a high-resolution product down to a lower-resolution 'scaled' product are left for the implementer to separately describe/document."

1.1.8 Appendix D, Page D-21, D.5, Segmentation Data Block, Sentence 5, reads as follows:

Change from:

…The Segmentation Data Block (if present) shall consist of two components, the Product File Length field and the APDU Number field.

To:

…The Segmentation Data Block (if present) shall consist of three components, the Product File *ID* field, Product File Length field and the APDU Number field.

1.1.9 Appendix D, Page D-21, supplement section D.5 with the following:

The Product File ID Field contains a reference number to associate segmented APDUs with the appropriate Product File. Such a reference is necessary when broadcasting the same APDU segments for a Product File from multiple radio stations.

1.1.10 Appendix D, Page D-23, Figure D-9 APDU Header Layouts, amend the optional Segmentation Data Block fields to read as follows:

Change from:

<table>
<tr><td colspan="48">ADPU Header (48 to 112 bits)</td></tr>
<tr><td colspan="16" rowspan="2">FIS-B APDU ID
(16 bits)</td><td rowspan="3">• • •</td><td colspan="24">Segmentation Data Block (Optional 24 bits)</td><td colspan="7" rowspan="2">Zero Pad
(0 – 7 bits)</td></tr>
<tr><td colspan="12">Product File Length
(12 bits)</td><td colspan="12">APDU Number
(12 bits)</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

To:

<table>
<tr><td colspan="52">ADPU Header (48 to 112 bits)</td></tr>
<tr><td colspan="16" rowspan="2">FIS-B APDU ID
(16 bits)</td><td rowspan="3">• • •</td><td colspan="28">Segmentation Data Block (Optional 28 bits)</td><td colspan="7" rowspan="2">Zero Pad
(0 – 7 bits)</td></tr>
<tr><td colspan="10">Product File ID
(10 bits)</td><td colspan="9">Product File Length
(9 bits)</td><td colspan="9">APDU Number
(9 bits)</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

1.1.11 Appendix D, Page D-23, Figure D-9 APDU Header Layouts, amend the APDU Header Time field text to read as follows:

Change from:

APDU Header Time (13 or 28 bits)

To:

APDU Header Time (13, *19, or 22* bits)

1.1.12 Appendix D, Page D-23, Figure D-9, APDU Header Layouts, add note to Option Flags table to read as follows:

"Note: A given APDU shall not have Time Flag #1 and Time Flag #2 set to one (1) within the same APDU Header."

1.1.13 Appendix K, Page K-1*,* the last entry in Table K-1, reads as follows:

Change from:

The last entry in Table K-1 shows the encoding of the CC (Change Cipher) character as "011111."

To:

The last entry in Table K-1 shows the encoding of the "**|**" character as "011111."

1.1.14 Appendix K, Page K-1, new note at the bottom of the table, reads as follows:

"**|** = The change cipher character is not used by FIS-B (per MASPS), so there is no expected impact on legacy users."