This paper suggests a requirement for the Mode S Transponder MOPS (DO-181) to replace the requirement imposed by DO-160 item 20.3.d.

DO-160E 20.3.d

Test Frequency Exclusions

RF receiving equipment may show sensitivity to in-band receive frequencies during susceptibility testing. This sensitivity is normal for devices that are required to be sensitive according to the receiver MOPS. This sensitivity is therefore normal and such frequencies may need to be excluded or levels at these frequencies reduced during testing.

Unless otherwise specified by the applicable receiver minimum performance standard, the following exclusion band shall apply for radio receivers. The band of frequencies from ten percent below the lowest operating frequency in the band to ten percent above the highest operating frequency shall be tested to Category S levels. Required receiver performance shall be stated in the test procedure and report, or in the specific receiver performance standard. The frequencies from one percent below the radio receiver tuned frequency through the one percent above the tuned frequency shall be tested to Category S for damage assessment only.

This test is not intended to evaluate the normal MOPS RF performance characteristics of the receivers, nor is the test intended to evaluate receiver performance in the presence of any interfering signal induced or coupled into the receiver's RF input port(s). Other responses due to power line and/or control/signal line coupling, or direct coupling through the receiver's enclosure shall be evaluated and pass/fail criteria determined based on the specific receiver specifications or performance requirements. Tests shall be performed to full levels, or for frequencies within 5% of the tuned frequency, to Category S levels. Required receiver performance shall be stated in the test procedure and report, or in the specific receiver performance standard.

The action suggested is to add the following requirement to DO-181:

Test Frequency Exclusions

The equipment may show sensitivity to in-band receive frequencies during susceptibility testing. This sensitivity is normal as the transponder is required to be sensitive according to these MOPS. Such frequencies may need to be excluded or levels at these frequencies reduced during testing.

After the presence of radiated susceptibility field of 5 V/m strength ranging from frequencies of 1020 MHz and 1040 MHz the equipment shall be shown to be sensitive to interrogations at 1030 MHz.

In the presence of radiated susceptibility field of 1 V/m strength at frequency of 1019 MHz the equipment shall be shown to be fully sensitive to interrogations at 1030 MHz.

In the presence of radiated susceptibility field of 1 V/m strength at frequency of 1041 MHz the equipment shall be shown to be fully sensitive to interrogations at 1030 MHz.

Note: This requirement replaces Test Frequency Exclusion requirements of DO-160.

It is recommended that this requirement not be placed in any environmental categories.

Suggest Test method:

Expose the equipment to a 5 V/m strength square modulated RF radiated susceptibility field stepping at 1 MHz frequencies across the range of 1020.0 MHz to 1040.0 MHz.

Set the ATC test set to interrogate with a UF-11 interrogation at 100 PRF. Expose the equipment to a 1 V/m strength square modulated RF radiated susceptibility field at a frequency of 1019.0 MHz and show the unit replies to 99% of valid interrogations (at 1030.0 MHz).

Set the ATC test set to interrogate with a UF-11 interrogation at 100 PRF. Expose the equipment to a 1 V/m strength square modulated RF radiated susceptibility field at a frequency of 1041.0 MHz and show the unit replies to 99% of valid interrogations (at 1030.0 MHz).