

ADS-B MASPS (DO-242A Draft) COMMENTS
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#	Author	Section	Page	Comment	Suggested Resolution
1	WG-5	2.1.2.5	31	<p>No air-air surveillance application requires a navigation reference point other than that available from STC level GPS units. The only ground-air applications of interest are monitoring an aircraft at the runway threshold when on final approach, and monitoring runway exit clearance by the lead aircraft when on final. For small aircraft, the GPS antenna location (generally just behind the cockpit) is very close to the recommended aircraft mid-point and no correction need be considered. For large aircraft, the GPS antenna is typically about midway between the aircraft mid-point and the nose. For a 200 ft long aircraft, the difference in the GPS antenna location and this ADS-B reference point is then about one quarter the length, or 50 ft. (Note that the three sigma radius of GPS uncertainty alone is over 20 ft.) An uncertainty margin of about half the aircraft length would clearly be required if ATC surveillance incorporates fusion of ADS-B position with ASDE and multilateration estimates. For these reasons, any prudent low visibility runway clearance criterion would very likely allow for, on the order of, one aircraft length in indicated position uncertainty. The only surface-surface application of interest seems to be assurance that the landing aircraft has cleared the runway before the take-off roll begins. The above clearance requirements would also apply in this case. Finally if, for any reason, ground ATC needs position accuracy better than this, a data base associated with the filed flight plan can provide the exact correction factor.</p> <p>While no operational surveillance interest appears to support the need for the ADS-B reference point, we should also observe that modification of ADS-B data with this “azimuth orientation dependent correction factor” is platform/installation dependent computation with the attendant platform related STC issues.</p>	<p>Delete the requirement to modify the ADS-B data to account for the suggested reference point.</p> <p>Alternative proposal per March 21 SC186 Leadership Telecon: The requirement that ADS-B position data be broadcast relative to the ADS-B Navigation Reference Point is not meant to put the requirement onto the ADS-B avionics to perform these calculations. It is proposed that a note will be added to DO-242A stating that the ADS-B requirement is only to broadcast data that has been so corrected, and that other processors (e.g. personality modules and/or ASSAP functions) will perform these calculations.</p> <p>WG6 Response: WG6 agrees to the resolution proposed on the 3/21/02 Leadership telecon as documented above. Tom Foster will craft appropriate note.</p>

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2	WG-5	3.3.3.1.4	90	<p>(WG3 comment #3 and Ron Jones comment #21 request the elimination of these update requirements and propose using the nominal rate under all conditions.)</p> <p>The text of Section 3.3.3.1.4 relating to T_U with 0.22 has a “shall” in it when it should not, and as such, it is in opposition with the “desired” requirements in Table 3-4(c).</p> <p>WG6 Response: The observation that the requirements specified in the text are inconsistent with the table is correct. The text should be modified to show the update rate for when there is a change in intent information past 40 NM is desired performance and not required.</p>	<p>When there is a change in the broadcast intent information as defined in §3.4.8.2 and §3.4.9.2, the update period for A2 and A3 equipage at ranges within 40 NM and for A3 equipage at ranges in the forward direction within 90 NM shall (R3.22) be T_U, such that</p> $T_U = \max\left(12\text{ s}, 0.22 \frac{\text{s}}{\text{NM}} \cdot R\right)$ <p>where R is the range to the broadcasting aircraft and T_U is rounded to the nearest whole number of seconds.</p> <p>WG6 Response: Agreed</p>
3	WG-5	3.4.4.10.1	117	<p style="text-align: center;">(Also see Jerry Anderson comment #7.)</p> <p>Section 3.4.4.10.1 requires the setting of a TCAS/ACAS Resolution Advisory Active Flag.</p> <p>There currently is no method to obtain this information since TCAS only provides it to the Mode-S Transponder for inclusion into the Resolution Advisory Report that is provided to the Ground Station via Ground Initiated Comm-B extraction.</p> <p>Rationale: If this information is going to be required, then an appropriate means needs to be established for the transponder to provide this information to other users. It is not appropriate to connect to the TXCoord Bus (TCAS -to- Transponder) in order to obtain this information.</p> <p>If this information cannot be made available, then the requirement should be deleted.</p>	<p>Recommend that the ADS-B MASPs Working Group, along with WG-3 (1090 MOPs) and WG-5 (UAT MOPs) consider making requests to the ARINC AEEC (ARINC-718A) to have the transponder provide this information via a new label "274" to be transmitted at a minimum rate of once per second on the Transponder Maintenance Output bus (low speed ARINC-429 @ 12.5 kbps).</p> <p>See the proposed definition of the new "274" Label provided in <u>Attachment WG5-2</u>. (Current definition is found in <u>Attachment WG5-1</u>.)</p>

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4	WG-5	2.1.2.11, Table 3.4.4, 3.4.4.10.3	34 112 117	(Also see C. Moody comment #5 and Ron Jones comments 7 & 27) The ATC Services Flag is to be set to ONE when “Receiving” ATC Services [in the current system, you change the transponder code when you are receiving services, and not before].	In paragraph 2.1.2.11, Table 3.4.4 and paragraph 3.4.4.10.1, each occurrence of “Requesting” should be changed to “Receiving.” Additionally, in paragraph 3.4.4.10.3, the 2 nd sentence should be changed to say that “... the transmitting ADS-B participant is receiving ATC services; ...” WG6 Response: Agreed. Accept Suggested Resolution as shown above.
5	WG-5	3.4.8.10 through 3.4.8.14	126 and 127	Need to update the interpretation of target and selected altitude to be consistent with the current definition from ICAO. WG6 Response: The definitions used in the draft MASPS are largely based on an ICAO paper on selected altitude presented to SCRSP in April of 2001. WG6 believes the definitions are consistent with ICAO.	
6	WG-5	3.3.1	78	Requirement R3.3 is inconsistent with Tables 3-3(b) and 3-4(a), and the discussion of Class B1 system participants in Sections 3.2.3.2 in that R3.3 discusses Class B1 installations with Class A2 transmit power.	Clarification of the MASPS for consistency is required.
7	WG-5	3.3.3.2.2	94	The requirement R3.29 should be conditioned on either $NAC_p \geq 9$, OR $NIC \geq 9$. This is made necessary by aircraft that will have NIC, but will not provide NAC_p as inputs to the ADS-B avionics.	
8	WG-5	Table 3-1	77	ADS-B is already being used for the provision of ATS Cooperative Surveillance. This should be reflected in the MASPS.	Recommend that in the “Comments” column for the C1 row, the following text be added “Supports provision of ATS Surveillance for ADS-B System Participants where adequate Air-Ground range and integrity have been demonstrated.” WG6 Response: Agreed.

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1	Chris Moody	2.1.2.2.3	28	Editorial: “AD-B” should be ADS-B	WG6 Response: Agreed.
2	Chris Moody	2.1.2.13	36	Editorial: Note 2 under Table 2.1.2.13 change “than” to “then”	WG6 Response: Agreed.
3	Chris Moody	3.4.4	112	Table 3.4.4 omits the ARV capability flag listed in Section 3.4.4.9.4	Either list ARV cap flag in the Table or delete Sect 3.4.4.9.4 WG6 Response: Agreed. ARV Report Capability flag will be added to Table 3.4.4.
4	Chris Moody	3.4.4.10.2	117	(Also see Jerry Anderson comment #32.) “18+/-1 second” is unnecessarily constraining in ADS-B context.	Instead say “approximately 20 seconds”. (Need a little latitude for some degree of link dependency on this time period.) WG6 Response: Change last sentence of paragraph to read as follows: “Upon activation of the IDENT switch, this flag shall (R3.114-B) be set to ONE for a period of 20 ± 3 seconds; thereafter, it shall (R3.114-C) be reset to ZERO.”
5	Chris Moody	3.4.4.10.3	117	(Also see WG5 comment #4 and Ron Jones comments 7 & 27.) Substitute “Receiving” for “Requesting”	This has been clarified by Anchorage Center Air Traffic as a result of UAT MOPS discussion. WG6 Response: Agreed. See resolution for WG5 comment #4.
6	Chris Moody	3.4.7.5	122	There does not appear to be any guidance on when to use, or how to encode, “Mach”	List airspeed type 3 as “Reserved”

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1	R.H. Saffell, Rockwell Collins, Inc.	3.4.4.10.2	117	<p>Section 3.4.4.10.2 requires the setting of an IDENT Switch Active Flag.</p> <p>There currently is no method to obtain this information directly from the Transponder or from Transponder Control Mechanisms.</p> <p>Rationale: If this information is going to be required, then an appropriate means needs to be established for the transponder or transponder control to provide this information to other users.</p> <p>If this information cannot be made available, then the requirement should be deleted.</p>	<p>Recommend that the ADS-B MASPs Working Group, along with WG-3 (1090 MOPS) and WG-5 (UAT MOPS) consider making request to the ARINC AEEC (ARINC-718A) to have the transponder to provide this information via a new label "274" to be transmitted at a minimum rate of once per second on the Transponder Maintenance Output bus (low speed ARINC-429 @ 12.5 kbps).</p> <p>See the proposed definition of the new "274" Label provided in <u>Attachment WG5-2</u>. (Current definition is found in <u>Attachment WG5-1</u>.)</p>
2	R.H. Saffell, Rockwell Collins, Inc.	3.4.8.8	126	<p>Section 3.4.8.8 requires the ability to determine the states of "acquiring", "capturing", or "maintaining" the Horizontal Mode.</p> <p>Existing FMS and/or FCU systems do not provided this information in a consistent manner from one vendor to the next or in one installation to the next.</p> <p>Rationale: If this information is going to be required, then an appropriate uniform means needs to be established to provide this information to the ADS-B transmission device.</p>	<p>The requirement to determine "acquiring", "capturing", or "maintaining" horizontal, vertical, heading, altitude, and / or altitude rate information may have originated in the interpretation of the earlier definitions of BDS 4,0 in the ICAO Manual of Mode-S Specific Services (see <u>Attachment RS-1</u>). In researching the availability of appropriate data to make such decisions, it became apparent that such information was not readily available in reasonably common methods throughout the industry. Consequently, BDS 4,0 has been redefined as shown in <u>Attachment RS-2</u>. Note that the new definition of BDS 4,0 provides for Hold Mode information, but not for "acquiring", "capturing", or "maintaining".</p> <p>Therefore, it is recommended that the ADS-B MASPS requirements be adjusted to be more consistent with the Manual of Mode-S Specific Services and require only declaration of the "Hold" mode when it can be so determined.</p>
3	R.H. Saffell, Rockwell Collins, Inc.	3.4.8.14	127	<p>Section 3.4.8.14 requires the ability to determine the states of "acquiring", "capturing", or "maintaining" the Vertical Mode.</p> <p>Existing FMS and/or FCU systems do not provide this information in a consistent manner from one vendor to the next or in one installation to the next.</p> <p>Rationale: If this information is going to be required, then an appropriate uniform means needs to be established to provide this information to the ADS-B transmission device.</p>	<p>Same as for Comment 2.</p>

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1	WG-3	2.1.2.19.2 3.4.9		<p style="text-align: center;">(Also see Ron Jones Comments 9 and 30.)</p> <p>The requirements for TC Reports are included in two sections of DO-242A. The report information contents are defined in section 2.1.2.19.2 (Long Term Intent) and the performance requirements associated with TC Reports are defined in 3.4.9. Introductory text should be added to both of these sections to indicate that the requirements associated with TC Reports may change as the requirements mature for the applications that will use TC Reports.</p> <p>WG6 Response: Per 4/1/02 SC186 Leadership telecon it is suggested the proposed sentence for §2.1.2.19.2 read as follows: “The postulated requirements described below for long-term intent reporting may be revised in future editions of these MASPS as the operational requirements for the associated ADS-B applications mature. Implementations should not include specific provisions for long-term intent reporting until the associated application standards are mature these standards are further validated.”</p>	<p style="text-align: center;">Suggested Resolution</p> <p>1. Add the following paragraph as the 2nd paragraph under 2.1.2.19.2.</p> <p>“The postulated requirements described below for long-term intent reporting may be revised in future editions of these ADS-B MASPS as the requirements for the associated ADS-B applications mature. Implementations should not include specific provisions for long-term intent reporting until the associated application standards are mature.”</p> <p>2. Delete Note 1 under 3.4.9 and add the following paragraph as the 1st “non-Note” paragraph of that section.</p> <p>“The postulated requirements for Trajectory Change (TC) Reports are to be the subject of further validation within the context of the associated applications. Implementations should not include specific provisions for TC+0 Reports until the application standards are mature. The requirements for TC+0 Reports may be revised in future versions of this ADS-B MASPS.</p> <p>WG6 Response: See WG6 resolution for Ron Jones comments 9 and 30.</p>
2	WG-3	Table 3-4(a) and Appendix H		<p style="text-align: center;">(Also see Ron Jones comments 16 and 32.)</p> <p>The ballot draft DO-242A has modified the air-to-air range requirement for the flight path deconfliction application in Note 3 to Table 3-4(a). The revised Note 3 for Table 3-4(a) incorrectly interprets the range requirement from Appendix H. Rather the 64 NM range requirement applies to targets at +/- 45 degree from forward and not from port or starboard (i.e., +/- 90 degrees from forward) bearing angles. Furthermore, there is no basis presented in Appendix H to justify the increase in aft range to the 48 NM value in the new Note 3 to table 3-4(a).</p>	<p>Correct Draft DO-242A to the range values as specified in DO-242 as there is no justification for the proposed changes nor are the proposed changes of Table 3-4(a), Note 3 consistent with the analysis of Appendix H (neither the original Appendix H or DO-242 nor the proposed revised Appendix H of DO-242A).</p> <p>Please see Attachment WG3-1 for further explanation.</p>

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3	WG-3	3.3.3.1.4		<p style="text-align: center;">(Also see Ron Jones comment #21.)</p> <p>The 12 second update rate for TS and TC reports when there is a change in intent information is a doubling of the TCP update requirements from DO-242, yet there is no analysis or justification given for this stringent requirement. It is not practical for safety applications to ever use intent information, so the nominal update rates specified for TS and TC reports should be sufficient at all times.</p> <p>WG6 Response: The justification for this requirement has been discussed numerous times with members from WG3, 5, and 6. It is suggested that this comment can not be resolved among the comment authors and WG6 and that all further discussion on this comment be at plenary.</p>	<p>Either delete middle two rows of Table 3-4(c) and all associated text, or mark all entries in those rows as desired and change the text to read as follows:</p> <p>When there is a change in the broadcast intent information as defined in §3.4.8.2 and §3.4.9.2, the update period for A2 equipage at ranges within 40 NM and for A3 equipage at ranges in the forward direction within 90 NM shall (R3.22) is desired to be T_U, such that</p> $T_U = \max\left(12 s, 0.22 \frac{s}{NM} \cdot R\right)$ <p>where R is the range to the broadcasting aircraft and T_U is rounded to the nearest whole number of seconds. It is desired that this higher update rate shall (R3.23) be maintained for at least two update periods before returning to the nominal update rate. If implemented, these requirements are applicable to TS Report update rates for A1 equipment for ranges of 20 NM or less.</p> <p>Note: It is desired that requirements R3.21 and R3.22 the higher update rates defined above for when there is a change in the broadcast intent information should be met by A2 equipment at ranges up to and including 50 NM and by A3 equipment up to and including 120 NM.</p>
4	WG-3	3.3.3.1.1 3.3.3.1.3 3.3.3.1.4		<p style="text-align: center;">(Also see Ron Jones comments 13, 22 and 23.)</p> <p>In each of the referenced subparagraphs, there is a sentence that that should be deleted from the paragraph text, which starts “<i>For the remaining 5% of the user population that has not been acquired ...</i>”</p> <p>This is the 2nd sentence of the 2nd paragraph of 3.3.3.1.1</p> <p>This is the last sentence of the 1st paragraph of 3.3.3.1.3</p> <p>This is the last sentence of the 1st paragraph of 3.3.3.1.4</p>	<p>Delete the sentence of each respective paragraph, which starts “For the remaining 5% of the user population” and add a “Note” immediately following each respective paragraph, which states: “<i>For the remainder of the user population that has not been acquired at the specified acquisition range, it is expected that those ADS-B participants will be acquired at the minimum ranges needed for safety applications.</i>”</p> <p>WG6 Response: I recommend acceptance of this resolution, but I believe Tony Warren needs convincing.</p>
5	WG-3	3.1 App. B		The definition of ADS-B Message should be clarified.	<p>Change “modulated packet” to “block”</p> <p>WG6 Response: Agreed.</p>

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1	Jerry Anderson	2.1.1.1	25	Does R2.1 need to be standardized across different links?	?
2	Jerry Anderson	2.1.1.2	26	Same question as above. (Does R2.2 need to be standardized across different links?)	?
3	Jerry Anderson	2.1.2.3	30	This is required, but there is no SHALL. WG6 Response: The SHALL for this requirement is found in §3.4.4.6. While 3.4.4.6 is referenced , a stronger link to the requirement should be included.	Insert a SHALL. WG6 Response: Change last sentence in 2.1.2.3 to read as follows: “However as specified in §3.4.4.6 , they <i>are</i> required to be transmitted by aircraft above a certain size, at least while those aircraft are in the airport surface movement area.
4	Jerry Anderson	2.1.2.5 & 3.3.3.1.1	87	If the Position Reference Point is not required when the length code is 0, does the Max. error in the last row of the last column of Table 3-4(a) not apply to length code 0?	Change Note 6 in Table 3-4(a) to indicate that this error specification is not required for length code 0. WG6 Response: Change note 6 to read as follows: <i>The position accuracy requirement for aircraft on the airport surface is stated with respect to the aircraft’s ADS-B position reference point (§2.1.2.5) if the conditions specified in §2.1.2.5 are met.</i>
5	Jerry Anderson	2.1.2.9	33	No SHALL. WG6 Response: The requirement that heading is to be broadcast when an ADS-B participant is on the airport surface is specified in Table 3.4.3 and §3.4.3.12. Also, §3.4.4.16 specifies the requirement that the heading type (True/Mag) be included in the MS report. Heading is also required when available within the ARV report as specified in 3.4.7.6.	Insert SHALL. WG6 Response: All requirements for when heading must be broadcast are specified in Section 3. No change needed in 2.1.2.9.
6	Jerry Anderson	2.1.2.10	33	No SHALL. WG6 Response: The requirement that Capability Class (CC) Codes are to be broadcast and contained within the MS report is specified in Table 3.4.4 and §3.4.4.9. Further, subparagraphs of 3.4.4.9 specify the definitions of each CC Code.	Insert SHALL. WG6 Response: All requirements for when CC Codes are to be broadcast and definitions for those codes are specified in Section 3. No change needed in 2.1.2.10.

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7	Jerry Anderson	2.1.2.10 (3.4.4.9.1, 3.4.4.9.2) & 2.1.2.11 (3.4.4.10.1)	33 & 34	(Also see WG5 comment #3.) Note: Before you can operate an ADS-B transmitting subsystem on an aircraft with a CDTI or an ACAS, you will have to show that your installation can transmit this required information and the ACAS information required in 2.1.2.11. The design assurance level for this information is not yet known, as applications have not yet been validated to use this information.	None. Just be careful what you ask for. You might get it.
8	Jerry Anderson	2.1.2.11		No SHALL. WG6 Response: The requirement that Operational Mode (OM) Codes are to be broadcast and contained within the MS report is specified in Table 3.4.4 and §3.4.4.10. Further, subparagraphs of 3.4.4.10 specify the definitions of each OM Code.	Insert SHALL. WG6 Response: All requirements for when CC Codes are to be broadcast and definitions for those codes are specified in Section 3. No change needed in 2.1.2.10.
9	Jerry Anderson	2.2.1		Last paragraph, second sentence begins “Requirements”.	Change to “Expected requirements” per Table 2-3. WG6 Response: Agreed. 2 nd sentence of last paragraph will read: Expected requirements for A/V-to-A/V scenarios are summarized in Table 2-3.
10	Jerry Anderson	Table 2-3	57 & 58	Combine Notes 2, 3 & 6 or reference Notes 2, 3 & 6 under Alert Time in first column. WG6 Response: Since Notes 3 and 6 are referenced elsewhere in the Table, combining them not recommended. Note 3 says “best engineering judgment” and Note 6 references Appendix J. Note 2, which is the only note currently referenced under “Alert Time” is a combination of notes 3 & 6 as it includes both “best engineering judgment” and an App J reference.	Combine Notes 2, 3 & 6 or reference Notes 2, 3 & 6 under Alert Time in first column. WG6 Response: Incorporate some language from notes 3 and 6 into note 2 s that it reads as follows: “References are provided where applicable. Alert time data is provided in Appendix J for simulated scenarios . Else, best engineering judgment was used to obtain performance data.”
11	Jerry Anderson	Table 2-4	59	What does Note 5 (Altitude Accuracy) have to do with Altitude Rate in Table 2-4b? WG6 Response: If altitude rate is being derived from altitude, the precision with which that altitude is measured will affect the error of Altitude Rate.	? WG6 Response: Clarify note to read as follows:
12	Jerry Anderson	Table 2-4	59	Note 3 refers to Table 3-2. Should that be Table 2-3?	Change to Table 2-3. WG6 Response: Agreed. Correct Note 3 to reference Table 3-2 .

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13	Jerry Anderson	3.2.3.2	76	Says B1 is permitted to have A0 or A1 transmit power. Section 3.3.1, third paragraph, third sentence says B1 shall have power of A0, A1, or A2. WG6 Response: <u>Also reference WG5 comment #6.</u>	Delete A2 from Section 3.3.1. For clarity, create a Class B0 that is equivalent to A0 and let B1 be the same as A1. WG6 Response: Agreed. This will require new item in bulleted list within 3.2.3.2 and adding “B0” to the Class column of the B1 row for table 3-1. Also, a global search of DO242A will be needed on “B1”.
14	Jerry Anderson	3.3.1	79	Third paragraph, fourth sentence says ground vehicles shall provide a 5NM range to “A1” receivers. Table 3-4(a), last column says B2 will provide 5NM to all Class A receivers.	Change “an A1 class receiver” in referenced sentence to “class A receivers”. WG6 Response: Agreed. Sentence will be changed to read as follows: Ground vehicles operating on the airport surface (class B2) shall (R3.4) provide a 5 NM coverage range for class A receivers.
15	Jerry Anderson	3.3.3.1.1	82	(Also see comments 22 and 23.) Second paragraph, second sentence says, “they will be acquired with high probability”. There is no “SHALL”. Table 3-4(a) does not include this “requirement”. WG6 Response: This comment will no longer be relevant if the suggested resolution to comment #4 from WG3 is accepted.	Delete referenced sentence. WG6 Response: Accept comment #4 from WG3 and its proposed resolution which lessens the numbers and moves them into a note.
16	Jerry Anderson	Table 3-4(a)	87	Note 3 was changed and is now unclear. WG6 Response: Comment #2 from WG3 questions the accuracy of Note 3. These two comments need to be considered together.	Return note to its original form or state that these new ranges apply at angles of +/-45 degrees for right and left quadrants and +/-135 degrees in the rear quadrant.
17	Jerry Anderson	Table 3-4(a)	87	In Note 6, should the word accuracy be replaced with error? WG6 Response: Yes it should.	? WG6 Response: In Note 6 for Table 3-4(a), “accuracy” will be replaced by “error”.

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18	Jerry Anderson	Table 3-4(a)	87	<p align="center">(Also see Ron Jones Comment #17.)</p> <p>Note 10 say, “Lower rates for MS are under consideration.” No update rate is being considered for MS.</p>	<p>Delete this sentence. Change next sentence to read “MS reports should be made....”.</p> <p>WG6 Response: Agreed. Note 10 will be modified to read as follows: <i>Update periods for the SV have been emphasized in determining link related performance requirements in this table. Lower rates for MS are under consideration. These MS reports should be made available to support the operational capabilities using considerations equivalent to the SV. The requirement should be optimized to ensure that the refresh/update of reports is appropriate for the equipment classes and the operations being supported..</i></p>
19	Jerry Anderson	Table 3-4(a)	88	<p>Note 11 references Section 2.2.2.4. Should that be 2.2.2.6? The title of 2.2.2.6 is “Aircraft Needs for Flight Path Deconfliction Planning (Cooperative Separation in Oceanic/Low Density En Route Airspace).” The last sentence is confusing. This is for low density airspace.</p> <p>WG6 Response: The reference is incorrect and should be fixed. However, the last sentence of this note was added so that this note is consistent with Note 9 of Table 2-3. This “warning” that applications operating at 90NM might need to be supported when overflying terminal airspace was part of the resolution of final resolution of IP46.</p>	<p>Fix the reference and delete the last sentence.</p> <p>WG6 Response: Correct the note to reference 2.2.2.6. Keep last sentence of note.</p>
20	Jerry Anderson	3.3.3.1.2	89	<p>In the first paragraph, last sentence there is no SHALL. Table 3-4(a) says this is required.</p> <p>WG6 Response: WG3 had similar question on this sentence. Either a SHALL should be added to the sentence, or the row in Table 3-4(a) should be relabeled as either “Desired” or “Expected” instead of “Required” 99th percentile.</p>	<p>If this new requirement has been validated, add a “SHALL” to the referenced sentence.</p> <p>WG6 Response: While numbers not fully validated, Jonathan Hammer, George Ligler, Stan Jones, Ron Jones, Tony Warren, and Tom Foster all agreed the 99% requirement will not force an increase in performance from that demanded by the 95% requirement. (Bill Harman is to further examine this for WG3.) Unless Bill shows this does force increased performance, recommend that a SHALL be added to sentence.</p>

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21	Jerry Anderson	3.3.3.1.2	89	In the last paragraph, last sentence the word “acceptable” is wrong. Validated applications will determine what is acceptable. WG6 Response: The sentence in question is a hold-over from DO-242. The purpose of this sentence is to convey the axiom that since the MS report conveys rather static information, it should be considered a given that broadcast rates needed to meet the acquisition range requirements will be by definition “acceptable” update rates.	Delete “acceptable.” WG6 Response: Do not accept this comment.
22	Jerry Anderson	3.3.3.1.3	89	(Also see comments 15 and 23.) First paragraph, last sentence contains no “SHALL.” WG6 Response: This comment will no longer be relevant if the suggested resolution to comment #4 from WG3 is accepted.	If this requirement has been validated, add a “SHALL” to the referenced sentence. WG6 Response: Accept comment #4 from WG3 and its proposed resolution which lessens the numbers and moves them into a note.
23	Jerry Anderson	3.3.3.1.4	90	(Also see comments 15 and 22.) First paragraph, last sentence contains no “SHALL.” WG6 Response: This comment will no longer be relevant if the suggested resolution to comment #4 from WG3 is accepted.	If this requirement has been validated, add a “SHALL” to the referenced sentence. WG6 Response: Accept comment #4 from WG3 and its proposed resolution which lessens the numbers and moves them into a note.
24	Jerry Anderson	Table 3-4(c)	92	What is the purpose of the last two rows? If the intent changes it will be update in accordance with the previous two rows. If it does not change, why update it? Is this a message broadcast requirement or a report output requirement?	Delete last two rows. WG6 Response: Tony??
25	Jerry Anderson	3.4.3.2.b	106	An estimate of NIC is now required. An estimate of NUC was not required in 242. How do you estimate NIC? WG6 Response: In a segmented message system, the value of NIC should be that which was last received, as it can not be estimated. However, this is a time-critical element in that “no data available” should be indicated if an update is not received in the preceding coast interval.	Delete requirement to estimate NIC. WG6 Response: Clarification s needed that NIC is a time-critical element, but that it is not to be estimated. NIC will remain as item b.vi , and a note will be added that reads as follows: “Estimation of NIC is to done by simply retaining the last reported value.”

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26	Jerry Anderson	3.4.3.2.c	106	<p>Must the report assembly function track the range to determine the coast interval to use? Is there a “no data available” bit in the SV report?</p> <p>WG6 Response:</p>	Delete requirement.
27	Jerry Anderson	3.4.3.2.d	106	<p>What are the non-time-critical elements of the SV report? Are there any?</p> <p>WG6 Response: Non-time-critical elements are all SV report elements not designated as time-critical in 3.4.3.2.b.</p>	<p>Delete requirement.</p> <p>WG6 Response: Do not accept this comment.</p>
28	Jerry Anderson	3.4.3.19	110	<p>Acquisition now requires MS elements.</p>	<p>Add MS to SV in first sentence.</p> <p>WG6 Response: Agreed. First sentence in 3.4.3.19 will be changed to read as follows: The “Report Mode” provides a positive indication when SV and MS acquisition is complete and all applicable data sets . . .”</p>
29	Jerry Anderson	3.4.4	111	<p>Third sentence of the first paragraph says, “These elements require lower update rates than the SV report.” MS reports don’t have any update requirements.</p> <p>WG6 Response: This sentence discusses MS report elements, not the report itself. However, clarification of this subtlety could be accomplished.</p>	<p>Delete sentence.</p> <p>WG6 Response: Replace the 3rd sentence of 1st paragraph with the following: “While there is no update rate requirements for MS reports, MS elements are more static than those found in SV reports and therefore can be updated less frequently.”</p>

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30	Jerry Anderson	Table 3.4.4	112	<p>(Also see comments 35 – 39 and Ron Jones Comment #28.)</p> <p>Note 4 talks about the Status Change on-condition-report. Let’s not have this unnecessary report. If an individual element of a report needs to be “Refreshed”, a system is not required to broadcast the entire report (or all the messages needed to output that report) again to refresh just that element. Each individual link implementation should decide how to “refresh” the needed element. Section 3.4.6 says, “This report is intended for use by the report assembly function of the receiving ADS-B system.” Why should the report assembly function output a report for itself to use to generate other reports? Just cut out the middleman (middle report) and refresh the real report. A message can be used to refresh just one element of a report and the report assembly function can then update the entire report, if necessary.</p> <p>If 1090, VDL Mode 4, or UAT systems do not output reports, they should output information that will allow a report assembly function to output reports. A link must show that its data transfer capabilities will support report generation that is in accordance with the MASPS. Just outputting messages is not necessarily sufficient.</p> <p>WG6 Response: WG6 feels the material for Status Change report needs to be clarified. WG6 would recommend that language be added that it is preferred that ADS-B systems support the rapid conveyance of changes in the values of time-critical elements within the MS and TC reports directly with broadcast messages. However, for some ADS-B systems which do not fully buffer these reports, a report such as the SC report defined in DO-242A could be a means used to convey the changes in these report elements.</p>	<p>Delete Note 4.</p> <p>Modify heading of fourth column in Table 3.4.4 to read, “Elements That Trigger Rapid Refresh.”</p> <p>Change title of Section 3.4.4.1 to read, “MS Report Update and Element Refresh Requirements.”</p> <p>Insert the following text after the first sentence in 3.3.4.1, “While this version of the MASPS specifies the “elements that trigger rapid refresh”, the specific refresh requirements for these elements are to be defined in a future version of this MASPS. Messages to support rapid refresh of the required elements will be broadcast when one or more of the elements changes from its last broadcast value.”</p> <p>In 3.4.4.1, second sentence, change “elements that trigger status change report” to “elements that trigger rapid refresh.”</p> <p>Delete Section 3.4.6 and all other MASPS references to SC reports.</p> <p>Rewrite Section 3.4.9 like 3.4.4. See comments below.</p>
31	Jerry Anderson	3.4.4.1		This requirement was 10 sec in 242. Why was it changed to 24 sec?	Change to original requirement. Delete Note.

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32	Jerry Anderson	3.4.4.10.2	117	<p>(Also see Chris Moody comment #4.)</p> <p>Why 18+/-1 sec? Since there is no update or refresh requirement, there is no guarantee that 18 seconds will do it.</p> <p>WG6 Response: 18 ± 1 sec was chosen because that is the current Transponder IDENT requirement. However, per comment #4 from Chris Moody WG6 recommends changing this requirement to be 20 ± 3 sec to loosen the requirement and make it more compatible with the UAT 4 second epoch.</p>	<p>Delete 18 sec requirement.</p> <p>WG6 Response: See WG6 resolution for Chris Moody comment#4.</p>
33	Jerry Anderson	3.4.8		<p>I though this was not going to be required.</p> <p>WG6 Response: Per plenary agreement in December the Target State (TS) report IS to be required for A2 and A3 equipment. (It is also to be an optional requirement for A1 equipment.)</p>	<p>Please make clear that this is not required in this version of the MASPS.</p> <p>WG6 Response: WG6 recommends that this comment is not accepted.</p>
34	Jerry Anderson	3.4.9		<p>I though this was not going to be implemented with this version of the MASPS.</p> <p>WG6 Response: Per plenary agreement in December the Target Change (TC) report IS to be implemented as requirements for this version of the MASPS. However, it is the proposal of the SC186 leadership that the plenary direct WGs 3 & 5 NOT to implement the TC reports in the MOPS document currently being developed.</p>	<p>Please make clear that this is not ready for implementation in a MOPS.</p> <p>WG6 Response: Note 1 at the top of 3.4.9 indicates that the requirement for TC reports are “to be subject to further validation”, and that “early implementations should be aware that the requirements for TC+0 reports may be refined in future versions of the MASPS.” However WG6 does not feel notes specific to plenary decisions or MOPS “blessed non-compliance” are appropriate.</p> <p>If the caveats about the lack of validation of these requirements need to be strengthened, refer to comment #1 from WG3.</p>
35	Jerry Anderson	Table 3.4.9		<p>(Also see comments 30, 35 – 39 and Ron Jones Comment #28)</p> <p>Need to remove SC report.</p>	<p>Change Note 2 to read, “While this version of the MASPS specifies these elements as requiring rapid refresh, the specific refresh requirements for these elements are to be defined in a future version of this MASPS. Messages to support rapid refresh of the required elements will be broadcast when one or more of the elements changes from its last broadcast value.”</p>
36	Jerry Anderson	3.4.9.1		<p>(Also see comments 30, 35 – 39 and Ron Jones Comment #28)</p> <p>Need to remove SC report.</p>	<p>Delete SC.</p>

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37	Jerry Anderson	3.4.9.5		(Also see comments 30, 35 – 39 and Ron Jones Comment #28) Need to remove SC report.	Delete Note 2.
38	Jerry Anderson	3.4.9.6		(Also see comments 30, 35 – 39 and Ron Jones Comment #28) Need to remove SC report.	Delete Note.
39	Jerry Anderson	3.4.9.23. 1 & 2		(Also see comments 30, 35 – 39 and Ron Jones Comment #28) Need to remove SC report.	Delete SC.

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* These Comments (indicated with an asterisk) are the basis for the non-concur on the Ballot Draft DO-242A

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1*	Ron Jones	2.1.2.2.2	27	The revised notes in this section have lost the central idea of the original note 2, specifically where the transponder code in question is a Mode S 24-bit address.	Add the following text as a new first sentence to the text of the proposed Note 2: “Correlation of ADS-B messages with Mode S transponder codes will facilitate the integration of radar and ADS-B information on the same aircraft during transition.”
2*	Ron Jones	2.1.2.2.2.1	27	Text needs to clarify that a unique address is required. WG6 Response: Must the address be unique if it is a not an ICAO address??	Modify text to read: “...or some kind of other <u>unique</u> address....”
3*	Ron Jones	2.1.2.2.2.2	27	Text needs to clarify that a unique address is required WG6 Response: Must the address be unique if it is a not an ICAO address??	Modify text to read: “...or another kind of <u>unique</u> address....”
4*	Ron Jones	2.1.2.2.2.2	28	(Also see comment # 29.) Note 1 - No justification for suggesting 4 bits are appropriate for the address qualifier. Since a given ADS-B link may only need to report that either the address is an ICAO address or that it is a specific type of alternative address. While allowing 4 bits in the report format could be acceptable the final statement in Note 1 implies that ADS-B links should also provide 4 bits in ADS-B messages. This is not justified. WG6 Response: This material is only guidance and is contained in a note. If a particular link decides it only needs 1 bit, it certainly can do so as that is the minimum requirement.	Delete the final sentence in Note 1. WG6 Response: It is recommended not to accept this comment, but to correct tables to reflect minimum requirement is a 1-bit allocation for this element per comment #29.
5	Ron Jones	2.1.2.5	31	Issues with this requirement were raised by WG5 comments and an alternative resolution for adding a note was proposed by 3/21/02 SC-186 Leadership Telecon.	Add note as proposed at 3/21/02 Leadership Telecon stating that the ADS-B requirement is only to broadcast data that has been so corrected, and that other processors will perform these calculation. WG6 Response: Agreed. See WG5 comment # 1.

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6	Ron Jones	2.1.2.7	32	<p>It is not clear from the text what the role of ARV is vs. geometric velocity, although this is later explained in para. 3.4.7. Since this is the first time AVR is introduced some additional text is needed to put AVR into the proper context.</p> <p>WG6 Response: Agreed that conditions for broadcast should be referenced in §2.1.2.7. However, this should be done by referencing the requirements, not restating them.</p>	<p>Add the following text as a new final para. under 2.1.2.7: “Air-referenced velocity is only be used in the event that valid ground-referenced geometric velocity is not available to the ADS-B system.”</p> <p>WG6 Response: Add the following text as a new final para. under 2.1.2.7: “Conditions for when the broadcast of ARV data is required are specified in §3.4.7.1.</p>
7	Ron Jones	2.1.2.11	34	<p>(Also see comment #27, WG5 comment #4, and Chris Moody comment #5)</p> <p>“Requesting ATC services” should be “receiving ATC services” since this code is not intended to be used a means for a flight crew to request ATC services but rather is an indication that the aircraft is receiving services from ATC.</p> <p>WG6 Response: Agreed.</p>	<p>Correct text to read “receiving ATC services”</p> <p>WG6 Response: Agreed. See resolution of WG5 Comment #4.</p>
8	Ron Jones	2.1.2.18	38	<p>It not clear why the definitions of the emergency/priority status values were deleted here. Since Chapter 2 is a statement of the operational requirements, it would seem appropriate to retain the list of values from DO-242A, para. 2.1.2.3.1</p>	<p>Retain list of values from DO-242A, para. 2.1.2.3.1.</p> <p>WG6 Response: Agreed. Either encoding should be defined in 2.1.2.18, or a reference to the encoding definition in §3.4.4.8 needs to be more explicit.</p>

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9*	Ron Jones	2.1.2.19.2	41	<p style="text-align: center;">(Also see comment #30 and WG3 comment #1)</p> <p>The MASPS material in this section on Long-term intent reporting is misleading in that the associated requirements are not yet mature and may very well change as the associated applications (e.g., ASAS) are further developed. Therefore, introductory text should be added to clearly indicate that the requirements associated with TC Reports may change as the requirements mature for the applications that will use TC Reports.</p> <p>WG6 Response: WG6 agrees that a caveat is needed in §2.1.2.19.2 similar to the one at the top of §3.4.9. WG6 is also agreeable to promoting the note from §3.4.4 to body text. However, the proposed resolution here and by WG3 are tied too closely to the validation of applications, and not to the maturity of the operational concept of long-term intent information and TC reports.</p>	<p>Add the following as new second para. under 2.1.2.19.2:</p> <p>“The postulated requirements described below for long-term intent reporting may be revised in future editions of these MASPS as the requirements for the associated ADS-B applications mature. Implementations should not include specific provisions for long-term intent reporting until the associated application standards are mature.”</p> <p>WG6 Response: Per 4/1/02 SC186 Leadership telecon it is suggested the proposed sentence read as follows: ““The postulated requirements described below for long-term intent reporting may be revised in future editions of these MASPS as the operational requirements for the associated ADS-B applications mature. Implementations should not include specific provisions for long-term intent reporting until the associated application standards are mature these standards are further validated.”</p>
10*	Ron Jones	Table 2-2	56	<p>It is not known if ATS surveillance has a need to obtain TC Reports via ADS-B or not. Other more efficient and more reliable means may be available for ATS automation systems to obtain intent information, such as the use of address data link services (not involving ADS-B).</p> <p>WG6 Response: First, nothing should be done with TS reports since these are to be required in DO242A compliant ADS-B systems. Second, since this is a table of “expected” informational requirements to support example applications, the requested note is not needed.</p>	<p>Add a new note 4 under the table and reference to Note 4 for the final 3 entries in the table. The proposed text for note 4 is: “ADS-B is one potential means to provide intent information to support ATS. Other alternatives mean may exist not involving ADS-B.”</p> <p>WG6 Response: Do not accept this comment.</p>
11	Ron Jones	2.2.3	60	<p>It would be appropriate to include an additional final para. in this section to indicate that for security reasons, ATS in certain airspace is expected to require independent sources of surveillance information.</p>	<p>Add a new para. at the bottom of page 60 to read: “Surveillance of air traffic plays a significant role in aviation security. For security reasons reasons, ATS surveillance requirements in certain airspace will include a need for independent sources of surveillance information.”</p>

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12	Ron Jones	3.3.3.1 and Table 3-3	82-84	<p>The text of 3.3.3.1 and 3.3.1.1.1 discusses Table 3-4(a) but doesn't discuss Tables 3.3(a) and 3-3(b). Thus no context is provided for these tables.</p> <p>WG6 Response: Tables 3-3(a) and 3-3(b) are discussed in §3.3.1 and 3.3.2, and should be moved a page or two forward in the document to be closer to the associated text.</p>	<p>Add text under 3.3.3.1 to discuss the meaning of the information presented in Tables 3-3(a) and 3-3(b).</p> <p>WG6 Response: As part of the final editing and formatting of DO-242A, these two tables will be moved closer to the associated text.</p>
13*	Ron Jones	3.3.3.1.1	82	<p>(Also see Comments 22 and 23 and WG3 comment #4.)</p> <p>The 2nd sentence in the 2nd para. that starts “For the remaining 5%...” Is technically flawed and would represent a requirement that no real-world system could likely achieve. A 99% requirement on the final 5% of the users would in effect require on the order of 99.9% for the full population. This was not the intent of this statement.</p>	<p>Remove this sentence from 3.3.3.1.1 and instead add a note indicating that all targets are expected to be acquired at the range considered the necessary minimum to support safety applications.</p> <p>WG6 Response: Agreed. See WG3 comment #4 for proposed solution.</p>
14	Ron Jones	Table 3-3(a) and Notes	83	<p>Add a note to indicate that AVR is not used under nominal conditions.</p> <p>WG6 Response: Whether ARV is required conditionally or only under certain conditions, the purpose of Table 3-3(a) is to specify what reports each equipage class needs to support from both the transmit and receive sides.</p>	<p>Add a note to indicate: “AVR are only used when valid ground reference velocity information in not available.”</p> <p>WG6 Response: No clarification note is needed. Do not accept this comment.</p>
15*	Ron Jones	Table 3-4(a)	86	<p>The entries for the Required 99th percentile MS acquisition range are not appropriate for the A3 case. The increase in probability from a 95% to a 99% values are related to range since the received signal strength and thus reception probability will increase as the range decreases. A reduction from 90 nmi. to 76 nmi. will probably not produce enough of an increase in signal strength to result in a probability of acquisition success from 95% to 99%. This is a link independent issue. Rather it relates a characteristic common to all links that results from antenna patterns and link budgets. An average increase in received power level of at least 3dB should be allowed to increase the acquisition probability from 95% to 99%. This 3 dB increase would be expected to occur at a range of 64 NM.</p>	<p>Change the entry for the 99th percentile MS acquisition range to 64 nmi. (i.e., twice the 99% acquisition range for A2 receivers).</p>

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16*	Ron Jones	Table 3-4(a) Note 3	87	<p style="text-align: center;">(Also see comment #32 and WG3 comment #2.)</p> <p>The changes to note 3 are not correct as to the range requirements for the Port, Starboard and Aft directions. These changes do not agree with the analysis in Appendix H. (See attached white paper for more information)</p>	<p>Restore the range requirements for the Port, Starboard and Aft direction to those in DO-242 -OR- as an alternative add a more detailed specification of the range. If for example it is agreed that the minimum velocity for an aircraft participating in the en route flight path de-confliction application is 180 knots, a more complete set of requirements could be expressed as follow:</p> <p><i>Note 3: The 90 NM (120 NM desired) range requirement applies in the forward direction. The required range +/- 45 degrees from forward is 64 NM (85 NM desired). The required range +/- 90 degrees from forward (i.e., port and starboard) is 45 NM (60 NM desired). The required range +/-45 degrees from aft is 35 NM (47 NM desired) and the required range aft is 32 NM (42 NM desired). (see Appendix H).</i></p>
17*	Ron Jones	Table 3-4(a) Note 10	87	<p style="text-align: center;">(Also see Jerry Anderson comment #18.)</p> <p>This note is incorrect since MS update rates have not been defined.</p>	<p>Delete Note 10.</p> <p>WG6 Response: Note 10 will retained, but modified as documented in the resolution of Jerry Anderson comment #18.</p>

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18*	Ron Jones	Table 3-4(a) Note 11	88	<p>Final sentence of Note 11 is misleading as to the likelihood for the applicability of the range requirements for over-flight of high density terminal airspace. Longer range applications have not yet been shown to be practical in high density en route airspace. For Note 11, a more general statement could be made, not specifically linked to over-flights of high density terminal.</p> <p>WG6 Response: Also see Lincoln Laboratory Comment #999.</p>	<p>Replace the final sentence of Note 11 with: “As the requirements mature for the applications (e.g., ASAS) requiring long range air-to-air ADS-B reception, the definition of the applicable operational environment (e.g, operational traffic density) may change.”</p> <p>WG6 Response: Per Lincoln Laboratory comment #999 suggested resolution, change Note 11 to read as follows: “<i>Air-to-air ranges extending to 90 NM are intended to support the application of Flight Path Deconfliction Planning, Cooperative Separation in Oceanic/Los Density En Route Airspace, as described in Section 2.2.2.6. It is noted in Section 2.2.2.6, in connection with Table 2-3, that the operational concept and constraints associated with using ADS-B for separation assurance and sequencing have not been fully validated. It is possible that longer ranges may be necessary. Also, the minimum range required may apply even in high interference environments, such as over-flight of high traffic density terminal areas.</i>”</p>
19*	Ron Jones	Table 3-4(a) Note 16	88	<p>The final sentence of this note appears to incorrectly state the relationship between required acquisition range and aircraft separation standards. Reduced separation standards, as postulated for the associated traffic scenario, could perhaps require longer acquisition ranges than for current separation standards and not the other way around.</p> <p>WG6 Response: Tony??</p>	<p>In the final sentence of Note 16 change the text to read: “<u>Shorter</u> acquisition ranges are necessary for current separation standards.”</p>
20*	Ron Jones	3.3.3.1.2	89	<p>The sentence in the 1st para.. that starts “For the remaining 5%...” over specifies the MS acquisition requirements. Table 3-4(a) specifies a 99% acquisition range and the text in this para. need not go any further.</p> <p>WG6 Response: Discussing 80% of the remaining 5% is all but equivalent to discussing a 99% requirement. However, the “remaining 5%” verbiage is preferred since it is more consistent with text from §3.3.3.1.1, 3.3.3.1.3, and 3.3.3.1.4.</p>	<p>Retain the 1st and 2nd sentences of the first para. as shown below and delete the remaining sentences of this para. Add a new 3rd sentence that would read: “Likewise Table 3-4(a) specifies the acquisition range at which 99% of the user population shall be acquired.”</p> <p>WG6 Response: Since current sentence and proposed change have same meaning and both reference same row of Table 3-4(a), keep current sentence for consistency in wording with other sections (§3.3.3.1.1, 3.3.3.1.3, and 3.3.3.1.4).</p>

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21*	Ron Jones	Table 3-4(c) and 3.3.3.1.4	91-92	<p style="text-align: center;">(Also see WG3 comment #3 .)</p> <p>No significant justification has been provided for the proposed 12 sec. update rate for TS Reports and TC+0 Reports at ranges to 40 NM following a change in information state. These update rates are very demanding and could result in significant impacts on the design of the ADS-B links and/or deduce the overall aircraft densities that can be supported by the given link. Since the MASPS are a minimum requirements document it is not appropriate to be including very demanding requirements based on speculation that some application at some point in the future might need such an update rate.</p> <p>WG6 Response: The justification for this requirement has been discussed numerous times with members from WG3, 5, and 6. It is suggested that this comment can not be resolved among the comment authors and WG6 and that all further discussion on this comment be at plenary.</p>	<p>For the rows labeled “TS Report state change update period” and “TC+0 state change update period” qualify all values as ‘desired’. Also in the text under 3.3.3.1.4 at the top of page 91, change the text to read “...the <u>desired</u> update period for A2 equipage within 40 NM and for A3 equipage ...” Further down in that same paragraph change Shall to Should (i.e., “The higher update rate <u>should</u>..” In the following para. change the text to read: “Table 3-4(c) shows the values for the required <u>and desired</u> minimum update...”</p>
22*	Ron Jones	3.3.3.1.3	89	<p style="text-align: center;">(Also see Comments 13 and 23 and WG3 comment #4.)</p> <p>The sentence in the 1st para.. that starts “For the remaining 5%...” Is technically flawed and would represent a requirement that no real-world system could likely achieve. A 99% requirement on the final 5% of the users would in effect require on the order of 99.9% for the full population. This was not the intent of this statement.</p>	<p>Remove this sentence from 3.3.3.1.3 and instead add a note indicating that all targets are expected to be acquired at the range considered the necessary minimum to support safety applications.</p> <p>WG6 Response: Agreed. See WG3 comment #4 for proposed solution.</p>
23*	Ron Jones	3.3.3.1.4	90	<p style="text-align: center;">(Also see Comments 13 and 22 and WG3 comment #4.)</p> <p>The sentence in the 1st para.. that starts “For the remaining 5%...” Is technically flawed and would represent a requirement that no real-world system could likely achieve. A 99% requirement on the final 5% of the users would in effect require on the order of 99.9% for the full population. This was not the intent of this statement.</p>	<p>Remove this sentence from 3.3.3.1.3 and instead add a note indicating that all targets are expected to be acquired at the range considered the necessary minimum to support safety applications.</p> <p>WG6 Response: Agreed. See WG3 comment #4 for proposed solution.</p>

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24*	Ron Jones	3.3.4	94 - 95	There is one limitation of the TLAT LA2020 traffic scenario that needs to be recognized and that is it assumes a smooth earth model. It should be noted in the MASPS that adjustments to the vertical position of the aircraft in the traffic scenario to reflect actual terrain is appropriate.	<p>Add the following note directly under the bullet at the top of page 95 related to altitude distribution :</p> <p>“Note: The TLAT LA2020 traffic scenario did not account for local terrain as it assumed a smooth earth model. For improved fidelity, adjustment of the aircraft altitudes in the traffic scenario is appropriate when used in conjunction with a link performance model that includes terrain.”</p> <p>WG6 Response: Agreed.</p>
25*	Ron Jones	3.4.2	101	A new requirement was added in the 4 th para. that states “..for each participant the report shall be updated and made available to ADS-B applications any time a new message containing all, or a portion of, it component information is received from a participant.” There needs to a lower bound placed on how often updated reports are required to be issued. In the case of 1090 ADS-B up to 4 state vector reports per second could be generated based on the stated requirement. However there is no technical or operational justification for this.	<p>Change the requirement in the 4th para. of 3.4.2 to read: “for each participant the report shall be updated and made available to ADS-B applications any time a new message containing all, or a portion of, it component information is received from a participant <u>with the exception that no type of report is required to be issued at a rate of greater than once per second.</u>”</p>
26*	Ron Jones	3.4.3.2	106	Item (a) text states “A receiving ADS-B subsystem shall update the SV report that it provides to user applications about a transmitting participant whenever it receives messages from that participant providing updated information about any of the SV report elements.” This is a rewording of a requirement from DO-242. There needs to a lower bound placed on how often updated SV reports are required to be issued. In the case of 1090 ADS-B up to 4 state vector reports per second could be generated based on this requirement. However, there is no technical or operational justification for this issuing SV reports more often than once per second..	<p>Change the requirement in the 4th para. of 3.4.2 to read: “...whenever it receives messages from that participant providing updated information about any of the SV report elements <u>with the exception that SV reports are not required to be issued at a rate of greater than once per second.</u>”</p>
27	Ron Jones	3.4.4.10.3	117	<p>(Also see comment #27, WG5 comment #4, and Chris Moody comment #5)</p> <p>“Requesting ATC Services” should be “Receiving ATC Services”</p>	<p>Change “Requesting” to “Receiving” for each occurrence in this 3.4.4.10.3.</p> <p>WG6 Response: Agreed. See resolution for WG5 Comment #4.</p>

ADS-B MASPS (DO-242A Draft) COMMENTS
RTCA SC-186

#	Author	Section	Page	Comment	Suggested Resolution
28	Ron Jones	3.4.6	119	<p style="text-align: center;">(Also see Jerry Anderson comments 30, 35-39.)</p> <p>What is meant by “This report is not intended to assist in ADS-B applications.” If this is true then why is this report type defined? Also the idea of generating a SC report instead of MS or TC report when only specific state information has changed causes a conflict with the previously stated requirement of 3.4.2 that reports (i.e., includes MS or TC) must be updated when a message is received with any updated data elements.</p>	<p>Delete the sentence “This report is not intended to assist in ADS-B applications.” Add a second note to indicate if SC Reporting is implemented that an SC Report in lieu of a MS or TC report may be used as a means of satisfying the report update requirement of 3.4.2.</p> <p>WG6 Response: See WG6 response to Jerry Anderson Comment #30.</p>
29*	Ron Jones	Table 3.4.7	121	<p>There is no justification given for requiring 4 bits for the address qualifier. In fact Note 1 indicates a single bit is considered sufficient to satisfy the ADS-B requirements stated in the MASPS. While allowing 4 bits in the report format could be acceptable the final statement in the note implies that ADS-B links should also provide 4 bits in ADS-B messages. This is not justified.</p> <p>WG6 Response: This requirement is in conflict with 2.1.2.2.2.2 which says minimum is 1 bit, but 4 are recommended.</p>	<p>Delete the final sentence (i.e., The number of bits shown....) of the Note as it is misleading and not valid as a general case.</p> <p>WG6 Response: Change requirement to be the minimum requirement – 1 bit – but add notes to all tables that show Address Qualifier as a report element suggesting 4 bits.</p>

ADS-B MASPS (DO-242A Draft) COMMENTS
RTCA SC-186

#	Author	Section	Page	Comment	Suggested Resolution
30*	Ron Jones	3.4.9	128	<p style="text-align: center;">(Also see comment #9 and WG3 comment #1.)</p> <p>The MASPS material in this section does not clearly reflect the maturity of the requirements associated with TC Reports. The contents of Note 2 needs to be strengthened and placed in the introductory text of this section (i.e., not just in a note).</p> <p>WG6 Response: WG6 is agreeable to promoting the note from §3.4.4 to body text. However, the proposed resolution here and by WG3 are tied too closely to the validation of applications, and not to the maturity of the operational concept of long-term intent information and TC reports.</p>	<p>The following changes are proposed:</p> <ol style="list-style-type: none"> 1. Delete current Note 1 and make Note 2 simply Note. 2. Add the following new text as the first para. under 3.4.9: “The postulated requirements for Trajectory Change (TC) reports (TC+0, TC+n) are to be the subject of further validation within the context of the associated applications. Implementations should not include specific provisions for TC reports until the application standards are mature. The requirements for TC+0 reports defined herein may be revised in future versions of this MASPS.” <p>WG6 Response: Per 4/1/02 SC186 Leadership telecon it is suggested the proposed sentence read as follows: “The postulated requirements for Trajectory Change (TC) reports (TC+0, TC+n) described below may be revised in future editions of these MASPS as the operational requirements mature. Implementations should not include specific provisions for TC reports until these standards are further validated.”</p>
31	Ron Jones	3.5.2.2	149	<p>Why were the DO-242 paragraphs 3.5.1.3.1 and 3.5.1.3.2 deleted from the DO-242A draft? It appears that these original paragraphs provided useful additional details on the requirements for aircraft onboard data sinks.</p>	<p>Restore text of DO-242 3.5.1.3.1 and 3.5.1.3.2.</p>

ADS-B MASPS (DO-242A Draft) COMMENTS
RTCA SC-186

#	Author	Section	Page	Comment	Suggested Resolution
32	Ron Jones	App. H	H2	<p style="text-align: center;">(Also see comment #16, and WG3 comment #2.)</p> <p>Why was the slower moving aircraft velocity reduced to 120 knots for the overtake scenario. Since this is high altitude enroute airspace it seems quite unlikely that an aircraft participating in fight path de-confliction could be traveling that slow.</p> <p>WG6 Response: Ron and the WG-3 authors are correct in questioning the 120 knot minimum velocity in the overtake scenario. Personally, I think that a value of 180 knots would be more accurate, given the "high altitude en-route scenario". In that case, the difference in velocities between a 600 knot aircraft and a 180 knot aircraft is 7 nm/min. So, 7 nm/min * 4.5 min = 31.5 nm for this scenario. However, the 40 nm min A2 requirement dominates here and so the min "in-trail" requirement is 40 nm. Similarly, the "desired" value for longer ranges is 7 nm/min * 6 min = 42 nm. That is such a small increment that we might as well just not specify a "desired" value for the "in-trail" scenario, i.e. just use the 40 nm minimum in this encounter direction.</p>	<p>Restore original values from DO-242 Appendix H for the slower aircraft velocity in the overtake scenario and restore the original calculations as to the required aft reception range –or- as an alternative define the velocity for the slower moving aircraft as 180 knots and change the aft range requirement to 31.5 NM. See <u>Attachment WG3-1</u> below. Also see comment 16 above.</p>

**ADS-B MASPS (DO-242A Draft) COMMENTS
RTCA SC-186**

#	Author	Section	Page	Comment	Suggested Resolution																																																		
1	Rick Cassell	3.4.4.6		In the definition of the classes for aircraft length and width (Table 3.4.4.6) there is a problem with class 0 having a range for fuselage length from 0 to 30 m. This is too large for a single class. The ranges for the other classes are only 8 m. This results in the maximum error in estimation of fuselage length equal to 15 m. Whereas for the other categories the max error is 4 m. There are a significant number of aircraft with lengths less than 30 m. The current grouping results in everything from the smallest general aviation aircraft to small commercial aircraft (Fokker 28, Gulfstream 5, BAC 146) being in the same category. With this size definition the impact will be either increased false alerts or late alerts in runway incursion alerting. False alerts would occur if the fuselage length is overestimated at 30 m for a small aircraft. Late alerts would occur if the fuselage length is underestimated to be 15 m, when it is actually 30 m length. Since pilots and controllers will not accept a high number of false alerts, runway incursion algorithms would have to assume shorter fuselage lengths and resulting late alerts.	<p>The recommendation is to increase the range for each class from 8 m to 10 m, thus reducing the smallest class length. The proposal is shown in a revised Table 3.4.4.6.</p> <p>This will significantly reduce the possible differences in length for the smaller planes, while having minimal impact on differences for the larger size classes. The max error for class 0 would be ± 5 m, since few planes are shorter than 5 m. Similarly, the max error for all other categories would be ± 5 m.</p> <p>This change will simplify the design and improve the performance of runway incursion alerting systems, since the magnitude of error in estimating aircraft length will be approximately the same for all sizes.</p> <p>There are some related changes that need to be made in the wingspan classes to match the changes to the fuselage classes. Recommended changes to wingspan classes are included as well.</p> <p align="center">Table 3.4.4.6 (Revised)</p> <table border="1"> <thead> <tr> <th colspan="2">Length Code (3 MSBs)</th> <th colspan="3">Width (Wingspan) Code (LSB)</th> </tr> <tr> <th>dec.</th> <th>Binary</th> <th>Length Category</th> <th>Narrow (LSB = 0)</th> <th>Wide (LSB = 1)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>000</td> <td>L < 15</td> <td>W < 15</td> <td>15 ≤ W < 23</td> </tr> <tr> <td>1</td> <td>001</td> <td>L < 25</td> <td>W < 23</td> <td>23 ≤ W < 33</td> </tr> <tr> <td>2</td> <td>010</td> <td>L < 35</td> <td>W < 28</td> <td>28 ≤ W < 38</td> </tr> <tr> <td>3</td> <td>011</td> <td>L < 45</td> <td>W < 38</td> <td>38 ≤ W < 48</td> </tr> <tr> <td>4</td> <td>100</td> <td>L < 55</td> <td>W < 42</td> <td>42 ≤ W < 52</td> </tr> <tr> <td>5</td> <td>101</td> <td>L < 65</td> <td>W < 52</td> <td>52 ≤ W < 65</td> </tr> <tr> <td>6</td> <td>110</td> <td>L < 75</td> <td>W < 70</td> <td>70 ≤ W < 80</td> </tr> <tr> <td>7</td> <td>111</td> <td>L ≥ 75</td> <td>W < 84</td> <td>W ≥ 84</td> </tr> </tbody> </table>	Length Code (3 MSBs)		Width (Wingspan) Code (LSB)			dec.	Binary	Length Category	Narrow (LSB = 0)	Wide (LSB = 1)	0	000	L < 15	W < 15	15 ≤ W < 23	1	001	L < 25	W < 23	23 ≤ W < 33	2	010	L < 35	W < 28	28 ≤ W < 38	3	011	L < 45	W < 38	38 ≤ W < 48	4	100	L < 55	W < 42	42 ≤ W < 52	5	101	L < 65	W < 52	52 ≤ W < 65	6	110	L < 75	W < 70	70 ≤ W < 80	7	111	L ≥ 75	W < 84	W ≥ 84
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2	010	L < 35	W < 28	28 ≤ W < 38																																																			
3	011	L < 45	W < 38	38 ≤ W < 48																																																			
4	100	L < 55	W < 42	42 ≤ W < 52																																																			
5	101	L < 65	W < 52	52 ≤ W < 65																																																			
6	110	L < 75	W < 70	70 ≤ W < 80																																																			
7	111	L ≥ 75	W < 84	W ≥ 84																																																			

Attachment WG5-1: Label "274" as Currently Specified for TCAS -to- Transponder

LABEL 274, TCAS -to- TRANSPONDER—RTCA/DO-185A COMPATIBLE

LABEL: 274
NAME: TXWORD 2, Standard ARINC-429 Format for Bus 2, Word 2
 TCAS -to- Transponder and to Displays
 TCAS OUTPUT (SL, RI)
 (See Note 1)
UPDATE RATE: 5/SECOND (MINIMUM)
 10/SECOND (MAXIMUM)
SOURCE: TCAS, ARINC 735A
DATA TYPE: Discrete
REFERENCE: ARINC 735A, Attachment 19A-1, 19B-2, 19D-1, and Attachment 12

LABEL – 274			
TXWORD 2, TCAS -to- TRANSPONDER			
Bit #	Function	Coding	RF Message Bit
1	Label 1 st Digit	“2”	1
2	Label 1 st Digit		0
3	Label 2 nd Digit	“7”	1
4	Label 2 nd Digit		1
5	Label 2 nd Digit		1
6	Label 3 rd Digit	“4”	1
7	Label 3 rd Digit		0
8	Label 3 rd Digit		0
9	PAD		
10	PAD		
11	Version Indicator (VI) (LSB)		(See Note 3)
12	Version Indicator (VI) (MSB)		
13	PAD		
14	PAD		
15	PAD		
16	PAD		
17	PAD		
18	PAD		
19	PAD		
20	PAD		
21	PAD		
22	PAD		
23	SL (MSB)	(See Notes 2, 4, and 5)	9
24	SL		10
25	SL (LSB)		11
26	RI (MSB)	(See Notes 2, 4, and 6)	14
27	RI		15
28	RI		16
29	RI (LSB)		17
30	SSM	(See Note 7)	
31	SSM		
32	PARITY	ODD	

Notes:

1. ARINC 429 data word fields for which there are corresponding RF fields are transmitted with the MSB first in order to maintain consistency between RF and ARINC 429 data. Normal ARINC 429 protocol calls for the transmission of the LSB of the field first.
2. The FAA TSO-C119A compatible interface defined the “274” TXWORD2 for output to both the Transponder and Displays. The RTCA/DO-185A compatible interface defines the “274” TXWORD2 for output only to the Transponder. Existing Displays may or may not be capable of properly processing the new TXWORD2; therefore, unless it can be guaranteed that the new TXWORD2 does not impact operation of the Displays, the TXWORD2 sent to the Display by an RTCA/DO-185A compatible TCAS shall remain the same as previously defined in Attachment 6U of ARINC-735A, i.e., section 3.274.3.
3. The Version Indicator Field provides the method for the TCAS to advise the Transponder whether or not is compatible with RTCA/DO-185A, and is encoded as follows:

Attachment WG5-1: Label "274" as Currently Specified for TCAS –to- Transponder

TXWORD 2 - VERSION INDICATOR (VI) ENCODING		
Bit 12	Bit 11	Encoding
0	0	FAA TSO-C119A Compatible
0	1	RTCA/DO-185A Compatible
1	0	Not Defined
1	1	Not Defined

If VI = 0, the Transponder shall continue to communicate with the TCAS as provided in Attachments 6A through 6D, Attachments 6K through 6V, and Attachment 12 of ARINC-735A which detail the FAA TSO-C119A compatible bus operation.

If VI = 1, the Transponder shall communicate with the TCAS as provided in Attachment 19 of ARINC-735A, which modifies operation specified in Attachments 6A through 6D, Attachments 6K through 6V, and Attachment 12 of ARINC-735A to be consistent with the RTCA/DO-185A capability.

If the Transponder receives a VI indicating a capability that exceeds that of the Transponder design, then the Transponder shall operate at the highest capability possible.

4. These bits are sent by own Transponder in data word DF=16.
5. The SL bits should be used by the TA and TA/RA displays to determine the TCAS Computer mode. The SL field should be used by the displays to determine if the TCAS Computer is in STBY mode. When the TCAS Computer is not in STBY mode, the RI field should be used to determine the TCAS Computer mode. The following bit definitions apply:

SL Field			
Bit 25	Bit 24	Bit 23	MODE
1	0	0	STBY
All other bit combinations are undefined			

The TCAS Computer is in STBY mode when the SL field indicates "STBY". If the SL field does not indicate "STBY", then the RI field can be used to determine the TCAS Computer mode.

6. RI Field:

RI Field				
Bit 29	Bit 28	Bit 27	Bit 26	MODE
0	0	0	0	No on-board TCAS
1	0	0	0	NOT ASSIGNED
0	1	0	0	TA ONLY
1	1	0	0	TA/RA
0	0	1	0	Reserved for TCAS IV
1	0	1	0	NOT ASSIGNED
0	1	1	0	NOT ASSIGNED
1	1	1	0	NOT ASSIGNED
0	0	0	1	Not Provided by TCAS
- through -				
0	1	1	1	
1	1	1	1	

7. TXWORD 2, "SSM" Encoding

TXWORD 2 - SSM ENCODING		
Bit 31	Bit 30	Encoding
0	0	VALID
0	1	NO COMPUTED DATA
1	0	FUNCTIONAL TEST
1	1	FAILURE WARNING

Attachment WG5-2: Proposed New Label "274" for Transponder Maintenance Bus Output

LABEL 274, TRANSPONDER MAINTENANCE BUS OUTPUT

LABEL: 274
NAME: TXWORD 2,
 Transponder Maintenance Bus Output
 TCAS OUTPUT (VI, SL, RI)
 (See Note 1)
UPDATE RATE: 1/SECOND (MINIMUM)
 5/SECOND (MAXIMUM)
SOURCE: TCAS, ARINC 718A (To Be Updated)
DATA TYPE: Discrete
REFERENCE: Current Reference: ARINC 735A, Attachment 19A-1, 19B-2, 19D-1, and Attachment 12

LABEL – 274			
TXWORD 2, TCAS -to- TRANSPONDER			
Bit #	Function	Coding	RF Message Bit
1	Label 1 st Digit	“2”	1
2	Label 1 st Digit		0
3	Label 2 nd Digit	“7”	1
4	Label 2 nd Digit		1
5	Label 2 nd Digit		1
6	Label 3 rd Digit	“4”	1
7	Label 3 rd Digit		0
8	Label 3 rd Digit		0
9	PAD		
10	PAD		
11	Version Indicator (VI) (LSB)		(See Note 3)
12	Version Indicator (VI) (MSB)		
13	PAD		
14	PAD		
15	PAD		
16	PAD		
17	PAD		
18	PAD		
19	PAD		
20	PAD		
21	RA Indicator	(See Note 8)	
22	IDENT Indicator	(See Note 9)	
23	SL (MSB)		9
24	SL	(See Notes 2, 4, and 5)	10
25	SL (LSB)		11
26	RI (MSB)		14
27	RI	(See Notes 2, 4, and 6)	15
28	RI		16
29	RI (LSB)		17
30	SSM	(See Note 7)	
31	SSM		
32	PARITY	ODD	

Notes:

- ARINC 429 data word fields for which there are corresponding RF fields are transmitted with the MSB first in order to maintain consistency between RF and ARINC 429 data. Normal ARINC 429 protocol calls for the transmission of the LSB of the field first.
- The FAA TSO-C119A compatible interface defined the “274” TXWORD2 for output to both the Transponder and Displays. The RTCA/DO-185A compatible interface defines the “274” TXWORD2 for output only to the Transponder. Existing Displays may or may not be capable of properly processing the new TXWORD2; therefore, unless it can be guaranteed that the new TXWORD2 does not impact operation of the Displays, the TXWORD2 sent to the Display by an RTCA/DO-185A compatible TCAS shall remain the same as previously defined in Attachment 6U of ARINC-735A, i.e., section 3.274.3.

Attachment WG5-2: Proposed New Label "274" for Transponder Maintenance Bus Output

3. The Version Indicator Field provides the method for the TCAS to advise the Transponder whether or not is compatible with RTCA/DO-185A, and is encoded as follows:

TXWORD 2 - VERSION INDICATOR (VI) ENCODING		
Bit 12	Bit 11	Encoding
0	0	FAA TSO-C119A Compatible
0	1	RTCA/DO-185A Compatible
1	0	Not Defined
1	1	Not Defined

If VI = 0, the Transponder shall continue to communicate with the TCAS as provided in Attachments 6A through 6D, Attachments 6K through 6V, and Attachment 12 of ARINC-735A which detail the FAA TSO-C119A compatible bus operation.

If VI = 1, the Transponder shall communicate with the TCAS as provided in Attachment 19 of ARINC-735A, which modifies operation specified in Attachments 6A through 6D, Attachments 6K through 6V, and Attachment 12 of ARINC-735A to be consistent with the RTCA/DO-185A capability.

If the Transponder receives a VI indicating a capability that exceeds that of the Transponder design, then the Transponder shall operate at the highest capability possible.

4. These bits are sent by own Transponder in data word DF=16.
5. The SL bits should be used by the TA and TA/RA displays to determine the TCAS Computer mode. The SL field should be used by the displays to determine if the TCAS Computer is in STBY mode. When the TCAS Computer is not in STBY mode, the RI field should be used to determine the TCAS Computer mode. The following bit definitions apply:

SL Field			
Bit 25	Bit 24	Bit 23	MODE
1	0	0	STBY
All other bit combinations are undefined			

The TCAS Computer is in STBY mode when the SL field indicates "STBY". If the SL field does not indicate "STBY", then the RI field can be used to determine the TCAS Computer mode.

6. RI Field:

RI Field				
Bit 29	Bit 28	Bit 27	Bit 26	MODE
0	0	0	0	No on-board TCAS
1	0	0	0	NOT ASSIGNED
0	1	0	0	TA ONLY
1	1	0	0	TA/RA
0	0	1	0	Reserved for TCAS IV
1	0	1	0	NOT ASSIGNED
0	1	1	0	NOT ASSIGNED
1	1	1	0	NOT ASSIGNED
0	0	0	1	Not Provided by TCAS
- through -				
0	1	1	1	
1	1	1	1	

7. TXWORD 2, "SSM" Encoding

TXWORD 2 - SSM ENCODING		
Bit 31	Bit 30	Encoding
0	0	VALID
0	1	NO COMPUTED DATA
1	0	FUNCTIONAL TEST
1	1	FAILURE WARNING

Attachment WG5-2: Proposed New Label "274" for Transponder Maintenance Bus Output

8. *RA Indicator (bit 21 coding)*

0 = Transponder **IS NOT** currently receiving an active Resolution Advisory from the on-board TCAS Computer.

1 = Transponder **IS** currently receiving an active Resolution Advisory from the on-board TCAS Computer.

9. *IDENT Indicator (bit 22 coding)*

0 = The transponder **IS NOT** currently indicating an IDENT ("SPI") condition in ATCRBS and Mode-S replies.

1 = The transponder **IS** currently indicating an IDENT ("SPI") condition in ATCRBS and Mode-S replies.

Attachment RS-1: Early Definition of BDS-40 from ICAO Manual of Mode-S Specific Services

(Circa 1997)

Table 2-64 BDS 4,0 - Aircraft Intention

BDS 4,0 MB FIELD											
1	STATUS	PURPOSE : To provide ready access to information about an aircraft's short-term intentions, in order to improve the effectiveness of conflict probes and to provide additional tactical information to controllers. <i>Notes:</i> 1) <i>The data entered into this register should be derived from the sources that are controlling the aircraft, however when a valid parameter is available and there is insufficient information to ensure that it is being delivered from the system that is flying the aircraft the Mode field for that parameter shall be set to the value = 00. (See Note 3)</i> 2) <i>Selected track/heading and selected airspeed/mach are switchable with an extra switch bit included to indicate which parameter is in use. It is defined as follows:</i>									
2	MSB = 32 768 ft										
3											
4	SELECTED										
5	ALTITUDE										
6	ARINC 429 Label 102										
7											
8	Range = 0 to 65 520 ft										
9		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>SWITCH bit</th> <th>0</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>Track/heading</td> <td>Track</td> <td>Heading</td> </tr> <tr> <td>Airspeed/Mach</td> <td>Airspeed</td> <td>Mach</td> </tr> </tbody> </table>	SWITCH bit	0	1	Track/heading	Track	Heading	Airspeed/Mach	Airspeed	Mach
SWITCH bit	0		1								
Track/heading	Track		Heading								
Airspeed/Mach	Airspeed		Mach								
10											
11											
12											
13	Resolution = 16 ft										
14	STATUS										
15	SIGN										
16	MSB = 8 192 ft/min										
17	SELECTED										
18	ALTITUDE RATE										
19	ARINC 429 Label 104										
20											
21	Range = ± 16 352 ft/min										
22											
23											
24	Resolution = 32 ft/min										
25	SWITCH										
26	STATUS										
27	SIGN										
28	MSB = 90 degrees										
29											
30	SELECTED MAGNETIC										
31	TRACK/HEADING										
32	ARINC 429 Label 114/101										
33											
34	Range = ± 180 degrees										
35	Resolution = 360/512 degrees										
36	SWITCH										
37	STATUS										
38	MSB = 256 Kt/Mach 2.048 (see Note 2)										
40	SELECTED										
41	AIRSPEED/MACH										
42	ARINC 429 Label 103/106										
43											
44	Range = 0 to 512 Kt/Mach 4.096										
45											
46											
47	Resolution = 0.5 Kt/Mach 0.004										
48	MODE coding flag										
49	MODE										
50	SELECTED ALTITUDE										
51	MODE										
52	SELECTED ALTITUDE RATE										
53	MODE										
54	SELECTED TRACK/HEADING										
55	MODE										
56	SELECTED AIRSPEED/MACH										

Attachment RS-2: Early Definition of BDS-40 from ICAO Manual of Mode-S Specific Services

TABLE 4.0 BDS 4,0 AIRCRAFT INTENTION – MB FIELD (See Note T-3)				
FIELD BIT	FIELD NAME	NOTES	PROBABLE DATA SOURCE	ARINC-429 LABEL
1	STATUS	1) The data entered into bits 1 -to- 13 should be derived from the Altitude Control Panel (Mode Control Panel/ Flight Control Unit or equivalent equipment). Alerting devices may be used to provide data if it is not available from 'control' equipment. The associated mode bits for this field (48 –to- 51) shall be as detailed in Note 3 below.	See Note T-1	See Note T-1
2	MSB = 32,768 ft.			
3				
4				
5	MCP / FCU			
6	SELECTED ALTITUDE			
7	(ARINC-429 LABEL 102)			
8				
9				
10	RANGE: 0 –to- 65,520 ft.			
11	RESOLUTION: 16 ft.			
12				
13	LSB Resolution = 16 ft.			
14	STATUS	2) The data entered into bits 14 -to- 26 shall be derived from the Flight Management System or equivalent equipment managing the vertical profile of the aircraft. 4) Target Altitude shall be the short-term vertical intent value, at which the aircraft will level-off (or has leveled-off) at the completion of the current manoeuvre. The data source that the aircraft is currently using to determine the target altitude shall be indicated in the altitude source bits (54 –to- 56) as detailed in Note 3 below. <i>Note: This information which represents the real “aircraft intent”, when available, represented by the Altitude Control Panel Selected Altitude, The Flight Management System Selected Altitude, or the current Aircraft altitude, according to the aircraft’s mode of flight (the intent may not be available At all when the pilot is flying the aircraft manually).</i>	See Note T-1	See Note T-1
15	MSB = 32,768 ft.			
16				
17				
18				
19	FMS SELECTED ALTITUDE			
20	(ARINC-429 LABEL 102)			
21				
22				
23	RANGE: 0 –to- 65,520 ft.			
24	RESOLUTION: 16 ft.			
25				
26	LSB Resolution = 16 ft.			
27	STATUS	5) The current Barometric Pressure Setting shall be calculated from the value contained in the field (Bits 28 –to- 39) plus 800 millibars (mb). When the Barometric Pressure Setting is less than 800 mb or greater than 1209.5 mb, the Status Bit for this field (Bit 27) shall be set to indicate invalid data.	See Note T-2	See Note T-2
28	MSB = 204.8 mb			
29				
30				
31				
32	BAROMETRIC PRESSURE SETTING			
33	MINUS 800 mb			
34	(ARINC-429 LABEL 234)			
35				
36	RANGE: 0 –to- 409.5 mb			
37				
38				
39	LSB Resolution = 0.1 mb			
40		3) Bits 48 -to- 56 shall indicate the status of the values provided in bits 1 -to-26 as follows: Bit 48 shall indicate whether the Mode Bits (49, 50, and 51) are actively being populated: 0 = No mode information provided 1 = Mode information deliberately provided Bits 49, 50, and 51: 0 = Not Active 1 = Active Bit 54 shall indicate whether the Target Altitude Source Bits (55 and 56) are actively being populated: 0 = No source information provided 1 = Source information deliberately provided Bits 55 and 56, shall indicate that Target Altitude Source is: 00 = Unknown 01 = Aircraft Altitude 10 = FCU / MCP Selected Altitude 11 = FMS Selected Altitude		
41				
42				
43				
44	RESERVED			
45	(set to "0" until further defined)			
46				
47				
48	STATUS OF MCP / FCU MODE BITS			
49	VERTICAL NAVIGATION (VNAV) MODE			
50	ALTITUDE HOLD MODE			
51	APPROACH MODE			
52	RESERVED			
53	RESERVED			
54	STATUS OF TARGET ALT. SOURCE BITS			
55	MSB TARGET ALTITUDE SOURCE			
56	LSB			

ISSUE:

The ballot draft DO-242A has modified the air-to-air range requirement for the flight path deconfliction application in Note 3 to Table 3-4(a) to:

The 90 NM range requirement applies in the forward direction. The required range aft is 40 NM. The required range 90 degrees to port and starboard is 64 NM. (see Appendix H) [The 120 NM desired range applies in the forward direction. The desired range aft is 48 NM. The desired range 90 degrees to port and starboard is 85 NM.]

The revised Note 3 for Table 3-4(a) incorrectly interprets the range requirement from Appendix H. Rather the 64 NM range requirement applies to targets at +/- 45 degree from forward and not from port or starboard (i.e., +/- 90 degrees from forward) bearing angles. Furthermore, there is no basis presented in Appendix H to justify the increase in aft range to the 48 NM value in the new Note 3 to table 3-4(a).

DISCUSSION:

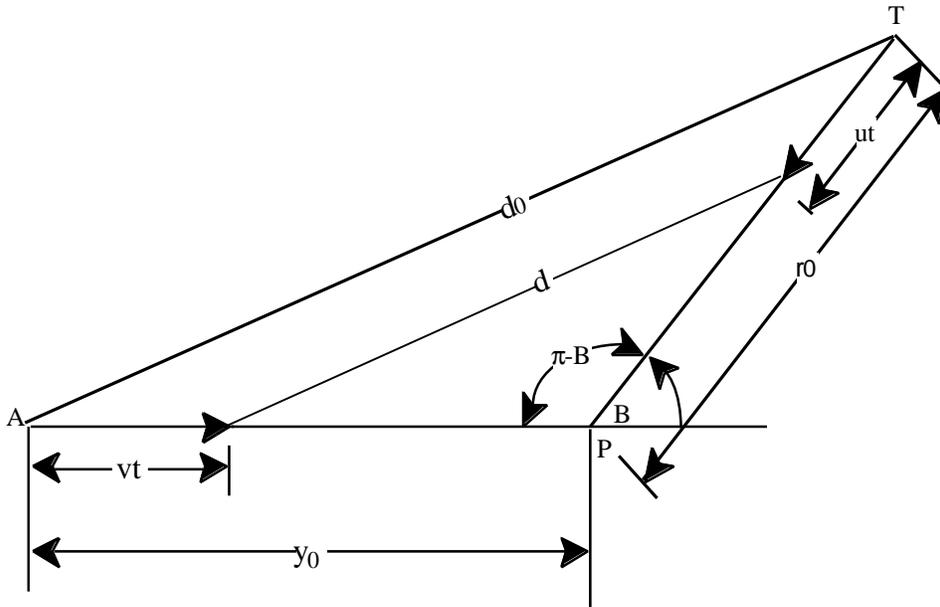
The intent of expressing the range requirements relative to target bearing is to provide a constant 4.5 minute acquisition range for encounters where the target aircraft is approaching from various bearing angles. The maximum aircraft velocity is set at 600 knots (Appendix H) thus the maximum distance either own aircraft or target aircraft can travel in 4.5 minutes is 45 NM. This leads to the 90 NM requirement from Table 3-4a being applicable to a head-on encounter.

The specific text and the associated Figure from Appendix H that relates to Note 3 of Table 3-4a is from DO-242A Section H.2 (Constant Alert Time Analysis) and is provided below:

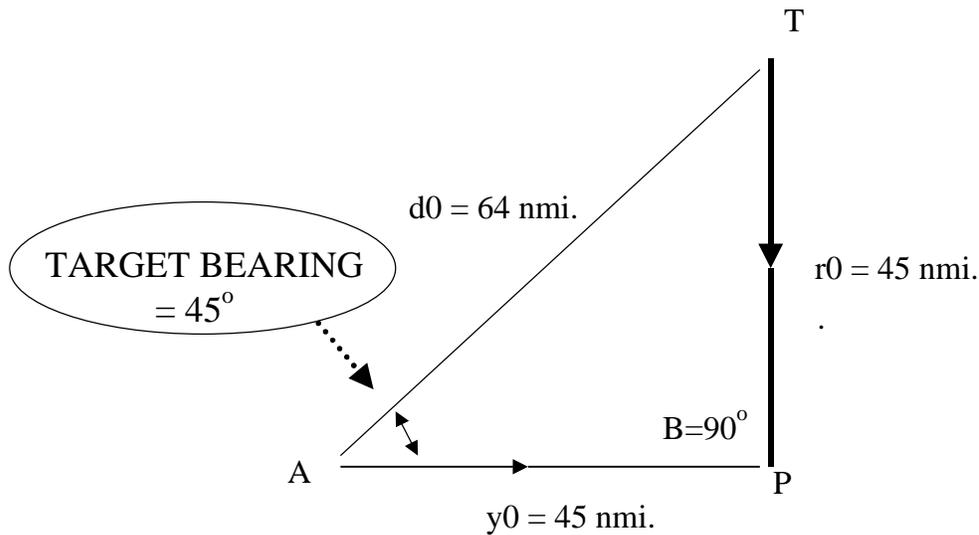
Several criteria may be used to examine air-to-air receive coverage requirements when all aircraft transmit with the same omnidirectional gain, G_0 . Figure H-1 shows own aircraft, A, headed along the y-axis at a speed, v , with a potential threat aircraft, T, moving at a speed, u , on a radial track intercepting the A projected track at y_0 at an angle, B. The separation between aircraft as a function of time is d . Figure H-1 also summarizes the relationships defining d and $\Delta d/\Delta t$, the rate of change of this separation range.

For a Level A3 ADS-B system, the required acquisition range for an encounter geometry with a minimum alert time requirement of 4.5 minutes (Table 2-3) depends on the encounter angle B as shown in Figure H-1. The worst case geometry is a head-on encounter with $B=0^\circ$ and both aircraft traveling at 600 kts, i.e. $u = v = 600$ kts. In this case the closure rate $\Delta d/\Delta t$ is 20 NM/min and the acquisition range in the forward direction is $R = 20 \text{ NM/min} * 4.5 \text{ min} = 90 \text{ NM}$. **For a crossing encounter with $B=90^\circ$ and both aircraft traveling 600 kts we have $d / \dot{d} = y = r$ and the closure rate is $Dd/Dt = 10 * \sqrt{2} \sim 14.14 \text{ NM/min}$. The acquisition range for this geometry is thus $R = 14.14 \text{ NM/min} * 4.5 \text{ min} \sim 64 \text{ NM}$. In the rear direction $B= 180^\circ$, the worst case geometry for an overtake is assumed to be the aircraft behind traveling at 600 kts and the lead aircraft traveling at about 120 kts for an aft encounter with a closure rate $Dd/Dt = 8 \text{ NM/min}$. In this case the acquisition range for an alert time of 4.5 minutes is $R = 8 \text{ NM/min} * 4.5 \text{ min} = 36 \text{ NM}$.** However, since a Level A3 system is also an A2 system with a minimum acquisition range of 40 NM in all directions (Table 2-3), the minimum acquisition range aft for an A3 is also 40 NM.

Attachment WG3-1: Early Definition of BDS-40 from ICAO Manual of Mode-S Specific Services



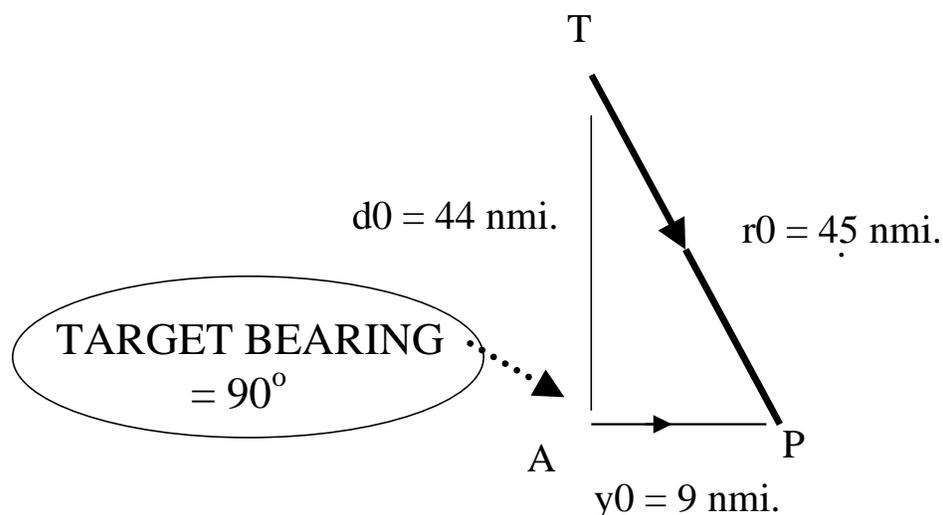
With angle $B=90$ degree for the crossing encounter this figure can be more accurately redrawn as follows:



Thus the 64 NM range requirement is not appropriate for a Port or Starboard target bearing encounter but rather for an encounter where the target aircraft is approaching at a bearing of 45 degrees from the forward direction.

The worst case for a true port or starboard target bearing encounter and where own aircraft is operating at the minimum velocity and where the target aircraft is approaching at the maximum velocity (i.e., 600 knots). The current DO-242 Appendix H analysis used a minimum aircraft velocity of 300 knots in keeping with high altitude enroute/oceanic operations. The revised Appendix H of DO-242A has changed the minimum aircraft velocity to just 120 knots. While this low a velocity may be unrealistic for high altitude operations, even such a low value would result in the following maximum port and starboard air-to-air range requirement.

Attachment WG3-1: Early Definition of BDS-40 from ICAO Manual of Mode-S Specific Services



Thus in this worst case Port or Starboard encounter (requiring maximum air-to-air acquisition range) own aircraft (A) has a velocity of 120 knots and the target aircraft (T) has a velocity of 600 knots, the required range is 44 nmi. in order to provide target tracking for 4.5 minutes before point of closest approach.

Finally for the aft range the current DO-242 Appendix H describes a case where own aircraft is operating at 300 knots and is being overtaken by a target aircraft operating at 600 knots (maximum velocity). This would result in an aft range requirement of 22.5 NM for a 4.5 minute time to point of closest approach. The proposed DO-242A appendix H decreases own aircraft velocity 120 knots and this results in a revised requirement for a 36 NM aft range in order to provide a 4.5 minute time to point of closest approach. There is no justification provided for the Table 3-4a, Note 3 aft range requirement of 48 NM nor is there any justification provided for reducing the minimum aircraft velocity from 300 knots (of DO-242 Appendix H) to the much lower value of 120 knots as included in DO-242A Appendix H.

PROPOSED MASPS CORRECTION

Correct Draft DO-242A to the range values as specified in DO-242 as there is no justification for the proposed changes nor are the proposed changes of Table 3-4a, Note 3 consistent with the analysis of Appendix H (neither the original Appendix H or DO-242 nor the proposed revised Appendix H of DO-242A).