

RTCA Special Committee 209

Working Group #1

Mode S Transponder MOPS Development/Maintenance

Meeting #1

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3 – 5 April 2007

**Raytheon Response to Action Item 6-3
Transponder Reply Rate Capabilities**

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SUMMARY

This Working Paper summarizes the Raytheon response to SC-209 Action Item 6-3 requesting the testing of the company transponders for reply rate capabilities.

Your ATCRBS test data request and Bob Saffell's response triggered the following RE Raytheon military transponders response:

The AIMS 03-1000A IFF spec meets ICAO requirements and explicitly requires a minimum transponder duty cycle capability of 1%. Requirements for combinations of modes and rates and AOC settings indicate that on the order of 1.5% duty cycle capability is implied, but is not explicitly required. The actual design margin is a Raytheon proprietary item but it exceeds the 1.5% value.

This transmitter capability allows the Raytheon APX-100 and APX-119 transponders to exceed both the DO-181 (w/TCAS and ADS-B rates included = 66 long Mode S + 500 ATCRBS = ~0.76% duty) and ICAO (w/ACAS and ADS-B = 25 long and 34 short Mode S + 1200 ATCRBS = ~1.15% duty) one second rates with considerable margin. Reiterating what Bob pointed out, the 100 ms period conditions are the most demanding and the AIMS standard also sets the ATCRBS AOC limit at 1000/sec and while the 1200/sec value was tested during transponder qualification, it can not be tested in the field without a software revision.

Going into the weeds... As AOC is the black-art of the transponder world, it might be more valuable to characterize it in its operational settings rather than transmitter capability. However, that would only be true if one could come up with meaningful tests that translate to useful system projections in the real world...

Practically speaking, as this group knows, one can only count on the minimums what are explicitly tested in the MOPS/TSO...