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Review of differences between ED-73 and DO-181 noted during January/February 2007 SC-209/WG-49 Joint Session (focusing on actions potentially affecting DO-181)

Prepared by Eurocontrol

Presented by Eric Potier

SUMMARY

During the common meeting held in January/February 2007 in Melbourne Florida between SC-209 and WG-49, differences between DO-181 and ED-73 were reviewed. A number of these differences were not explained or resolved during the meeting. This Working Paper presents the result of further investigation performed on these differences.

Note from Gary Furr: In the left column of this Working Paper, Antoine Herve filled in the column with red those points that WG-49 would like for SC-209 to consider before the August meeting. Antoine filled in with orange those points which he feels need to be discussed during the Joint Meeting. This Working Paper is a subset of WG49N11-09, and will be used to focus specifically on those issues that WG-49 feels may result in a change to DO-181. WG49N11-09 generally focused on items of potential change to ED-73.

General comments

#	DO-181	ED-73	Comment 140	Proposal
G-1				Adopt a consistent and uniform identification of the optional requirements and associated tests.
G-2				After page 273 the page restarts at 259. Use continuous page numbering
G-3			Reply rate in SSR 1200/s?	Xpdr manufacturers agreed to test their transponders – Need to update ED , DO, ICAO annex 10?
G-4			Hijack mode to be removed from ED?	
G-5			Data-flash also in DO?	RTCA agreed to copy data-flash in DO Check that data-flash is in line with ICAO annex10
G-6			ELS/EHS testing: ♦ Review specification and check with RTCA proposal ♦ Incorporate it in ED73? o 3.20 Level 1 o 3.21. Level 2 o 3.22. Level 3 o 3.23. Level 4 o 3.24. Level 5 o 3.25. Transponder supporting ACAS o 3.26 ES o 3.27 ELS o 3.28 EHS ♦ In fact ELS is required for international traffic ♦ Review generic procedure be sure of correct testing of reg 10 bit 25, 33, … MSSNV ♦ Insert detailed RTCA procedure as an example ♦ Check BDS 40 ♦ Comm B broadcast ♦ Interleaving space in AC bits in Reg 40 ♦ Mode b	
G-7			Invalid address at Start-up	Honeywell problem on some transponder which continue to reply in Mode S
G-8			Check Environmental test (vibration,…)	AH action
G-9			ICAO CW interference to be added to ED + DO	

Specific comments

On the ground status and FS and VS fields

<table>
<tr><th>#</th><th>DO-181</th><th>ED-73</th><th>Comment</th><th>Proposal</th></tr>
<tr><td>S-4</td><td>2.2.18.2.7 p 71/72 (Level 1 requirements)
Flight Status and Vertical Status Protocols (Figure 2-13)
…
c. Validation of declared on-the-ground status
Note 2: For aircraft with an automatic means of determining vertical status, the CA field reports whether the aircraft is airborne or on the ground. ACAS II acquires aircraft using the short or Extended Squitter, both of which contain the CA field. If an aircraft reports on-the-ground status, that aircraft will not be interrogated by ACAS II in order to reduce unnecessary interrogation activity. If the aircraft is equipped to report Extended Squitter messages, the function that formats these messages may have information available to validate that an aircraft reporting “on-the-ground” is actually airborne.
Aircraft with an automatic means for determining the on-the-ground condition that are equipped to format Extended Squitter messages shall perform the following validation check:
If the automatically-determined air/ground status is not available or is “airborne”, no validation shall be performed. If the automatically-determined air/ground status is available and “on-the-ground” condition is being reported, the air/ground status shall be overridden and changed to “airborne” if the conditions given for the vehicle category in the following table are satisfied.
<table>
<tr><th colspan="7">Determination of airborne status</th></tr>
<tr><th>A/V category</th><th>Ground Speed (knots)</th><th></th><th>Airspeed (knots)</th><th></th><th>Radio Altitude (feet)</th></tr>
<tr><td>No information</td><td colspan="5">No change to on-the-ground status</td></tr>
<tr><td>Weight < 15,500 lbs (7,031 kg)</td><td colspan="5">No change to on-the-ground status</td></tr>
<tr><td>Weight 15,500 lbs (7,031 kg)</td><td>>100</td><td>or</td><td>>100</td><td>or</td><td>>50</td></tr>
<tr><td>High performance (>5 g acceleration and >400 knots)</td><td>>100</td><td>or</td><td>>100</td><td>or</td><td>>50</td></tr>
<tr><td>Rotorcraft</td><td colspan="5">No change to on-the-ground status</td></tr>
</table>
Note 3: While this test is only required for aircraft that are equipped to format Extended Squitter messages, this feature is desirable for all aircraft.</td><td>3.20.2.7 p 61 (level 1 requirements)
Flight Status and Vertical Status Protocols (Figure 3-12)
Mode S-equipped aircraft shall report details of their flight status. The source of and the rules for such reports are as follows:
a. Alert - The transponder shall transmit the 4096 identification code in Mode A replies and in the ID field of downlink format DF=5. This code can be changed by the pilot, and when a change is made an alert condition shall be established. If the identification code is changed to 7500, 7600 or 7700, the alert condition shall be permanent. If the identification code is changed to any other value, the alert condition shall be temporary and self-cancelling after 18 ±1.0 seconds (TC timer). The alert condition shall be reported in the FS field. The permanent alert condition shall be terminated and replaced by a temporary alert condition when the identification code is set to a value other than 7500, 7600 or 7700.
b. On-the-Ground Report – The on-the-ground status of the aircraft shall be reported in the FS field and the VS field and the CA field. If a means for automatically indicating the on-the-ground condition (e.g., a weight on wheels or strut switch) is available at the transponder data interface, it shall be used as the basis for the reporting of status (FS, VS, for CA codes 4 or 5 for airborne or on-the ground). If a means for automatically indicating the on-the-ground condition is not available at the transponder data interface, the FS and VS codes shall indicate that the aircraft is airborne and the CA field shall indicate that the aircraft is either airborne or on the ground (CA=6).
c. Special Position Identification - When manually selected, the transponder shall transmit the equivalent of the SPI in the FS field of surveillance replies DF=4,5. This code shall be transmitted for 18 ±1.0 seconds (TI timer) after initiation and can be reinitiated at any time.</td><td>Requirements related to the validation of the on-the-ground status are missing in ED.</td><td>WG49 will insert this paragraph in level 2 section.
RTCA SC209 to consider to move this requirement in level 2 section</td></tr>
</table>

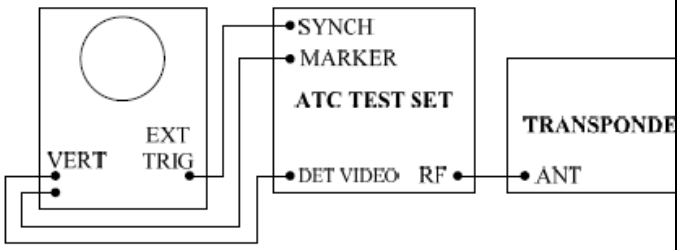
#	DO-181	ED-73	Comment	Proposal
S-5	2.2.23.3.7 p 132 (ES level requirements) Airborne/Surface State Determination Aircraft with an automatic means of determining on-the-ground condition shall use this input to select whether to report the airborne or surface message types. Aircraft without such means shall report the airborne type messages.	3.21.2.6.5 p 86/87 (ES level requirements *Airborne/Surface State Determination* Aircraft with an automatic means of determining on-the-ground condition shall use this input to select whether to report the airborne or surface message types. Aircraft without such means shall report the airborne type messages. Aircraft with or without such automatic on-the-ground determination shall use position message types as commanded by control codes in the TCS subfield (Paragraph 3.21.2.6.7). After timeout of the TCS commands, control of airborne/surface determination shall revert to the means described above. *NOTE: Extended squitter ground stations determine aircraft airborne or surface status by monitoring aircraft position, altitude and ground speed. Aircraft determined to be on the ground that are not reporting the surface position message type will be commanded to report the surface format via the TCS subfield. The normal return to the airborne position message type is via a ground command to report the airborne message type. To guard against loss of communications after takeoff, commands to report the surface position message type automatically timeout.*		The on the ground validation is already covered in level 2 transponder in both documents . SC209 to consider to add the highlighted paragraph
S-6	2.4.2.12.2 p 176 (test procedure) Variable Direct Data (§2.2.13.1.2) Step 5 Flight Status and Vertical Status (§2.2.13.1.2.c) Interrogate with UF=0 and UF=16 and verify that the VS field is a ONE when the "on-the-ground port" of the transponder is set to the on-the-ground condition. Also, verify that the VS field is a ZERO otherwise. Interrogate with formats UF=4, 5, 20, 21 and verify that the transponder follows the protocol of §2.2.14.4.14, and Figure 2-13.	5.4.12.2 p 186 (test procedure) Variable Direct Data (§2.2.13.1.2) e. STEP 5 - Flight Status and Vertical Status Interrogate with UF=0 and UF=16 and record that the VS field is a ONE when the "on-the-ground" port of the transponder is set to the "on-the-ground" condition, and a ZERO otherwise. Interrogate with formats UF=4, 5, 20, 21 and record that the above indications are correctly contained in the FS field (3.18.4.12 and figure 3.12) and that CA is set to 4 (airborne) or 5.(ground), if a status is provided to the transponder, and code CA=6 (either airborne or on-the-ground) is reported when the input is idle (or not available).		Wg-49 to add text highlighted in blue. SC209 to check reference to figure 2-13. SC209 to consider to add text highlighted in yellow to cover CA field.

#	DO-181	ED-73	Comment	Proposal
S-8	2.5.4.7 p 204 Procedure #7 FS and VS Protocol/Code Tests On-the-Ground Validation Test For transponders that support automatic on-the-ground condition input and either implement Extended Squitter formatting or support the on-the-ground validation requirements of §2.2.18.2.7.c, the following test shall be performed. The on-the-ground input is used in determining the codes for FS, VS and CA fields. The requirements of Section §2.2.18.2.7.c utilize radio altitude, ground speed and airspeed inputs to validate the on-the-ground status when indicated by the input to the transponder. If the conditions for overriding the on-the-ground status indicated by the input to the transponder, the airborne status shall be utilized to select FS, VS and CA field coding. Also, for extender squitter format selection, airborne formats shall be transmitted unless overridden by ground station interrogation commands. CA field validation for Acquisition squitters and Extended Squitters is verified as part of Procedure #6 in §2.5.4.6, so the following test can be incorporated as part of that testing. Setup the transponder to indicate on-the-ground status by input to the transponder. With no input of radio altitude, airspeed and ground speed to the transponder, verify that the FS codes are determined by the transponder states above with the Ground Register set to on-the-ground and VS is set to 1. Input radio altitude, airspeed and ground speed to the transponder. Since not all aircraft installations may have access to all three inputs, testing is required for all combinations of inputs being provided to the transponder so that each input is tested individually and collectively. This is to insure that any one input reporting a value that sets airborne status as specified in §2.2.18.2.7.c, properly outputs FS values according to Figure 2-13 with the Ground Register reset to NOT indicate on-the-ground condition and VS is ZERO. If all inputs are supported by the transponder, a total of 27 combinations are required. This represents 9 cases with radio altitude not input, 9 cases with a value above 50 feet and 9 cases with a value below or equal to 50 feet. The same variation for airspeed and ground speed is required except the values selected would be above 100 knots to satisfy the requirement to reset the Ground Register to NOT indicate on-the-ground condition and a value at 100 knots or below to not modify the on-the ground status.	5.5.8.7 p 205/206 PROCEDURE #7 FS and VS Protocol/Code Tests …		Test procedure step for On-the-ground validation is not present in ED. Text in line with DO181 text to be added. SC209 to consider revision of DO181 text in particular the second paragraph starting by if conditions…

Mode S Reply rate capability

#	DO-181	ED-73	Comment	Proposal
S-13	2.2.3.4.2 p 21 Mode S Reply Rate Capability a. A transponder equipped for only short Mode S downlink formats (DF), shall have the following minimum reply rate capabilities: 50 Mode S replies in any 1-second interval. 18 Mode S replies in a 100-millisecond interval. 8 Mode S replies in a 25-millisecond interval. 4 Mode S replies in a l.6-millisecond interval. b. A transponder equipped for long Mode S reply formats shall be able to transmit as long replies: At least 16 of the 50 Mode S replies in any 1-second interval. At least 6 of the 18 Mode S replies in a 100-millisecond interval. At least 4 of the 8 Mode S replies in a 25-millisecond interval. At least 2 of the 4 Mode S replies in a l.6-millisecond interval. c. A transponder equipped with the enhanced data link protocols (see §2.2.21) shall be able to transmit as long replies: At least 24 of the 50 Mode S replies in any 1-second interval. At least 9 of 18 Mode S replies in a 100-millisecond interval. At least 6 of 8 Mode S replies in a 25 millisecond interval. At least 2 of 4 Mode S replies in a 1.6 millisecond interval. All of the above reply rates shall be in addition to any squitter transmissions that the transponder is required to make. *Note: Higher reply rates are required by a TCAS-compatible transponder (see §2.2.22.b.).*	3.4.2 p 29 Reply Rate Capability - Mode S The total reply rate over each time interval specified below, shall be the sum of the individual Mode A/C replies at an average rate of 500 per second and the Mode S reply rate over that interval. a. Short DF Reply Rates A transponder equipped for only short Mode S Downlink Formats (DF), shall have the following minimum reply rate capabilities. (1) 50 Mode S replies in any one-second interval; (2) 18 Mode S replies in a 100-millisecond interval; (3) 8 Mode S replies in a 25-millisecond interval; (4) 4 Mode S replies in a 1.6-millisecond interval. b. Long DF Reply Rates A transponder equipped for long Mode S reply formats shall be able to transmit as long replies, (1) at least 16 of the 50 Mode S replies in any one-second interval; (2) at least 6 of the 18 Mode S replies in a 100-millisecond interval; (3) at least 4 of the 8 Mode S replies in a 25-millisecond interval; (4) at least 2 of the 4 Mode S replies in a 1.6-millisecond interval.		SC209 to consider DO shall specify that the Mode S reply rate shall be in addition to the ATCRBS reply rate of 500 replies per second. ED shall specify that the Mode S reply rate shall be in addition to any squitter transmissions that the transponder is required to make. ED shall include a similar note as DO making reference to § 3.23.b. ED to be modified with the yellow text.

RF peak power

#	DO-181	ED-73	Comment	Proposal
S-14	2.3.2.2.2 p 139 RF Peak Power Output (§2.2.3.2) Step 1 ATCRBS Power Output (§2.2.3.2) Connect the equipment as shown in Figure 2-26. Set the transponder for a 14-pulse (7777) reply. Interrogate the transponder with a standard Mode A interrogation at 1200 interrogations per second or the maximum for which the transponder is designed and measure the single pulse having the least RF power output. Determine that the power output meets the requirements of §2.2.3.2.  Figure 2-26: Step 2 Mode S Power Output (§2.2.3.2) Repeat Step 1 with a standard Mode A ATCRBS/Mode S All-Call interrogation at the standard rate.		ED does not describe specific procedures for environmental testing and only makes reference to the standard procedure and describes the range of environmental conditions to be tested.	It is proposed to remove the assumed duplicated procedure and to make reference in the DO document to the procedure described in § 2.4.2.2.2 and move figure 2-26 in this section. To be discussed under general discussion on environmental test procedure

#	DO-181	ED-73	Comment	Proposal
S-15	2.4.2.2.2 p 156/157 RF Peak Power Output (§2.2.3.2) Equipment Required: ATC Test Set with P4 capability (TIC T-50-3A/4B, or equivalent). Wide Band Dual Channel Oscilloscope (HP 1710B, or equivalent). Measurement Procedure: Step l ATCRBS Power Output (§2.2.3.2) Connect the equipment as shown in Figure 2-26. Set the transponder for a 14 (7777) pulse reply. Interrogate the transponder with a standard Mode A interrogation and measure the single pulse having the least RF power output. While varying the interrogation rate from 100 interrogations per second to the maximum interrogation rate specified for the transponder, determine that the power output meets the requirements of §2.2.3.2. Repeat the procedure measuring the single pulse having the most RF power output. Step 2 Mode S Power Output (§2.2.3.2) Repeat Step l with a standard Mode A ATCRBS/Mode S All-Call interrogation at standard rate only. -	5.4.2.2.2 p 147 *Test Procedure* Connect the equipment as shown in Figure 5-3. a. STEP 1 - Mode A/C Power Output (Paragraph 3.3.3) Set the transponder for a 14 pulse reply (Mode-A code 7777). Interrogate the transponder with a Mode A interrogation and record the peak power level of the single reply pulse having the least RF power level. While varying the interrogation rate from 100 interrogations per second to the maximum interrogation rate specified for the transponder, record the variation in peak power level of the single reply pulse having the least RF power level. Repeat the procedure, recording the level and variation in peak power level of the single reply pulse having the highest RF power level. b. STEP 2 - Mode S Power Output (Paragraph 3.3.3) Repeat STEP 1 with a Mode A/Mode S All-Call interrogation at standard rate only. For transponders with long reply capability, repeat STEP 1 with a Mode S interrogation, using any format and coding for which a long reply is required.		1st item do nothing, record means record and check against requirement 2nd item WG49 to rewrite text for long Mode S reply and specify long Mode S interrogation rate in both ED and DO to be 16 per second for level2 transponder and adding the transmission of 6 extended squitter for the transponder that are ES capable + TCAS Refer WG49N11-05 RF Peak Power Output 5.4.2.2.2 SC209 to consider inclusion of ED text in DO in the 2.4 chapter and 2.3.2.2.2 chapter

RR field

<table>
<tr><th>#</th><th>DO-181</th><th>ED-73</th><th>Comment</th><th>Proposal</th></tr>
<tr>
<td>S-16</td>
<td>2.2.14.4.35 p 58
RR Reply Request
This 5-bit (9-13) uplink field contains length and content of the reply requested by the interrogators. RR is part of the surveillance and Comm-A interrogations UF=4, 5, 20, 21.
The codes are outlined below:
<table>
<tr><th>RR Code</th><th>Reply Length</th><th>MB Content</th></tr>
<tr><td>0-15</td><td>Short</td><td>-------</td></tr>
<tr><td>16</td><td>Long</td><td>Air-Initiated Comm B (§2.2.19.1.12.4)</td></tr>
<tr><td>17</td><td>Long</td><td>Data Link Capability Report (§2.2.19.1.12.5)</td></tr>
<tr><td>18</td><td>Long</td><td>Flight ID (§2.2.19.1.13)</td></tr>
<tr><td>19</td><td>Long</td><td>TCAS Resolution Advisory Report (§2.2.22.3.4)</td></tr>
<tr><td>20-31</td><td>Long</td><td>Not Assigned</td></tr>
</table>
Note: If the first bit of the RR code is ONE, the last four bits of the 5-bit RR code, if transformed into their decimal equivalent, designate the number (BDS1) of the requested source. BDS2 is assumed to be ZERO if not specified by DI=3 or 7 and RRS.
</td>
<td>3.18.4.32 p 55
Reply Request RR
This 5-bit (9-13) uplink field contains length and content of the reply requested by the interrogators. RR is part of the surveillance and Comm-A interrogations UF=4, 5, 20, 21. The codes are outlined below:
<table>
<tr><th>RR Code</th><th>Reply Length</th><th>MB Content</th></tr>
<tr><td>0-15</td><td>Short</td><td>Not applicable</td></tr>
<tr><td>16</td><td>Long</td><td>Air-Initiated Comm-B (3.21.1.12 b)</td></tr>
<tr><td>17</td><td>Long</td><td>"Data Link Capability Report" (3.21.1.12 e)</td></tr>
<tr><td>18</td><td>Long</td><td>Flight ID (3.21.1.13)</td></tr>
<tr><td>19</td><td>Long</td><td>ACAS Resolution Advisory Report (3.23.3.4)</td></tr>
<tr><td>20-31</td><td>Long</td><td>Not assigned</td></tr>
</table>
NOTE 1: If the first bit of the RR code is ONE, the last four bits of the 5-bit RR code, if transformed into their decimal equivalent, designate the number (BDS1) of the requested source. BDS2 is assumed to be ZERO if not specified by DI=7 and RRS. See paragraph 3.21.2.1 a(4).
NOTE 2: Codes 20-31 are reserved for applications such as data link communications, ACAS, etc.
</td>
<td>RR 20-31 to clarify (20-40)
In Note 1 of ED DI = 3 has been forgotten whereas § 3.21.2.1.(6) makes reference to § 3.18.4.32</td>
<td>Extend the table as follows in both DO and ED to take into account BDS 40, 50 and 60 for ELS.
<table>
<tr><th>RR Code</th><th>Reply Length</th><th>MB Content</th></tr>
<tr><td>0-15</td><td>Short</td><td>Not applicable</td></tr>
<tr><td>16</td><td>Long</td><td>Air-Initiated Comm-B (3.21.1.12 b)</td></tr>
<tr><td>17</td><td>Long</td><td>"Data Link Capability Report" (3.21.1.12 e)</td></tr>
<tr><td>18</td><td>Long</td><td>Flight ID (3.21.1.13)</td></tr>
<tr><td>19</td><td>Long</td><td>ACAS Resolution Advisory Report (3.23.3.4)</td></tr>
<tr><td>20</td><td>Long</td><td>Selected vertical intention</td></tr>
<tr><td>21</td><td>Long</td><td>Track and turn report</td></tr>
<tr><td>22</td><td>Long</td><td>Heading and speed report</td></tr>
<tr><td>23</td><td>Long</td><td>Reserved</td></tr>
<tr><td>24-31</td><td>Long</td><td>Not assigned</td></tr>
</table>
Sc209 to considerate it together with SC209 WP01-08R1

Add reference to the sections describing registers 40 50 60
Remove Note 2 subsequently
In ED include DI = 3 in Note 1.
</td>
</tr>
</table>

Mode S replies: Pulse shape and spectrum

<table>
<tr><th>#</th><th>DO-181</th><th>ED-73</th><th>Comment</th><th>Proposal</th></tr>
<tr><td>S-18</td><td>2.2.4.2.3 p 24
Mode S Reply Pulse Shape
a. The pulse amplitude variation between one pulse and any other pulse in a reply shall not exceed 2 dB.
b. The pulse rise time shall not exceed 0.1 microsecond.
c. The pulse decay time shall not exceed 0.2 microsecond.
d. The spectrum of a reply shall not exceed the following bounds:
<table>
<tr><th>Frequency Difference (MHz From Carrier)</th><th>Maximum Relative Response (dB Down From Peak)</th></tr>
<tr><td>> 1.3 and < 7</td><td>3</td></tr>
<tr><td>> 7 and < 23</td><td>20</td></tr>
<tr><td>> 23 and < 78</td><td>40</td></tr>
<tr><td>> 78</td><td>60</td></tr>
</table></td><td>3.3.2 p 25

Transmitter Reply Spectrum
The spectrum of the transponder transmitter output shall not exceed the limits shown in Table 3.1 and Figure 3.1.
<table>
<tr><th>Frequency Difference from Carrier (MHz)</th><th>Maximum Relative Response from Peak</th></tr>
<tr><td>≥ 1.3 and < 7</td><td>-3 dB</td></tr>
<tr><td>≥ 7 and < 23</td><td>-20 dB</td></tr>
<tr><td>≥ 23 and < 78</td><td>-40 dB</td></tr>
<tr><td>> 78</td><td>-60 dB</td></tr>
</table></td><td></td><td>Add = sign for all low limits in both ED (78MHz) and DO

SC209 to consider this addition</td></tr>
<tr><td>S-19</td><td>2.2.4.23 p 24
Mode S Reply Pulse Shape
a. The pulse amplitude variation between one pulse and any other pulse in a reply shall not exceed 2 dB.
b. The pulse rise time shall not exceed 0.1 microsecond.
c. The pulse decay time shall not exceed 0.2 microsecond.</td><td>3.6.4 p 29
Mode S Reply Pulse Shape
a. All Mode S reply pulses shall have the following characteristics.
Duration: See paragraph 3.6.2 c.
Rise time: Between 0.05 and 0.1 µs.
Decay time: Between 0.05 and 0.2 µs.
b. The pulse amplitude variation between one pulse and any other pulse in a reply shall not exceed 2 dB.</td><td></td><td>ED specifies minimum and maximum rise and decay times whereas DO only specifies maximum.

SC209 to consider addition of minimum rise and decay time of 0.05 µs to be in line with ICAO Annex 10 3.1.1.6.4</td></tr>
<tr><td>S-20</td><td>2.4.2.3.4 p 163
Frequency Spectrum of Mode S Replies (§2.2.4.2.3.d)
Connect the equipment as shown in Figure 2-32. Interrogate the transponder with a standard Mode S surveillance-identity interrogation and observe the spectral response of the reply.</td><td>5.4.2.3.2 p 148
Transmitter Spectrum
b. STEP 2 - Mode S
Repeat Step 1 with Mode S "All-Call interrogation".
Record the maximum response in each frequency band as a ratio expressed in dB relative to the centre band peak level.</td><td></td><td>DO specifies UF interrogation whereas ED specifies UF 11 interrogation. To be harmonised.

To be amended after discussion in common SC209-WG49 meeting with manufacturers</td></tr>
</table>

Mode A/C replies: Pulse shape and spectrum

#	DO-181	ED-73	Comment	Proposal
S-21	2.4.2.3.1 p 160 ATCRBS Reply Pulse Characteristics (§2.2.4.1) … Step 2 ATCRBS Reply Pulse Shape (§2.2.4.1.4) Using a standard ATCRBS Mode A interrogation, measure the duration of each reply pulse. Measure rise and decay times of each pulse. Measure the pulse amplitude variations of each pulse with respect to all other pulses in the reply train. *CAUTION: If the detector is not known to be linear, checks should be made to determine what amplitude points on the detected pulse correspond to the 10 percent and 90 percent amplitude points of the RF pulses.* In addition, checks should be made to determine the rise time of the detector. Step 3 SPI Pulse (§2.2.4.1.3, §2.2.4.1.4 and §2.2.4.1.5) Momentarily activate the SPI pulse control. Interrogate the transponder with a standard ATCRBS Mode-A interrogation. Measure the position of the SPI pulse with respect to the last framing pulse and the time the pulse remains in the reply train. Measure the width of the SPI pulse. With the SPI pulse activated, interrogate the transponder with a standard ATCRBS Mode-C interrogation. Verify that the SPI pulse is not present in the reply train.	5.4.3.1 p 151 Mode A/C Replies … b. STEP 2 - Mode A/C Reply Pulse Shape (Paragraph 3.5.4) Set the transponder for a 15-pulse reply (Mode A with SPI). Interrogate the transponder on Mode A. Record the duration of each reply pulse. Record the rise and decay times of each pulse. Record the pulse amplitude variations of each pulse with respect to all other pulses in the reply train. *CAUTION: If the detector is not known to be linear, checks should be made to determine what amplitude points on the detected pulse correspond to the 10% and 90% amplitude points of the RF pulses. In addition, checks should be made to determine the rise time of the detector.* c. STEP 3 - SPI Pulse (Paragraph 3.5.3 and 3.5.5) Interrogate with Mode A interrogations. Activate the SPI pulse control. Record the position of the SPI pulse with respect to the last framing pulse and the time the pulse remains in the reply train. d. STEP 4 - SPI Pulse with Mode C Interrogations (Paragraph 3.5.3) Interrogate with Mode C interrogations. Activate the SPI pulse control and verify that the SPI pulse is not transmitted.		SC209 to consider to Align DO on ED regarding the type of reply for step2 (i.e. 15 pulses including a SPI pulse). SC209 to consider to split step3 in step3 / step4, a step 4 including the last 2 sentences of step 3.

Variable Direct Data

#	DO-181	ED-73	Comment	Proposal
S-24	2.4.2.12.2 p 176/177 Variable Direct Data (§2.2.13.1.2) Step 3 Pressure Altitude (Mode S) [§2.2.13.1.2.a (2)] Connect the transponder RF port to the Mode S test set. Interrogate the transponder with a standard surveillance-altitude interrogation (UF=4) with the PC, RR, DI and SD fields set to ZERO and the address the same as that provided to the transponder. With the ALT switch on, provide altitude code inputs to the transponder which should result in setting each of the ac field bits (including the M bit or the Q bit if the transponder is equipped to report altitude in 25-foot increments) of the reply one at a time. Verify that the correct bits are transmitted in the AC field of the reply. Verify that the AC field is all ZEROs when the ALT switch is set to "off."	5.4.12.2.2 p 185 Variable Direct Data (Paragraph 3.17.1 b.) c. STEP 3 - Pressure Altitude (Mode S) (1) Connect the transponder RF port to the transponder test set. (2) Interrogate the transponder with a standard surveillance-altitude interrogation (UF=4) with the PC, RR, DI and SD fields set to ZERO and the address the same as that provided to the transponder. (3) With the ALT switch ON, provide altitude code inputs from an altitude source in feet quantised to greater than 25 ft to the transponder which should result in setting each of the AC field bits of the reply, one at a time. (4) Verify that the correct bits are transmitted in the AC field of the reply with the Q bit set to 0 and the M bit set to 0. (5) With the ALT switch ON, provide altitude code inputs from an altitude source in feet quantised to 25 ft or less to the transponder and verify that the altitude report is correct as a minimum when the input indicates pressure altitudes of 17 050 and 34 125 ft. (6) Verify that the correct bits are transmitted in the AC field of the reply with the Q bit set to 1 and the M bit set to 0. (7) With the ALT switch ON, provide altitude code inputs from an altitude source quantised to 25 ft or less to the transponder. Verify that the altitude report is correct when the input indicates pressure altitudes of between 50 188 ft and 126 700 ft, which should result in setting each of the AC field bits of the reply. (8) Verify that the correct bits are transmitted in the AC field of the reply with the Q bit set to 0 to indicate a report to 100 ft quantisation and the M bit set to 0. (9) Repeat Step 3 (1) to (8) with the input indicating metric input if available and verify that the M bit is set to 1 in the AC field of all replies. Verify that the AC field is all ZEROs when the ALT switch is set to " OFF ". Set the input altitude data to invalid and verify that the AC field is all ZEROs.		SC209 to consider addition of step 3.9 to ensure correct implementation of metric altitude if implemented. SC209 to consider addition of invalid altitude testing (I.e. Add last sentence of ED in DO).

SPI data

#	DO-181	ED-73	Comment	Proposal
S-28		3.6.3 p 29 Special Position Identification (SPI) a. When manually activated, the SPI condition is indicated in the FS field of Mode S replies (DF = 4, 5, 20 and 21). b. This information shall be present for a period of 18 ±1.0 seconds, after activation.		No equivalent specification in the Mode S replies section of the DO document. In fact there a section on SPI in 2.2.18.7d for level 1 transponder it does not include df20/21 but erroneously include ES. For level2 section 2.2.19.1.6 makes reference to FS. SC 209 to check that SPI is correctly covered. There is no corresponding test procedure in ED 5.4.3.2.2 Mode S replies, there is one but in the ES control. Same comment for DO, as there is no requirement.

ME for extended squitter

#	DO-181	ED-73	Comment	Proposal
S-31	2.2.23.1.8 p 129 Subfields in ME for Extended Squitter SSS, the 2-bit (38-39) Surveillance Status Subfield in ME shall report the surveillance status of the transponder when this field contains the airborne position squitter report. The following codes have been assigned: **Code** / **Description** 0 — No status information 1 — Transponder reporting permanent alert condition (§2.2.18.2.7.a) 2 — Transponder reporting a temporary alert condition (§2.2.18.2.7.a) 3 — Transponder reporting SPI condition (§2.2.18.2.7.c)	3.21.2.6.8 p 89 *Subfields in ME for Extended Squitter* SSS, the 2-bit (38,39) Surveillance Status Subfield in ME shall report the surveillance status of the transponder when ME contains the airborne position squitter report. The following codes have been assigned: 0 = No status information. 1 = Transponder reporting permanent alert condition (3.20.2.7 a). 2 = Transponder reporting a temporary alert condition (3.20.2.7 a). 3 = Transponder reporting SPI condition (3.20.2.7 c).		SC209 to check and correct reference for Code 3 (it shall refer to § 2.2.18.2.7.d in DO)

Standard transaction interfaces

#	DO-181	ED-73	Comment	Proposal
S-34	2.4.2.12.3 p 177 Standard Transaction Interfaces (§2.2.13.3) Step l Uplink Interface Information Content (§2.2.13.3.1 a and e) Interrogate the transponder with valid Mode S interrogations of all uplink formats which the transponder is designed to accept, including broadcast interrogations. Verify that all fields (possibly excluding AP) of the interrogations are passed correctly through the transponder and except for UF=0, 11, 16, and 24 (when it is a request for a downlink ELM), appear at the uplink interface. Make additional valid interrogations with the uplink formats (excluding UF=11 and UF=24) and field content randomly chosen. Verify proper output of the uplink interface. Verify that broadcast interrogations are identified as such, either by AP content or by a special purpose code. Step 2 Uplink Interface, "No-Storage Design" (§2.2.13.3.1.b) Interrogate the transponder with valid Mode S interrogations of all uplink formats which the transponder is designed to accept. Verify that all data appear correctly at the uplink interface prior to the start of the transponder reply. Step 3 Uplink Interface, "Storage Design" Acceptance Rate (§2.2.13.3.1.c) Interrogate the transponder with valid Mode S interrogations (both short and long) at the rates and time periods specified in §2.2.3.4.2. Verify that all data appear correctly at the uplink interface.	5.4.12.3 p 186/187 *Standard Transaction Interfaces (Paragraph 3.17.3)* *Test Procedure* Connect the equipment as shown in Figure 5.1. a. STEP 1 - Uplink Interface Information Content (Paragraph 3.17.3 c.) Interrogate the transponder with valid Mode S interrogations excluding UF 0, UF 11 and UF 16 of all uplink formats which the transponder is designed to accept, including broadcast interrogations. Record that all fields (possibly excluding AP) of the interrogations are passed correctly through the transponder and appear at the uplink interface. Make additional valid interrogations with the Uplink Formats and field content randomly chosen. Record proper output of the uplink interface. Verify and record that broadcast interrogations are identified as such, either by AP content or a special purpose code. b. STEP 2 - Uplink Interface, "No-Storage" Design (Paragraph 3.17.3 c.) Interrogate the transponder with valid Mode S interrogations (including broadcast but excluding UF=11 and UF=24) of all Uplink Formats which the transponder is designed to accept. Record that all data appear correctly at the uplink interface prior to the start of the transponder reply. c. STEP 3 - Uplink Interface, "Storage Design" Acceptance Rate (Paragraph 3.17.3 c.) Interrogate the transponder with valid Mode S interrogations (both short and long) at the rates and time periods specified in Paragraph 3.17.3 c. Record that all data appear correctly at the uplink interface.		To modify ED to also exclude DF24 for Downlink request ie. RC=3 In ED the 3 steps shall specify "UF=0, 11, 16, and 24 (when it is a request for a downlink ELM)…" according to 3.17.3. SC209 and WG49 to check if the same exclusion applies to all steps.

#	DO-181	ED-73	Comment	Proposal
S-37	2.4.2.12.3 p 178 Standard Transaction Interfaces (§2.2.13.3) … Step 7 Downlink Interface, “Storage Design” Buffer Rate, Buffer Function (§2.2.13.3.2.c) Set up a sequence of Comm-B replies with the value of the last 48 bits of MB of each reply set to the number of the reply in the sequence (e.g., MB=1 for first reply). Interrogate the transponder with a standard Comm-A, altitude interrogation at the rates specified for long interrogations in §2.2.3.4. Verify that the replies include the proper data in the MB field. Repeat with RR equal to all valid codes from 16 through 18.	5.4.12.3 p 188 *Standard Transaction Interfaces (Paragraph 3.17.3)* *Test Procedure* … g. STEP 7 - Downlink Interface, "Storage Design" Buffer Rate, Buffer Function (Paragraph 3.17.3 d.) Set up a sequence of Comm-B replies, associated with a specific BDS data source designator code, with the value of the 56 bit MB field of each reply set to a number to enable verification of reply sequence (e.g. value =2n where n is the number of the reply in the sequence). Apply this sequence of replies to the transponder down link interface at the rate specified for long interrogations in paragraph3.17.3 d. Interrogate the transponder with a standard Comm-A, altitude interrogation requesting the BDS data source designator under test at the rate specified for long interrogations in paragraph 3.17.3 d. Record that the replies include the correct data in the MB field. Repeat for all valid BDS data source designator codes 0 to 255. *NOTE: BDS code 0 represents AICB messages. Testing of such messages requires such messages to be closed-out after being read.*		SC209 to consider addition of green text to cover the extraction of all registers. WG49 to replace BDS 0 by BDS 0;0.

#	DO-181	ED-73	Comment	Proposal
S-38	2.4.2.13.3 p 178 Standard Transaction Interfaces (§2.2.13.3) … Step 8 Downlink Interface, Unavailable Data (§2.2.13.3.2.e) Disconnect all inputs from the transponder's downlink interface port. Interrogate the transponder with a standard Comm-A, altitude interrogation containing RR=16. Verify that the reply contains all ZEROs in the MB field. Repeat with all RR codes from 17 through 31, noting that: - For RR code 17, bits of the MB field of the reply excluding bits 1-8, 24, 26-32, 33 and 35 are set to ZEROs (bits 1-8, 24, 26-32, 33 and 35 are or may eventually be set by the transponder itself when no interface is available). - For RR code 18, the reply contains all ZEROs excluding bits 1 – 8, in the MB field if the aircraft identification consists of variable direct data, or the tail number if the aircraft identification consists of fixed direct data. - For RR code 19, bits 9-56 of the MB field of the reply are set to ZEROs.	5.4.12.3 p 188 *Standard Transaction Interfaces (Paragraph 3.17.3)* *Test Procedure* … h. STEP 8 - Downlink Interface. Unavailable Data (Paragraph 3.17.3 d.) Disconnect all inputs from the transponder's downlink interface port. Interrogate the transponder with a standard Comm-A, altitude interrogation containing RR=16. Record that the reply contains all ZEROs in the MB field. Repeat with all RR codes from 17 through 31. Verify that: - For RR code 17, bits of the MB field of the reply excluding bits 1-8, 24, 26-32, 33 and 35 are set to ZEROs (bits 1-8, 24, 26-32, 33 and 35 are or may eventually be set by the transponder itself when no interface is available). - For RR code 18, the reply contains either all ZEROs in the MB field if the aircraft identification consists of variable direct data, or the tail number if the aircraft identification consists of fixed direct data. - For RR code 19, bits 9-56 of the MB field of the reply are set to ZEROs. - For RR codes 20 though 31, verify that the reply contains all ZEROs in the MB field.	Which downlink interface port?	SC209 and WG49 to exclude bit36 from RR= 17 , bit 34 (squitter) need to be tested before and after corresponding timer expiration. WG49 to use the DO text for RR18 Wg49 to add 'if not manage by the transponder itself at the end of RR 20-31. Sc209 to consider addition of the last bullet.

Non selective lockout

<table>
<tr><th>#</th><th>DO-181</th><th>ED-73</th><th>Comment</th><th>Proposal</th></tr>
<tr><td>S-46</td>
<td>2.5.4.5 p 192
Procedure #5 Selective Lockout Tests
…
Principle of Test Sequence
…
Test #1 Multisite, TL Timer and Lockout: Timer Duration and Insensitivity to Non-Valid Signals (All Transponders)
<table>
<tr><th>Time (sec)</th><th>Action</th></tr>
<tr><td>0.0</td><td>Start timer with UF=4.</td></tr>
<tr><td>0.02</td><td>Verify lockout to timer’s II or SI with UF=11.</td></tr>
<tr><td>0.04 to 1.62</td><td>Verify non-lockout to all other non-locked out IIS and SIS (times 0.9 and 1.1 will be used for the last 2 steps of the sequence for timers started previously with interlace, see note below).</td></tr>
<tr><td>2.0</td><td>Start next timer for interlace.</td></tr>
<tr><td>3.64</td><td>Try timer restart with correct IIS or SIS and incorrect DI-LOS and DI-LSS combinations (DI:0 – 7 = 8 combinations (see note above).</td></tr>
<tr><td>16.9</td><td>Verify lockout to timer’s II or SI with UF=11.</td></tr>
<tr><td>19.1</td><td>Verify non-lockout.</td></tr>
</table>
If the last test fails, the timer either runs too long or has been restarted by a non-valid signal.
Note: Test #1 provides the basic timing of a test sequence that satisfies the principles of the test procedure while maintaining a maximum of 50 interrogations per second. Because the test sequence calls for interlacing multisite lockout timers (in this case one is started every 2 seconds), the above sequence will need to accommodate the critical timer verifications that occur at 16.9 and 19.1 seconds relative to the start of each timer. When the test sequence reaches 16.9 and 19.1 seconds after the start of each timer it will be 0.9 and 1.1 after the start of a new timer. Priority is given to verify the lockout of the earlier timer at the correct time, while the verification of non-lockout to all other timers is scheduled around these critical measurements.</td>
<td>5.5.8.5 p 202/203
PROCEDURE #5 Selective Lockout Tests (Paragraph 3.20.2.5)
5.5.8.5.3 Principle of Test Sequence
a. Test #1 - Multisite, TL Timer and Lockout: Timer Duration and Insensitivity to Non-Valid Signals (All Transponders)
(1) run test for each IIS related TL timer
<table>
<tr><th>Time (sec)</th><th>Action</th></tr>
<tr><td></td><td></td></tr>
<tr><td>0.00</td><td>Start timer with UF=4, DI= 1, LOS = 1</td></tr>
<tr><td>0.02</td><td>Verify lockout to timer's II with UF=11.</td></tr>
<tr><td>0.04 to 9.90</td><td>Verify non-lockout to all other IIS and SIS.</td></tr>
<tr><td>10.0</td><td>Try timer restart with correct IIS and incorrect DI - LOS combinations (DI= 0, 2, 3, 4, 5, 6 and Bit 26 (location of LOS)=0,1; DI = 1, 7 and LOS = 0 (14 combinations))</td></tr>
<tr><td>13.3</td><td>Try timer restart with correct IIS and all DI-LSS combinations (DI=0, 1, 2, 3, 4, 5, 6, 7 and Bit 23 (location of LSS)=0,1 (16 combinations)).</td></tr>
<tr><td>16.9</td><td>Verify lockout to timer's II with UF=11.</td></tr>
<tr><td>19.1</td><td>Verify non-lockout with UF=11.</td></tr>
</table>
If the last test fails, the timer either runs too long or has been restarted by a non-valid signal.
(2) run test for each SIS related TL timer
<table>
<tr><th>Time (sec)</th><th>Action</th></tr>
<tr><td>0.00</td><td>Start timer with UF=4, DI = 3, LSS =1.</td></tr>
<tr><td>0.02</td><td>Verify lockout to timer's SI with UF=11.</td></tr>
<tr><td>0.04 to 9.90</td><td>Verify non-lockout to all other IIS and SIS.</td></tr>
<tr><td>10.0</td><td>Try timer restart with correct SIS and all DI-LOS combinations (DI=0, 1, 2, 3, 4, 5, 6, 7 and Bit 26 (location of LOS)=0,1 (16 combinations))</td></tr>
<tr><td>13.3</td><td>Try timer restart with correct SIS and incorrect DI-LSS combinations (DI=0, 1, 2, 4, 5, 6, 7 and LSS=0,1; DI=3 and Bit 23 (location of LSS) = 0 (15 combinations)).</td></tr>
<tr><td>16.9</td><td>Verify lockout to timer's SI with UF=11.</td></tr>
<tr><td>19.1</td><td>Verify non-lockout with UF=11.</td></tr>
</table>
If the last test fails, the timer either runs too long or has been restarted by a non-valid signal.</td>
<td>The policy for negative test in DO and ED is different which is explaining the differences in the procedure.</td>
<td>DO and ED shall specify that the procedure is repeated for each type UF and each possible II and SI codes.
In the last step of the DO it is proposed to add “ with UF 11” to be consistent with previous step and to be consistent with ED.

Same test in principle but more detailed in ED WG49 to justify why additional details were added
SC209 to consider addition of UF 11 in the last step</td></tr>
</table>

<table>
<tr><th>#</th><th>DO-181</th><th>ED-73</th><th>Comment</th><th>Proposal</th></tr>
<tr><td>S-47</td>
<td>2.5.4.5 p 193
Procedure #5 Selective Lockout Tests
…
Principle of Test Sequence
…
Test #2 Multisite TL Timer and Lockout: Restart Capability and Sensitivity to All Valid Formats (All Transponder)
Time (sec) Action
0.0 Start timer with UF=4.
0.02 Verify lockout to timer’s II or SI.
4.5 Restart timer with UF=5.
21.4 Verify lockout for timer’s II or SI.
23.6 Verify non-lockout for timer’s II or SI.
Interlace all timers in approximately 0.3-second intervals.
For Level 2 transponders and above, alternate using UF=4 and UF=20 interrogations to start the timers, and alternate using UF=5 and UF=21 interrogations to restart timers.
If the test at 21.4 seconds fails, the timer has not been restarted.</td>
<td>5.5.8.5 p 202/203
PROCEDURE #5 Selective Lockout Tests (Paragraph 3.20.2.5)
…
5.5.8.5.3 Principle of Test Sequence
…
b. Test #2 - Multisite TL Timer and Lockout: Restart Capability and Sensitivity to Valid Formats (All Transponders)
(1) run test for each IIS related TL timer, using DI=1
<table>
<tr><th>Time (sec)</th><th>Action</th></tr>
<tr><td></td><td></td></tr>
<tr><td>0.00</td><td>Start timer with UF=4, DI = 1, LOS = 1</td></tr>
<tr><td>0.02</td><td>Verify lockout to timer's II with UF = 11.</td></tr>
<tr><td>4.5</td><td>Restart timer with UF=5, DI = 1, LOS = 1.</td></tr>
<tr><td>21.4</td><td>Verify lockout for timer's II with UF = 11.</td></tr>
<tr><td>23.6</td><td>Verify non-lockout for timer's II with UF = 11.</td></tr>
</table>
Interlace all timers in approximately 0.3 second intervals.
If the test at 21.4 seconds fails, the timer has not been restarted.
(2) run test for each IIS related TL timer, using DI=7
<table>
<tr><th>Time (sec)</th><th>Action</th></tr>
<tr><td></td><td></td></tr>
<tr><td>0.00</td><td>Start timer with UF=5, DI=7, LOS=1.</td></tr>
<tr><td>0.02</td><td>Verify lockout to timer's II with UF = 11.</td></tr>
<tr><td>4.5</td><td>Restart timer with UF=4, DI=7, LOS=1.</td></tr>
<tr><td>21.4</td><td>Verify lockout for timer's II with UF = 11.</td></tr>
<tr><td>23.6</td><td>Verify non-lockout for timer's II with UF = 11.</td></tr>
</table>
Interlace all timers in approximately 0.3 second intervals.
If the test at 21.4 seconds fails, the timer has not been restarted
(3) run test for each SIS related TL timer, using DI=3
<table>
<tr><th>Time (sec)</th><th>Action</th></tr>
<tr><td></td><td></td></tr>
<tr><td>0.00</td><td>Start timer with UF=4, DI=3, LSS=1.</td></tr>
<tr><td>0.02</td><td>Verify lockout to timer's SI with UF = 11.</td></tr>
<tr><td>4.5</td><td>Restart timer with UF=5, DI=3, LSS=1.</td></tr>
<tr><td>21.4</td><td>Verify lockout for timer's SI with UF = 11.</td></tr>
<tr><td>23.6</td><td>Verify non-lockout for timer's SI with UF = 11.</td></tr>
</table>
Interlace all timers in approximately 0.3 second intervals.
If the test at 21.4 seconds fails, the timer has not been restarted.</td>
<td>ED test are more detailed and clearly details the different case for each type of interrogation (DI = 1 and 7 with LOS = 1 and DI = 3 LSS = 1). Further more for the second type of interrogation UF5 followed by UF4 is proposed in ED whereas DO is always using UF4 followed by UF5. Same comment for Test #3 with UF20/21.</td>
<td>SC-209 : should consider to use the Eurocae test procedures
(SI and II should be tested)</td></tr>
</table>

#	DO-181	ED-73	Comment	Proposal
S-48		5.5.8.5 p 202/203 PROCEDURE #5 Selective Lockout Tests (Paragraph 3.20.2.5) … *5.5.8.5.3 Principle of Test Sequence* … d. Test #4 - Broadcast Discrimination related to IIS … e. Test #5 - Broadcast Discrimination related to SIS …	No equivalent test steps in DO	SC- 209 to consider to add this test.

Squitter

#	DO-181	ED-73	Comment	Proposal
S-49	2.5.4.6.1 .193/194 Acquisition Squitter Verification The following test shall verify proper transmission of Acquisition squitters when the transponder is not transmitting Extended Squitters. The following tests shall be conducted with no external data input to the Extended Squitter GICB registers. Step 1: Setup the transponder to airborne status. The Acquisition squitter transmission shall be verified to be uniformly distributed between 0.8 and 1.2 seconds with a time quantization less than or equal to 15 milliseconds. The test setup will require measuring the time difference between successive Acquisition squitters. The time interval measured between successive Acquisition squitters shall be counted in individual 15 millisecond bins between 0.8 and 1.2 seconds. Validation of the proper quantization is achieved upon receipt of at least one Acquisition squitter in each 15 millisecond time bin between 0.8 and 1.2 seconds. Improper times are those occurring outside of the time bins between 0.8 and 1.2 seconds. Verify that the Acquisition squitters are uniformly distributed over the interval between 0.8 and 1.2 seconds. Step 2: Verify the content of the CA, AA and PI fields. For diversity transponders, verify that the squitters occur alternately from both channels. For transponders that are designed for aircraft installations with automatic means of determining on-the-ground condition, when the transponder is in on-the-ground status, verify that Acquisition squitters occur on the top antenna only at the prescribed rate.		Squitter to be reviewed in ED. The tests corresponding to the requirements defined in 3.20.2.6 ands 3.21.2.6 shall be defined.	Eurocae WG49 to add this test in ED73 (5.5.8.6) and to update the requirements (3.20.2.6) => see following item (S-50)

#	DO-181	ED-73	Comment	Proposal
S-50	2.54.6.2 p 194 Extended Squitter Verification Extended squitters occur randomly at rates determined by internal states of the transponder. Each Extended Squitter type must be separately verified for content, rate and antenna selection which are dependent upon transponder air/ground state and Extended Squitter ground station interrogations. The selection of airborne or surface position formats are dependent upon determination of on-the-ground status and ground station control via interrogation content. The following tests shall be performed to verify proper operation of the transponder Extended Squitter functions. The external data sources for Extended Squitter loading shall be connected via the appropriate interfaces. …	5.5.8.6 p 205 PROCEDURE #6 Squitter Verification (Paragraphs 3.20.2.6 and 3.21.2.6) The squitter transmissions function of transponders cannot be externally disabled. Squitters will occur randomly at approximately one-second intervals during all test procedures. As a result, squitter transmissions will be noted by the reply receiver and the test controller as unsolicited replies. Software or hardware provisions shall be made in the test setup so that squitter transmissions are recognized as such, and it should be noted that they occur in the specified random manner. The following is recommended: If an unsolicited reply is detected, the processor shall delay the next scheduled interrogation so that it doesn't overlap the squitter transmissions and remain undetected by the transponder. When squitter transmissions are detected, their content shall be verified observing the CA, AA and PI fields of the transmissions. For diversity transponders, it shall be verified that squitters are transmitted alternately from both channels. For tests of the squitter function, refer to paragraph 5.4.11.2.	Extended squitter to be discussed in EUROCAE	WG-49 : To reuse the procedure from DO181 2.5.4.6 (2.5.4.6.1 and 2.5.4.6.2) and add random transmission test in extended squitter procedure. SC209 to consider the add of random transmission test in extended squitter test procedure (2.5.4.6.2)
S-51	2.5.4.9 p 205 Procedure #9 Address Tests This test procedure verifies that the address set into the address interface of the transponder is only accepted during power-up or unit reset, that the accepted address set is actually the address to which the transponder responds, and that the accepted address is the only address which the transponder reports in DF=11. It is also verified that this accepted address pattern is used in generating the AP field of replies and that the transponder does reply only to this address.	5.5.8.9 p 207 PROCEDURE #9 Address Tests *5.5.8.9.1 Pattern Selection* Because more than 16 million addresses are possible, exhaustive testing is not practical. Address test patterns must be chosen so that the most likely failure modes (incorrect wiring of the interface connector, register malfunction, etc.) can be found. As a minimum the 276 address patterns consisting of two ONEs and 22 ZEROs (Pattern group A) and the 276 patterns having two ZEROs and 22 ONEs (Pattern group B) shall be used for verification.	To check why this pattern + if inputs bit to configure	WG-49 ED : take the DO text. And add that this test should be done with the two following address patterns AAAAAA and 555555. SC209 : To consider the same amendment (AAAAAA and 555555).