

RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS (DO-282), Revision A

Meeting #15

**Proposed Changes to DO-282 that are probably,
well, almost totally, most likely in some cases - editorial**

Presented by Gary Furr

SUMMARY

One of the things that has always driven me crazy is my ability to spend hundreds of hours on a technical document such as the UAT MOPS, and just AFTER it is published, to open it to a random page and find an error. Some of the proposed changes in this Working Paper are in that category! Other proposed changes were found by people who were reviewing the document for themselves, or trying to verify Test Procedures. Still others are a result of the creation of the UAT SARPS and the UAT SARPS Technical Manual by the ICAO AMCP WG-C UAT Subgroup. This list of changes will continue to be maintained, and as changes are accepted by WG-5, this document will become a change history for the production of DO-282A. In the following table, those items shaded in yellow are those that I believe will require discussion by the Working Group for approval.

Changes proposed and accepted by WG-5 for DO-282A

Section	DO-282 Page #	Date Accepted	Description
Various			During the review of the proposed UAT SARPS Technical Manual, it was pointed out that there was inconsistency in the treatment of capitalization in some Tables in DO-282 that reference the names of Fields versus subfields. This comment affects numerous field names in several Tables and in paragraph text in DO-282A.
§1.3.1 Figure 1-1 §1.3.3	5 6		The last MSO should be numbered 3951 in: (1) Figure 1-1, (2) as the last number in the paragraph following Figure 1-1, and (3) at the end of the first sentence in the first paragraph of §1.3.3.
§2.2.2.3 Note 2	18		In the second line of Note 2, change “frequency offset” to “frequency deviation”
§2.2.2.4	18		To address an issue that arose during the discussion of the UAT SARPS Technical Manual, it appears that for the sake of completeness and to rule out some potential anomalous behavior, §2.2.2.4 should be amended to include a requirement for the horizontal dimension of the eye opening as well as the vertical dimension. Working Paper UAT-WP-15-01 discusses this proposed change and suggests changing the beginning of the text in §2.2.2.4 to read” “The minimum <i>vertical</i> opening ...” Additionally, add a second paragraph reading “ <i>The minimum horizontal opening of the eye diagram of the transmitted signal (measured at 978 MHz) shall be no less than 0.624 microseconds (0.65 symbols periods) when measured over an entire Long ADS-B Message containing pseudorandom payload data.</i> ”
§2.2.2.6 Figure 2-2	20		In order to clarify the “necessary” or “occupied” bandwidth, the UAT SARPS Subgroup suggested adding a dashed line at the 0.65MHz position in Figure 2-2 and labeling it as “Necessary Bandwidth” in order to conform to the change also made in the Note below the table. Additionally add a vertical label on the right side of the plot in Figure 2-2 indicating “250% Boundary.”
§2.2.2.6 Note below Fig 2-2	20		To conform to a proposed change in the UAT SARPS, in the Note following Figure 2-2: (1) add “+/-“ in front of the value 250%, (2) change both occurrences of “occupied bandwidth” to “necessary bandwidth” (3) after 1.3MHz, add “(+/- 0.65MHz)” (4) find a reference higher than “47 CFR §2.1”

Section	DO-282 Page #	Date Accepted	Description
§2.2.3.2.2.1.4	24		During the review of the proposed UAT SARPS Technical Manual, it was agreed that this paragraph should be re-written for clarity as: “The “UTC Coupled” flag is a 1-bit (bit 1 of byte 7) flag used to indicate whether or not the ground station 1 Pulse Per Second timing is valid. An encoding of ONE represents that the Ground Station is UTC-Coupled (§2.2.5.1). An encoding of ZERO represents that the Ground Station is not UTC-Coupled (§2.2.5.2).”
§2.2.4.5.2.1	31		In paragraph (a), second line, change “encode the latitude of the ADS-B Transmitting System” to “encode the latitude provided to the ADS-B Transmitting System”
§2.2.4.5.2.1	32		In paragraph (b), second line, change “encode the latitude of the ADS-B Transmitting System” to “encode the longitude provided to the ADS-B Transmitting System”
§2.2.4.5.2.5.1 Table 2-17	37		Working Paper UAT-WP-15-02 describes the error that caused the value of 100 feet to be placed into the “Radio Altitude” column. Replace all “100 feet” values with “50 feet”
§2.2.4.5.2.7.2 Table 2-35	45		Working Paper UAT-WP-15-03 describes the request to simplify the “Length” and “Width” Category columns by eliminating the left side of all of the inequalities.
§2.2.4.5.3 Table 2-38	46		During the review of the proposed UAT SARPS Technical Manual, it was requested that a “ <i>Note</i> ” be added after Table 2-38, reading “ <i>Design of the TIS-B Ground Subsystem is in a preliminary phase. The message structure in Table 2-38 may be changed as this design matures.</i> ”
§2.2.4.5.3.1	46		During the review of the proposed UAT SARPS Technical Manual, it was requested that the “ <i>Notes</i> ” in this section be revised to be clearer. The proposed Notes would read: “1. The “UTC” field shown in Table 2-11 for the State Vector Element is not provided for TIS-B transmissions. The “UTC Coupled” status of the ground station transmitting TIS-B information is available in the UAT Ground Uplink Message (§2.2.3.2.2.1.4)” and 2. The application that uses TIS-B reports is assumed to make appropriate checks for a TIS-B Site ID of value ZERO. If the Address Qualifier shown in Table 2-10 indicates that this is a TIS-B Message, and the TIS-B SITE ID indicates a value of ZERO, an error condition is indicated.”

Section	DO-282 Page #	Date Accepted	Description
§2.2.4.5.4.12.2	54		As per discussion in Working Paper UAT-WP-15-04, there appears to have been an inconsistency between the TCAS equipment interface requirements in the ADS-B MASPS and the UAT MOPS. This analysis is supported by discussion of the UAT SARPS Subgroup and the proposed changes are consistent with changes made to the UAT SARPS Technical Manual. Following the suggested changes in UAT-WP-15-04, the sentence in the ADS-B MASPS §3.4.4.9.1, which contains the requirement R3.102-B, will be inserted prior to the last sentence in the first paragraph of §2.2.4.5.4.12.2. Additionally, in the second existing paragraph, the last word will be changed from “ZERO” to “ONE.” Finally, the “ <i>Note</i> ” from the ADS-B MASPS §3.4.4.9.1 will be inserted after the second paragraph.
§2.2.4.5.4.13.1	55		As per discussion in Working Paper UAT-WP-15-04, there appears to have been an inconsistency between the TCAS equipment interface requirements in the ADS-B MASPS and the UAT MOPS. This analysis is supported by discussion of the UAT SARPS Subgroup and the proposed changes are consistent with changes made to the UAT SARPS Technical Manual. Following the suggested changes in UAT-WP-15-04, the sentence in the ADS-B MASPS §3.4.4.10.1, which contains the requirement R3.110-B, will be inserted prior to the last sentence in the first paragraph of §2.2.4.5.4.13.1. Additionally, in the second existing paragraph, the last word will be changed from “ZERO” to “ONE.”
§2.2.5.1	63		During the review of the proposed UAT SARPS Technical Manual, it was requested that the second sentence of the “ <i>Note</i> ” in this section be re-written as: “ <i>Short term GNSS outages are mitigated by UAT ground infrastructure providing timing information and/or by the ability of UAT avionics to prevent Airborne UAT Transmitting Subsystems from transmitting in the Ground Uplink Segment for a minimum of 20 minutes in the absence of GNSS (§2.2.5.2 [d]).</i> ”
§2.2.6.1.2	66		In Note 2 under Table 2-63, second line change “Trajectory State” to “Target State”
§2.2.8.2.1.1	73		In the title, change “is desired” to “as desired”
§2.2.8.2.1.2	73		In the title, change “is desired” to “as desired”
§2.2.8.2.1.2	73		To conform to a proposed addition to the UAT SARPS Technical Manual, add a new paragraph entitled “Basic UAT ADS-B Message as Desired Signal.” Copy the existing text of §2.2.8.2.1.1 for “long” and change the desired signal level to “-94dBm.”

Section	DO-282 Page #	Date Accepted	Description
§2.2.8.3.5	78		During the review of the UAT SARPS Technical Manual, it was agreed that in writing this requirement, we forgot about the reference point for the measurement. Therefore, to conform to a proposed change to this requirement in the UAT SARPS Technical Manual, revise subparagraph (c) to read: “Accuracy of +/- 500 nanoseconds relative to the optimum sample point of the first bit of the synchronization sequence applied at the receiver terminals for UAT equipment using either an internal or external UTC Coupled time source.”
§2.3.1 Table 2-70	91		To conform to a proposed addition to the UAT SARPS Technical Manual, add a new paragraph §2.3.2.12 entitled “Basic UAT ADS-B Message as Desired Signal.” Indicate appropriate tests for new §2.3.2.12. Increase all of the following paragraph numbers in the 2.3.2.13 through 20 range.
§2.3.2.11	95		In the title, change “is desired” to “as desired”
§2.3.2.12	95		In the title, change “is desired” to “as desired”
§2.3.2.12	95		To conform to a proposed addition to the UAT SARPS Technical Manual, add a new paragraph entitled “Basic UAT ADS-B Message as Desired Signal.” Reference correct test procedure paragraph.
§2.4.2.1 Table 2-71	98		Working Paper UAT-WP-15-13 raises concerns about using the root raised cosine filter when setting up the Vector Signal Analyzer for this test procedure. Further investigation will be performed by various individuals and reported on during the 20 June 2003 teleconference so that a conclusion may be reached on what change, if any, to apply here.
§2.4.2.4	101		Pursuant to the acceptance of the change suggested in Working Paper UAT-WP-15-01 for §2.2.2.4, update the Purpose/Introduction with the new text from the requirement change in §2.2.2.4, then re-write the test procedure to accommodate the additional requirement.
§2.4.4.5.4.3.1 Table 2-91	164		In the title, change “is desired” to “as desired”
§2.4.4.5.4.3.1 Table 2-91	164		In the “Call Sign Character” column, in the row specific to the “Small – 15,500 to 75,000 lbs” Emitter Category, change the “Call Sign” value from “KG000000” to “MG000000”
§2.4.4.5.4.3.2 Table 2-92	165		Numerous corrections to the “Call Sign Characters” values associated with the Binary Encoding for Bytes 20 and 21. No changes to any of the Binary Encoding values.
§2.4.4.5.4.3.3 Table 2-93	166		Numerous corrections to the “Call Sign Characters” values associated with the Binary Encoding for Bytes 22 and 23. These changes are the same as applied to Table 2-92 Call Sign Characters. No changes to any of the Binary Encoding values.

Section	DO-282 Page #	Date Accepted	Description
§2.4.4.5.4.12.2	173		As per changes suggested in Working Paper UAT-WP-15-04, modify the Purpose/Introduction to be consistent with §2.2.4.5.4.12.2. Add an additional Test Procedure step to test the new requirement being added in §2.2.4.5.4.12.2 and alter Step 3 to test for a condition of “ONE” instead of “ZERO.”
§2.4.4.5.4.13.1	174		As per changes suggested in Working Paper UAT-WP-15-04, modify the Purpose/Introduction to be consistent with §2.2.4.5.4.13.1. Add an additional Test Procedure step to test the new requirement being added in §2.2.4.5.4.13.1 and alter Step 3 to test for a condition of “ONE” instead of “ZERO.”
§2.4.8.2.1.1	216		In the title, change “is desired” to “as desired”
§2.4.8.2.1.2	217		In the title, change “is desired” to “as desired”
§2.4.8.2.1.2	217		To conform to a proposed addition to the UAT SARPS Technical Manual, add a new paragraph §2.4.8.2.1.2 entitled “Basic UAT ADS-B Message as Desired Signal.” Write a new Test Procedure for this new requirement.
§2.4.8.3.1.2 Table 2-105 Table 2-108	244 247		Row 2 of table 2-105 and Row 6 of Table 108 have a font size larger than the other rows causing the columns not to line up with the other rows.
§2.4.8.3.5	257		If the change is accepted for §2.2.8.3.5 suggested above, then the Test Procedure must be updated to reflect the corrected requirements text for subparagraph (c).
§2.4.10.3	262		The existing test procedure in this section requires the use of an external report interface, which is inconsistent with other requirements in DO-282, as described in Working Paper UAT-WP-15-09. Suggestions are made in the Working Paper for modifying the “Measurement Procedure” text, and Steps 3 and 6. This topic will be further discussed during the 20 April 2003 teleconference to ensure WG agreement with the proposal of UAT-WP-15-09.