

RTCA Special Committee 186, Working Group 3

ADS-B 1090 MOPS, Revision A

Meeting #15

**Draft 0.1 of the Proposed Appendix F:
ADS-B MASPS Compliance Matrix**

Presented by: Stuart Searight

SUMMARY

This Working Paper presents Draft 0.1 of the proposed ADS-B MASPS Compliance Matrix, for DO-260A, compatible with DO-242A.

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Appendix F

MASPS Compliance Matrix

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F. ADS-B MASPS Compliance Matrix

F.1 Introduction

This Appendix compares the ADS-B system requirements stated in the ADS-B MASPS with minimum operational requirements stated in the 1090 MHz Extended Squitter MOPS. The data is presented in tabular format, ordered by MASPS requirement. The compliance column of the matrix indicates the level of 1090 MHz Extended Squitter MOPS compliance with each MASPS requirement where MASPS requirements are not totally accommodated.

F.2 Compliance Matrix

See the ADS-B MASPS (DO-242A) compliance matrix on the following pages.

Table F-1: ADS-B MASPS Compliance Matrix

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R2.1 (\$2.1.1.1)	When the full resolution of available aircraft data cannot be accommodated within an ADS-B message, a common quantization algorithm shall be used to ensure consistent performance across different implementations.	A.1.3.2, item #3	Representation of Numerical Data <i>Unless specified otherwise, data is rounded to the nearest value that can be encoded in the field.</i>	
R2.2 (\$2.1.1.2)	The output of ADS-B shall be standardized so that it can be translated without compromising accuracy.	§2.2.3	Broadcast Message Characteristics <i>Standardized to Downlink Format (DF)=17 format as defined in DO-181B including 24 bit PI (Parity/Interrogator ID) field</i> ADS-B Report Characteristics <i>ADS-B report format has been standardized in compliance with MASPS</i>	
R2.3 (\$2.1.2)	The ADS-B system shall be capable of transmitting messages containing the information specified in the following subsections [of §2.1.2].	General (various)	See subsequent requirements	
R2.4 (\$2.1.2.1)	Time of applicability [TOA] shall be provided in all ADS-B reports.	§2.2.8.1.4	Report Time of Applicability	
R2.5 (\$2.1.2.2)	The basic identification information to be conveyed by ADS-B shall include the following elements: 1. Call Sign (§2.1.2.2.1) 2. Participant Address (§2.1.2.2.2.1) and Address Qualifier (§2.1.2.2.2.2) 3. ADS-B Emitter Category (§2.1.2.2.3)	§2.2.8.2.6 §2.2.5.1.11 §2.2.5.1.1 §2.2.5.1.1.3 §2.2.8.2.3 §2.2.3.2.5.2 §2.2.8.2.7 §2.2.3.2.5.3	Call Sign Aircraft Identification (or Registration) Data ICAO 24-bit Address (i.e. Mode-S Address) Address Qualifier for Non-Transponder Devices Address Qualifier ADS-B Emitter Category Subfield in ADS-B Aircraft Identification and Type Message Emitter Category	
R2.6 (\$2.1.2.2.1)	ADS-B shall convey an aircraft call sign of up to 8 alphanumeric characters in length. [A change from DO-242, which required only 7 characters.]	§2.2.8.2.6	“Character Subfield” <i>8 Characters of aircraft registration or flight number encoded in International Alphabet Number 5 (IA-5)</i> Call Sign	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R2.7 (\$2.1.2.2.2)	The ADS-B system design shall include a means (e.g., an address) to: (a) correlate all ADS-B messages transmitted from the A/V, and (b) differentiate it from other A/Vs in the operational domain.	§2.2.5.1.1 §2.2.3.2.1.5	ICAO 24-bit Discrete Address (i.e. <i>Mode-S Address</i>) “AA” Address Field, Announced	The MOPS necessarily presumes that operational procedures are in place to ensure that participant addresses are unique. Additionally, the “DF” field can be used to differentiate transponder and non-transponder based implementations.
R2.8 (\$2.1.2.2.2)	Aircraft with Mode-S transponders using an ICAO 24 bit address shall use the same 24-bit address for ADS-B.	§2.2.3.2.15 §2.2.5.1.1.1	“AA” Address Field, Announced ICAO 24-bit Address <i>Requires the “AA” Address field contains the 24 bit ICAO address of the transmitting installation.</i>	
R2.9 (\$2.1.2.2.2)	All aircraft/vehicle addresses shall be unique within the operational domain(s) applicable.	§4.4.3	Participant Address (Optional)	Accommodated by R2.7, R2.8. Procedures for assigning addresses are administrative and outside the scope of the MOPS.
R2.10 (\$2.1.2.2.2)	The ADS-B system design shall accommodate a means to ensure anonymity whenever pilots elect to operate under flight rules permitting an anonymous mode.	§2.2.5.1.1.2 §4.4.3	Anonymous Address Participant Address (Optional)	1090 MOPS requires a 24 bit address field in ADS-B messages. Address must be unique within the operating domain (see also R2.8). Administrative solutions are anticipated such as assigning blocks of codes to large user groups for random assignment to airplanes within an operational domain. Operationally acceptable solutions are supported by the MOPS and may be capable of being automated. Flight identification or aircraft registration information may be omitted.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R2.11 (\$2.1.2.2.2.1)	The Participant Address field shall be included in all ADS-B reports. This 24-bit field contains either the ICAO 24-bit address assigned to the particular aircraft about which the report is concerned, or another kind of address that is unique within the operational domain, as determined by the Address Qualifier field.	§2.2.3.2.1.5 §2.2.5.1.1.1 §2.2.5.1.1.2 §2.2.5.1.1.3	“AA” Address Field, Announced ICAO 24-bit Address Anonymous Address Address Qualifier	Addresses other than the ICAO 24-bit address apply only to non-transponder devices.
R2.12 (\$2.1.2.2.2.2)	The Address Qualifier Field shall be included in all ADS-B reports. This field consists of one or more bits and describes whether the Address field contains the 24-bit ICAO address of a particular aircraft or another kind of address that is unique within the operational domain.	§2.2.5.1.1.3	Address Qualifier for Non-Transponder Devices	Address Qualifier applies only to non-transponder devices.
R2.13 (\$2.1.2.2.3)	Aircraft/vehicle category, as defined by ICAO, shall be one of the following: - Light aircraft - 7,000 kg (15,500 lbs) or less - Small aircraft 7,000 kg-34,000 kg - 34,000 kgs 136,000 kg (75,000 lbs to 300,000 lbs) - High vortex large (aircraft such as B-757) - Heavy aircraft 136,000 kg (300,000 lbs) or more - Highly maneuverable (> 5g acceleration capability) and high speed (> 400 knots cruise) - Rotorcraft - Glider/sailplane - Lighter than air - Unmanned aerial vehicle - Space/Trans-atmospheric vehicle - Ultralight/ Hang glider/ Paraglider - Parachutist/ Skydiver - Surface vehicle – emergency vehicle - Surface Vehicle – service vehicle - Point obstacle (includes tethered balloons) - Cluster obstacle - Line Obstacle	§2.2.3.2.5.2	“ADS-B Emitter Category” Subfield... <i>Table 2-16 shows 4 category sets provided; 7 categories per set (0000=no info.)</i>	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R2.14 (§2.1.2.4)	Position Information shall be transmitted in a form that can be translated, without loss of accuracy and integrity, to latitude, longitude, geometric height and barometric pressure altitude.	§2.2.3.2.3 §2.2.3.2.3.4.3 §2.2.3.2.3.7 §2.2.3.2.3.8 §2.2.3.2.4 §2.2.3.2.4.7 §2.2.3.2.4.8	ADS-B Airborne Position Messages “Altitude Encoding” in ADS-B Airborne Position Messages “Encoded Latitude” Subfield in ADS-B Airborne Position Messages “Encoded Longitude” Subfield in ADS-B Airborne Position Messages ADS-B Surface Position Messages “Encoded Latitude” Subfield in ADS-B Surface Position Messages “Encoded Longitude” Subfield in ADS-B Surface Position Messages	Accuracy and Integrity components of position data are conveyed in Position Message “TYPE” subfields.
R2.15 (§2.1.2.4)	All geometric position elements shall be referenced to WGS-84 ellipsoid.	§2.2.8.1.5 §2.2.8.1.6 §2.2.8.1.7	Latitude (WGS-84) Longitude (WGS-84) Altitude, Geometric (WGS-84)	[Ref. ICAO Doc. 9688 references to WGS-84]
R2.16 (§2.1.2.4)	Barometric pressure altitude shall be referenced to standard temperature and pressure. [Note: “Pressure Altitude” refers to barometric pressure altitude relative to a standard pressure of 1013.2 hectopascals (29.92 in Hg)].	§2.2.3.2.3.4.1	“Barometric Altitude” in ADS-B Airborne Position Messages	
R2.17 (§2.1.2.4)	For any ADS-B participant that sets the “reporting reference point position” CC code (in MS report element #7g, §3.4.4.9.7) to ONE, the position that is broadcast in ADS-B messages as that participant’s nominal position shall be the position of that participant’s ADS-B position reference point (§2.1.2.5)	§2.2.3.2.7.2.3.7 §2.2.3.2.7.2.11	“Position Offset Applied” CC Code Subfield in Aircraft Operational Status Messages “Aircraft Length and Width Codes” Subfield in Aircraft Operational Status Messages	Actual calculation of position offset in not the required responsibility of the ADS-B system. If, however, this offset is calculated in other avionics, ADS-B shall convey this within the “Position Offset Applied” CC Code.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R2.18 (§2.1.2.5)	<p>The <i>ADS-B position reference point</i> of an A/V shall be defined as the center of a rectangle (the “defining rectangle for position reference point”) that has the following properties:</p> <ol style="list-style-type: none"> The defining rectangle for position reference point shall have length and width as defined in Table 2-1 for the length and width codes that the participant is transmitting in messages to support the MS report. The defining rectangle for position reference point shall be aligned parallel to the A/V’s heading. The ADS-B position reference point (the center of the defining rectangle for position reference point) shall lie along the axis of symmetry of the A/V. (For an asymmetrical A/V, the center of the rectangle should lie midway between the maximum port and starboard extremities of the A/V.) The forward extremity of the A/V shall just touch the forward end of the defining rectangle for position reference point. 	<p>§2.2.3.2.7.2.3.7</p> <p>§2.2.3.2.7.2.11</p>	<p>“Position Offset Applied” CC Code Subfield in Aircraft Operational Status Messages</p> <p>“Aircraft Length and Width Codes” Subfield in Aircraft Operational Status Messages</p>	<p>Responsibility for position offset adjustment lies outside the 1090 MHz ES equipment. Compliance must be assessed as part of installation certification.</p>
R2.19 (§2.1.2.6)	Both barometric pressure altitude and geometric height shall be reported, if available to the transmitting ADS-B subsystem.	§2.2.3.2.4.3	”Altitude” Subfield in ADS-B Airborne Position Messages	The Altitude Subfield only allows for a single altitude to be reported as indicated by the Airborne Position Message “Type” code.
R2.20 (§2.1.2.6)	Altitude [barometric pressure altitude and geometric altitude] shall be provided with a range from -1,000 ft up to 100,000 ft.	<p>§2.2.3.2.3.4.3</p> <p>§2.2.8.1.7</p> <p>§2.2.8.1.12</p>	<p>“Altitude Encoding “ in Airborne Position Messages Q bit => 100 or 25 ft. resolution Range: -1000 to 50,175 ft. with 25 ft. res. (Q=1) >50,175 ft. with 100 ft. res. (Q=0) Altitude, Geometric (WGS-84) Altitude, Barometric (Pressure Altitude)</p>	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R.2.21 (§2.1.2.6)	ADS-B link equipment shall support a means for the pilot to indicate that the broadcast of altitude information from pressure altitude sources is invalid. This capability can be used at the request of ATC or when altitude is determined to be invalid by the pilot. This capability is in addition to the setting of the "Pressure Altitude Valid" bit in the State Vector report when altitude source equipment indicates the data is invalid.	N/A		Transponder-based ADS-B devices are required to have an inhibit altitude capability available to the pilot. [DO-181C] <<Do we require such capability for non-transponder systems?? >>
R2.22 (§2.1.2.6.1)	The pressure altitude reported shall be derived from the same source as the pressure altitude reported in Mode C and Mode S for aircraft with both transponder and ADS-B.	§3.4.2	Flight Environment Data Sources: Altitude	
R2.23 (§2.1.2.7)	ADS-B geometric velocity information shall be referenced to WGS-84.	§2.2.8.1 Table 2.2.8.1 Table 2.2.8.1.1b	ADS-B State Vector Report Characteristics ADS-B State Vector Data Elements – Source Data Mapping to Report Structure ADS-B Report Structure Coding	<<The only place I found stating velocity data is referenced to WGS-84 is in Table 2.2.8.1 where "(WGS-84)" is found under the element names in the left-most column. I feel we need a high level requirement in §2.2.3.2.6 "ADS-B Airborne Velocity Messages" that all velocity components shall be referenced to WGS-84. (We should do likewise for Position Messages.) We should at minimum add "(WGS-84)" to the velocity components of SV in table 2.2.8.1.1.1b "ADS-B Report Structure Coding" as is done for position data elements.>> <<I feel none of the cited sections apply to the requirement. Do we say anywhere in the document that ground referenced geometric horizontal velocity shall be transmitted for AV known not to be on the surface??? (If we do, I could not find it!) Does DO-181 define when Airborne Velocity messages are to be broadcast??? >>
R2.24 (§2.1.2.7)	Transmitting A/Vs that are not fixed or movable obstacles and that are not known to be on the airport surface shall provide ground referenced geometric horizontal velocity.	2.2.3.2.6.1.6 2.2.3.2.6.1.7 2.2.3.2.6.1.8 2.2.3.2.6.1.9 2.2.3.2.6.1.12 2.2.3.2.4.2-4	"East/West Direction Bit" "East/West Velocity" "North South Direction Bit" "North/South Velocity" "Vertical Rate" Surface "Movement" and "Ground Track"	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R2.25 (§2.1.2.8)	Transmitting A/Vs that are not fixed or movable obstacles and that are not known to be on the airport surface shall provide vertical rate.	\$2.2.3.2.6.1.11	“Sign Bit for Vertical Rate” Subfield in Airborne Velocity Subtype “1” Messages	<<See above comment for R2.24.>>
R2.26 (§2.1.2.8)	Vertical Rate shall be designated as climbing or descending.	\$2.2.3.2.6.4.11 \$2.2.8.1.14 \$2.2.8.1.15	“Sign Bit for Vertical Rate” Subfield in Airborne Velocity Subtype “4” Messages Vertical Rate, Geometric (WGS-84) Barometric Altitude Rate	
R2.27 (§2.1.2.8)	Vertical Rate shall be reported up to 32,000 feet per minute (fpm).	\$2.2.8.1.14 \$2.2.8.1.15	Vertical Rate, Geometric (WGS-84) Barometric Altitude Rate	
R2.28 (§2.1.2.8)	At least one of the two types of vertical rate (barometric and geometric) shall be reported.	\$2.2.3.2.6.1.10 \$2.2.3.2.6.4.10 \$2.2.8.1.14 \$2.2.8.1.15	“Source Bit for Vertical Rate” Subfield in Airborne Velocity Subtype “1” Messages “Source Bit for Vertical Rate” Subfield in Airborne Velocity Subtype “4” Messages Vertical Rate, Geometric (WGS-84) Barometric Altitude Rate	<<I believe we need a validity flag for each altitude rate within the SV report. Language in 2.2.8.1.14 & 2.2.8.1.15 seems to say we could set validity bit to “0” because we are not sending Geometric, even though we are sending valid Barometric rates.>> UAT: For NIC less than 9 and NACp less than 10, WG-5 elected to use barometric rate as the vertical velocity source in light of fleet equipage and lack of more definitive guidance in the ADS-B MASPS (DO-242A).
R2.29 (§2.1.2.8)	If only one of these two types of vertical rate is reported, it shall be obtained from the best available source of vertical rate information.	UAT: \$2.2.4.5.2.7.1.1	UAT: “Vertical Velocity Source” Subfield Encoding	<<Is our criteria simply if geo is available send it, else send baro?? Is this sufficient??>>
R2.30 (§2.1.2.12)	Table 2-2 defines the navigation integrity categories [NIC] that transmitting ADS-B participants shall use to describe the integrity containment radius.	\$2.2.3.2.7.2.6 Table 2.2.3.2.7.2.6	“NIC Supplement” Subfield in Aircraft Operational Status Messages Navigation Integrity Encoding (NIC) Encoding	NIC encoding is done using the “TYPE” subfield in Airborne Position and Surface Position messages and the “NIC Supplement” subfield of the Aircraft Operational Status Message.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R2.31 (§2.1.2.13)	Table 2-3 defines the navigation accuracy categories that shall be used to describe the accuracy of positional information in ADS-B messages from transmitting ADS-B participants. The NAC _p value broadcast from an ADS-B participant shall include any inaccuracies in the reported position due to the transmitting participant's not correcting the position from the navigation sensor to that of the ADS-B position reference point (see §2.1.2.5).	§2.2.3.2.7.2.7 Table 2.2.3.2.7.2.7	"Navigation Accuracy Category for Position (NAC _p)" Subfield in Aircraft Operational Status Messages Encoding for Navigation Accuracy Category for Position (NAC _p)	
R2.32 (§2.1.2.13)		§2.2.3.2.7.2.7 Table 2.2.3.2.7.2.7	"Navigation Accuracy Category for Position (NAC _p)" Subfield in Aircraft Operational Status Messages Encoding for Navigation Accuracy Category for Position (NAC _p)	Responsibility for NAC _p adjustment lies outside the 1090 MHz ES equipment. Compliance must be assessed as part of installation certification.
R2.33 (§2.1.2.14)	[In determining NAC _v , the] velocity accuracy category of the least accurate velocity component being supplied by the reporting A/V's source of velocity data shall be as indicated in <u>Table 2-4</u> .	Table 2-20 Table 2-21 Table 2-22	Determining NAC _v if HFOM _R and VFOM _R are provided Determining NAC _v if From a GNSS Receiver Operating in LAAS or WAAS Mode Determining NAC _v When Differential GNSS Corrections Are Not Available	
R2.34 (§2.1.2.15)	The Surveillance Integrity Limit encoding shall be as indicated in Table 2-5	§2.2.3.2.7.1.3.13 Table 2.2.3.2.7.1.3.13 §2.2.3.2.7.2.9	"SIL" Subfield in Target State and Status Message "SIL" Subfield Encoding "Surveillance Integrity Level (SIL)" Subfield in Aircraft Operational Status Messages	
R2.35 (§2.1.2.16)	The Barometric Altitude Quality Code (BAQ), is a 2-bit field which shall be zero for equipment that conforms to version DO-242A of the ADS-B MASPS	§2.2.3.2.7.2.8	"Reserved for Barometric Altitude Quality (BAQ)" Subfield in Aircraft Operational Status Message	
R2.36 (§2.1.2.8)	The ADS-B system shall be capable of supporting broadcast of emergency and priority status.	§2.2.3.2.7.8 §2.2.8.2.9	Extended Squitter Aircraft Status Message (Type "28") Emergency/Priority Status	
R2.37 (§2.1.2.19.1)	For equipment classes A2 and A3, the ADS-B system shall provide the capability to transmit and receive messages in support of the TS report. [TS report capability is optional for equipment class A1.]	Table 2-3 Table 2-5	ADS-B Class A Transmitter Equipment To Message Coverage ADS-B Class A Receiver Equipment To Report Coverage	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R2.38 (§2.1.2.19.2)	For equipage class A2, the ADS-B system shall provide the capability to transmit and receive messages in support of one TC (TC+0) report.	Table 2-3 Table 2-5 §2.2.3.2.7.1	ADS-B Class A Transmitter Equipment To Message Coverage ADS-B Class A Receiver Equipment To Report Coverage “Target State and Status” Message	
R2.39 (§2.1.2.19.2)	For equipage class A3, the ADS-B system shall provide the capability to transmit and receive messages in support of multiple TC reports.	Table 2-3 Table 2-5 §2.2.3.2.7.7	ADS-B Class A Transmitter Equipment To Message Coverage ADS-B Class A Receiver Equipment To Report Coverage Reserved Type “27” ADS-B Messages	<<We should indicate TC reports in Table 2-3 similar to how we have in Table 2-5.>>

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes																																				
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description																																					
R3.1 (§3.3.1)	<p>ADS-B equipage classes summarized in Table 3-1 shall provide air-to-air coverage specified in Table 3-2(a). The stated ranges are the basis for the indicated relative effective radiated power (ERP) and the receiver sensitivity requirement for each transmit unit.</p> <p style="text-align: center;"><u>Table 3-2(a)</u></p> <table border="1"> <thead> <tr> <th>Class</th> <th>Range</th> <th>TX ERP/PRX sensitivity</th> </tr> </thead> <tbody> <tr> <td>A0</td> <td>10 NM</td> <td>≥-2.5 dB +3.5 dB</td> </tr> <tr> <td>A1</td> <td>20 NM</td> <td>0 dB</td> </tr> <tr> <td>A2</td> <td>40 NM</td> <td>+3 dB -3 dB</td> </tr> <tr> <td>A3</td> <td>90 NM</td> <td>≤ +6 dB -7 dB</td> </tr> <tr> <td>A3+</td> <td>120 NM</td> <td>≤ +6 dB -9.5 dB</td> </tr> </tbody> </table> <p><i>Note: Required range requirements for A3 and A3+ are forward direction coverage. Port and star-board coverage may be one half of this value; aft coverage may be one third of this value.</i></p>	Class	Range	TX ERP/PRX sensitivity	A0	10 NM	≥-2.5 dB +3.5 dB	A1	20 NM	0 dB	A2	40 NM	+3 dB -3 dB	A3	90 NM	≤ +6 dB -7 dB	A3+	120 NM	≤ +6 dB -9.5 dB	<p>Appendix E</p> <p>Table E-1</p> <p>Appendix P</p>	<p>Transmitter and Receiver Power Requirements</p> <p>Air-To-Air MTL Link Budgets</p> <p>1090 System Performance Simulation Results</p>																			
Class	Range	TX ERP/PRX sensitivity																																						
A0	10 NM	≥-2.5 dB +3.5 dB																																						
A1	20 NM	0 dB																																						
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A3	90 NM	≤ +6 dB -7 dB																																						
A3+	120 NM	≤ +6 dB -9.5 dB																																						
R3.2 (§3.3.1)	<p>The effective radiated power (ERP) and minimum signal detection capabilities shall support the associated pair-wise minimum operational ranges listed in Table 3-2(b).</p> <p style="text-align: center;"><u>Table 3-2(b), Interoperability Ranges</u></p> <table border="1"> <thead> <tr> <th></th> <th>RX A0</th> <th>RX A1</th> <th>RX A2</th> <th>RX A3</th> <th>RX</th> </tr> </thead> <tbody> <tr> <td>TX A0:</td> <td>10 NM</td> <td>15 NM</td> <td>21 NM</td> <td>34 NM</td> <td>45</td> </tr> <tr> <td>TX A1:</td> <td>13 NM</td> <td>20 NM</td> <td>28 NM</td> <td>45 NM</td> <td>60</td> </tr> <tr> <td>TX A2:</td> <td>18 NM</td> <td>28 NM</td> <td>40 NM</td> <td>64 NM</td> <td>85</td> </tr> <tr> <td>TX A3:</td> <td>26 NM</td> <td>40 NM</td> <td>56 NM</td> <td>90 NM</td> <td>120</td> </tr> <tr> <td>TX A3:</td> <td>26 NM</td> <td>40 NM</td> <td>56 NM</td> <td>90 NM</td> <td>120</td> </tr> </tbody> </table>		RX A0	RX A1	RX A2	RX A3	RX	TX A0:	10 NM	15 NM	21 NM	34 NM	45	TX A1:	13 NM	20 NM	28 NM	45 NM	60	TX A2:	18 NM	28 NM	40 NM	64 NM	85	TX A3:	26 NM	40 NM	56 NM	90 NM	120	TX A3:	26 NM	40 NM	56 NM	90 NM	120	<p>§2.2.2.1.1</p> <p>§2.2.4.1</p> <p>§2.2.4.2</p> <p>§2.2.4.3</p> <p>Appendix E</p> <p>Appendix P</p>	<p>RF Peak Output Power (minimum) Minimum Triggering Level (MTL) Definition</p> <p>Receivers Shared with a TCAS Unit Stand Alone Receivers</p> <p>Air-To-Air MTL Link Budgets</p> <p>1090 System Performance Simulation Results</p>	<p>The 90 NM air-to-air range for class A3 equipment will be met in low density airspace. A planned revision to this MOPS will address techniques for extending the range of the system in high density airspace. See Appendix I.</p>
	RX A0	RX A1	RX A2	RX A3	RX																																			
TX A0:	10 NM	15 NM	21 NM	34 NM	45																																			
TX A1:	13 NM	20 NM	28 NM	45 NM	60																																			
TX A2:	18 NM	28 NM	40 NM	64 NM	85																																			
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Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.3 (§3.3.1)	Broadcast only aircraft (class B0 and B1) shall have ERP values equivalent to those of class A0 and A1 as determined by own aircraft maximum speed, operating altitude, and corresponding coverage requirements	§2.2.2.1.1.5 Appendix E	Class B ADS-B Transponder Based Transmitter Power Transmitter and Receiver Power Performance	
R3.4 (§3.3.1)	Ground vehicles operating on the airport surface (class B2) shall provide a 5 NM coverage range for Class A receivers.	§2.2.2.10.2 Appendix E	Class B Equipment RF Peak Output Power Transmitter and Receiver Power Performance	DO-260: Meeting the requirement for automatic suppression requires a correlation to a geographical mask.
R3.5 (§3.3.1)	If required due to spectrum considerations, ADS-B transmissions from ground vehicles (Class B2) shall be automatically prohibited when those vehicles are outside the surface movement area (i.e., runways and taxiways)	§2.2.3.2.4	ADS-B Surface Position Messages <i>MOPS provides for surface position message data as required by MASPS. When/where transmissions are allowed is an administrative function. Operational compliance with the administrative requirements is a system or installation certification responsibility.</i>	UAT: It is outside the scope of any ADS-B link MOPS to ensure compliance with the “automatic” feature of this requirement. <<1 recommend WG3 takes the same approach as WG5 with this requirement: Leave the Section and Title columns blank and adopt the note from the UAT MOPS shown above.>>
R3.6 (§3.3.1)	Fixed obstruction (class B3) broadcast coverage shall be sufficient to provide a 10 NM coverage range from the location of the obstruction.	§2.2.2.2.10.2 Appendix E	Class B Equipment RF Peak Output Power Transmitter and Receiver Power Performance	Requirement met presuming available of line-of-sight coverage to 10 NM
R3.7 (§3.3.2)	Each equipage class shall meet the required information broadcast and receiving capability at the indicated range to support the applications indicated in Table 3-3(a) and Table 3-3(b).	§2.2.2.1 §2.2.2.2 §2.2.3 §2.2.4.2 §2.2.4.3 Appendix E Appendix P	Transponder-based Transmitters Stand Alone Transmitters Broadcast Message Characteristics Receivers Shared with a TCAS Unit Stand Alone Receivers Transmitter and Receiver Power Performance 1090 System Performance Simulation Results	The 90 NM air-to-air range for class A3 equipment will be met in low density airspace. A planned revision to this MOPS will address techniques for extending the range of the system in high density airspace. See Appendix I.
R3.8 (§3.3.3.1)	... report acquisition shall be considered accomplished when all report elements required for an operational scenario have been received by an ADS-B participant.	§2.2.10.3	Report Assembly Acquisition State	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.9 (§3.3.1.1)	Report accuracy, update period and acquisition range requirements are derived from the sample scenarios of Chapter 2, and are specified in Table 3-3(a). The state vector report shall meet the update period and 99 percentile update period requirements for each operational range listed [in Table 3-4(a)].	Appendix E Table E-1 Appendix P	Transmitter and Receiver Power Requirements Air-To-Air MTL Link Budgets 1090 System Performance Simulation Results	
R3.10 (§3.3.1.1)	For each of the scenarios included in Table 3-4(a), the state vector from at least 95% of the observable user population (radio line-of-sight) supporting that application shall be acquired and achieve the time and probability requirements specified for the operational ranges.	Appendix E Appendix L Appendix P Appendix E	Transmitter and Receiver Power Requirements <i>Calculations are based on 95% probability of receipt of required information for 95% of the equipage class within the required update interval, assuming a 90% ADS-B receiver duty factor.</i> Impact of Radio Frequency Interference on Extended Squitter Report Integrity 1090 System Performance Simulation Results Transmitter and Receiver Power Requirements	The 90 NM air-to-air range for class A3 equipment will be met in low density airspace. A planned revision to this MOPS will address techniques for extending the range of the system in high density airspace. See Appendix I.
R3.11 (§3.3.1.1)	Required ranges for acquisition shall be as specified in Table 3-4(a): (10 NM for A0, 20 NM for A1, 40 NM for A2, and 90 NM for A3).	Appendix L Appendix P Appendix A Appendix E Appendix K Appendix L Appendix P	Impact of Radio Frequency Interference on Extended Squitter Report Integrity 1090 System Performance Simulation Results CPR encoding meets req. both air and surface position requirement. Extended Squitter meets req. including 24 sec. acquire at 90 NM with 95% probability. Extended Squitter meets Velocity without filtering if probability of reception is > 0.38. General limit becomes update period, dependent upon interference environment. 1090 System Performance Simulation Results	The 90 NM air-to-air range for class A3 equipment will be met in low density airspace. A planned revision to this MOPS will address techniques for extending the range of the system in high density airspace. See Appendix I.
R3.12 (§3.3.1.1)	The ADS-B system shall satisfy the error budget requirements specified in the table in order to assure satisfaction of ADS-B report accuracies.			For some longer range applications in dense air space, velocity accuracy requirements may not always be met.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.13 (§3.3.3.1.1)	If a smoothing filter or tracker is used in the ADS-B design, the quality of the reports shall be sufficient to provide equivalent track accuracy implied in Table 3-4(a) over the period between the reports, under target centripetal accelerations of up to 0.5g with aircraft velocities of up to 600 knots.	§2.2.8.1 §2.2.8.1.17-20 Appendix K	ADS-B State Vector Report Characteristics (N/S; E/W) Velocity Accuracy as Affected by Report Assembly <i>Shows velocity accuracy is NOT the limiting factor in meeting scenario requirements.</i>	For some longer range applications in dense air space, velocity accuracy requirements may not always be met.
R3.14A R3.14B (§3.3.3.1.2)	For each of the equipage classes included in Table 3-4(a), the mode status reports from at least 95% of the observable (radio line-of-sight) population shall be acquired at the range specified in the “Required 95th Percentile Acquisition Range” row of Table 3-4(b). (10 NM for A0, 20 NM for A1, 40 NM for A2, and 90 NM for A3). Likewise, for each of the equipage classes included in Table 3-4(b), the mode status reports from at least 99% of the observable (radio line of sight) population shall be acquired at the reduced range specified in the “Required 99th Percentile Acquisition Range” row of Table 3-4(b)	Appendix E Appendix L Appendix P	Transmitter and Receiver Power Requirements <i>Calculations are based on 95% probability of receipt of required information for 95% of the equipage class within the required update interval, assuming a 90% ADS-B receiver duty factor.</i> Impact of Radio Frequency Interference on Extended Squitter Report Integrity 1090 System Performance Simulation Results	The 90 NM air-to-air range for class A3 equipment will be met in low density airspace. A planned revision to this MOPS will address techniques for extending the range of the system in high density airspace. See Appendix I
R3.15 (§3.3.3.1.3)	When the ARV report is required as defined in §3.4.6.1, [its] nominal update interval shall be 5 seconds for A1, A2, and A3 equipment at ranges of 10 NM and closer.	§2.2.3.3.1.3 §2.2.3.3.2	Maximum Transmission Rates for Transponder-based Transmitters Transmission Rates for Stand-Alone Transmitters	Due to constraints on the amount of velocity message transmissions from DO-181C, DO-260A only supports transmission of messages supporting ARV reports (velocity messages subtypes 3 & 4) under the condition that ground-referenced data is not available and therefore no velocity messages subtypes 1 or 2 are being broadcast.
R3.16 (§3.3.3.1.3)	When the ARV report is required as defined in §3.4.6.1, [its] nominal update interval shall be 7 seconds for A1, A2, and A3 equipment at ranges greater than 10 NM and less than or equal to 20 NM.	§2.2.3.3.1.3 §2.2.3.3.2	Maximum Transmission Rates for Transponder-based Transmitters Transmission Rates for Stand-Alone Transmitters	See note for requirement R3.15.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.17 (§3.3.3.1.3)	When the ARV report is required as defined in §3.4.6.1, [its] nominal update interval shall be 12 seconds for A2 equipment at ranges greater than 20 NM and less than or equal to 40 NM.	§2.2.3.3.1.3 §2.2.3.3.2	Maximum Transmission Rates for Transponder-based Transmitters Transmission Rates for Stand-Alone Transmitters	See note for requirement R3.15.
R3.18 (§3.3.3.1.3)	When the ARV report is required as defined in §3.4.6.1, [its] nominal update interval shall be 12 seconds for A3 equipment at ranges greater than 40 NM and less than or equal to 90 NM.	§2.2.3.3.1.3 §2.2.3.3.2	Maximum Transmission Rates for Transponder-based Transmitters Transmission Rates for Stand-Alone Transmitters	See note for requirement R3.15.
R3.19 (§3.3.3.1.3)	When the ARV report is required as defined in section 3.4.6.1, its acquisition range in the forward direction shall be: a. 20 NM for equipage class A1, b. 40 NM for equipage class A2, c. 90 NM for equipage class A3.	Appendix E Appendix L Appendix P	Transmitter and Receiver Power Requirements <i>Calculations are based on 95% probability of receipt of required information for 95% of the equipage class within the required update interval, assuming a 90% ADS-B receiver duty factor.</i> Impact of Radio Frequency Interference on Extended Squitter Report Integrity 1090 System Performance Simulation Results	See note for requirement R3.15.
R3.20 (§3.3.3.1.3)	The acquisition range requirements [for ARV reports] in directions other than forward shall be consistent with those stated in Note3 of Table 3-4(a).	Appendix E Appendix L Appendix P	Transmitter and Receiver Power Requirements <i>Calculations are based on 95% probability of receipt of required information for 95% of the equipage class within the required update interval, assuming a 90% ADS-B receiver duty factor.</i> Impact of Radio Frequency Interference on Extended Squitter Report Integrity 1090 System Performance Simulation Results	See note for requirement R3.15.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.21 (§3.3.3.1.4)	When there has been no change in intent information, the nominal update period for A2 equipage at ranges within 40 NM and for A3 equipage at ranges in the forward direction within 90 NM shall be T_U such that $T_U = \max[12s, 0.45 s/NM * R]$ where R is the range to the broadcasting aircraft and T_U is rounded to the nearest whole number of seconds. If implemented, these requirements are applicable to TS Report update rates for A1 equipage for ranges of 20 NM or less.	Table 2-3 Appendix E Appendix P	ADS-B Class A Transmitter Equipment To Message Coverage Transmitter and Receiver Power Requirements 1090 System Performance Simulation Results	See note for requirement R3.15
R3.22 (§3.3.3.1.4)	If the TS report is implemented in ADS-B systems of equipage class A1, such systems shall have a 20NM acquisition range for TS Report.	Table 2-3 Appendix E Appendix P	ADS-B Class A Transmitter Equipment To Message Coverage Transmitter and Receiver Power Requirements 1090 System Performance Simulation Results	
R3.23 (§3.3.3.1.4)	For equipage class A2, the acquisition range for TS reports and TC reports shall be 40 NM, with 50 NM desired.	Table 2-3 Appendix E Appendix P	ADS-B Class A Transmitter Equipment To Message Coverage Transmitter and Receiver Power Requirements 1090 System Performance Simulation Results	
R3.24 (§3.3.3.1.4)	For equipage class A3, the acquisition range for TC reports in the forward direction shall be 90 NM, with 120 NM desired.	Table 2-3 Appendix E Appendix P	ADS-B Class A Transmitter Equipment To Message Coverage Transmitter and Receiver Power Requirements 1090 System Performance Simulation Results	
R3.25 (§3.3.3.1.4)	The range requirements in all other directions for A3 equipage shall be consistent with those stated in Note 3 of Table 3-4(a).			<<Do we address any of these cases in the MOPS??>>

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.26 (§3.3.3.2.2)	If NAC _p is less than 10 and NIC is less than 9, then ADS-B latency of the reported information shall be less than 1.2 seconds with 95 percent confidence.	e.g., §2.2.10.3.1.1	Latency, Report Assembly Acquisition State – Airborne Participant <i>Deliver the new State Vector Report for the given Airborne Participant to the Report Output Storage Buffer within 500 milliseconds of receipt of the Airborne Velocity Information Message</i>	<<2.2.5.3 only discusses NAC _p ≤ or > 8. This is not a copy over from DO-260, which had NUCP ≤ or > 7. Does this need to be changed, or am I looking at the wrong MOPS requirement??>>
R3.27 (§3.3.3.2.2)	If either NAC _p ≥ 10 or NIC ≥ 9, then ADS-B latency shall be less than 0.4 seconds with 95% confidence.	§2.2.5.2	ADS-B Transmission Device Message Latency	Report Delivery Time can involve a ADS-B latency of 700 milliseconds. Estimation of both position and velocity in the ADS-B receiving subsystem will meet this requirement.
R3.28 (§3.3.3.2.2)	The standard deviation of the report time error shall be less than 0.5 s (1 sigma).	e.g., §2.2.10.3.1.1	Latency, Report Assembly Acquisition State – Airborne Participant <i>Deliver the new State Vector Report for the given Airborne Participant to the Report Output Storage Buffer within 500 milliseconds of receipt of the Airborne Velocity Information Message</i>	<<Same comment as above, and question if the carry-over comment here from DO-260 still applies.>>
R3.29 (§3.3.3.2.2)	The mean report time error for position shall not exceed 0.5 s.	§2.2.5.2	ADS-B Transmission Device Message Latency	
		§2.2.10.3.1.1	Latency, Report Assembly Acquisition State- Airborne Participant <i>Deliver report within 500 milliseconds</i> Receiving Installation Time Processing Airborne Latitude Position Extrapolation / Estimation Case (non-precision) Airborne Longitude Position Extrapolation / Estimation Case (non-precision)	
		§2.2.8.4	Receiving Installation Time Processing	Transmission delays, report assembly and delivery delays all contribute to report time errors.
		§2.2.3.2.3.7.3	Airborne Latitude Position Extrapolation / Estimation Case (non-precision)	
		§2.2.3.2.3.8.3	Airborne Longitude Position Extrapolation / Estimation Case (non-precision)	
		§2.2.10.3.1.1	Latency, Report Assembly Acquisition State- Airborne Participant <i>Deliver report within 500 milliseconds</i> Receiving Installation Time Processing Airborne Latitude Position Extrapolation / Estimation Case (non-precision) Airborne Longitude Position Extrapolation / Estimation Case (non-precision) Position Time of Applicability	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.30 (§3.3.2.2)	The mean report time error for velocity shall not exceed 1.5 s.	§2.2.5.2.4 §2.2.5.2.5 §2.2.8.1.4.3 §2.2.8.4 e.g., §2.2.10.4.1.2 (b)	Airborne Velocity- Subtype "1" Message Latency Airborne Velocity -Subtype "2" Message Latency Velocity Time of Applicability Receiving Installation Time Report Assembly Track State Maintenance-Airborne Participant <i>Deliver report within 500 milliseconds</i>	
R3.31 (§3.3.4)	The ADS-B system shall be capable of meeting the requirements of this document, unless otherwise explicitly noted for a given requirement, in the traffic density shown by the LA 2020 curves in Figure 3-8, and as further detailed in Table 3-5.	Appendix E Appendix P	Transmitter and Receiver Power Requirements <i>In a high interference environment as measured at L.A. in June of 1999 (approximately 175 aircraft within 75 NM), the techniques required in this document yield 95th percentile ranges of 40 to 57 NM for Class A3.</i> 1090 System Performance Simulation Results	The 90 NM air-to-air range for class A3 equipment will be met in low density airspace. A planned revision to this MOPS will address techniques for extending the range of the system in high density airspace. See Appendix I.
R3.32 (§3.3.4)	Requirements specified for en route, Low Density air space shall be met in the traffic density shown by the Low Density curve in Figure 3-8.	Appendix E Appendix P	Transmitter and Receiver Power Requirements 1090 System Performance Simulation Results	
R3.33 (§3.3.5)	The ADS-B medium shall be suitable for all-weather operation, and ADS-B system performance will be specified relative to a defined interference environment for the medium.	2.2.2.2.1	Transmission Frequency	
R3.34 (§3.3.5)	Radio frequencies used for ADS-B Message transmission shall operate in an internationally allocated aeronautical radio navigation band(s).	§2.2.2.2.1	Transmission Frequency	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.35 (\$3.3.6.3)	ADS-B availability shall be 0.9995 for class A0 through class A3 and class B0 through class B3 transmission subsystems.	§1.8 §2.1.9	MASPS Compliance Design Assurance <<Do we need §1.8?? These three items can be handled in the comment column of this matrix. I recommend deleting this section. >>	Avionics subsystem availability is treated at the aircraft level in certification activities. ADS-B transmission subsystem availability is assessed at the aircraft installed system level, using a failure mode and effects analysis. Current manufacturing practices will yield a “box-level” MTBF consistent with this requirement in implementations not employing redundancy.
R3.36 (\$3.3.6.3)	ADS-B availability shall be 0.95 for class A0 receiver subsystems.	§1.8 §2.1.9	MASPS Compliance Design Assurance	Avionics subsystem availability is treated at the aircraft level in certification activities. ADS-B transmission subsystem availability is assessed at the aircraft installed system level, using a failure mode and effects analysis. Current manufacturing practices will yield a “box-level” MTBF consistent with this requirement in implementations not employing redundancy.
R3.37 (\$3.3.6.3)	Class A1, A2, and A3 receiver subsystems shall have an availability of 0.9995.	§1.8 §2.1.9	MASPS Compliance Design Assurance	Avionics subsystem availability is treated at the aircraft level in certification activities. ADS-B transmission subsystem availability is assessed at the aircraft installed system level, using a failure mode and effects analysis. Current manufacturing practices will yield a “box-level” MTBF consistent with this requirement in implementations not employing redundancy.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.38 (§3.3.6.4)	The probability that the ADS-B System, for a given ADS-B Message Generation Function and in-range ADS-B Report Generation Processing Function, is unavailable during an operation, presuming that the System was available at the start of the operation, shall be no more than 2×10^{-7} per hour of flight.	§2.2.14.1.1.3 §2.2.14.2.1.3 §2.1.9	Processing Efficiency (message generation function) Processing Efficiency (report assembly function) Design Assurance	Avionics subsystem continuity is treated at the aircraft level in certification activities. ADS-B subsystem continuity is assessed at the aircraft installed system level, using a failure mode and effects analysis. Current manufacturing practices will yield a “box-level” MTBF consistent with this requirement in implementations not employing redundancy. 1090 MHz link established to be 10^{-7} without acknowledgement, based on message length and error correction. (ref. DO-181; 24 parity check bits used for error detection, supports undetected error rate owing to data link (per ADS-B message) of better than 1 in 10^7 .) This integrity requirement is not likely to be met with single-string equipage. Avionics integrity is treated at the aircraft level in certification activities.
R3.39 (§3.3.6.5)	The integrity of the ADS-B system shall be 10^{-6} or better on a per report basis.	§1.2.3 §2.1.9	ADS-B Avionics Integrity Design Assurance	
R3.40 (§3.4.2)	The messages shall be correlated, collated, uncompressed, re-partitioned, or otherwise manipulated as necessary to form the output reports specifically defined in 3.4.3 to 3.4.8 below.	§2.2.6 §2.2.9.1 §2.2.10.3 §2.2.10.4	ADS-B Receiving Device Message Processor Characteristics ADS-B Receiver Reporting Requirements for Class A Equipage Report Assembly Acquisition State (Airborne and Surface Participants) Report Assembly Track State (Airborne and Surface Participants)	
R3.41 (§3.4.2)	The message and report assembly processing capability of the receiving subsystem shall support the total population of the participants within detection range provided by the specific data link technology.	§2.2.10.5	Minimum Number of Participant Track Files (e.g. A3=400)	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.42 (§3.4.2)	Receiving subsystem designs must provide reports based on all decodable messages received, i.e., 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, its component information is received from that participant with the exception that no type of report is required to be issued at a rate of greater than once per second.	§2.2.10 §2.2.10.4.1.2	ADS-B Receiver Report Assembly and Delivery Report Assembly Track State Maintenance-Airborne Participant	
R3.43 (§3.4.2)	The applicable report shall be made available to the applications on a continual basis in accordance with the local system interface requirements.	§2.2.10	ADS-B Receiver Report Assembly and Delivery	
R3.44 (§3.4.2)	If the ADS-B uses the ICAO 24-bit address then there shall be agreement between the address currently being used by the Mode-S transponder and the reported ADS-B address, for aircraft with both transponder and ADS-B.	§2.2.5.1.1.1 §2.2.5.1.1.3 §2.2.3.2.1.5 §2.2.11.3	ICAO 24-Bit Discrete Address Address Qualifier “AA” Address Field, Announced Address Verification	
R3.45 (§3.4.3.1.1)	If a transmitting ADS-B participant is not equipped with a means, such as a weight on wheels switch, to determine whether it is airborne or on the surface, and that participant’s emitter category is one of the following, then it shall set its air/ground state to “known to be airborne”: a. Light Aircraft b. Glider or Sailplane c. Lighter than Air d. Unmanned aerial vehicle e. Ultralight, Hang Glider, or Paraglider f. Parachutist g. Point Obstacle h. Cluster obstacle i. Line Obstacle	§2.2.3.2.1.2(c) Table 2-9A	“CA” Capability Field: Air/Ground Broadcast Format Selection Determination of Surface Position Message Broadcast (when there is no means to automatically determine vertical status)	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.46 (§3.4.3.1.1)	If a transmitting ADS-B participant is not equipped with a means, such as a weight on wheels switch, to determine whether it is airborne or on the surface, and that participant's emitter category is one of the following, then it shall set its air/ground state to "known to be on the surface": a.Surface Vehicle – Emergency b.Surface Vehicle - Service	§2.2.3.2.1.2(c) Table 2-9A	"CA" Capability Field: Air/Ground Broadcast Format Selection Determination of Surface Position Message Broadcast (when there is no means to automatically determine vertical status)	
R3.47 (§3.4.3.1.1)	If a transmitting ADS-B participant is <u>not</u> equipped with a means, such as a weight on wheels switch, to determine whether it is airborne or on the surface, and that participant's emitter category is "rotorcraft," then that participant shall set its air/ground state to "uncertain whether airborne or on the surface."	§2.2.3.2.1.2(c) Table 2-9A	"CA" Capability Field: Air/Ground Broadcast Format Selection Determination of Surface Position Message Broadcast (when there is no means to automatically determine vertical status)	UAT equipment on rotorcraft will, in the absence of an automated means to determine Airborne/On-Ground condition, report the AIRBORNE Condition.
R3.48A (§3.4.3.1.1)	If a transmitting ADS-B participant is not equipped with a means, such as a weight on wheels switch, to determine whether it is airborne or on the surface, and that participant's emitter category is not one of those listed above, then that participant's ground speed (GS), airspeed (AS) and radio height (RH) shall be examined, provided that some or all of those parameters are available to the transmitting ADS-B subsystem.	§2.2.3.2.1.2(c) Table 2-9A	"CA" Capability Field: Air/Ground Broadcast Format Selection Determination of Surface Position Message Broadcast (when there is no means to automatically determine vertical status)	
R3.48B (§3.4.3.1.1)	If GS < 100 knots, or AS < 100 knots, or RH < 100 feet, then the transmitting ADS-B participant shall set its Air/Ground state to "known to be on the surface".	§2.2.3.2.1.2(c) Table 2-9A	"CA" Capability Field: Air/Ground Broadcast Format Selection Determination of Surface Position Message Broadcast (when there is no means to automatically determine vertical status)	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.49 (\$3.4.3.1.1)	If a transmitting ADS-B participant is equipped with a means, such as a weight on wheels switch, to determine automatically whether it is airborne or on the surface, and that automatic means indicates that the participant is airborne, then that participant shall set its air/ground state to “known to be airborne”.	§2.2.3.2.1.2(c) Table 2-9A	“CA” Capability Field: Air/Ground Broadcast Format Selection Determination of Surface Position Message Broadcast (when there is no means to automatically determine vertical status)	
R3.50 R3.51-A R3.51-B (\$3.4.3.1.1)	If a transmitting ADS-B participant is equipped with a means, such as a weight on wheels switch, to determine automatically whether it is airborne or on the surface, and that automatic means indicates that the participant is on the surface, then the following additional tests shall be performed to validate the “on the surface” condition:.... a.... then the participant shall set the its Air/Ground state to “known to be airborne” b Otherwise the participant shall set the its Air/Ground state to “known to be on the surface”	§2.2.3.2.1.2(d) Table 2-9B	“CA” Capability Field: Validation of Ground Status Validation of “On-Ground” Status	
R3.52 (\$3.4.3.1.2)	ADS-B participants that are known to be on the surface shall transmit those State Vector report elements that are indicated with bullets (“•”) in the “required from surface participants” column of Table 3-6.	§2.2.3.2.1.2(c) §2.2.3.2.4	“CA” Capability Field: Air/Ground Broadcast Format Selection Surface Position Message	
R3.53 (\$3.4.3.1.2)	ADS-B participants that are known to be airborne shall transmit those State Vector report elements that are indicated with bullets (“•”) in the “required from airborne participants” column of Table 3-6.	§2.2.3.2.1.2(c) §2.2.3.2.3 §2.2.3.2.6	“CA” Capability Field: Air/Ground Broadcast Format Selection Airborne Position message Airborne Velocity Message	
R3.54 (\$3.4.3.1.2)	ADS-B participants for which the air/ground state is uncertain shall transmit those State Vector report elements that are indicated with bullets (“•”) in the “required from airborne participants” column [of Table 3-6].	§2.2.3.2.1.2(c) Table 2-9A	“CA” Capability Field: Air/Ground Broadcast Format Selection Determination of Surface Position Message Broadcast (when there is no means to automatically determine vertical status)	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.55 (§3.4.3.2)	A receiving ADS-B subsystem shall update the SV report that it provides to user applications about a transmitting ADS-B participant whenever it receives messages from that participant providing updated information about any of the SV report elements with the exception that SV reports are not required to be issued at a rate of greater than once per second.	§2.2.8.1.7 §2.2.8.1.12 §2.2.8.1.14 §2.2.8.1.15 §2.2.8.1.17 §2.2.8.1.18 §2.2.8.1.19 §2.2.8.1.20 Appendix K	Altitude, Geometric (WGS-84) Altitude, Barometric (Pressure Altitude) Vertical Rate, Geometric (WGS-84) Altitude Rate, Barometric Estimated Latitude (WGS-84) Estimated Longitude (WGS-84) Estimated North/South Velocity Estimated East/West velocity Velocity Accuracy As Affected By Report Assembly	Position is required to be estimated. Horizontal velocity estimation is optional, with requirements and test procedures provided should the option be exercised. This MOPS does not require estimation of altitude or altitude rate.
R3.56 (§3.4.3.2)	For ADS-B systems that use segmented messages for SV data, <i>time-critical SV report elements</i> that are not updated in the current received message shall be estimated whenever the SV report is updated.	§2.2.8.1.7 §2.2.8.1.12 §2.2.8.1.14 §2.2.8.1.15 §2.2.8.1.17 §2.2.8.1.18 §2.2.8.1.19 §2.2.8.1.20 Appendix K	Altitude, Geometric (WGS-84) Altitude, Barometric (Pressure Altitude) Vertical Rate, Geometric (WGS-84) Altitude Rate, Barometric Estimated Latitude (WGS-84) Estimated Longitude (WGS-84) Estimated North/South Velocity Estimated East/West velocity Velocity Accuracy As Affected By Report Assembly	Position is required to be estimated. Horizontal velocity estimation is optional, with requirements and test procedures provided should the option be exercised. This MOPS does not require estimation of altitude or altitude rate.
R3.57 (§3.4.3.2)	For time-critical elements of the SV report, a receiving ADS-B subsystem's report assembly function shall indicate "no data available" if no data are received in the preceding coast interval specified in Table 3-4(a) (§3.3.3.1.1).	§2.2.8.1.1.2 §2.2.8.1.4 §2.2.10.3.1(d)	State Vector Report Validity Flags State Vector Report Time of Applicability Reports retained in output buffer for 100 +/- 5 seconds	Assured by the Time of Applicability of the report.
R3.58 (§3.4.3.3)	The Time of Applicability (TOA) relative to local system time shall be updated with each State Vector report update.	§2.2.8.1.4	Report Time of Applicability	
R3.59 (§3.4.3.4)	Horizontal position (§2.1.2.4) shall be reported as WGS-84 latitude and longitude.	§2.2.8.1.5 §2.2.8.1.6	Latitude (WGS-84) Longitude (WGS-84)	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.60 (§3.4.3.4)	Horizontal position (§2.1.2.4) shall be reported with the full range of possible latitudes (-90to +90) and longitudes (-180 to +180).	§2.2.8.1.5 §2.2.8.1.6 Table 2.2.8.1	Latitude (WGS-84) Longitude (WGS-84) ADS-B State Vector Data Elements	1. <<Should we have angular weighted binary table similar to UAT?? 2. Should we move figure in Appendix B into body?? 3. Table 2.2.8.1 indicates legal ranges for latitude as ±180. Should this be ±90? 4. Also, we should have legal ranges specified in subsections of §2.2.3.2.3 'Airborne Position Messages,>>
R3.61 (§3.4.3.4)	Horizontal position shall be communicated and reported with a resolution sufficiently fine that it does not compromise the accuracy reported in the NAC _P field of the Mode-Status report (§2.1.2.13 and §3.4.4).	§2.2.8.1.5 §2.2.8.1.6 Table 2.2.8.1 §2.2.3.2.7.2.7 §2.2.3.2.7.1.3.11	Latitude (WGS-84) Longitude (WGS-84) ADS-B State Vector Data Elements NAC _P Subfield in Aircraft Operational Status Message NAC _P Subfield in Target State and Status Message	<<What is L.SB of Lat & Lon?? That value should be cited here. (This would be readily apparent to reader if we had table requested in above row!!)>>
R3.62 (§3.4.3.4)	Moreover, horizontal position shall be communicated and reported with a resolution sufficiently fine that it does not compromise the one-sigma maximum ADS-B contribution to horizontal position error, listed in Table 3-4(a): 20 meters for airborne participants or 2.5 meters for surface participants.	Table 2.2.8.1 §2.2.3.2.7.2.7 §2.2.3.2.7.1.3.11	ADS-B State Vector Data Elements NAC _P Subfield in Aircraft Operational Status Message NAC _P Subfield in Target State and Status Message	
R3.63A R3.63B (§3.4.3.5)	The Horizontal Position Valid field in the SV report shall be set to ONE if a valid horizontal position is being provided in geometric position (latitude and longitude) fields of that report; otherwise, the Horizontal Position Valid field shall be ZERO.	§2.2.8.1.5 §2.2.8.1.6 §2.2.8.1.1.2 Table 2.2.8.1.1.2	Latitude (WGS-84) Longitude (WGS-84) State Vector Report Validity Flags ADS-B State Vector Report Validity Flag Requirements	
R3.64 (§3.4.3.6)	Geometric altitude shall be reported with a range from -1000 feet up to +100,000 feet.	§2.2.8.1.7 Table 2.2.8.1	Altitude, Geometric (WGS-84) ADS-B State Vector Data Elements	Maximum range is ±131,071.984375 feet

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.65 (§3.4.3.6)	If the NAC _P code reported in the MS report is 9 or greater, geometric altitude shall be communicated and reported with a resolution sufficiently fine that it does not compromise the vertical accuracy reported in the NAC _P field.	§2.2.8.1.7 Table 2.2.8.1 §2.2.3.2.7.2.7 §2.2.3.2.7.1.3.11	Altitude, Geometric (WGS-84) ADS-B State Vector Data Elements NAC _P Subfield in Aircraft Operational Status Message NAC _P Subfield in Target State and Status Message	<<<I don't believe we address the part of this requirement as to when geometric altitude must be broadcast in relation to NAC _P >>> LSB = 0.015625 assures sufficient resolution.
R3.66 (§3.4.3.6)	Geometric Altitude shall be communicated and reported with a resolution sufficiently fine that it does not compromise the one-sigma maximum ADS-B contribution to vertical position error, listed in Table 3-4(a): =30 feet for airborne participants.	§2.2.8.1.7 Table 2.2.8.1	Altitude, Geometric (WGS-84) ADS-B State Vector Data Elements	LSB = 0.015625 assures sufficient resolution.
R3.67 (§3.4.3.7)	The Geometric Altitude Valid field in the SV report is a one-bit field that shall be ONE if valid data is being provided in the Geometric Altitude field (§3.4.3.6), or ZERO otherwise.	§2.2.8.1.7 §2.2.8.1.1.2 Table 2.2.8.1.1.2	Altitude, Geometric (WGS-84) State Vector Report Validity Flags ADS-B State Vector Report Validity Flag Requirements	
R3.68 (§3.4.3.8)	The range of reported velocity shall accommodate speeds up to 250 knots for surface participants and up to 4000 knots for airborne participants.	§2.2.8.1.8 §2.2.8.1.9 Table 2.2.8.1	North / South Velocity East / West Velocity ADS-B State Vector Data Elements	Maximum range is ±4,095.875 knots
R3.69 (§3.4.3.8)	Horizontal velocity shall be communicated and reported with a resolution sufficiently fine that it does not compromise the accuracy reported in the NAC _V field of the Mode-Status report.	§2.2.8.1.8 §2.2.8.1.9 Table 2.2.8.1 §2.2.3.2.6.1.5 §2.2.3.2.6.4.5	North / South Velocity East / West Velocity ADS-B State Vector Data Elements NAC _V Subfield in Aircraft Velocity – Subtype “1” Messages NAC _V Subfield in Aircraft Velocity – Subtype “4” Messages	LSB = 0.125 assures sufficient resolution.
R3.70 (§3.4.3.8)	Horizontal velocity shall be communicated and reported with a resolution sufficiently fine that it does not compromise the one-sigma maximum ADS-B contribution to the horizontal velocity error, listed in Table 3-4(a): that is, 0.5 m/s (about 1 knot) for airborne participants with speeds of 600 knots or less, or 0.25 m/s (about 0.5 knot) for surface participants.	§2.2.8.1.8 §2.2.8.1.9 Table 2.2.8.1	North / South Velocity East / West Velocity ADS-B State Vector Data Elements	LSB = 0.125 assures sufficient resolution.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.71A R3.71B (§3.4.3.9)	The Airborne Horizontal Velocity Valid field in the SV report shall be set to ONE if a valid horizontal velocity is being provided in the “North Velocity while airborne” and “East velocity while airborne” fields of the SV report; otherwise, the Horizontal Velocity Valid field shall be ZERO.	§2.2.8.1.8 §2.2.8.1.9 §2.2.8.1.1.2 Table 2.2.8.1.1.2	North / South Velocity East / West Velocity State Vector Report Validity Flags ADS-B State Vector Report Validity Flag Requirements	
R3.72 (§3.4.3.10)	The ground speed (the magnitude of the geometric horizontal velocity) of an A/V that is known to be on the surface shall be reported in the “ground speed while on the surface” field of the SV report.	§2.2.8.1.10 §2.2.3.2.4.2 Table 2-13	Ground Speed While on the Surface “Movement” Subfield in ADS-B Surface Position Messages “Movement” Subfield Code Definitions	
R3.73 (§3.4.3.10)	For A/Vs moving at ground speeds less than 70 knots, the ground speed shall be communicated and reported with a resolution of 1 knot or finer.	Table 2-13	“Movement” Subfield Code Definitions	
R3.74 (§3.4.3.10)	The resolution with which the “ground speed while on the surface” field is communicated and reported shall be sufficiently fine so as not to compromise the accuracy of that speed as communicated in the NACv field of the MS report (§2.1.2.14).	Table 2-13 §2.2.3.2.6.1.5 . . §2.2.3.2.6.4.5	“Movement” Subfield Code Definitions NACv Subfield in Aircraft Velocity – Subtype “1” Messages . . NACv Subfield in Aircraft Velocity – Subtype “4” Messages	
R3.75 (§3.4.3.11)	The Surface Ground Speed Valid field in the SV report is a one-bit field which shall be ONE if valid data is available in the “Ground Speed While on the Surface” field (§3.4.3.10) or ZERO otherwise.	§2.2.8.1.10 §2.2.8.1.1.2 Table 2.2.8.1.1.2	Surface ground Speed State Vector Report Validity Flags ADS-B State Vector Report Validity Flag Requirements	
R3.76 (§3.4.3.12)	Each ADS-B participant that reports a length code of 1 or greater shall transmit messages to support the heading element of the SV report when that participant is on the surface and has a source of heading available to its ADS-B transmitting subsystem.	§2.2.3.2.1.2(c) §2.2.3.2.4 §2.2.8.1.11	“CA” Capability Field: Air/Ground Broadcast Format Selection Surface Position Message Heading While On Surface	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	Compliance / Notes
R3.77A R3.77B (§3.4.3.12)	Heading shall be reported for the full range of possible headings (the full circle from 0 to nearly 360°). The heading of surface participants shall be communicated and reported with a resolution of 6 degrees of arc or finer.	§2.2.8.1.11 §2.2.3.2.4.4 Table 2-15	Heading While On Surface “Heading / Ground Track” Subfield in ADS-B Surface Position Messages “Heading / Ground Track” Encoding	LSB = 1.40625 degrees assures sufficient resolution
R3.78A R3.78B (§3.4.3.13)	The heading valid field in the SV report shall be a ONE if valid heading is provided in the “ heading while on the surface” field of the SV report; otherwise it shall be ZERO.	§2.2.8.1.1.2 Table 2.2.8.1.1.2	State Vector Report Validity Flags ADS-B State Vector Report Validity Flag Requirements	
R3.79 (§3.4.3.14)	Barometric pressure altitude shall be reported referenced to standard temperature and pressure (1013.25 hPa or mB, or 29.92 In Hg).	§2.2.3.2.3.4.1	Barometric Altitude” in ADS-B Airborne Position Messages	
R3.80 (§3.4.3.14)	Barometric pressure altitude shall be reported over the range of -1000 feet to +100,000 feet.	§2.2.8.1.12 Table 2.2.8.1	Altitude, Barometric (Pressure Altitude) ADS-B State Vector Data Elements	Maximum range is ±131,071.984375 feet
R3.81A R3.81B (§3.4.3.14)	If a pressure altitude source with 26-foot or better resolution is available to the ADS-B transmitting subsystem, then pressure altitude from that source shall be communicated and reported with 25-foot or finer resolution. Otherwise, if a pressure altitude source with 100 foot or better resolution is available, pressure altitude from that source shall be communicated and reported with 100-foot or finer resolution.			<<Do we have language for this requirement??>>
R3.82A R3.82B (§3.4.3.15)	The pressure altitude valid field in the SV report is a one-bit field that shall be ONE if valid information is provided in the pressure altitude field otherwise the pressure altitude valid field shall be ZERO.	§2.2.8.1.12 §2.2.8.1.1.2 Table 2.2.8.1.1.2	Altitude, Barometric (Pressure Altitude) State Vector Report Validity Flags ADS-B State Vector Report Validity Flag Requirements	
R3.83 (§3.4.3.16)	This (vertical rate field) shall be either the rate of change of pressure altitude or of geometric altitude, as specified by the “vertical rate type” element in the MS report.	§2.2.8.2.18 Table 2.2.8.2	Vertical Rate Type ADS-B Mode Status Data Elements	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.84 (§3.4.3.16)	The range of reported vertical rate shall accommodate up to +/- 32,000 ft/min for airborne participants.	Table 2-28 Table 2-29	“Sign Bit for Vertical Rate” Encoding “Vertical Rate” Encoding	
R3.85 (§3.4.3.16)	Geometric vertical rate shall be communicated and reported with a resolution sufficiently fine that it does not compromise the accuracy reported in the NAC _V field of the Mode-Status report.	Table 2-29 §2.2.3.2.6.1.5 . . §2.2.3.2.6.4.5	“Vertical Rate” Encoding NAC _V Subfield in Aircraft Velocity – Subtype “1” Messages . . NAC _V Subfield in Aircraft Velocity – Subtype “4” Messages	
R3.86 (§3.4.3.16)	Vertical Rate shall be communicated and reported with a resolution sufficiently fine that it does not compromise the one-sigma maximum ADS-B contribution to vertical rate error, listed in Table 3-4(a); that is 1.0 ft/s for airborne participants.	§2.2.3.2.6.1.12 . . §2.2.3.2.6.4.12 Table 2.2.8.1	“Vertical Rate” Subfield Airborne Velocity Subtype “1” Messages . . “Vertical Rate” Subfield Airborne Velocity Subtype “4” Messages ADS-B State Vector Elements	
R3.87A R3.87B (§3.4.3.17)	The “vertical rate valid” field in the SV report is a one-bit field that shall be ONE if valid information is provided in the vertical rate field; otherwise the “vertical rate valid” field shall be ZERO.	§2.2.8.1.1.2 Table 2.2.8.1.1.2	State Vector Report Validity Flags ADS-B State Vector Report Validity Flag Requirements	
R3.88 (§3.4.3.18)	The NIC field in the SV report is a 4-bit field that shall report the Navigation Integrity Category described in Table 2-2 in §2.1.2.12.	§2.2.8.1.16 Table 2.2.8.1.16	Navigation Integrity Category (NIC) NIC Encoding	
R3.89 (§3.4.4)	For each participant the Mode-Status report shall be updated and made available to ADS-B applications any time a new message containing all, or a portion of its component information is accepted from a participant.	§2.2.10.4 §2.2.10.4.1.1(e) §2.2.10.4.1.2(d)	Report Assembly Track State Report Assembly Track State Initialization - Airborne Participant <i>Initiate Assembly of Mode Status Reports</i> Report Assembly Track State Maintenance - Airborne Participant <i>Update MS Report whenever appropriate messages received</i>	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.90A R3.90B (\$3.4.4.1)	The report assembly function shall provide [MS Report] updates when received. For those elements indicated in Table 3-8 as “elements that require rapid update”, the report assembly function shall indicate the data has not been refreshed with the Mode Status Data A available bit (§3.4.4.7) if no update is received in the preceding 24 second period.	§2.2.8.2.1.2 Table 2.2.8.2.1.2 §2.2.8.2.4 §2.2.10.4.1.1(e4) §2.2.10.4.1.2(d3)	Mode Status Report Validity Flags ADS-B Mode Status Report Validity Flag Requirements Report Time of Applicability <i>Reports retained in output buffer for 100+/- 5 seconds</i>	
R3.91 (\$3.4.4.2)	The time of applicability relative to local system time shall be updated with every Mode-Status report update.	§2.2.8.2.4 §2.2.10.4.1.1(e3) §2.2.10.4.1.2(d2)	Report Time of Applicability <i>Deliver Report within 500 milliseconds of message receipt</i>	
R3.92 (\$3.4.4.3)	The ADS-B Version Number shall be defined as specified in Table 3-9.	§2.2.8.2.5 Table 2.2.3.2.7.2.5	Version Number “Version Number” Subfield Encoding	Version Number relates to the MOPS, not ADS-B MASPS. Applications can map link MOPS versions to appropriate MASPS version.
R3.93 (\$3.4.4.4)	The Call Sign shall consist of up to 8 alphanumeric characters.	§2.2.8.2.6 §2.2.3.2.5.3	Call Sign “Character” Subfield in ADS-B Aircraft Identification and Type Message	
R3.94 (\$3.4.4.4)	The characters of the Call Sign shall consist of the capital letters A-Z, the decimal digits 0-9, and, as trailing pad characters only, the “space” character.	§2.2.8.2.6 §2.2.3.2.5.3 A.1.4.4	Call Sign “Character” Subfield in ADS-B Aircraft Identification and Type Message Aircraft Identification Coding	
R3.95 (\$3.4.4.5)	Provision in the [Emitter Category] encoding shall be made for at least 24 distinct emitter categories, including the particular categories listed in §2.1.2.2.3.	§2.2.8.2.7 §2.2.3.2.5.2	Emitter Category “ADS-B Emitter Category” Subfield in ADS-B Aircraft Identification and Type Message	
R3.96 (\$3.4.4.6)	The aircraft length and width codes shall be as described in Table 3-10.	§2.2.8.2.8 Table 2.2.3.2.7.2.11	A/V Length and Width Codes “A/V Length and Width Code” Encoding	
R3.97 (\$3.4.4.6)	Each aircraft shall be assigned the smallest length and width codes for which its overall length and wingspan qualify it.	N/A		Installation certification issue
R3.98 (\$3.4.4.6)	Each aircraft ADS-B participant for which the length code is 1 or more (length greater than 25 meters or wingspan greater than 34 m) shall transmit its aircraft size code while it is known to be on the surface.	§2.2.3.2.7.2.11	“A/V Length and Width Code” Subfield in Aircraft Operational Status Messages	Installation certification issue; MOPS supports.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.99 (§3.4.4.6)	For this purpose, the determination of when an aircraft is on the surface shall be as described in §3.4.3.1.1 above.	§2.2.3.2.1.2(c) Table 2-9A	”CA” Capability Field: Air/Ground Broadcast Format Selection Determination of Surface Position Message Broadcast (when there is no means to automatically determine vertical status) ”CA” Capability Field: Validation of Ground Status Validation of ”On-Ground” Status	No MOPS requirement for monitoring 24 second refresh of Mode Status Data.
R100A R100B (§3.4.4.7)	The report assembly function shall set this (Mode-Status Available) field to ZERO if no data has been received within 24 seconds under the conditions specified in 3.4.4.1; otherwise, the report assembly function shall set this bit to ONE.	§2.2.9.1	Report Assembly on Receipt of ADS-B Message	<< Text in this row is from UAT. I do not believe we have any conditions in which we invalidate only the Mode Status Report. (If no Position or Velocity Messages received in 25 ± 5 seconds we drop track.) Also, I do not believe we have the ”MS Available” flag in our MS report definition.>>
R3.101 (§3.4.4.8)	The emergency/priority status field in the MS report is a 3-bit field, which shall be encoded as indicated in Table 3-11. Status shall include the following: 1. No emergency / Not reported 2. General emergency 3. Lifeguard/medical 4. Minimum fuel 5. No communications 6. Unlawful interference 7. Downed Aircraft 8. Spare	§2.2.8.2.9	Emergency / Priority Status	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.102A R3.102B R3.102C (\$3.4.4.9.1)	The CC code for "TCAS/ACAS installed and operational" shall be set to ONE if the transmitting aircraft is fitted with a TCAS II or ACAS computer and that computer is turned on and operating in a mode that can generate Resolution Advisory (RA) alerts. Likewise, this CC code shall be set to one if the transmitting ADS-B equipment cannot ascertain whether or not a TCAS II or ACAS computer is installed, or cannot ascertain whether that computer, if installed, is operating in a mode that can generate RA alerts. Otherwise, this CC code shall be ZERO.	§2.2.8.2.10 §2.2.3.2.7.2.3 §2.2.3.2.7.2.3.2 §2.2.3.2.7.1.3.14	Capability Class Codes "Capability Class Codes" Subfield in Aircraft Operational Status Messages "Not-TCAS" CC Code Subfield in Aircraft Operational Status Message "Capability / Mode Codes" Subfield in Target State and Status Message	
R3.103A R3.103B (\$3.4.4.9.2)	The CC code for "CDTI based traffic display capability" shall be set to ONE if the transmitting aircraft has the capability of displaying nearby traffic on a Cockpit Display of Traffic Information (CDTI). Otherwise, this CC code shall be ZERO.	§2.2.8.2.10 §2.2.3.2.7.2.3	Capability Class Codes "Capability Class Codes" Subfield in Aircraft Operational Status Messages "CDTI Traffic Display Capability" CC Code Subfield in Aircraft Operational Status Message	
R3.104 (\$3.4.4.9.3)	At least four bits (sixteen possible encodings) shall be reserved in the capability class codes for the "Service Level" of the transmitting ADS-B participant.	§2.2.8.2.10 §2.2.3.2.7.2.3 §2.2.3.2.7.2.3.1	Capability Class Codes "Capability Class Codes" Subfield in Aircraft Operational Status Messages "Reserved for Service Level" CC Code Subfield in Aircraft Operational Status Message	
R3.105 (\$3.4.4.9.3)	ADS-B equipment conforming to this MASPS (DO-242A) shall set the Service Level code to ZERO.	§2.2.3.2.7.2.3.1	"Reserved for Service Level" CC Code Subfield in Aircraft Operational Status Message	
R3.106 (\$3.4.4.9.4)	The ARV Capability Flag is a one-bit field that shall be encoded as in Table 3-12.	§2.2.8.2.10 §2.2.3.2.7.2.3 Table 2.2.3.2.7.2.3.3	Capability Class Codes "Capability Class Codes" Subfield in Aircraft Operational Status Messages ARV Report Capability Encoding	
R3.107 (\$3.4.4.9.5)	The TS Report Capability Flag is a one-bit field that shall be encoded as in Table 3-13.	§2.2.8.2.10 §2.2.3.2.7.2.3 Table 2.2.3.2.7.2.3.3	Capability Class Codes "Capability Class Codes" Subfield in Aircraft Operational Status Messages TS Report Capability Encoding	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.108 (§3.4.4.9.6)	The TC Report Capability Level is a two-bit field that shall be encoded as in Table 3-14.	§2.2.8.2.10 §2.2.3.2.7.2.3 Table 2.2.3.2.7.2.3.3	Capability Class Codes “Capability Class Codes” Subfield in Aircraft Operational Status Messages TC Report Capability Encoding	
R3.109A R3.109B (§3.4.4.9.7)	The Reporting ADS-B Position Reference Point Flag is a one-bit subfield within the CC subfield that a transmitting ADS-B participant shall set to ONE if the A/V position that it transmits (in messages to support the SV report) is the center of the largest rectangle that (a) contains the entire horizontal extent of the A/V, (b) has length and width equal to largest possible length and width for an aircraft with the same length and width codes as are being reported in MS reports for that A/V, (c) is oriented parallel to the current heading of the A/V. Otherwise, the transmitting ADS-B participant shall set this flag to ZERO.	§2.2.8.2.10 §2.2.3.2.7.2.3 §2.2.3.2.7.2.3.3	Capability Class Codes “Capability Class Codes” Subfield in Aircraft Operational Status Messages “Position Offset Applied” CC Code Subfield in Aircraft Operational Status Message	
R3.110A R3.110B R3.110C (§3.4.4.10.1)	The CC code for “TCAS/ACAS Resolution Advisory Active” shall be set to ONE if the transmitting aircraft has a TCAS II or ACAS computer that is currently issuing a Resolution Advisory (RA). Likewise, this CC code shall be set to ONE if the transmitting ADS-B equipment cannot ascertain whether the TCAS II or ACAS computer is currently issuing an RA. This CC code shall be ZERO only if it is explicitly known that a TCAS II or ACAS computer is not currently issuing a Resolution Advisory (RA).	§2.2.8.2.11 §2.2.3.2.7.2.4 §2.2.3.2.7.2.4.2 §2.2.3.2.7.1.3.14	Mode Status Report Operational Mode “Operational Mode (OM)” Subfield in Aircraft Operational Status Messages “TCAS/ACAS Resolution Advisory Active” OM Code Subfield in Aircraft Operational Status Message “Capability / Mode Codes” Subfield in Target State and Status Message	<<The unknown condition needs to be explicitly linked to a value of ONE in §2.2.3.2.7.2.4.2.>>
R3.111A R3.111B R3.111C (§3.4.4.10.2)	Initially, the IDENT Switch Active” OM code shall be ZERO. Upon activation of the IDENT switch, this flag shall be set to ONE for a period of 20 +/-3 seconds: thereafter, it shall be set to ZERO.	§2.2.8.2.11 §2.2.3.2.7.2.4 §2.2.3.2.7.2.4.3	Mode Status Report Operational Mode “Operational Mode (OM)” Subfield in Aircraft Operational Status Messages “IDENT Switch Active” OM Code Subfield in Aircraft Operational Status Message	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.112 (§3.4.4.10.3)	The "Receiving ATC Services" flag is a one-bit OM code. When set to ONE, this code shall indicate that the transmitting ADS-B participant is receiving ATC services; otherwise this flag should be set to ZERO.	§2.2.8.2.11 §2.2.3.2.7.2.4 §2.2.3.2.7.2.4.4	Mode Status Report Operational Mode "Operational Mode (OM)" Subfield in Aircraft Operational Status Messages "Receiving ATC Services" OM Code Subfield in Aircraft Operational Status Message	
R3.113 (§3.4.4.11)	The NAC _P field in the MS report is a 4-bit field that shall be encoded as described in Table 2-3 in §2.1.2.13.	§2.2.8.2.12 Table 2.2.3.2.7.2.7 §2.2.3.2.7.1.3.11 §2.2.3.2.7.2.7	SV Quality - NAC _P Encoding of NAC _P "NAC _P " Subfield in Target State and Status Message "NAC _P " Subfield in Aircraft Operational Status Message	
R3.114 (§3.4.4.12)	The NAC _V field in the MS report is a 3-bit field that shall be encoded as described in Table 2-4 in §2.1.2.14.	§2.2.8.2.13 Table 2-20 Table 2-21 Table 2-22 §2.2.3.2.6.1.5 · · §2.2.3.2.6.41.5	SV Quality - NAC _V Determining NAC _V if HFOM _R and VFOM _R are provided Determining NAC _V if From a GNSS Receiver Operating in LAAS or WAAS Mode Determining NAC _V When Differential GNSS Corrections Are Not Available "NAC _V " Subfield in Aircraft Velocity - Subtype "1" Messages · · "NAC _V " Subfield in Aircraft Velocity - Subtype "1" Messages	
R3.115 (§3.4.4.13)	The SIL field in the MS report is a 2-bit field that shall be encoded as described in Table 2-5 in §2.1.2.15.	§2.2.8.2.14 Table 2.2.3.2.7.2.9 §2.2.3.2.7.1.3.13 §2.2.3.2.7.2.9	SV Quality - SIL "SIL" Subfield Encoding "SIL" Subfield in Target State and Status Message "SIL" Subfield in Aircraft Operational Status Message	
R3.116 (§3.4.4.14)	In this MASPS (DO-242A), the "Reserved for Barometric Altitude Quality" field shall be set to ZERO.	§2.2.8.2.15 §2.2.3.2.7.2.8	SV Quality - BAQ Reserved "Reserved for Barometric Altitude Quality (BAQ)" Subfield in Aircraft Operational Status Message	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.117A R3.117B (\$3.4.4.15)	A transmitting ADS-B participant shall set NIC _{BARO} to ONE in the message that it sends to support the MS report only if there is more than one source of barometric pressure altitude data and cross-checking of one altitude source against the other is performed so as to clear the “barometric altitude valid” flag in the SV report if the two altitude sources do not agree. Otherwise, it shall set this flag to ZERO.	§2.2.8.2.16 Table 2.2.3.2.7.2.10 §2.2.3.2.7.2.10 §2.2.3.2.7.1.3.12	SV Quality – NIC _{BARO} “NIC _{BARO} ” Subfield Encoding “NIC _{BARO} ” Subfield in Aircraft Operational Status Messages “NIC _{BARO} ” Subfield in Target State and Status Messages	
R3.118 (\$3.4.4.16)	The True/Magnetic Heading Flag in the Mode-Status report is a one-bit field that shall be ZERO to indicate that heading is reported referenced to true north, or ONE to indicate that heading is reported referenced to magnetic north.	§2.2.8.2.17 Table 2.2.3.2.7.2.13 §2.2.3.2.7.2.13	Track / Heading and Horizontal Reference Direction (HRD) “HRD” Encoding “Horizontal Reference Direction (HRD)” Subfield in Aircraft Operational Status Messages	
R3.119 (\$3.4.4.17)	The Primary Vertical Rate Type field in the MS report is a one-bit flag that shall be ZERO to indicate that the vertical rate in the SV report §3.4.3.16 holds the rate of change of barometric pressure altitude, or ONE to indicate that the vertical rate field holds the rate of change of the geometric altitude.	§2.2.8.2.18 Table 2-27 §2.2.3.2.6.1.10 §2.2.3.2.6.4.10	Vertical Rate Type “Source Bit For Vertical Rate” Encoding “Source Bit For Vertical Rate” Subfield in Aircraft Velocity Subtype “1” Messages “Source Bit For Vertical Rate” Subfield in Aircraft Velocity Subtype “4” Messages	
R3.120 (\$3.4.4.18)	In the current version of this MASPS (DO-242A), the “Reserved for Flight Mode Specific Data” field shall be ZERO.			DO-260A does not define this 3-bit field as part of the MS Report on the receive side, however, a value of ZERO can be inferred by applications through the Version Number. <<<There is not sufficient bits reserved in the Aircraft Operational Status Message reserved for future implementation of this field.>>>
R3.121 (\$3.4.6.3)	The time of applicability relative to local system time shall be updated with every Air-Referenced Velocity report update.	§2.2.8.3.2.4	Report Time of Applicability	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.122 (§3.4.6.4)	Reported airspeed ranges shall be 0-4000 knots airborne.	Table 2.2.8.3.2 §2.2.8.3.2.5 Table 2-38 Table 2-40	ADS-B Air Referenced Velocity Data Elements Airspeed “Airspeed” (subsonic) Encoding “Airspeed” (supersonic) Encoding	
R3.123 (§3.4.6.4)	Airspeeds of 600 knots or less shall be reported with a resolution of 1 knot or finer.	Table 2.2.8.3.2 §2.2.8.3.2.5 Table 2-38	ADS-B Air Referenced Velocity Data Elements Airspeed “Airspeed” (subsonic) Encoding	
R3.124 (§3.4.6.4)	Airspeeds between 600 and 4,000 knots shall be reported with a resolution of 4 knots or finer.	Table 2.2.8.3.2 §2.2.8.3.2.5 Table 2-40	ADS-B Air Referenced Velocity Data Elements Airspeed “Airspeed” (supersonic) Encoding	
R3.125 (§3.4.6.5)	The Airspeed Type and Validity field in the ARV report is a 2-bit field that shall be encoded as described in Table 3.4.7.5.	§2.2.8.3.2.1.2 §2.2.8.3.2.6 Table 2.2.8.3.2.7	ARV Report Validity Flags Airspeed Type Airspeed Type Encoding	
R3.126 (§3.4.6.6)	If an ADS-B participant broadcasts messages to support ARV reports, and heading is available to the transmitting ADS-B subsystem, then it shall provide heading in those messages.	2.2.8.3.2.7 2.2.3.2.6.3.7 2.2.3.2.6.4.7	Heading While Airborne “Heading” Subfield in Aircraft Velocity – Subtype “3” Messages “Heading” Subfield in Aircraft Velocity – Subtype “4” Messages	
R3.127 (§3.4.6.6)	Reported heading range shall cover a full circle from 0-(almost) 360 degrees.	Table 2.2.8.3.2 Table 2-36	ADS-B Air Referenced Velocity Data Elements “Heading” Encoding	
R3.128 (§3.4.6.6)	The heading field in ARV reports shall be communicated and reported with a resolution at least as fine as 1 degree of arc.	Table 2.2.8.3.2 Table 2-36	ADS-B Air Referenced Velocity Data Elements “Heading” Encoding	
R3.129 (§3.4.6.7)	The Heading Valid field in the ARV report shall be ONE if the “Heading While Airborne” field contains valid heading information or ZERO if that field does not contain valid heading information.	§2.2.8.3.2.1.2 §2.2.3.2.6.3.6 §2.2.3.2.6.4.6	ARV Report Validity Flags “Heading Status Bit” Subfield in Aircraft Velocity Subtype “3” Messages “Heading Status Bit” Subfield in Aircraft Velocity Subtype “4” Messages	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.130 (§3.4.7.1)	An airborne ADS-B participant of equipage class A2 or A3 shall transmit messages to support the TS report when either of the following conditions are met. a. The flight director or autopilot is engaged in a vertical mode and a target altitude or an acceptable substitute for target altitude (§3.4.7.1) is available from the automation system; or b. The flight director or autopilot is engaged in a horizontal mode and a target heading or target track (§3.4.7.6) is available from the automation system.	§2.2.3.3.1.4.1	ADS-B Target State and Status Message Broadcast Rates	
R3.131 (§3.4.7.2)	The higher “state change” update interval requirements specified for TS Report information in §3.3.1.4 and Table 3-4 (d) shall be met whenever there is a change in the value of any of the following TS report fields: Horizontal Data Available and Horizontal Source Ind. §3.4.7.4 Target Heading or Track Angle §3.4.7.5 Target Heading /Track Indicator §3.4.7.6 Vertical Data available (§3.4.7.10) Target Altitude (§3.4.7.11).	§2.2.3.3.1.4.1	ADS-B Target State and Status Message Broadcast Rates	Higher rates for when a state change occurs to specified TS report elements is only listed as desired in DO-242A §3.3.3.1.4 and Table 3-4(d).
R3.132 (§3.4.7.3)	The time of applicability relative to local system time shall be updated with every Target State report update.	§2.2.8.3.1.4	Report Time of Applicability	
R3.133 (§3.4.7.4)	The Horizontal Data Available and Horizontal Target Source Indicator field shall be encoded as specified in Table 3-18.	§2.2.8.3.1.5 §2.2.3.2.7.1.3.7	Horizontal Data Available and Horizontal Target Source Indicator “Horizontal Data Available / Source Indicator” Subfield in Target State and Status Message	
R3.134 (§3.4.7.4)	In cases where the aircraft is operated in a horizontal FMS/RNAV mode and the FMS/RNAV target track angle is the same as the autopilot control panel selected track angle, the Horizontal Data Available and Horizontal Target Source Indicator shall be set to “FMS/RNAV system”.	§2.2.8.3.1.5 §2.2.3.2.7.1.3.7	Horizontal Data Available and Horizontal Target Source Indicator “Horizontal Data Available / Source Indicator” Subfield in Target State and Status Message	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.135 (§3.4.7.5)	Target heading or track angle shall be reported over the full range of all possible directions, 0 to almost 360, expressed as an angle measured clockwise from a reference direction.	Table 2.2.8.3.1 §2.2.8.3.1.5 §2.2.3.2.7.1.3.8	ADS-B Target State Data Elements Horizontal Intent: Target Heading or Track Angle “Target Heading / Track Angle” Subfield in Target State and Status Message	
R3.136 (§3.4.7.5)	Target heading or track angle shall be communicated and reported with a resolution at least as fine as one degree of arc.	Table 2.2.8.3.1 Table 2.2.3.2.7.1.3.8	ADS-B Target State Data Elements “Target Heading / Track Angle” Subfield Encoding	
R3.137 (§3.4.7.6)	[The Target Heading/Track Indicator] field shall be ZERO to indicate that it conveys target heading, or ONE to indicate that it conveys target track angle.	Table 2.2.3.2.7.1.3.9	“Target Heading / Track Indicator” Subfield Encoding	
R3.138 (§3.4.7.7)	In the current version (DO242A) of this MASPS, the “Reserved for Heading /Track Capability” field shall be ZERO.			UAT MOPS has reserved one (1) bit in the message supporting the TS Report that could be used for this purpose should this requirement change in the future. The ADS-B application can infer from the UAT MOPS Version Number that DO-242A is the ADS-B MASPS that is supported. <<This field is not addressed in the Target State message or report sections. Do we have the 1 bit needed for this field?? Do we insert sections for this field, or go with a note similar to the above note from UAT MOPS??>>
R3.139 (§3.4.7.8)	The Horizontal Mode Indicator shall be encoded as specified in Table 3-19.	Table 2.2.3.2.7.1.3.10	“Horizontal Mode Indicator” Subfield Encoding	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.140 (§3.4.7.9)	In the current version (DO-242A) of this MASPS, the “Reserved for Horizontal Conformance” field shall be ZERO.	§2.2.8.3.1.19	Horizontal Intent: Reserved for Horizontal Conformance Parameter	UAT MOPS has reserved one (1) bit in the message supporting the TS Report that could be used for this purpose should this requirement change in the future. The ADS-B application can infer from the UAT MOPS Version Number that DO-242A is the ADS-B MASPS that is supported.
R3.141 (§3.4.7.10)	The Vertical Data Available and Vertical Target Source Indicator field shall be encoded as specified in Table 3-20.	Table 2.2.3.2.7.1.3.1	“Vertical Data Available / Source Indicator” Subfield Encoding	<<We have a section for this in report section, but do not show a bit reserved for this in message section. Do we have bit?? Do we have not similar to above note from UAT MOPS?>>
R3.142 (§3.4.7.10)	In cases where the aircraft is operated in a vertical FMS/RNAV mode and the FMS/RNAV target altitude is the same as the autopilot control panel selected altitude, the Vertical Data Available and Vertical Target Source Indicator shall be set to “FMS/RNAV system”.	§2.2.8.3.1.10 §2.2.3.2.7.1.3.1	Vertical Intent: Vertical Data Available and Vertical Target Source Indicator “Vertical Data Available / Source Indicator” Subfield in Target State and Status Report	
R3.143 (§3.4.7.11)	Target altitude shall be represented as the operational altitude recognized by the transmitting aircraft’s guidance system.	§2.2.8.3.1.11 §2.2.3.2.7.1.3.6	Vertical Intent: Target Altitude “Target Altitude” Subfield in target State and Status Message	
R3.144 (§3.4.7.11)	If a substitute value is provided, that value shall be consistent with the aircraft’s target altitude capability as listed in Table 3-22.	§2.2.8.3.1.13 §2.2.3.2.7.1.3.4 §2.2.8.3.1.11 §2.2.3.2.7.1.3.6	Vertical Intent: Target Altitude Capability “Target Altitude Capability” Subfield in Target State and Status Message Vertical Intent: Target Altitude “Target Altitude” Subfield in target State and Status Message	
R3.145 (§3.4.7.11)	Target Altitude field shall be provided with a range from -1000 ft to +100,000 feet	Table 2.2.8.3.1 Table 2.2.3.2.7.1.3.6	ADS-B Target State Data Elements “Target Altitude” Subfield Encoding	
R3.146 (§3.4.7.11)	Target Altitude field shall be communicated and reported with a resolution of 100 feet or finer.	Table 2.2.8.3.1 Table 2.2.3.2.7.1.3.6	ADS-B Target State Data Elements “Target Altitude” Subfield Encoding	

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.147 (§3.4.7.12)	The Target Altitude Type shall be encoded as specified in Table 3-21.	§2.2.8.3.1.12 Table 2.2.3.2.7.1.3.2	Vertical Intent: Target Altitude Type “Target Altitude Type” Subfield Encoding	
R3.148 (§3.4.7.13)	The Target Altitude capability field shall be encoded as specified in Table 3-22.	§2.2.8.3.1.132 Table 2.2.3.2.7.1.3.4	Vertical Intent: Target Altitude Capability “Target Altitude Capability” Subfield Encoding	
R3.149 (§3.4.7.14)	The Vertical Mode Indicator shall be encoded as specified in Table 3-23.	§2.2.8.3.1.14 Table 2.2.3.2.7.1.3.5	Vertical Intent: Vertical Mode Indicator “Vertical Mode Indicator” Subfield Encoding	
R3.150 (§3.4.7.15)	In ADS-B systems that conform to this MASPS (DO-242A), the “Reserved for Vertical Conformance” field shall be ZERO.	§2.2.8.3.1.15	Vertical Intent: Reserved for Vertical Conformance	UAT MOPS has reserved one (1) bit in the message supporting the TS Report that could be used for this purpose should this requirement change in the future. The ADS-B application can infer from the UAT MOPS Version Number that DO-242A is the ADS-B MASPS that is supported. <<We have a section for this in report section, but do not show a bit reserved for this in message section. Do we have bit?? Do we have not similar to above note from UAT MOPS?>>
R3.151 (§3.4.8.1)	Given that the above conditions are satisfied, and any TC+0 report previously generated is not currently valid, an A2 level system shall initiate broadcast of a TC+0 report when the aircraft is within 4 minutes TTG to the trajectory change described in that TC+0 report, or as otherwise needed to meet the acquisition range requirements for A2 equipment as specified in Table 3-4(e).	Table 2-3 Appendix E Appendix P Appendix O	ADS-B Class A Transmitter Equipment To Message Coverage Transmitter and Receiver Power Requirements 1090 System Performance Simulation Results Accommodation of Trajectory Change Reports	This MOPS has reserved a message type for supporting of broadcasting data for supporting TC+0 and TC+1 reports. This message, its scheduling, and how the data might be sent within these messages is defined in Appendix O. There are not, however, any requirements in this MOPS for the transmission or reception of these messages or support of the TC reports. This was done at the direction of the SC-186 plenary.

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.152 (§3.4.8.1)	Similarly, [i.e., given that the prerequisite conditions listed in R3.151 are met] an A3 level system shall initiate broadcast of a TC+0 report when the aircraft is within 8 minutes TTG to the trajectory change described in that report, or as otherwise needed to meet the acquisition range requirements for A3 equipage as specified in Table 3-4(e).	Table 2-3 Appendix E Appendix P Appendix O	ADS-B Class A Transmitter Equipment To Message Coverage Transmitter and Receiver Power Requirements 1090 System Performance Simulation Results Accommodation of Trajectory Change Reports	See entry for R3.151
R3.153 (§3.4.8.1)	[F]or Fly-By turns, the TC latitude and longitude are for a point in the middle of the turn segment, and the active flight segment (turn maneuver) is not completed until the target track in the TC report, i.e. track-from value has been captured. Normally, this condition is signaled by the Horizontal Mode Indicator. If the TS report target track is not available, then a test should be performed on current state vector components to verify capture of the track-from value as a condition for sequencing the turn maneuver. In either event, the Fly-by turn shall be sequenced if more than 2 minutes has elapsed since the time of Fly-by transition sequencing.			See entry for R3.151
R3.154 (§3.4.8.1)	In the event that the active flight segment is sequenced, or a major change in intent is detected such that TC+0 report data is no longer valid, the aircraft broadcasting TC+0 reports shall increment the TC report cycle number (modulo 4) for subsequent TC report broadcasts.			See entry for R3.151
R3.155 (§3.4.8.3)	The time of applicability relative to local system time shall be updated with every TC report update.			See entry for R3.151
R3.156 (§3.4.8.4)	The "TC Report Sequence Number" field in the TC report shall contain a value of ZERO for this version (DO-242A) of the MASPS.			See entry for R3.151

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	Compliance / Notes
R3.157 (§3.4.8.5)	<p>The TC Report Cycle Number shall increment when any of the following conditions are met:</p> <ul style="list-style-type: none"> a. A change in TC estimated time of arrival (i.e. TOA + TTG) greater than 30 seconds. b. A change in the horizontal Data Available and Horizontal TC type (§3.4.8.8) field c. A change in horizontal position greater than 2 NM from the position defined by TC Latitude and TC Longitude (§3.4.8.9) and (§3.4.8.10, respectively). d. A change in the Horizontal Command/Planned flag (§3.4.8.15) field e. A change in the Vertical Data Available and Vertical TC Type (§3.4.8.16) field. f. A change in TC Altitude (§3.4.8.17) – if the Vertical TC Type (§3.4.8.16) is not Estimated Altitude-of more than 100 feet; g. A change in the Vertical Command/Planned flag (§3.4.8.22) 			See entry for R3.151
R3.158 (§3.4.8.5)	The TC Report Cycle Number shall be a number in the range from 0 to 3 that is incremented (modulo 4) each time the numbering of TC reports changes.			See entry for R3.151
R3.159 (§3.4.8.6)	For this version of the MASPS (DO-242A) the “Reserved for TC Report Management Indicator” field shall be given a value of ZERO.			See entry for R3.151
R3.160 (§3.4.8.7)	The TTG field shall have a resolution of 4 seconds or better.			See entry for R3.151
R3.161A R3.161B (§3.4.8.7)	The TTG field shall have a range from –120 seconds to +1200 seconds (20 minutes) and shall have a means to indicate a TTG value of greater than 20 minutes			See entry for R3.151

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.162 (§3.4.8.8)	The Horizontal TC Type shall be encoded as specified in the first column of Table 3-25.			See entry for R3.151
R3.163 (§3.4.8.8)	For each Horizontal TC Type listed, the resolution of the TC report elements listed in the following columns shall be at least as fine as indicated in the table except that elements marked as “n/r” are not required to be reported in TC reports for that horizontal TC type			See entry for R3.151
R3.164 (§3.4.8.9)	TC Latitude shall be reported as WGS-84 latitude.			See entry for R3.151
R3.165 (§3.4.8.9)	TC horizontal resolution shall be reported with the full range of possible latitudes (-90 to +90).			See entry for R3.151
R3.166 (§3.4.8.9)	Resolution of TC latitude shall be 700 meters or finer for the horizontal TC types shown in Table 3-25.			See entry for R3.151
R3.167 (§3.4.8.10)	TC Longitude shall be reported as WGS-84 longitude.			See entry for R3.151
R3.168 (§3.4.8.10)	TC horizontal position shall be reported with the full range of possible longitudes (-180 to + 180).			See entry for R3.151
R3.169 (§3.4.8.10)	Resolution of the TC longitude shall be 700 meters or finer for the horizontal TC types shown in Table 3-25			See entry for R3.151
R3.170A (§3.4.8.11)	Turn radius in NM shall be reported if available as an input to the ADS-B transmit system for horizontal TC type 3 and 4 i.e. when the TC report describes a Fly-by turn.			See entry for R3.151
R3.170B (§3.4.8.11)	For horizontal TC type 5 (radius to a fix turns), turn radius in nautical miles shall be reported as a mandatory TC report element, i.e. if turn radius is unavailable, then the horizontal TC report data fields should be marked not valid.			See entry for R3.151
R3.170C (§3.4.8.11)	Resolution of turn radius shall be 700 meters or finer when reported.			See entry for R3.151

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.171 (§3.4.8.12)	If the leg type is a Direct to Fix (DF) type then the bearing from the current position to the endpoint TCP shall be used to represent track-to for the active flight segment, e.g. TC+0.			See entry for R3.151
R3.172 (§3.4.8.14)	In ADS-B systems that conform to this MASPS (DO-242A), the "Reserved for Horizontal Conformance" field shall be ZERO.			See entry for R3.151
R3.173 (§3.4.8.15)	The horizontal command/planned flag shall be set to "Planned" unless both of the following conditions are met: <ul style="list-style-type: none"> It has been determined on the transmitting aircraft that the horizontal trajectory change is part of the command trajectory, as defined above. It has been determined on the transmitting aircraft that it is broadcasting trajectory change information for each intended horizontal trajectory change between the current aircraft position and the corresponding TCP. 			See entry for R3.151
R3.174 (§3.4.8.16)	The Vertical TC Type shall be encoded as specified in the first column of Table 3-26.			See entry for R3.151
R3.175 (§3.4.8.17)	The ADS-B system shall support TC altitudes in the range from -1,000 feet to +100,000 feet.			See entry for R3.151
R3.176 (§3.4.8.17)	The resolution with which TC altitude is reported shall be 100 feet.			See entry for R3.151
R3.177 (§3.4.8.18)	The TC Altitude Type shall be encoded as specified in Table 3-27.			See entry for R3.151
R3.178 (§3.4.8.19)	In ADS-B systems that conform to this MASPS (DO-242A), the "Reserved for Altitude Constraint Type" field shall be ZERO.			See entry for R3.151
R3.179 (§3.4.8.20)	In ADS-B systems that conform to this MASPS (DO-242A), the "Reserved for Able/Unable Altitude Constraint" field shall be ZERO.			See entry for R3.151

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.180 (§3.4.8.2.1)	In ADS-B systems that conform to this MASPS (DO-242A), the "Reserved for Vertical Conformance" field shall be ZERO.			See entry for R3.151
R3.181 (§3.4.8.2.2)	The vertical command/planned flag shall be set to "Planned" unless both of the following conditions are met: <ul style="list-style-type: none"> • It has been determined on the transmitting aircraft that the vertical trajectory change is part of the command trajectory, as defined above. • It has been determined on the transmitting aircraft that it is broadcasting trajectory change information for each intended vertical trajectory change between the current aircraft position and the corresponding TCP. 			See entry for R3.151
R3.182 (§3.4.8.2.3.1)	If the current TC+0 report is being updated or refreshed, the message generation function in the ADS-B transmitting subsystem shall do the following: (a). keep the value of the TC Report Cycle Number the same as in the messages previously sent to support TC+0 reports; (b). refresh the TOA and TTG fields in the messages being generated to support the TC+0 report; and (c). update all pertinent TC+0 report elements in those messages.			See entry for R3.151
R3.183 (§3.4.8.2.3.1)	If a new TC+0 report is to be generated, then the message generation function in the ADS-B transmitting subsystem shall do the following: a. increment (modulo 4) the TC Report Cycle Number from the messages previously generated to support the previous TC+0 report; b. reinitialize all TC+0 report elements; and c. generate messages to support the new TC+0 report.			See entry for R3.151

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.184 (§3.4.8.23.1)	<p>If the current TC+0 report is no longer valid and no subsequent TC+0 reports are to be generated, the message generation function in the ADS-B transmitting subsystem shall do the following:</p> <p>(a). increment (modulo 4) the TC Report Cycle Number from the messages previously generated to support the previous TC+0 report;</p> <p>(b). set the “Horizontal Data Available and Horizontal TC Type” and “Vertical Data Available and Vertical TC Type” fields in the newly generated messages to 0.</p>			See entry for R3.151
R3.185 (§3.4.8.23.1)	<p>If the previous TC+0 report is considered invalid and no subsequent TC+0 reports are to be immediately issued, the message generation function in the ADS-B transmitting subsystem shall transmit messages supporting the current TC+0 report for a time period of at least twice the required update interval for TC reports as specified in §3.3.1.4 that has the incremented TC Cycle Number and indicates “no horizontal or vertical data available”.</p>			See entry for R3.151
R3.186 (§3.4.8.23.2)	<p>In this case the report assembly function in the ADS-B receiving subsystem shall refresh the TOA and TTG fields and update the report fields with the received data.</p>			See entry for R3.151
R3.187 (§3.4.8.23.2)	<p>In this case the report assembly function in the ADS-B receiving subsystem shall clear the current TC+0 report by setting the “Horizontal Data Available and Horizontal TC Type” and “Vertical Data Available and Vertical TC Type” fields to 0.</p>			See entry for R3.151

Table F-1: ADS-B MASPS Compliance Matrix (continued)

DO-242A ADS-B MASPS Requirements		1090 MHz MOPS		Compliance / Notes
DO-242A Ref. # (Section #)	Requirement Text	Section #	Title / Description	
R3.188 (§3.5.1.1.3)	<p>The transmit subsystem shall interface with the onboard data entry mechanisms such as flight deck keyboards/selectors, encoded data sources, and logical discrete inputs to provide the subsystem with the following data:</p> <ul style="list-style-type: none"> • participant address • emitter category • call sign • emergency/priority status • capability class codes 	<p>§2.2.5.1.1.1 §2.2.5.1.2 §2.2.5.1.11 §2.2.5.1.22 – §2.2.5.1.28</p>	<p>ICAO 24-bit Address Emitter Category Aircraft Identification (or Registration) Data Capability Class Codes</p>	<p><<Should we have an “Emergency / Priority Status” paragraph within 2.2.5.1??>></p>
R3.189 (§3.5.2.1.3)	<p>The transmit subsystem shall interface with the onboard data base or approved data entry mechanisms such as flight deck keyboards/selectors, encoded data sources, and logical discrete inputs to provide the subsystem with the following data:</p> <ul style="list-style-type: none"> • participant address • emitter category • emergency/priority status • capability class codes 	<p>§2.2.5.1.1.1 §2.2.5.1.2 §2.2.5.1.22 – §2.2.5.1.28</p>	<p>ICAO 24-bit Address Emitter Category Capability Class Codes</p>	<p><<Should we have an “Emergency / Priority Status” paragraph within 2.2.5.1??>></p>