

RTCA Special Committee 209
ATCRBS / Mode S Transponder
Meeting #3

RTCA, Washington DC
8 – 9 August 2006

**Consolidated Set of Comments Received from Responses to
Action Item 2-3**

Consolidated and Presented by Gary Furr
L-3 / Titan Group, FAA Technical Center

SUMMARY

This Working Paper represents a consolidation of all of the comments that have been received from Manufacturers as a result of Action Item 2-3, which requested that a Letter be sent to Manufacturers, asking Manufacturers to assess the impact of proposed changes to the Test Procedure for TACAN/DME in §2.4.2.7, presented during Meeting #2 in Working Paper WP02-05R1.

14 June 2006

Letter to Manufacturers:

As part of the task of updating the ATCRBS/Mode-S MOPS, RTCA/DO-181C and RTCA/DO-144, RTCA Special Committee 209 (SC-209) met for their second (2nd) meeting on 23 and 24 May 2006. As part of the discussion on potential updates to the DO-181C document, Working Paper SC209-WP02-05 details a number of suggested changes, mostly in the test procedure areas of that document. This working paper was reviewed during the meeting in detail and was annotated with comments from SC-209 in preparation for an update of the suggested changes during the next meeting of SC-209 on 8 and 9 August at RTCA in Washington DC. You can obtain a copy of the entire annotated working paper, along with all of the other documents presented during Meeting #2, and other meetings, on the SC-209 web site, which is located at: <http://adsb.tc.faa.gov/SC209.htm>

One of the suggested changes to DO-181C involved DME and JTIDS Interference Tests, where the requirement appears in paragraph 2.2.8.4 as follows:

2.2.8.4 Response in the Presence of TACAN/DME and JTIDS Interference

Given a Mode S interrogation that requires a reply, the reply ratio of the transponder **shall** be at least 90 percent for input signal levels between -68 and -21 dBm when either of the following signals is applied with the interrogation signal:

- a. A TACAN/DME signal at a nominal repetition rate of 3,600 pulse pairs per second for both X and Y (12 and 30 microseconds) channel pulse spacings, at a level of -30 dBm, and over the frequency ranges of 962-1020 and 1041-1213 MHz.
- b. A single pulse with a duration of 6.4 microseconds at a rate of 2,000 pulses per second, at a level of -80 dBm and a frequency of 1030 MHz.

In Working Paper SC209-WP02-05, John Van Dongen of the FAA Technical Center indicates the following, with respect to changes to the test procedure for this requirement:

DME and JTIDS Interference Tests

In subparagraph 2.2.8.4 the required response to TACAN/DME and JTIDS Interference is defined over a range of signal levels between -68 and -21 dBm. Currently the test procedure only uses -50 dBm for the Mode S interrogation. The test procedure [in Step #4] should be expanded to include the defined range. Also, the test calls for a 6.4 microsecond wide pulse pair when it should call for a single pulse.

2.4.2.7 Response to Interference

...

Step 4 DME and JTIDS Interference Tests (Subparagraph 2.2.8.4)

Insert 3.5-microsecond wide pulse pairs spaced 12 microseconds apart with amplitudes of -30 dBm at a rate of 3,600 randomly spaced pulse pairs per second. Observe the reply ratio as the frequency of the interfering signal is varied over the ranges of 962 to 1020 MHz and 1041 to 1213 MHz in 1-MHz steps. Repeat the test for all signal levels between -68 and -21 dBm in 1-dB increments.

Repeat the test using 3.5-microsecond wide pulse pairs spaced 30 microseconds apart.

Repeat the test using a single 6.4-microsecond wide pulse at a random rate of 2000 pulses per second, with an amplitude of -80 dBm and a frequency of 1030 MHz.

Based on the suggested change to the test procedure in 2.4.2.7, Step #4, SC-209 has asked me to inquire from all concerned manufacturers as to the effect on your testing efforts that such a change might incur. Please reply to me directly with your agreement and comment to the change, or your causes for not wanting the change, or suggested other changes. These responses will be consolidated and presented as a working paper during Meeting #3 of SC-209 at RTCA in Washington DC on 8 and 9 August 2006.

You are all invited to attend this and other SC-209 meetings, particularly as we move closer to finalizing the changes to DO-181C and DO-144.

Regards,
Gary Furr
Secretary, RTCA SC-209
gary.ctr.furr@faa.gov
609-485-4254

July 19, 2006

RE: Working Paper SC209-WP02-05

SC-209 Leadership:

This letter is in response to the request for feedback on Working Paper SC209-WP02-05 from vendors that Gary Furr sent on 14 June 2006. I have distributed the material within Honeywell and received comments from several of our Mode S hardware designers. I have compiled this material and organized it into the following table. Although I am not planning to attend the August SC-209 meeting, I can be available via telephone to speak on behalf of Honeywell. We appreciate the committee's concern for the impact changes may have on our product development cycle. Thank you.

Paragraph	Comment	Author
2.3.2.2.3, 2.4.2.2.4	If the most stringent time to measure Power and Frequency is during the burst rate tests, then why are there separate tests for power and frequency at nominal reply rates. Redundant testing during environmental qualification is a huge problem with both ED-73 and DO-181C. Suggest that Power and Frequency be measured only when absolutely necessary.	Del Brandley, Judy Loewe
2.4.2.7	Reject this change. If implemented, this would add approximately 10 days of real time to our environmental test time. This is due to the number of measurement repetitions this change would add. We do not feel that these added steps add any value over the current samples.	John Carocari, Del Brandley, Judy Loewe
2.3.2.6, 2.4.2.6 Step 2	Reject change. Receiver desensitization and recovery (2.2.7.1, 2.2.7.2) are tested in 2.3.2.6/2.4.2.6 step 1. Repeat of same test with Mode-S interrogation is redundant. Current test is sufficient to verify requirement in 2.2.7.2.1.	Showkat Osman
2.3.2.6, 2.4.2.6 Step 4	Reject. Intent of this test is to verify suppression pair do not prevent mode-S decode and reply. Recovery rate is tested in Step 1. Why -35 dBm?	Showkat Osman, Judy Loewe
2.4.2.6 Step 7	Reject. Redundant with Step 1. The signal levels of Master and Slave should be identical. Non-acceptance is a rejection by SW and should not be based on the signal level. If these changes were adopted they would make Step 7 like Step 1.	Showkat Osman, Judy Loewe

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"Guetter, Douglas @ ACSSD" <Douglas.Guetter@1-3com.com>

07/31/2006 05:21 PM

To: Gary CTR Furr/ACT/CNTR/FAA@FAA

Cc: rhsaffel@rockwellcollins.com, Thomas Pagano/ACT/FAA@FAA, rhssx@msn.com

Subject: RE: SC-209 Action Item 2-3

Gary,

Sorry about the 1 dB vs. 5 dB confusion. Our response remains the same. I have no objection to the change from 5 dB test steps to 1 dB (and even with 1 dB steps, about 1 day would be added to our test time). I didn't really consider the 1-Mz steps a change, but rather a clarification.

Doug.

-----Original Message-----

From: gary.ctr.furr@faa.gov [mailto:gary.ctr.furr@faa.gov]

Sent: Monday, July 31, 2006 1:24 PM

To: Guetter, Douglas @ ACSSD

Cc: rhsaffel@rockwellcollins.com; thomas.pagano@faa.gov; rhssx@msn.com

Subject: Re: SC-209 Action Item 2-3

Doug,

Before we ride too far on this pony, take a look at the revised working paper which is attached that we revised and agreed to during the meeting.

You will see two things (on page 14 of 15) that affect your response below:

(1) The revised test procedure calls for 1-MHz steps and repeating the test between -68 and -21 dBm in 1-dB increments.

(2) We took care of the typo that you mentioned in the original proposal to change the procedure.

We talked at length during the meeting about the 1-dB increments versus the 5-dB increments, and everybody agreed that with today's testing tools, it was no big deal to test in 1-dB increments. There was even an agreement that I would search the document and change all 5-dB increments to 1-dB increments, which I did and which are in the draft version of DO-181D (v0.4) that we will have in front of us during Meeting #3.

Now, is your response still the same??

Gary

(See attached file: SC209-WP02-05R1-Comments on RTCA181C.pdf)

"Guetter, Douglas @ ACSSD" <Douglas.Guetter@L-3com.com>
To: Gary.Furr@L-3com.com, Thomas Pagano/ACT/FAA@FAA
07/31/2006 03:45
Cc: Bob Saffell" <rhsaffel@rockwellcollins.com>
Subject SC-209 Action Item 2-3

Gary, Tom, and Bob,

I reviewed the proposed changes to the test in section 2.4.2.7 (testing at 5 dB increments).

This change to the test will add about 1 day (8 hours) to our test efforts. The change to the test procedure will probably only be incorporated in our "qualification" testing, not the testing done as part of our manufacturing/build. Our manufacturing automated test will continue to be run at the -50 dBm level. This is really a "design assurance" type test and as such, will be conducted in its entirety during our qualification testing.

As I reviewed the test procedure (section 2.4.2.7, step 4, third paragraph) I believe there may be a typo that should be corrected. The third paragraph states "Repeat the test using 6.4-microsecond wide pulse pairs at a random rate of 2000 pulses per second, with an amplitude of -80 dBm and a frequency of 1030 MHz." I don't believe the procedure should state "pulse pairs" but rather "pulse". The 6.4-microsecond pulse would represent the signal characteristic of the Link 16 transmission.

Douglas Guetter

"Robert H. Saffell" <rhssx@msn.com>

07/31/2006 08:00 PM

To: Gary CTR Furr/ACT/CNTR/FAA@FAA, <douglas.guetter@L-3com.com>

Cc: <rhsaffel@rockwellcollins.com>, Thomas Pagano/ACT/FAA@FAA

Subject: Re: SC-209 Action Item 2-3

As I get back to looking at some of this stuff, THERE SHOULD NEVER EVER BE A NEED TO TEST TO 1 dB INCREMENTS. Simply PUT from a concerned vendor. WHO PAYS FOR IT? It surely gains you nothing. Suspect that this should be dealt with AGAIN.

Best Regards,
Bob Saffell
Rockwell Collins