

RTCA Special Committee 186, Working Group 3

ADS-B 1090 MOPS (DO-260), Revision B

Meeting #18

Teleconference 01.21.04

Proposal to Revisit Transmitter Power for Class B2

Presented by: Ronald Staab

SUMMARY

This Working Paper summarizes prior discussion by WG-3 on the Transmitter Power of Class B2 equipment and proposes the possibility of a change based on published requirements in the new ASA MASPS (DO-289).

Transmitter Power for Class B2 Revisited

Issue: Ground Vehicle (Class B2) Transmitter Power in light of ASA MASPS (DO-289)

References: Summarized below are the past WG-3 Working Papers and Action Items, as well as the new ASA MASPS (DO-289) requirements, directly related to issue.

WP-13-15R1: Ron Jones proposed DO-260A change for Class B2 and B3 equipment transmitter power (from minimum of 70 watts and maximum of 500 watts to minimum of 50 watts and maximum of 100 watts). After working group discussion, it was agreed that Ron's proposal was not ready to be included in DO-260A.

Action Items 13-04 and 14-03: Bill Harmon accepted an action, in response to WP-13-15R1, to analyze the probability of report update by an airborne A1 aircraft at 10 NM out, with 30,000 fruit per second, at a 2 second update rate of a B2 surface vehicle in motion, and determine minimum power for B2. This action was addressed in WP-14-13 for transmit powers of 70 watts and 10 watts at antenna, but inadvertently used the airborne transmission rate. After discussion by the working group, it was agreed that Bill would re-run and revise the analysis of WP-14-13 to include 2 or 0.2 surface position squitters per second, and that he would also address acquisition as well as surveillance time for an aircraft flying at 150 knots on final and having a stationary or moving vehicle on the runway.

Action Item 14-02: Mark Schneider accepted an action; in conjunction with Action Item 14-03, to review the requirements for update time and range for FAROA and propose requirements for selection for required transmit power of surface vehicles.

WP-15-17R1: Mark Schneider concluded, in response to Action Item 14-02, a 10-watt transmitter for ground vehicles was adequate to address the needs of anticipated ADS-B applications, based on test data and simulation data (WP-15-21). But part of the paper contains an application driven requirements analysis that implies, in conjunction with the simulation data (WP-15-21), that a 10-watt transmitter is not adequate.

WP-15-21: Bill Harmon presented, in response to Action Items 13-04 and 14-03, the Lincoln Labs simulation results for 70-watt and 10-watt ground vehicle transmitter cases. The performance results for 10 watts and a transmission rate of 2 squitters per second, i.e., an acquisition probability of 95% at a range of about 7.5 NM, correspond to a surveillance update time of about 20 seconds. As pointed out in the paper, if we use a criterion that the update time should be 1.5 seconds or less, as is suggested in WP-15-17R1, then surveillance performance satisfies this criterion at a range of only about 2.5 NM with an acquisition probability of 99%. The group noted that this does not meet the ADS-B MASPS (DO-242A) requirement R3.4 for providing a 5 NM coverage range for Class A receivers. The performance results for 70 watts and a transmission rate of 2 squitters per second, indicates that a 1.5 second update period is achieved at a range of about 7 NM with an acquisition probability of 99%.

WP-15-26: Jim Maynard proposed, in response to WP-15-17R1 and WP-15-21, adding a Capability Class (CC) Code bit in the Surface version of the Operational Status Message for flagging ground vehicles (class B2 equipment) with less than 70 watts of transmitted power. The working group agreed to implement the proposed changes into DO-260A.

ASA MASPS (DO-289), Table 2-3: Airport Surface Situational Awareness (ASSA) and Final Approach and Runway Occupancy Awareness (FAROA): requirement for Update Interval is 2 seconds for airborne A/Vs or surface moving A/Vs, and 10 seconds for stationary A/Vs on the surface; and requirement for Coverage Volume is the airport maneuvering area, and within 3 NM runway threshold and less than 1000 ft AGL from airport surface.

Conclusion: A 10-watt transmitter for ground vehicles is adequate to address the ASA MASPS requirements of ASSA and FAROA, based on simulation data (WP-15-21) that indicates a 1.8 second update period is achieved at a range of 3 NM with an acquisition probability of 99%.

Alternatives (pros and cons not evaluated) for change to 1090ES MOPS (DO-260A):

1. Do nothing
2. Add note about ASA requirements
3. Change B2 (and B3) power requirements per ASA requirements
4. Other