



The European Organisation for Civil Aviation Equipment
L'Organisation Européenne pour l'Équipement de l'Aviation Civile

MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR AIRCRAFT VDL MODE 2 PHYSICAL, LINK, AND NETWORK LAYER

CHANGE 1

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ED-92B Change 1

March 2014

102 rue Etienne Dolet
92240 MALAKOFF, France
Web Site: www.eurocae.net

 **Documents**
Document Sharing Hub
Tel: 33 1 46 92 79 30
Fax: 33 1 46 55 62 65
Email: eurocae@eurocae.net

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FOREWORD

1. This document was prepared jointly by EUROCAE Working Group 92 “VDL Mode 2 airborne MOPS implementation support” and RTCA SC-214 “Standards for Air Traffic Data Communication Services”, and was approved by the Council of EUROCAE on 26 March 2014.
2. EUROCAE is an international non-profit making organisation in Europe. Membership is open to manufacturers and users of equipment for aeronautics, trade associations, national civil aviation administrations, and, under certain conditions, non-European organisations. Its work programme is principally directed to the preparation of performance specifications and guidance documents for civil aviation equipment, for adoption and use at European and world-wide levels.
3. The findings of EUROCAE are resolved after discussion amongst Members of EUROCAE and in collaboration with RTCA Inc, Washington D.C., and/or the Society of Automotive Engineers (SAE), Warrendale PA, U.S.A., through their appropriate committees.
4. This change aims at fixing some tests and editorial issues following alignment of the VDL Mode 2 standards (ICAO, EUROCAE, RTCA, AEEC). This ensures that ED-92B is notably in line with the ICAO 9776 version 2 which has been released after ED-92B.

This change also incorporates comments from suppliers which have used ED-92B in their test campaign and therefore identified inconsistencies in some test procedures.
5. In parallel, RTCA DO-281B applies the change 1 in order to maintain both documents aligned.
6. EUROCAE performance specifications and other documents are recommendations only. EUROCAE is not an official body of the European Governments. Its recommendations are valid as statements of official policy only when adopted by a particular government or conference of governments.
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EUROCAE
102, rue Etienne Dolet
92240 MALAKOFF
France

Telephone: 33 1 40 92 79 30
Fax: 33 1 46 55 62 65
Email: eurocae@eurocae.net
Website: www.eurocae.net

CHANGE 1 TO EUROCAE ED-92B

MOPS FOR AN AIRBORNE VDL MODE2 SYSTEM OPERATING IN THE FREQUENCY RANGE 118-136,975 MHZ

1. In Step 2 of Section 2.4.4.1.12, remove the second sentence, add “dBm” after 75 and replace “-” with “minus”.

2.4.4.1.12 In-Band Intermodulation/Desensitization

Reference: Section 2.2.1.2.12

Equipment Required

Desired VDL Mode 2 Signal Source

Undesired VDL Mode 2 Signal Source

VHF Signal Generator

External BER Test Fixture (optional)

RF Combiner

Measurement Procedure

- Step 1 Connect the equipment as shown in Figure 19 or Figure 20.
- Step 2 Use the Desired VDL Mode 2 Signal Source as Signal Generator A to generate the desired input signal to the receiver. Tune Signal Generator A to one of the test frequencies (Section 2.4.4). Modulate the output of Signal Generator A with either an appropriate test payload in burst form provided by the external BER test fixture, or a test payload provided by the data generator, as appropriate. Adjust the level of Signal Generator A to produce a signal level of minus 75 dBm at the receiver input.
- Step 3 Use the VHF Source as interfering Signal Generator B. Tune Signal Generator B to a frequency 1 MHz above the selected channel frequency. Set Signal Generator B to produce an unmodulated carrier to the input of the receiver at minus 32 dBm.
- Step 4 Use the Undesired VHF Source as interfering Signal Generator C. Tune Signal Generator C to a frequency 2 MHz above the selected test frequency. Create an Undesired VDL Mode 2 Signal with Generator C at a level of minus 32 dBm.
- Step 5 Apply the desired signal and the two interfering signals to the receiver input via the RF combiner. Use the process of Section 2.4.2.1 or Section 2.4.2.2, as appropriate, to determine the error rate. Verify compliance with the error rate requirements of Section 2.2.1.2.
- Step 6 Repeat Steps 3 to 5 for the other two test frequencies (Section 2.4.4).

NOTE: *In the absence of the desired signal (i.e., Generator A switched “off”), the intermodulation products produced by any interaction between the interfering signal generators B & C, must be less than minus 105 dBm at the receiver input. Additional band-pass filters, inserted between each generator and the R.F combiner, may be necessary to reduce the intermodulation product.*

2. In Table 2-3 of Section 2.4.5.1.6, IUT is replaced by EUT.

TABLE 2-3: PRO FORMA TEST DESCRIPTION TABLE

Name	Description
Test Case Name	The name of the test case used as a reference in the overall test suite
Purpose	Describes the intention of the test case
Reference	Provides a reference to the paragraphs of the requirements which are addressed by the test case
Configuration	Describes which of several possible LT configuration is used to perform the test.
Context	Indicates which part of the test case is executed. The following entries are defined:
	Preamble In this part of the test case the EUT is brought into the appropriate state to begin the test
	Test Body In this part of the test case the actual test steps required for the verification are defined
	Postamble In this part of the test case the EUT is brought into the defined idle state
Step	Numbers the individual test steps
Action	Holds the action to be performed during the test. Following actions are defined:
	DO
	INHIBIT
	RECEIVE
	REPEAT
	SEND
	SET
	VERIFY
	WAIT
PCO	Point of Control and Observation, which indicates where in the test set-up the action shall be performed. The following entries are used:
	EUT Equipment Under Test
	UT Upper Tester
	LT Lower Tester
	GS n The n -th Ground Station Emulator (for LT Configurations 2 and 3)
Action Qualifier	This is the main description of the test step; it defines or further qualifies the precise actions for the test step. In addition, it either holds one or more of the entries shown below:
	A time to wait
	A macro name with parameters value as appropriate
Comment	A comment which adds information for understanding of the actual step
Comments	An overall comment on the test case, if necessary

3. Change the title of Section 2.4.5.1.6.3 to RESERVED and remove the SET8208X macro table.

4. Add X.25 before RR in Section 2.4.5.1.6.5.

2.4.5.1.6.5 Check network link is established (CHECKNetwork)

Macro Name: CHECK _{Network}					
Purpose: Check that a link is established between EUT and LT					
Parameters: no macro level parameters are required					
Reference :					
Context	Step	Action	PCO	Action Qualifier	Comment
Macro	1	SEND	LT	DATA packet	
	2	VERIFY	LT	X.25 RR with correct flow control information	
Comments:					

5. In Step 6 of Section 2.4.5.4.3.1, change RR(F=1) to RR(F=0).

Test Case Name: DLS Timer T1 (delay before retransmission)					
Purpose: Verify the setting and usage of the T1 timer within the DLS.					
Configuration: 1					
Reference: [ICAO] 5.3.4.1					
Context	Step	Action	PCO	Action Qualifier	Comment
Preamble				Unload channel (no transmission on the frequency)	
Test body	1	SET _{AVLC}			
	2	INHIBIT	LT	Inhibit generation of any type of acknowledgement for the first N2-1 INFO frames	See comment 3
	3	SEND	UT	INFO	See comment 4 The EUT starts a T1 timer
	4	RECEIVE	LT	INFO received and time stamped	
	5	REPEAT		Repeat step 4 (N2-1 times)	Receive (N2-1) re-transmissions of the same INFO from the UT
	6	SEND	LT	RR (F=0)	
	7	VERIFY	LT	EUT stops re-transmitting INFO to the LT	
	8	VERIFY	LT	1) Same INFO was received all the time at the LT 2) Calculation of T1 values lies within the values indicated in Table 2-5.	
Postamble		RESET _{AVLC}			
Comments:					
1. The Timer T1 formula should be verified during the DO-178B design review process.					
2. This test requires the UT and LT to directly access the AVLC protocol.					
3. For Class Y equipment, UT control and observation point may be at the Data/Management Interface.					
4. For Class Z equipment, LT control and observation point may be at the Data/Management Interface.					

6. In Step 2 of Section 2.4.5.4.3.2, add a comment "Response within T2 assumes no other traffic on the channel. Traffic on the channel may introduce extra short delays in addition to T2."

Test Case Name: Timer T2 (delay before acknowledgement)					
Purpose: Verify the setting and usage of Timer T2.					
Configuration: 1					
Reference: [ICAO] 5.3.4.2					
Context	Step	Action	PCO	Action Qualifier	Comment
Preamble		SET _{AVLC}			No INFO frame in the queue!
Test body	1	SEND	LT	INFO (data content not important to this test)	
	2	VERIFY	LT	RR (F=0) is received at the expiration of T2 Timer	Response within T2 assumes no other traffic on the channel. Traffic on the channel may introduce extra short delays in addition to T2.
Postamble		RESET _{AVLC}			
Comments:					
1. This test requires the LT to directly access its AVLC protocol.					

7. Renumber the steps in Section 2.4.5.4.3.4 (b) Timer T4 (maximum delay between transmissions) – SRM, and add “frame” in Step 2.

Procedure (b) SRM Mode

Test Case Name: Timer T4 (maximum delay between transmissions) – SRM					
Purpose: Verify the setting and usage of Timer T4 in SRM					
Configuration: 3					
Reference: [ICAO] 5.3.4.4					
Context	Step	Action	PCO	Action Qualifier	Comment
Preamble		SET _{AVLC}	LT GS1	Since the LT is still sending GSIF frames with sufficient signal quality from the same GS address, verify that the EUT Attempts link establishment with this same GS address	SRM
Test body	1	SEND	LT GS2	GSIFs periodically	
	2	SEND	LT GS1	An out-of-sequence frame	
	3	INHIBIT	LT GS1	Any additional frames except GSIF for a period to exceed EUT T4	
	4	RECEIVE	LT GS1	SREJ (NR=0, F=0, ACK N(S)=1) and timestamp (TS1)	
	5	WAIT	LT GS1	EUT T4	
	6	RECEIVE	LT GS1	SREJ (NR=0, P=1, ACK N(S)=1) and timestamp (TS2)	
	7	REPEAT	LT GS1	Repeat step 5 N2-1 times without time stamping	
	8	WAIT	LT GS1	EUT T1	
	9	VERIFY	LT GS1	Verify that the EUT stops retransmissions of the SREJ	
	10	VERIFY	LT GS1	Check that TS2-TS1=T4	
	11	RECEIVE	LT GS2	XID_CMD_HO(P=1)	
Postamble		RESET _{AVLC}			

8. In Section 2.4.5.4.4.2, replace "Force disconnect" with "Begin in mode 2 with no link established." in Preamble, and replace “p=0” by “P=0” in step 1.

Procedure

Test Case Name: Non-Operational Mode					
Purpose: Verify the non-operational mode of the DLS to be Asynchronous Disconnect Mode (ADM).					
Configuration: 1					
Reference: [ICAO] 5.3.6.2					
Context	Step	Action	PCO	Action Qualifier	Comment
Preamble		RESET _{AVLC}	LT		Begin in mode 2 with no link established.
Test body	1	SEND	LT	INFO (P=0)	
	2	VERIFY	LT	DM (F=0)	
Postamble					
Comments:					
1. This test requires the LT to directly access its AVLC protocol.					
2. For Class Z equipment, LT control and observation point may be at the Data/Management Interface.					