

**RTCA Special Committee 209**

**Mode S Transponder MOPS Maintenance**

**Working Group #1, Meeting #6**

**Engility Corporation, Washington DC  
14 – 16 April 2008**

**Proposed Resolution in DO-181D and ED-73C for Action Item 7-5**

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**SUMMARY**

This Working Paper proposes resolutions for both DO-181D and ED-73C for Action Item 7-5, which requests a *“review of the environmental sections for Fixed and Variable Direct Data (DO-181D, §2.3.2.11.1 & §2.3.2.11.2) to see if referencing DO-181D, §2.6 is appropriate.”*

**Action Item:** 7-5  
**Assigned to:** R.H. "Bob" Saffell  
**Description:** Review the environmental sections for Fixed and Variable Direct Data (DO-181D, §2.3.2.11.1 & §2.3.2.11.2) to see if referencing DO-181D, §2.6 is appropriate.

## **Introduction:**

This document addresses the changes necessary to address the Action Item referenced above.

### **1. RTCA DO-181D, section 2.3.2.11.1. Test Procedures**

Currently, the test procedures provided in section 2.3.2.11.1 read as follows:

#### Step 4 Aircraft Identification Data (§2.2.13.1.1.c)

If the transponder inputs aircraft identification data as fixed data, the following test applies. Interrogate the transponder with a short surveillance-altitude (UF=4) with PC, DI and SD fields set to 0 and the RR field set to 18. Set the aircraft identification input to the transponder to 'LLLLLLLL' and verify that the encoded aircraft identification data is correctly transmitted in the MB field (MB Bits 9-56 = 001100001100 ...) of the transponder's reply. Repeat with an aircraft identification input of '33333333' and verify that the encoded aircraft identification data is correctly transmitted in the MB field (MB Bits 9-56 = 110011110011 ...) of the transponder's reply.

### **2. RTCA DO-181D, section 2.3.2.11.2. Test Procedures**

Currently, the test procedures provided in DO-181D section 2.3.2.11.2 read as follows:

*“Appropriate test procedures are presented in §2.6. ← BOB SAFFELL to check”*

However, DO-181C section 2.3.2.11.2 provides the following:

#### Step 6 Aircraft Identification Data (§2.2.13.1.2.e)

If the transponder inputs aircraft identification data as fixed data, the following test applies. Interrogate the transponder with a short surveillance-altitude (UF=4) with PC, DI and SD fields set to 0 and the RR field set to 18. Set the aircraft identification input to the transponder to 'LLLLLLLL' and verify that the encoded aircraft identification data is correctly transmitted in the MB field (MB Bits 9-56 = 001100001100 ...) of the transponder's reply. Repeat with an aircraft identification input of '33333333' and verify that the encoded aircraft identification data is correctly transmitted in the MB field (MB Bits 9-56 = 110011110011 ...) of the transponder's reply.

### **3. EUROCAE ED-73C, section 5.4.12.1.2.d Test Procedures**

Previously, the test procedures provided in ED-73C paragraph 5.4.12.1.2.d read as follows:

Interrogate the transponder with a short surveillance-altitude interrogation (UF=4) with PC, DI and SD fields set to 0 and the RR field set to 18. Set the aircraft identification input to the transponder to 101010.....(etc) and record that the identification data are properly transmitted in the MB field of the transponder's reply.

Repeat for an aircraft identification input of 010101.....(etc).

Repeat with an aircraft identification input of ABCD1234 coded in accordance with the character coding specified in paragraph 3.23.1.13 f.appropriate procedure are presented in Elementary Surveillance Tests, paragraph 5. xxxx.

### **4. EUROCAE ED-73C, section 5.4.12.2.2.f Test Procedures**

Previously, the test procedures provided in ED-73B paragraph 5.4.12.2.2.f did not exist as ED-73B provided no Variable Direct data tests in section 5.4.xxx for Aircraft Identification.

ED-73C added paragraph 5.4.12.2.2.f as follows:

f. STEP6 – Aircraft Identification Data

Appropriate test procedures are defined in Elementary Surveillance tests section paragraph 5.XXX (TBD)

**Commentary RHS:**

During the development of RTCA DO-181D and EUROCAE ED-73C the assumption was made that Aircraft Identification testing previously called out in the above discussed sections could be referenced to the new ELS Test procedures. Upon further review of the issue, it is apparent that a simple reference to the ELS procedures as a whole is not appropriate. The ELS procedures provided in DO-181D section 2.6 and ED-73C section 5.6 exercise the detailed protocol requirements of ELS as a whole and include all necessary testing for Aircraft Identification. Such detailed testing is not necessary in DO-181D section 2.4 and ED-73C section 5.4 which are exercising fundamental operation and hardware. Likewise, such detailed testing is not necessary in DO-181D section 2.3 and ED-73C section 5.4 during environmental testing.

Therefore, each of the items 1 –through- 4 are corrected by making the following updates which call out specific sections within the ELS procedures which should be adequate to demonstrate fundamental operation during ambient and environmental conditions.

Note that Part 1 and Part 2 of the Updates provided below also provide changes to section 2.4 of DO-181D.

**Required Updates:**

**Part 1: Update of DO-181D Test Procedures.**

Update DO-181D section 2.3.2.11.1, Step 4 to read as given below:

Also Update DO-181D section 2.4.2.12.1, Step 4 to read as given below:

**Step 4 Aircraft Identification Data (§2.2.13.1.1.c)**

- (1) Perform the test procedure provided in §2.6.6.1.a.(1).
- (2) Perform the test procedure provided in §2.6.6.1.b. with the exception that the Test Timer need not be implemented to monitor the “B” timer.
- (3) Perform the test procedure provided in §2.6.6.5.a.(1).
- (4) Perform the test procedure provided in §2.6.6.5.b.

**Part 2: Update of DO-181D Test Procedures.**

Update DO-181D section 2.3.2.11.2, Step 6 to read as given below.:

Also Update DO-181D section 2.4.2.12.2, step 6 to read as given below:

**Step 6 Aircraft Identification Data (§2.2.13.1.1.e)**

- (1) Perform the test procedure provided in §2.6.6.1.a.(1).
- (2) Perform the test procedure provided in §2.6.6.1.b. with the exception that the Test Timer need not be implemented to monitor the “B” timer.
- (3) Perform the test procedure provided in §2.6.6.5.a.(1).
- (4) Perform the test procedure provided in §2.6.6.5.b.

**Part 3: Update of ED-73 Test Procedures.**

Update ED-73C section 5.4.12.1.2.d, Step 4 to read as given below.

d. Step 4 Aircraft Identification Data

- (1) Perform the test procedure provided in paragraph 5.6.6.1.a.(1).
- (2) Perform the test procedure provided in paragraph 5.6.6.1.b. with the exception that the Test Timer need not be implemented to monitor the “B” timer.
- (3) Perform the test procedure provided in paragraph 5.6.6.5.a.(1).
- (4) Perform the test procedure provided in paragraph 5.6.6.5.b.

**Part 4: Update of ED-73 Test Procedures.**

Update ED-73C section 5.4.12.2.2.f, Step 6 to read as given below.

f. Step 6 Aircraft Identification Data

- (1) Perform the test procedure provided in paragraph 5.6.6.1.a.(1).
- (2) Perform the test procedure provided in paragraph 5.6.6.1.b. with the exception that the Test Timer need not be implemented to monitor the “B” timer.
- (3) Perform the test procedure provided in paragraph 5.6.6.5.a.(1).
- (4) Perform the test procedure provided in paragraph 5.6.6.5.b.

**End of Action Item 7-5 Work**