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Proposed Test Procedure Corrections for RF Peak Output Power (§2.4.2.2.10.1 & §2.4.2.2.10.2)

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Summary
This Working Paper proposes changes to two test procedures (§2.4.2.2.10.1 and §2.4.2.2.10.2) that verify the RF Peak Output Power of non-transponder based transmitters. The proposed changes will make these tests consistent with equivalent test procedures for transponder based systems (§2.4.2.1.1 and subsections) and DO-181D.

The purpose of this working paper is to propose changes to two test procedures (§2.4.2.2.10.1 and §2.4.2.2.10.2) that verify the RF Peak Output Power of non-transponder based transmitters. The proposed changes will make these tests consistent with equivalent test procedures for transponder based systems (§2.4.2.1.1 and subsections) and DO-181D. Currently transponder based systems are tested to comply with DO-181D section §2.4.2.2.2 for peak output power (see the latest draft of DO-260A++ §2.4.2.1.1 and subsections). DO-181D, section §2.4.2.2.2 is included at the end of this working paper for clarification.

The tests in DO-181D, §2.4.2.2.2 and the draft of DO-260A++ §2.4.2.2.10.1 and §2.4.2.2.10.2 are designed to verify that minimum output power requirements are met. In DO-181D this is achieved by measuring the pulse with the least power (as highlighted in the DO-181D excerpt). This is a logical approach to determining if minimum output power requirements are met. However, in the draft of DO-260A++ §2.4.2.2.10.1 and §2.4.2.2.10.2 this is attempted by measuring the pulse with the maximum RF power (as highlighted below). This contradicts the intent of the test. There is also a maximum output power requirement that is tested in §2.4.2.2.10.3 and here, the pulse with the maximum power is correctly used.

This working paper proposes to resolve this issue by changing the text in the test procedures as indicated in the following paragraphs:

2.4.2.2.10 Verification of RF Peak Output Power (§2.2.2.2.10)

No specific test procedure is required to validate §2.2.2.2.10, which provides only general information.

2.4.2.2.10.1 Verification of Class A0 Equipment RF Peak Output Power (§2.2.2.2.10.1)

Equipment Required:

Provide a method of loading valid data for ADS-B broadcast messages into the ADS-B equipment under test. Provide a Wide Band Dual Channel Oscilloscope (HP 1710B, or equivalent).

Measurement Procedure:

Load valid data into the ADS-B Airborne Position format and ensure that the expected ADS-B transmissions occur. Measure the single pulse having the ~~maximum~~ least RF power output. Determine that the ~~maximum~~ power output meets the requirements of §2.2.2.2.10.1.

2.4.2.2.10.2 Verification of Class B Equipment RF Peak Output Power (§2.2.2.2.10.2)

Equipment Required:

Provide a method of loading valid data for ADS-B broadcast messages into the ADS-B equipment under test. Provide a Wide Band Dual Channel Oscilloscope (HP 1710B, or equivalent).

Measurement Procedure:

Load valid Airborne Position data into the ADS-B Transmitting Subsystem and ensure that the expected ADS-B transmissions occur. Measure the single pulse having the ~~maximum~~ least RF power output. Determine that the ~~maximum~~ power output meets the requirements of §2.2.2.2.10.2.

From DO-181D:

2.4.2.2.2 RF Peak Power Output (§2.2.3.2)

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Step 1 ATCRBS Power Output (§2.2.3.2)

Connect the equipment as shown in Figure 2-31. 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.

Note: Step 1 is repeated in steps 2, 3, and 4 for Mode S types.