

RTCA Special Committee 186, Working Group 3

ADS-B 1090 MOPS, Revision A

Meeting #6

Clarification of Antenna Diversity Requirements

Presented by Gary Furr

SUMMARY

Several months ago I received a call from an engineer that was working on a 1090 MHz system for his company. Their target customer is the A1 class equipment, but he indicated that he looked through DO-260 for almost 3 months before finding the single statement in section 3.3.1 indicating that diversity was required for Class A1. He requested that we review the subparagraphs related to antenna diversity and try to indicate a simple fix to help users read the document.

1.0 Background

Several months ago I received a call from Mike Exner who is an engineer at Avidyne and he indicated that he was working on a 1090 MHz system for his company. Their target customer is the A1 class equipment, but he indicated that he had looked through DO-260 for almost 3 months before finding the single statement in section 3.3.1 indicating that diversity was required for Class A1. He requested that we review the subparagraphs related to antenna diversity and try to propose a simple fix to help users read the document, and specifically find information on diversity easier.

2.0 Proposal 1

Section 3.3.1 states: "... Class A1, A2, and A3 require antenna diversity and must have transmitting and receiving capability on both the top and bottom of the aircraft ..." A 'quick' look through DO-260 finds no other statement in the document that indicates which classes of equipment require diversity.

In order to make this "requirement" for diversity easier to find, I propose that text be added to the A1, A2 and A3 "Comments" column of Table 2-1, DO-260 page 19 simply stating "**Antenna Diversity.**" Table 2-1 also states that it is a copy of Table 3-1 from DO-242, so that notation should be removed if this proposal is accepted, unless it is appropriate to request that Table 3-1 of DO-242A also be changed.

**Table 2-1: ADS-B Aircraft System Classes
(from RTCA DO-242, Table 3-1)**

CLASS	SUBSYSTEM	CAPABILITIES	FEATURES	COMMENTS
Interactive Aircraft/Vehicle Participant Systems (Class A)				
A ₀	Minimum Interactive Aircraft/Vehicle	Aid to Visual Acquisition.	Lower transmit power and less sensitive than Class A ₁ .	Minimum interactive capability with CDTI.
A ₁	Basic Interactive Aircraft	A ₀ Plus Conflict Avoidance.	Standard Tx and Rx.	Provides ADS-B based conflict avoidance and interface to current TCAS surveillance algorithms/displays. Antenna Diversity
A ₂	Enhanced Interactive Aircraft	A ₁ Plus Separation Assurance and Sequencing.	Standard transmit power and more sensitive receiver. Interface with avionics source required for TCP data.	Baseline for separation management employing intent information. Antenna Diversity
A ₃	Extended Interactive Aircraft	A ₂ Plus Flight Path Deconfliction Planning.	More sensitive receiver. Interface with avionics source required for TCP and TCP+1 data.	Extends planning horizon for strategic separation employing intent information. Antenna Diversity
Broadcast-Only Participant Systems (Class B)				
B ₁	Aircraft Broadcast Only	Supports visual acquisition and conflict avoidance for other participants.	Transmit power may be matched to coverage needs. Nav data input required.	Enables aircraft to be seen by Class A and Class C users.
B ₂	Ground Vehicle Broadcast Only	Supports visual acquisition and conflict avoidance on airport surface.	Transmit power matched to surface coverage needs. High accuracy Nav data input required.	Enables vehicle to be seen by Class A and Class C users.
B ₃	Fixed Obstruction	Supports visual acquisition and conflict avoidance.	Fixed coordinates. No Nav data input required. Collocation with obstruction not required with appropriate broadcast coverage.	Enables Nav hazard to be detected by Class A users.
Ground Receive Systems (Class C)				
C ₁	ATS En route and Terminal Area Operations	Supports ATS cooperative surveillance.	Requires ATS certification and interface to ATS sensor fusion system.	En route coverage out to 200 nmi. Terminal coverage out to 60 nmi.
C ₂	ATS Parallel Runway and Surface Operation	Supports ATS cooperative surveillance.	Requires ATS certification and interface to ATS sensor fusion system.	Approach coverage out to 10 nmi. Surface coverage out to 5 nmi.
C ₃	Flight Following Surveillance	Supports private user operations planning and flight following.	Does not require ATS interface. Certification requirements determined by user application.	Coverage determined by application.

2.1 Proposal 2

Section 2.2.13.6.1 entitled “Transmitting Diversity” on DO-260 page 203 indicates in the last sentence of that subparagraph:

“If transmission diversity is used, the bit described in 2.2.3.2.3.3 shall be set valid.”

This is not a very clear requirement. I propose that the sentence be replaced with:

“If transmission diversity is used, the Single Antenna 1-bit Subfield described in subparagraph 2.2.3.2.3.3 shall be set to ZERO (0) to indicate diversity.”

The test procedure in subparagraph 2.4.3.2.3.3 is not affected.