

RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS

Meeting #5

The Debate over Flight ID Field Length

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SUMMARY

There appears to be disagreement in the ADS-B MASPS in Chapter 2 and 3 with regard to the length of the Flight ID Field. When all is said and done, the problem appears to be in the MASPS, and not with any of the “controlling” specification documents, such as ICAO Annex 10, Volume IV. The recommendation is to suggest editorial changes to DO-242A to eliminate further confusion.

1 In The Beginning ...

On 23 May 2001, Ron Jones issued the following email entitled “*ADS-B MASPS & MOPS [1090] inconsistency*” to [WG-3 members] Gary Furr, Stuart Searight, Bill Harman and Vince Orlando:

Stu, Gary, Bill and Vince -

I have a few items related to Flight ID.

The ADS-B MASPS in Chapter 2 [2.1.2.1.1, page 29] says the Flight ID/callsign is up to 7 characters in length, but in chapter 3 [3.4.4, page 100] it says that it is up to 8 characters in length. The 1090 MHz MOPS [2.2.3.2.5.3, page 69] has allowed 8 characters for the call sign based on the MASPS chapter 3 requirement. I checked with ICAO and have found that PANS RAC, ICAO DOC 4444 allows a maximum of 7 characters for Flight ID and this is consistent with other ICAO documentation (include the existing reference in the MASPS). Therefore it appears that Chapter 2 of the MASPS is correct and Chapter 3 should be revised to indicate the requirement is 7 characters not 8. I also found out that the flight ID will always begin with the one to three letter designator assigned by ICAO, as per ICAO Doc 8585, then followed with additional characters that may included letters in addition to numeric characters.

As a result of the correction to Chapter 3 of the MASPS, the 1090 MOPS can be changed (also probably the draft UAT MOPS) to only accommodate up to 7 characters for Flight ID. In the case of the 1090 MOPS this will free up 6-bits, four of which could be allocated to version number and the remaining two bits would be spares for future use.

A question came up at this week's MASPS ad hoc meeting related to my proposal to allow for an anonymous Flight ID of the format VFRxxxx where the xxxx is a randomly generated 4 digit number. I have verified that the label VFR is not assigned by ICAO as a valid aircraft ID prefix either for tail number or to designate an air carrier. Specifically, ICAO Doc 8585 ("Designators of aircraft operating agencies, aeronautical authorities and services") has assigned a few designators that begin with the letter "V" but none that begin with the letters "VF". If RTCA were to adopt my proposed format for an anonymous flight ID then we should request that ICAO made the specific designator "VFR" a reserved value.

Ron Jones

2 And, Then What Followed ...

The above email was sent to other Working Group 3 members for review and what followed was a flurry of emails, mostly indicating that:

“ICAO Annex 10, Volume IV, specifically identifies 8 characters in section 3.1.2.9.1.2, and ... also, that RTCA DO-181 has used the 8 character call out in section 2.2.17.1.13 for many years and ALL Mode-S transponders are required to implement accordingly.”

To be more specific, what follows is a copy of page 65 from ICAO Annex 10, Volume IV, which includes Section 3.1.2.9.1.2:

3.1.2.8.6.8.2 *ATS, altitude type subfield in MB.* The transponder shall report the type of altitude being provided in the airborne extended squitter in this 1-bit (35) subfield of MB when the reply contains the contents of GICB register 07 { HEX }

Coding

- 0 signifies that barometric altitude is being reported
- 1 signifies that navigation-derived height is being reported

3.1.2.8.6.9 *Surface squitter rate control.* Surface squitter rate shall be determined as follows:

- a) once per second the contents of the TRS shall be read. If the value of TRS is 0 or 1, the transponder shall transmit surface squitters at the high rate. If the value of TRS is 2, the transponder shall transmit surface squitters at the low rate;
- b) the squitter rate determined via TRS shall be subject to being overridden by commands received via RCS (3.1.2.6.1.4.1 f). RCS code 1 shall cause the transponder to squitter at the high rate for 60 seconds. RCS code 2 shall cause the transponder to squitter at the low rate for 60 seconds. These commands shall be able to be refreshed for a new 60 second period before time-out of the prior period; and
- c) after time-out and in the absence of RCS codes 1 and 2, control shall return to TRS.

3.1.2.9 AIRCRAFT IDENTIFICATION PROTOCOL

3.1.2.9.1 *Aircraft identification reporting.* A ground-initiated Comm-B request (3.1.2.6.11.2) containing RR equals 18 and either DI does not equal 7 or DI equals 7 and RRS equals 0 shall cause the resulting reply to contain the aircraft identification in its MB field.

3.1.2.9.1.1 *A/S, aircraft identification subfield in MB.* The transponder shall report the aircraft identification in the 48-bit (41-88) AIS subfield of MB. The aircraft identification transmitted shall be that employed in the flight plan. When no flight plan is available, the registration marking of the aircraft shall be inserted in this subfield.

Note.- When the registration marking of the aircraft is used, it is classified as "fixed direct data" (3.1.2.10.5.1.1). When another type of aircraft identification is used, it is classified as "variable direct data" (3.1.2.10.5.1.3).

3.1.2.9.1.2 *Coding of the AIS subfield.* The AIS subfield shall be coded as follows:

33	41	47	53	59	65	71	77	83
BDS	Char. 1	Char. 2	Char. 3	Char. 4	Char. 5	Char. 6	Char. 7	Char. 8
40	46	52	58	64	70	76	82	88

Note.- Aircraft identification coding provides up to eight characters.

The BDS code for the aircraft identification message shall be BDS1 equals 2 (33-36) and BDS2 equals 0 (37-40).

Each character shall be coded as a 6-bit subset of the International Alphabet Number 5 (IA-5) as illustrated in Table 3-6. The character code shall be transmitted with the high order unit (*b6*) first and the reported aircraft identification shall be transmitted with its left-most character first. Characters shall be coded consecutively without intervening SPACE code. Any unused character spaces at the end of the subfield shall contain a SPACE character code.

3.1.2.9.1.3 *Aircraft identification capability report.* Transponders which respond to a ground-initiated request for aircraft identification shall report this capability in the data link capability report (3.1.2.6.10.2.2.2) by setting bit 33 of the MB subfield to 1.

3 And, Then There Was Peace on Earth ...

On 5 June 2001, Bob Saffell, after discussion with Dan Castleberry, produced an email, which among other things summarized the contents of ICAO Annex 10, Volume IV and ICAO Documents 4444 and 9705. Bob and others mostly came to the same conclusion:

“... In other words, I vote that we stay with Annex 10, Volume IV with 8 characters and let those who want more (i.e., Boeing and Airbus) justify just what they intend to do with them.”

4 So, Finally a Recommendation

The Working Group 3 people reviewing this issue have concluded that there is no change necessary in the 1090 MHz MOPS. Working Group 5 should also consider this issue when setting the format and editorial description for Flight ID. And, both Working Groups should consider whether there should be any recommendation(s) to the Ad Hoc MASPS Working Group for making changes in the MASPS, DO-242A, to resolve the confusion caused with the specification of both 7 characters in Chapter 2 [section 2.1.2.1.1, “Call Sign” page 29], and 8 characters in Chapter 3 [section 3.4.4, Table 3-6, “Mode Status Report Definition,” page 100].

My opinion is that the recommendation should be to change the specification in DO-242A, Section 3.4.4, page 100, Table 3-6 for the Mode Status Report Definition, to “seven (7)” alphanumeric characters. Annex 10, Volume IV, while it is specific, only applies to Mode S. Since the general requirement (non-link specific) from ICAO is for 7 characters, then the ADS-B MASPS should state as its “minimum,” the seven (7) alphanumeric characters.

In addition, we could recommend to the Ad Hoc MASPS Group that further clarification could be achieved if they add a requirement in Section 2.1.2.1.1 which indicates that “for call signs of less than seven (7) characters, the ADS-B report shall left justify the call sign value within the allocated 7 [minimum] character field and use trailing blanks for padding.”