RTCA Special Committee 186, Working Group 5

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

Meeting #19

Teleconference on 1.12.04

Proposed Changes to DO-282 that may be considered for Change-1 of DO-282

Maintained by Gary Furr

SUMMARY
This Working Paper contains a number of proposed changes to DO-282 for the purpose of considering the publication of a Change-1. Some of the proposed changes in this Working Paper are clearly corrections to typos and errors! Other proposed changes were found by people who were reviewing the document for themselves or their companies, 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 ACP 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 any published change to DO-282. 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 by WG-5 for changes to the UAT MOPS in preparation for DO-282A

Section	DO-282 Page #	Change Source	Date Accepted	Description
Various Capitalization		Editorial	WG Telecon 8/6/03	During the review of the proposed UAT SARPS Technical Manual, it has been pointed out that there were inconsistencies in the treatment of capitalization in some Tables in DO-282 that reference the names of Fields versus those of subfields. This comment will affect numerous field names in several Tables and in paragraph text in DO-282A. **Implemented**
§1.3.1 Figure 1-1 §1.3.3	5 6	Errata	WG Telecon 8/6/03	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. **Implemented**
§2.2.2.3 Note 2	18	Editorial	WG Telecon 8/6/03	In the second line of Note 2, change "frequency offset" **to** "frequency deviation" **Implemented**
§2.2.2.4	18	SARPS Review	WG Telecon 8/6/03	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 *vertical* opening …" Additionally, add a second paragraph reading "*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 symbol periods) when measured over an entire Long ADS-B Message containing pseudorandom payload data.*" **Implemented**
§2.2.2.6 Figure 2-2	20	SARPS Review	WG-5 Meeting 18 12/8/03	Numerous discussions in the UAT SARPS Subgroup regarding the use of the terms "necessary" or "occupied" bandwidth, led to the ultimate resolution of deleting references to either term. It was agreed that Figure 2-2 would however be enhanced by adding a vertical label on the right side of the plot in Figure 2-2 indicating "250% Boundary." **Implemented**
§2.2.2.6 Note below Fig 2-2	20	SARPS Review	WG-5 Meeting 18 12/8/03	Numerous discussions in the UAT SARPS Subgroup regarding the use of the terms "necessary" or "occupied" bandwidth, led to the ultimate resolution of agreeing to replace the Note following Figure 2-2 by breaking it into two separate notes reading: 1. *99% of the power of the UAT spectrum is contained in 1.3 MHz (+/- 0.65MHz). This is roughly equivalent to the 20 dB bandwidth.* 2. *Spurious transmission requirements begin at +/- 250% of the 1.3 MHz value, therefore the transmit mask requirement extends to +/- 3.25 MHz.* **Implemented**

Section	DO-282 Page #	Change Source	Date Accepted	Description
§2.2.3.2.2	23	Expanded Rqmt	WG-5 Meeting 16 9/17/03	Working Paper UAT-WP-15-08 proposed a format for Information Frames that would contain the incremental units of information conveyed in the UAT Ground Uplink Message. This framework of Information Frames offers the flexibility to support various kinds of uplink information as well as a mixture of information types within each Ground Uplink Message. WG-5 agreed with the recommendations of UAT-WP-15-08 and directed that the additions proposed in the Working Paper be made in §2.2.3.2.2 and §2.2.3.2.2.2, as appropriate. **Implemented**
§2.2.3.2.2.1.4	24	SARPS Review	WG Telecon 8/6/03	During the review of the proposed UAT SARPS Technical Manual, it was agreed by the UAT SARPS Subgroup 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)." **Implemented**
§2.2.4.5.1.2 Table 2-10	29		Withdrawn pending implementation of the TQL parameter from ASA MASPS	We can identify an ADS-B and a TIS-B Message, but we have no separate way to indicate ADS-B re-broadcast. It may be important to distinguish ADS-B from ADS-R in order to do range validation properly. And, we may need to distinguish ADS-R from TIS-B (radar) to properly interpret latency and possibly NIC/NAC/SIL. Proposed Resolution: Consider assigning one of the two reserved states in Table 2-10 to "ADS-B Re-broadcast."
§2.2.4.5.1.3.2	30	Errata	WG-5 Meeting 18 12/8/03	The ground systems folks have a strong requirement that, if a participant uses a Temporary Address, that it always be the same address within one flight segment, regardless of how many times the pilot toggles the ICAO versus Temporary selection. The reason being that having multiple Temporary addresses from the same participant in a short period of time (less than 1 minute coast time) can cause bogus conflict alerts on the ATC controller displays. Proposed Resolution: At the top of page 30 where the values of M(1), M(2) and TIME are described: change "at the time the temporary address option is selected" **to** " the first time the temporary address option is selected" **Implemented**
§2.2.4.5.2.1	31	Editorial	WG Telecon 8/6/03	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" **Implemented**
§2.2.4.5.2.1	32	Errata	WG Telecon 8/6/03	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" **Implemented**

Section	DO-282 Page #	Change Source	Date Accepted	Description
§2.2.4.5.2.1 Table 2-12	32	Errata	WG-5 Meeting 18 12/8/03	Two errors have been discovered in Table 2-12 during implementation of the UAT Capstone GBT. 1. For the bit definition “1011 1111 1111 1111 1111 1111” the Longitude **should be** “(90+LSB) degrees West” 2. For the bit definition “1100 0000 0000 0000 0000 0000” the Latitude **should be** ”+90 degrees (South Pole)” **Implemented**
§2.2.4.5.2.1 Figure 2-5	33	SARPS Review	WG Telecon 8/6/03	During the review of the proposed UAT SARPS Technical Manual, it was agreed by the UAT SARPS Subgroup that the following changes would be made to Figure 2-5 for clarity: 1. In the lower half of the figure, change: “270 degrees E = 90 degrees W” to “90 degrees W” 2. In the lower half of the figure, add a label at the center of the globe indicating “N Pole” **Implemented**
§2.2.4.5.2.2	34	Errata and Clarify	(1) WG-5 Meeting 16 9/17/03 and (2) WG-5 Meeting 18 12/8/03	(1) When transmission of Pressure Altitude is inhibited (i.e. made not-available), does that force the Altitude Type field to assume the '1' value (i.e. Geometric Altitude becomes Primary)? The question arises due to a lack of clarity in the last sentence of the 3rd paragraph of this section (i.e. "If only one ALTITUDE TYPE is available, then that Altitude shall be indicated in the "ALTITUDE TYPE" field"). But note that the ALTITUDE TYPE field always refers to both types of altitude, by assigning one of them as "primary" (though it doesn't use that word), and the other as the SECONDARY ALTITUDE. Proposed Resolution: Change the last sentence of the 3rd paragraph: " If only one altitude source is available, then the use of that Altitude **shall** be reflected in both the “ALTITUDE TYPE” and “ALTITUDE” fields.” (2) As documented in Working Paper UAT-WP-18-01, in some cases, the UAT MOPS text includes phrases such as "if available" to describe the appropriate processing of Optional Input Elements detailed in Table 2-64. A suggested clarification to the Altitude Type Selection, Element #5 in Table 2-64 is to modify §2.2.4.5.2.2, third paragraph, second sentence by replacing the first five words as follows: "~~A means shall be provided~~ If an Altitude Type Selection Input is available, it **shall** be used ..." **Implemented**
§2.2.4.5.2.3	34	New Rqmt	WG-5 Meeting 18 12/8/03	In §2.2.4.5.2.3 for the ALTITUDE Field Encoding there is no data lifetime requirement. In the paragraph above for the ALTITUDE TYPE Field Encoding, the data lifetime statement uses the ALTITUDE lifetime, but only for the purposes of encoding the ALTITUDE TYPE Field, and not the content of the ALTITUDE Field itself. Note that there is already a test procedure in §2.4.4.5.2.3 (page 127) for the ALTITUDE data lifetime. Proposed Resolution: Add a “Data Lifetime” paragraph to §2.2.4.5.2.3. **Implemented**

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§2.2.4.5.2.5.1 Table 2-17	37	Errata	Resolved in the text of UAT-WP-17-03 WG-5 Meeting 17 11/6/03	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" **Note:** The text adapted by the SC-186 Ad Hoc Working Group, which was formed to resolve the air/ground determination and validation issue, incorporates the corrected "50 feet" value. Table 2-17 will be deleted and replaced by the text described in Working Paper UAT-WP-17-03, which describes the requirement. **Implemented as reflected in UAT-WP-17-03**
§2.2.4.5.2.5.1 and §2.2.4.5.2.5.2	36 to 38	Errata	WG-5 Meeting 17 Telecon 11/6/03	As initiated by the review of the UAT SARPS Technical Manual, and as documented in Issue Paper 71, the errors in the determination and validation of the Air/Ground State were originally defined in DO-260 and were carried forward to the ADS-B MASPS (DO-242A), the UAT MOPS (DO-282), and the revised 1090 MHz ES MOPS (DO-260A). The RTCA SC-186 Plenary on 9/18/03 established an ad hoc working group to resolve the errors and to recommend language for the draft ASA MASPS (DO-289). Working Paper **UAT-WP-17-03** details the text agreed to by that ad hoc working group, and which was additionally reviewed and agreed to by the Technical Subgroup of the ICAO ACP WG-B SCRSP for inclusion in the revision of the 1090 SARPS. Proposed Resolution: It is recommended that the text of UAT WP-17-03 as included in the ASA MASPS be adopted to replace the text and tables of these referenced paragraphs in DO-282. **Implemented as reflected in UAT-WP-17-03**
§2.2.4.5.2.5.1 Table 2-17	37	Expanded Rqmt	Resolved in the text of UAT-WP-17-03 WG-5 Meeting 17 11/6/03	Row 2 of the Table requires that LIGHT aircraft must always report the AIRBORNE condition. Because of a misunderstanding of the intent of DO-242A, this is not strictly required by R3.45 of that document. DO-242A contains no requirement to report the Air/Ground state at all. Instead, DO-242A sets requirements for what elements of the State Vector Report must be present (see DO-242A, §3.4.3.1, first paragraph). In the case of participants that do not have an automatic means of determining their Air/Ground state, the intention of R3.45 was to guarantee particularly that the participant Altitude is included in the State Vector (SV) Report. See DO-242A Table 3-6 for a list of the required SV Report elements by Air/Ground state. Since UAT equipped aircraft always include Altitude in all SV reports, there is no reason for forcing special conditions on UAT participants for the LIGHT emitter category. Proposed Resolution: For LIGHT participants, add the following Note to the table: ***Note:*** *When appropriate, LIGHT participants may use a Ground Speed threshold to determine their Air/Ground status. The Ground Speed threshold used should be appropriate for the performance characteristics of the aircraft.* **Implemented as reflected in UAT-WP-17-03**

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§2.2.4.5.2.6.2	40	Clarify	WG-5 Meeting 18 12/8/03	As documented in Working Paper UAT-WP-18-01, in some cases, the UAT MOPS text includes phrases such as "if available" to describe the appropriate processing of Optional Input Elements detailed in Table 2-64. A suggested clarification to the Ground Speed Element #12 in Table 2-64 is to modify the first sentence of §2.2.4.5.2.6.2 by changing the end of the sentence by inserting the phrase "if Ground Speed is available." **Implemented**
§2.2.4.5.2.6.4	42	Clarify	WG-5 Meeting 18 12/8/03	As documented in Working Paper UAT-WP-18-01, in some cases, the UAT MOPS text includes phrases such as "if available" to describe the appropriate processing of Optional Input Elements detailed in Table 2-64. A suggested clarification to the Track Angle, Element #13 in Table 2-64 is to modify the end of the first sentence of §2.2.4.5.2.6.4 as follows: "~~if not available~~ otherwise Track Angle **shall** be encoded, if available." **Implemented**
§2.2.4.5.2.7.1.1	43	Clarify	WG-5 Meeting 18 12/8/03	As documented in Working Paper UAT-WP-18-01, in some cases, the UAT MOPS text includes phrases such as "if available" to describe the appropriate processing of Optional Input Elements detailed in Table 2-64. A suggested clarification to the Geometric Vertical Rate, Element #16 in Table 2-64, is to insert the words "if available" after "Geometric source" in the second paragraph of §2.2.4.5.2.7.1.1. **Implemented**
§2.2.4.5.2.7.2 Table 2-35	45	SARPS Review	WG Telecon 8/6/03 Meeting 18 12/8/03	As a result of review of the proposed UAT SARPS Technical manual, 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. Working Paper UAT-WP-18-03 further describes a change to Codes 14 and 15 as per agreement in the ASA MASPS (RTCA DO-289). **Implemented**
§2.2.4.5.3 Table 2-38	46	SARPS Editorial	WG Telecon 8/6/03	During the review of the proposed UAT SARPS Technical Manual, it was requested that a "***Note***" be added after Table 2-38, reading: "*Design of the TIS-B Ground Subsystem is in a preliminary phase. The message structure in Table 2-38 may evolve as this design matures.*" **Implemented**
§2.2.4.5.3.1	46	SARPS Editorial	WG Telecon 8/6/03	During the review of the proposed UAT SARPS Technical Manual, it was requested that the "***Notes***" 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."* **Implemented**

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§2.2.4.5.4.5 Table 2-43	51	Editorial	WG-5 Meeting 16 9/17/03	The UAT MOPS at present contains no requirements on use of the MOPS Version field by an ADS-B receiver. The only requirement is that it be transmitted, and that it be the value ONE. At a minimum, some guidance on how to use the Version Number would be appropriate. Proposed Resolution: Add Note 2 below Table 2-43 stating: "*It is assumed that future changes to the UAT MOPS will be backward-compatible with previous versions. Given this, the function of the UAT MOPS Version Number is to support forward compatibility with future revisions of these MOPS. For example, future MOPS Version UAT equipment may safely assume that it may ignore any "reserved" data fields in received messages from the earlier versions of these MOPS. Also, future MOPS Version equipment should ignore the content of all reserved fields shown in the original RTCA DO-282, until the receiving equipment obtains a participant's MOPS Version number. Fields that are defined in a earlier version of these MOPS may be relied upon to remain consistent with later MOPS versions.*" **Implemented**
§2.2.4.5.4.12.2	54	Errata	WG Telecon 8/6/03	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 "*Note*" from the ADS-B MASPS §3.4.4.9.1 will be inserted after the second paragraph. **Implemented**
§2.2.4.5.4.13.1	55	Errata	WG Telecon 8/6/03	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." **Implemented**

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§2.2.4.5.4.14	56	Clarify	WG-5 Mtg 18 12/8/03	As documented in Working Paper UAT-WP-18-01, confusion over the scope of this True/Mag Flag is easy to achieve, since it exists in the Mode Status Element, but refers to fields in the Target State Element in a different transmitted message. Proposed Resolution: Change the title of §2.2.4.5.4.14 to "True/Magnetic Indicator Flag for the Target State Element" and alter the text of paragraph one to clarify the use of this 'Indicator' in support of the Target State Element. **Implemented**
§2.2.4.5.6.1 Table 2-52	57	Errata	WG-5 Mtg 18 12/8/03	As documented in Working Paper UAT-WP-18-01, the use of "Track Heading" inside Table 2-52 is incorrect and should be changed to "Target Heading." **Implemented**
§2.2.5.1	63	SARPS Editorial	WG Telecon 8/6/03	During the review of the proposed UAT SARPS Technical Manual, it was requested by the UAT SARPS Subgroup that the second sentence of the "***Note***" in this section be re-written as: *"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])."* **Implemented**
§2.2.6.1.2	66	Errata	WG Telecon 8/6/03	In Note 2 under Table 2-63, second line change "Trajectory State" **to** "Target State" **Implemented**
§2.2.6.2.2	67		WG-5 Mtg 18 12/8/03	Clarification is required as to whether the "1 second UTC epoch," referenced in the 3rd line of the first paragraph, is specified as the reference point for Tx MSO timing, is the Time Mark signal presented to the equipment, as specified in §2.2.5 and Figure 2-6, page 64. Using the Time Mark signal as presented to the equipment would remove any implied requirement for the UAT equipment to compensate for errors in an externally supplied 1PPS time mark signal. Proposed Resolution: Insert the phrase "as supplied to the UAT Transmitting Subsystem" in the third line of the first paragraph after the words 'UTC epoch.' **Implemented**
§2.2.7.1.b	68	Clarify	12/8/03	As documented in Working Paper UAT-WP-18-01, §2.2.7.1 provides the requirements text for Table 2-64. Subparagraph "b" describes how the "Optional" input elements are handled. As written, the text is most applicable to Data Elements that have a corresponding Field in the transmitted message payload. The text of "b" does not provide sufficient guidance for Input Elements that are used by the UAT Transmitting Subsystem, but do not necessarily map one-for-one into a transmitted Field. Proposed Resolution: Change the period ending the sentence of subparagraph "b" into a comma and to the end add the phrase: "or be processed using the 'data unavailable' procedures related to that element." **Implemented**

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§2.2.7.1 Table 2-64	69	Errata	(1) WG-5 Telecon 8/6/03 and (2) WG-5 Mtg 18 12/8/03	(1) Element #13 (Track Angle) is listed as Mandatory for Class A1L. The requirement in §2.2.4.5.2.6 is that while in the GROUND state, the State Vector data includes Ground Speed and either Heading or Track Angle. It makes little sense for Ground Speed and Heading interfaces to be Optional, but a Track Angle interface to be Mandatory, as shown in Table 2-64. Proposed Resolution: Mark the Track Angle interface as Optional for A1L **Implemented** (2) As documented in Working Paper UAT-WP-18-01, the existing text of §2.2.4.5.2.7.2 does not define any "data unavailable" condition for the Aircraft/Vehicle Length and Width Code, and the Position Offset Applied fields. This is consistent with Table 2-64 showing a "n/a" in the Data Lifetime column, since this is a static data for a given A/V. However, these Input Data Elements are designated as Optional for the A0 and A1L equipment classes. Though the ADS-B MASPS (DO-242A §3.4.4.6) allows certain participants (Length < 25 meters and Width <= 34 meters) to not transmit the A/V Length and Width Code, the UAT MOPS as written makes no provision for not sending these codes. In addition, the UAT MOPS does not provide any guidance for the use of these codes in the case where these inputs are Optional and not provided. Proposed Resolution: Modify Table 2-64 to make A/V Length, Width and POA Fields Mandatory for all aircraft equipment classes. **Implemented** (3) It appears that the data lifetime for the NICBARO parameter is incorrectly listed as 60 seconds. It seems that it should have the same data lifetime as the NIC parameter, which is 2 seconds. (4) It also appears that the TCAS/ACAS Resolution Advisory Flag is incorrectly listed as 60 seconds. That seems rather a long lifetime for an indication that could have safety effects.
§2.2.8.2.1.1	73	Editorial	WG Telecon 8/6/03	In the title, change "is Desired" **to** "As Desired" **Implemented**
§2.2.8.2.1.2	73	Editorial	WG Telecon 8/6/03	In the title, change "is Desired" **to** "As Desired" **Implemented**
§2.2.8.2.1.2	73	SARPS Review	WG Telecon 8/6/03	To conform to a proposed addition to the UAT SARPS Technical Manual, insert 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." **Implemented**

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§2.2.8.2.1.3 (new)	73	SARPS Review	WG Telecon 8/6/03	The existing §2.2.8.2.1.2 will be renumbered to §2.2.8.2.1.3 if the proposal to insert a new paragraph is accepted. However, in the published §2.2.8.2.1.2, in order to have consistency with the ICAO VDL documentation, it is proposed that subparagraph (a) be changed from a value of 600 knots **to a value** of 850 knots, and that a ***Note*** be added under (a) stating that: ***Note:*** *The 850 knot ground station closure rate is derived from a 600 knot true air speed, added to a 250 knot worst-case wind velocity. The 1200 knot air-to-air closure remains valid because both aircraft are assumed to be within the same air mass, so the wind velocity makes no difference to the closure rate.* **Implemented**
§2.2.8.3.3	77	Errata	Pagano to review WP-18-05 for 1/12/04 Telecon	The requirements for processing ADS-B sync Trigger events do not provide a minimum requirement for the time interval between overlapping message events. (i.e. gives no guidance on the rate of overlapping messages). This implies that all successful messages may be overlapping messages. The test procedure (§2.4.8.3.3, page 252) presents without justification that 100 overlapping messages per second is sufficient to validate this requirement. Proposed Resolution: Review the requirement and test procedure to determine if the requirement is fully specified, and if the test procedure provides appropriate validation. **See Working Paper UAT-WP-17-02 for partial resolution, using new requirement and test. Action Item 17-01 accepted to revise existing test procedure. WP-18-05 suggests changes for 2.4.8.3.3, and WP-19-09 suggests changes to WP-18-05**
§2.2.8.3.5	78	SARPS Review	WG-5 Meeting 18 12/8/03	During the review of the UAT SARPS Technical Manual, it was agreed by the UAT SARPS Subgroup 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, it is proposed to 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.*" **Implemented**

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§2.2.12	82	New Rqmt	WG-5 Meeting 18 12/8/03	During the review of the UAT SARPS Technical Manual, it was agreed by the UAT SARPS Subgroup that the title of this requirement in the Tech Manual would be changed to "Mutual Suppression Pulses," and that the text of this section will be changed to be: a. UAT equipment **shall** provide an output suitable for sending suppression signals. b. UAT equipment **shall not** respond to suppression signals. ***Note:*** *UAT equipment is not to inhibit or delay its transmissions based on suppression signals. There is no need to desensitize the UAT receiver based on suppression signals.* **Implemented**
§2.2.15.2.1.3	86	Errata		The existing text of this section appears to be a cut-and-paste from §2.2.15.1.1.3, and it appears that it was not completely edited for content, because it still includes references to "data input interfaces" that are required for the report assembly function, and that does not make a lot of sense. Proposed Resolution: Replace the text of this section with the following "The ADS-B Receiving Subsystem input processing function **shall** be capable of efficiently processing all necessary interfaces as required for Receiver Message Processing and Report Assembly, as defined in §2.2.8.3, §2.2.9 and §2.2.10."
§2.3.1 Table 2-70	91	SARPS Review	WG Telecon 8/6/03	To conform to a proposed addition to the UAT SARPS Technical Manual, it is proposed that we add a new paragraph §2.3.2.12 entitled "Basic UAT ADS-B Message As Desired Signal." Indicate appropriate tests for the new §2.3.2.12. Increase all of the following paragraph numbers in the 2.3.2.13 through 20 range. **Implemented**
§2.3.2.11	95	Editorial	WG Telecon 8/6/03	In the title, change "is Desired" **to** "As Desired" **Implemented**
§2.3.2.12	95	Editorial	WG Telecon 8/6/03	In the title, change "is Desired" **to** "As Desired" **Implemented**
§2.3.2.12	95	SARPS Review	WG Telecon 8/6/03	To conform to a proposed addition to the UAT SARPS Technical Manual, it is proposed that we add a new paragraph entitled "Basic UAT ADS-B Message As Desired Signal." Reference the correct test procedure paragraphs. Increase all of the following paragraph numbers in the 2.3.2.13 through 20 range. **Implemented**
§2.4.2.1 Table 2-71	98	Errata	WG-5 Meeting 18 12/8/03	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 17 September 2003 WG Meeting #16 so that a conclusion may be reached on what change, if any, to apply here. Proposed Resolution: For the measurement filter selection, replace "root raised cosine" with "low pass". **Implemented**

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§2.4.2.4	101	Expanded Rqmt	(1) WG-5 Telecon 8/6/03 (2) WG-5 Meeting 18 12/8/03	(1) Pursuant to the acceptance of the change suggested in Working Paper UAT-WP-15-01 for §2.2.2.4 with the addition of the paragraph for the horizontal eye diagram, update the Purpose/Introduction with the new text from the requirement change in §2.2.2.4. **Implemented** (2) Update Figure 2-11 in Step 2 because of the change in filter from "root raised cosine" to "low pass." **See Working Paper WP-19-07** (3) Write new test procedure (Step 3) to accommodate the new requirement for the horizontal eye opening. **See Working Paper WP-19-07**
§2.4.3.2.2.2	114	Expanded Rqmt	9/17/03	Working Paper UAT-WP-15-08 proposed a format for Information Frames that would contain the incremental units of information conveyed in the UAT Ground Uplink Message. This framework of Information Frames offers the flexibility to support various kinds of uplink information as well as a mixture of information types within each Ground Uplink Message. WG-5 agreed during Meeting #16 with the recommendations of UAT-WP-15-08 and directed that the additions proposed in the Working Paper be made in §2.2.3.2.2 and §2.2.3.2.2.2, as appropriate. There are no additional test procedures required because of this implementation. **Implemented**
2.4.4.5.2.2	125	Errata	WG-5 Meeting 18 12/8/03	ALTITUDE TYPE Test Procedure: Steps 1, 3, and 4 says to provide "valid non-zero altitude information". The term "non-zero" is redundant, since sea-level is a perfectly valid altitude. Proposed Resolution: Delete the phrase "non-zero" from the text of Steps 1, 3, and 4. The 2nd sentence of Step 1 says to verify the test procedures for Message Types, but none of the remaining test procedure steps make any mention of Message Types (since the Altitude field is included in the basic State Vector which is common to all messages). Proposed Resolution: Delete the 2nd sentence of Step 1. In the title of Step 3, change the phrase "in Failure Mode" to "not available". In Step 3, 5th paragraph, end of the first sentence, add the phrase "and resume the input of Barometric Pressure Altitude." The second paragraph of §2.2.4.5.2.2 details the 'data lifetime' requirement for the Altitude Type Selection Input, but there is no specific test procedure for this requirement. Proposed Resolution: Add a test procedure step for the test of data lifetime for the Altitude Type Selection Input. **Implemented**

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§2.4.4.5.2.5.1 including Table 2-82 through §2.4.4.5.2.5.2 including Table 2-83	132 through 136	Errata	(1) WG-5 Meeting 18 12/8/03	(1) As initiated by the review of the UAT SARPS Technical Manual, and as documented in Issue Paper 71, the errors in the determination and validation of the Air/Ground State were originally defined in DO-260 and were carried forward to the ADS-B MASPS (DO-242A), the UAT MOPS (DO-282), and the revised 1090 MHz ES MOPS (DO-260A). The RTCA SC-186 Plenary on 9/18/03 established an ad hoc working group to resolve the errors and to recommend language for the draft ASA MASPS (DO-289). Working Paper **UAT-WP-17-03** details the text agreed to by that ad hoc working group, and which was additionally reviewed and agreed to by the Technical Subgroup of the ICAO ACP WG-B SCRSP for inclusion in the revision of the 1090 SARPS. **Implemented** (2) These test procedures have been checked and revised to correspond to the text outlined in Working Paper UAT-WP-17-03, which describes the resolution to the air/ground determination and validation agreed to by RTCA, the FAA and ICAO groups. **See UAT-WP-19-06**
§2.4.4.5.4.3.1 Table 2-91	164	Errata	WG Telecon 8/6/03	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" **Implemented**
§2.4.4.5.4.3.2 Table 2-92	165	Errata	WG Telecon 8/6/03	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. **Implemented**
§2.4.4.5.4.3.3 Table 2-93	166	Errata	WG Telecon 8/6/03	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. **Implemented**
§2.4.4.5.4.12.2	173	Errata	WG Telecon 8/6/03	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." **Implemented**
§2.4.4.5.4.13.1	174	Errata	WG Telecon 8/6/03	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." **Implemented**

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§2.4.7.1 Table 2-98	202	Errata	(1) WG-5 Telecon 8/6/03 and (2) WG-5 Mtg 18 12/8/03	(1) Element #13 (Track Angle) is listed as Mandatory for Class A1L. The requirement in §2.2.4.5.2.6 is that while in the GROUND state, the State Vector data includes Ground Speed and either Heading or Track Angle. It makes little sense for Ground Speed and Heading interfaces to be Optional, but a Track Angle interface to be Mandatory, as shown in Table 2-98. Proposed Resolution: Mark the Track Angle interface as Optional for A1L **Implemented** (2) As documented in Working Paper UAT-WP-18-01, the existing text of §2.2.4.5.2.7.2 does not define any "data unavailable" condition for the Aircraft/Vehicle Length and Width Code, and the Position Offset Applied fields. This is consistent with Table 2-64 showing a "n/a" in the Data Lifetime column, since this is a static data for a given A/V. However, these Input Data Elements are designated as Optional for the A0 and A1L equipment classes. Though the ADS-B MASPS (DO-242A §3.4.4.6) allows certain participants (Length < 25 meters and Width <= 34 meters) to not transmit the A/V Length and Width Code, the UAT MOPS as written makes no provision for not sending these codes. In addition, the UAT MOPS does not provide any guidance for the use of these codes in the case where these inputs are Optional and not provided. Proposed Resolution: Modify Table 2-98 to make A/V Length, Width and POA Fields Mandatory for all aircraft equipment classes. **Implemented** (3) It appears that the data lifetime for the NICBARO parameter is incorrectly listed as 60 seconds. It seems that it should have the same data lifetime as the NIC parameter, which is 2 seconds. (4) It also appears that the TCAS/ACAS Resolution Advisory Flag is incorrectly listed as 60 seconds. That seems rather a long lifetime for an indication that could have safety effects.
§2.4.8.2.1.1	216	Editorial	WG Telecon 8/6/03	In the title, change "is Desired" **to** "As Desired" **Implemented**
§2.4.8.2.1.1	216 217	Errata	WG-5 Meeting 18 12/8/03	There is an error in this test procedure whereby the center frequency should be deviated by the maximum tolerance plus the Doppler. It appears to have just the Doppler on the value of 2 kHz. Proposed Resolution: (1) The paragraph between the **Note:** and the **Equipment Required:** should end with: "… under conditions of maximum frequency offset, Doppler shift, and modulation distortion. (2) Under the **Equipment Required:** the Center Frequency should be stated as 978 MHz +/- 2.0 kHz +/- 19.560 kHz (3) The Center Frequency for Step 1 should be 978 MHz – 2.0 kHz – 19.56 kHz (4) The Center Frequency for Step 3 should be 978 MHz + 2.0 kHz + 19.56 kHz **Implemented**
§2.4.8.2.1.2	217	Editorial	WG Telecon 8/6/03	In the title, change "is Desired" **to** "As Desired" **Implemented**

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§2.4.8.2.1.2	217	SARPS Review	(1) WG-5 Telecon 8/6/03	(1) To conform to a proposed addition to the UAT SARPS Technical Manual, it is proposed that we add a new paragraph §2.4.8.2.1.2 entitled "Basic UAT ADS-B Message As Desired Signal." **Implemented** (2) **A new Test Procedure is proposed by Tom Pagano for this new requirement in Working Paper UAT-WP-19-03 as a copy of the test procedure in 2.4.8.2.1.1 with appropriate changes in the signal level.**
§2.4.8.2.1.3 (new)	217 218	SARPS Review	WG Telecon 8/6/03	(1) The existing §2.4.8.2.1.2 will be renumbered to §2.4.8.2.1.3. However, in the published §2.4.8.2.1.2, in order to have consistency with the ICAO VDL documentation, it is proposed that in the "Purpose/Introduction" subparagraph "(a)" there be a change from a value of 600 knots to a value of 850 knots. **Implemented** (2) Additional changes are required to the Test procedure in the "Equipment Required" section and possibly to the "Measurement Procedures." Proposed Resolution: Correct the calculations in the "Note" of the "Equipment Required" section and based on those calculations, update the Desired Signal in Steps 1 and 3. **Implemented**
§2.4.8.3.1.2 Table 2-105 Table 2-108	244 247	Editorial	WG Telecon 8/6/03	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. **Implemented**
§2.4.8.3.3	252	Expanded Rqmt	Pagano Action to review WP-18-05 for 1/12/04 Telecon	The requirements for processing ADS-B sync Trigger events do not provide a minimum requirement for the time interval between overlapping message events. (i.e. gives no guidance on the rate of overlapping messages). This implies that all successful messages may be overlapping messages. This test procedure presents without justification that 100 overlapping messages per second are sufficient to validate this requirement. Proposed Resolution: Review the requirement and test procedure to determine if the requirement is fully specified, and if the test procedure provides appropriate validation. **See Working Paper UAT-WP-17-02 for partial resolution, using new requirement and test. Action Item 17-01 accepted to revise existing test procedure. WP-18-05 suggests changes for 2.4.8.3.3, and Working Paper WP-19-09 suggests changes to WP-18-05**

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§2.4.8.3.5	257	SARPS Review	WG-5 Meeting 18 12/8/03	During the review of the UAT SARPS Technical Manual, it was agreed by the UAT SARPS Subgroup 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, it is proposed to 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.*" In both paragraphs of Step 1, add the phrase "applied at the receiver terminals" between the words " sequence" and "arriving." **Implemented**
§2.4.10.3	262	Errata	WG-5 Meeting 16 9/17/03	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. The Working Group agreed with the recommended changes during Meeting #16 held 17 September 2003. **Implemented**
§2.4.12	265	Expanded Rqmt		During the review of the UAT SARPS Technical Manual, it was agreed by the UAT SARPS Subgroup that the title of this requirement in the Tech Manual would be changed to "Mutual Suppression Pulses," and that the text of this section will be changed to be: a. UAT equipment **shall** provide an output suitable for sending suppression signals. b. UAT equipment **shall not** respond to suppression signals. ***Note:*** *UAT equipment is not to inhibit or delay its transmissions based on suppression signals. There is no need to desensitize the UAT receiver based on suppression signals.* **A new Test Procedure is proposed by Tom Pagano for this new requirement, and a small change to the requirement is proposed in UAT-WP-19-04**
Appendix C Table C-1	C-4	Errata	WG-5 Meeting 18 12/8/03	• Payload Type Code is shown as 4 bits, should be 5. (i.e. '00000') • Address Qualifier is shown as 4 bits, should be 3 (i.e. '000') No other changes to Table C-1 are necessary. **Implemented**

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Appendix C Table C-2	C-6	Errata	WG-5 Meeting 18 12/8/03	• Payload Type Code "Value" column should be '1', not '0', and should be represented as '00001'. As published, the example represents Payload Type Code 2. • Address Qualifier is shown as 4 bits, should be 3 (i.e. '000') • Data Field label "Participant Category Code" should read "Emitter Category" • For completeness, the description of the Emitter Category should indicate that the "Small" category is represented by the character code '2'. • The phrase "Flight ID" should be replaced by "Call Sign". • The character string **AB** should be represented in quotes, indicating that these characters are members of the radix-40 character set. Similarly, the character strings **CD1** and **234** should be represented in quotes as well. **Implemented**
Appendix C	C-7	Errata	WG-5 Meeting 18 12/8/03	Because of the error in the Payload Type in Table C-2, the FEC Parity Bits for this example are incorrect and must be revised. The original author of Appendix C would be the best candidate to provide the corrections. **Implemented**
Appendix D	D-12	Errata	WG-5 Meeting 18 12/8/03	There are several incorrect references in the paragraph just prior to Figure D-7 because Appendix K was reorganized late in the publication process and references to Appendix K inside Appendix D were not corrected. In the 7th line of the paragraph prior to Figure D-7, change "K.3.3.2 and K.3.4" **to** "K.4.1 and K.4.2." Additionally, delete the last sentence of this paragraph because it incorrectly references a section "D.3.1.2" that does not exist. **Implemented**
Appendix H	H-6	Editorial	WG-5 Meeting 18 12/8/03	In the last sentence of the paragraph under Figure H-2, it is stated that: "*Note that prior to the synchronization sequence (i.e., during ramp up), the waveform is assumed to be modulated with zeroes as specified in the MOPS.*" However, the MOPS contains no such requirement during the ramp-up period. Proposed Resolution: In the interest of clarity, I suggest that we replace the sentence with the following: "Note that prior to the synchronization sequence (i.e., during ramp up), the waveform is assumed to be modulated with zeroes. Although the MOPS do not specify the type of modulation to be applied prior to the synchronization sequence, an input of some kind is required by the Nyquist filter, and the all zero bit pattern is shown as a representative example." **Implemented**