RTCA Special Committee 209 and EUROCAE WG-49

ATCRBS / Mode S Transponder MOPS Maintenance

Meeting #11

In Joint Plenary Session at
RTCA Headquarters, Washington DC
8 – 10 September 2010

Proposal for Setting Reserved Bits in Register 40_{16} to Zero

Prepared by: Gary Furr, Engility Corporation supporting the FAA, ATO-P and Tom Pagano, FAA ATO-P

SUMMARY

This Working Paper suggests that there was an omission in DO-181D/ED-73C where the status bits in Register 40_{16}, bits 40 to 47 were not set to Zero. Also there needs to be a requirement that data bits be set to Zero if the status bit is set to Zero.

1.0 Register 40_{16} Reserved Bits

The MOPS requirements for the formats of Register 40_{16} is very detailed and consistent with the general requirements for register formatting. However, there appears to be one omission in the requirements for the reserved bits to be set to zero.

As written, DO-181D, §2.2.25.5.2.5 [ED-73C, §3.30.5.2.5] requires that reserved bits 52 and 53 be set to ZERO. No mention is made of the other reserved field in this message, bits 40 to 47. For completeness, paragraph §2.2.25.5.2.5 [ED-73C, §3.30.5.2.5] should be revised to include bits 40 to 47 in the requirement for being set to ZERO.

2.0 Data Requirements for Future Transponder Register Formatting

DO-181D, §2.2.26.2.1 [ED-73C, §3.31.2.1] states the general formatting requirements for future register specification. As written, the list of requirements is not complete since the following requirements are omitted:

Setting data bits to ZERO if the Status Bit for that field is set to ZERO

Setting any Reserved Bits to ZERO

Note that that (except for bits 40-47 of Register 40_{16} as corrected in 1.0 above) both of the above requirements are consistent with the current MOPS formatting requirements for Registers 40_{16}, 50_{16} and 60_{16}.

3.0 Proposed MOPS Change

The tracked changes in the following paragraphs include revisions to implement both of the above corrections.

2.2.25.5.2.5 Reserved Bits (Bits 40 to 47, 52 & 53)

Bits 40 to 47, 52 and 53 of Register 40_{16} "MB" field **shall** be set to ZERO (0).

2.2.26.2 Data Requirement

2.2.26.2.1 Data Field "y"

a. The transponder will process data from on-board aircraft data sources as provided in Appendix B, Table B-3-**ddd** of Register $\mathbf{XX_{16}}$ definition table and format the data into field "**y**" of the Register $\mathbf{XX_{16}}$ "MB" field as shown in that table.

b. Field "**y**" will be encoded using two's complement coding if it is a signed arithmetic field unless otherwise specified.

c. The data loaded into the "MB" field will be rounded so as to preserve accuracy of the source data within ±1/2 LSB.

d. Status Bit of field "**y**" will be set to ONE (1) whenever valid and up-to-date data (data not older than twice the maximum update interval specified in Table B-2-1 in Appendix B) is available in field "**y**".

e. Status Bit of field "**y**" will be set to ZERO (0) whenever there is no valid and up-to-date data with which to fill field "**y**".

f The data bits of field "y" will be set to ZERO if the Status Bit is set to ZERO

g Any Reserved Bits will be set to ZERO.

Note 1: *On an ARINC platform, when data is available in BCD and in binary, transponders will preferably use binary data rather than BCD data.*

Note 2: *When multiple sources of data are available for a given field "**y**", transponders will use the data source that is being used to manage the aircraft profile or the source selected by the flight crew. This general convention applies unless the highest integrity data is desired as in Automatic Dependent Surveillance – Broadcast (ADS-B). In such cases, the highest integrity source will be used for data.*