

RTCA Special Committee 186 Working Group 6

ADS-B / ASA MASPS Maintenance

Meeting #18

Teleconference and WebEx Session

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Requirements Matrices from the Working Drafts of both DO-242B and DO-289A

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SUMMARY

This Working Paper is in response to Action Item 17-07, which requested that a requirements matrix be generated for both of the revised MASPS documents in order to retain tracking of the requirements from the original documents into a combined document.

1. INTRODUCTION

During the discussions on the working drafts of DO-242B and DO-289A during Meeting #17, it was agreed by the Working Group that requirements matrices would be created from the basis of both draft documents in order to track the requirements from the original, and modified, documents into the new combined Super MASPS document.

During the generation of each matrix, it was discovered that both documents contained requirements that were not previously numbered. These orphan requirements were numbered using the “shall” number found in the text just previous to each of the orphaned requirements and given an additional letter designator, such as “A,” “B,” and/or “C.”

Additionally, each of the requirements, that have already been deleted as a part of the process to bring both MASPS documents into compliance with the changes that were made in the ADS-B MOPS, have been retained as red-lined and strikethrough text in each requirements matrix for the purpose of traceability.

Summary of Requirements in DO-242A / Working Draft DO-242B

Shall #	Working Draft DO-242B Requirement
242AR2.1	When the full resolution of available aircraft data cannot be accommodated within an ADS-B message, a common quantization algorithm shall (242AR2.1) be used to ensure consistent performance across different implementations.
242AR2.2	The output of ADS-B shall (242AR2.2) be standardized so that it can be translated without compromising accuracy.
242AR2.3	The ADS-B system shall (242AR2.3) be capable of transmitting messages and issuing reports containing the information specified in the following subsections.
242AR2.4	Time of applicability shall (242AR2.4) be provided in all reports.
242AR2.5	The basic identification information to be conveyed by ADS-B shall (242AR2.5) include the following elements:
242AR2.6	ADS-B shall (242AR2.6) be able to convey an aircraft call sign of up to 8 alphanumeric characters in length [6].
242AR2.7	The ADS-B system design shall (242AR2.7) 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.
242AR2.8	Aircraft with Mode-S transponders using an ICAO 24 bit address shall (242AR2.8) use the same 24 bit address for ADS-B.
242AR2.9	All aircraft/vehicle addresses shall (242AR2.9) be unique within the applicable operational domain(s).
242AR2.10	The ADS-B system design shall (242AR2.10) accommodate a means to ensure anonymity whenever pilots elect to operate under flight rules permitting an anonymous mode.
242AR2.11	The Participant Address field shall (242AR2.11) be included in all ADS-B reports.
242AR2.12	The Address Qualifier field shall (242AR2.12) be included in all ADS-B reports.
242AR2.13	The ADS-B system shall (242AR2.13) provide for at least the following emitter categories:
242AR2.14	Position information shall (242AR2.14) be transmitted in a form that can be translated, without loss of accuracy and integrity, to latitude, longitude, geometric height, and barometric pressure altitude.
242AR2.15	All geometric position elements shall (242AR2.15) be referenced to the WGS-84 ellipsoid.
242AR2.16	Barometric pressure altitude shall (242AR2.16) be reported referenced to standard temperature and pressure.
242AR2.17	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 (242AR2.17) be the position of that participant’s ADS-B position reference point (§2.1.2.5 below).
242AR2.18	The ADS-B position reference point of an A/V shall (242AR2.18) be defined as the center of a rectangle (the “defining rectangle for position reference point”) that has the following properties:
242AR2.18-A	The defining rectangle for position reference point shall (242AR2.18-A) have length and width as defined in Table 2-1 below for the length and width codes that the participant is transmitting in messages to support the MS report.
242AR2.18-B	The defining rectangle for position reference point shall (242AR2.18-B) be aligned parallel to the A/V’s heading.
242AR2.18-C	The ADS-B position reference point (the center of the defining rectangle for position reference point) shall (242AR2.18-C) lie along the axis of symmetry of the A/V.
242AR2.18-D	The forward extremity of the A/V shall (242AR2.18-D) just touch the forward end of the defining rectangle for position reference point.

Shall #	Working Draft DO-242B Requirement
242AR2.19	Both barometric pressure altitude and geometric altitude (height above the WGS-84 ellipsoid) shall (242AR2.19) be provided, if available, to the transmitting ADS-B subsystem.
242AR2.20	Altitude shall (242AR2.20) be provided with a range from -1,000 ft up to +100,000 ft.
242AR2.21	ADS-B link equipment shall (242AR2.21) support a means for the pilot to indicate that the broadcast of altitude information from pressure altitude sources is invalid.
242AR2.22	The pressure altitude reported shall (242AR2.22) 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.
242AR2.23	ADS-B geometric velocity information shall (242AR2.23) be referenced to WGS-84 [7].
242AR2.24	Transmitting A/Vs that are not fixed or movable obstacles shall (242AR2.24) provide ground-referenced geometric horizontal velocity.
242AR2.25	Transmitting A/Vs that are not fixed or movable obstacles and that are not known to be on the airport surface shall (242AR2.25) provide vertical rate.
242AR2.26	Vertical Rate shall (242AR2.26) be designated as climbing or descending and shall (242AR2.27) be reported up to 32,000 feet per minute (fpm).
242AR2.27	Vertical Rate shall (242AR2.26) be designated as climbing or descending and shall (242AR2.27) be reported up to 32,000 feet per minute (fpm).
242AR2.28	At least one of the two types of vertical rate (barometric and geometric) shall (242AR2.28) be reported.
242AR2.29	If only one of these two types of vertical rate is reported, it shall (242AR2.29) be obtained from the best available source of vertical rate information.
242AR2.30	Table 2-2 defines the navigation integrity categories that transmitting ADS-B participants shall (242AR2.30) use to describe the integrity containment radius, RC, associated with the horizontal position information in ADS-B messages from those participants.
242AR2.31	Table 2-3 defines the navigation accuracy categories that shall (242AR2.31) be used to describe the accuracy of positional information in ADS-B messages from transmitting ADS-B participants.
242AR2.32	The NAC_p value broadcast from an ADS-B participant shall (242AR2.32) include any inaccuracies in the reported horizontal position due to the transmitting participant's not correcting the horizontal position from the navigation sensor to that of the ADS-B position reference point (see §2.1.2.5).
242AR2.33	The velocity accuracy category of the least accurate velocity component being supplied by the reporting A/V's source of velocity data shall (242AR2.33) be as indicated in Table 2-4.
242AR2.34	The Source Integrity Limit encoding shall (242AR2.34) be as indicated in Table 2-5.
242AR2.36	The ADS-B system shall (242AR2.36) be capable of supporting broadcast of emergency and priority status.
242AR2.37	For equipage classes A2 and A3, the ADS-B system shall (242AR2.37) provide the capability to transmit and receive messages in support of the TS report.
242AR2.38	For equipage class A2, the ADS-B system shall (242AR2.38) provide the capability to transmit and receive messages in support of one TC (TC+0) report.

Shall #	Working Draft DO-242B Requirement
242AR2.39	For equipage class A3, the ADS-B system shall (242AR2.39) provide the capability to transmit and receive messages in support of multiple TC reports.
242AR3.1	ADS-B equipage classes summarized in Table 3-1 shall (242AR3.1) provide the air-to-air coverage specified in Table 3-2(a).
242AR3.2	The ERP and minimum signal detection capabilities shall (242AR3.2) support the associated pair-wise minimum operational ranges listed in Table 3-2(b).
242AR3.3	Broadcast only aircraft (class B0 and B1) shall (242AR3.3) have ERP values equivalent to those of class A0 and A1, respectively, as determined by own aircraft maximum speed, operating altitude, and corresponding coverage requirements.
242AR3.4	Ground vehicles operating on the airport surface (class B2) shall (242AR3.4) provide a 5 NM coverage range for class A receivers.
242AR3.5	If required due to spectrum considerations, ADS-B transmissions from ground vehicles (class B2) shall (242AR3.5) be automatically prohibited when those vehicles are outside the surface movement area (i.e, runways and taxiways).
242AR3.6	Fixed obstacle (class B3) broadcast coverage shall (242AR3.6) be sufficient to provide a 10 NM coverage range from the location of the obstacle.
242AR3.7	Each equipage class shall (242AR3.7) 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).
242AR3.8	For each of these subparagraphs, report acquisition shall (242AR3.8) be considered accomplished when all report elements required for an operational scenario have been received by an ADS-B participant.
242AR3.9	The state vector report shall (242AR3.9) meet the update period and 99 percentile update period requirements for each operational range listed.
242AR3.10	For each of the scenarios included in Table 3-4(a), the state vectors from at least 95% of the observable user population (radio line-of-sight) supporting that application shall (242AR3.10) be acquired and achieve the time and probability update requirements specified for the operational ranges.
242AR3.11	Required ranges for acquisition shall (242AR3.11) 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).
242AR3.12	The ADS-B system shall (242AR3.12) satisfy the error budget requirements specified in the table in order to assure satisfaction of ADS-B report accuracies.
242AR3.13	If a smoothing filter or tracker is used in the ADS-B design, the quality of the reports shall (242AR3.13) be sufficient to provide equivalent track accuracy implied in Table 3-4(a) over the period between reports, under target centripetal accelerations of up to 0.5g with aircraft velocities of up to 600 knots.
242AR3.14-A	For each of the equipage classes included in Table 3-4(b), the mode status reports from at least 95% of the observable (radio line of sight) population shall (242AR3.14-A) be acquired at the range specified in the “Required 95th Percentile Acquisition Range” row of Table 3-4(b).
242AR3.14-B	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 (242AR3.14-B) be acquired at the reduced range specified in the “Required 99th Percentile Acquisition Range” row of Table 3-4(b).

Shall #	Working Draft DO-242B Requirement
242AR3.15	The ARV report's nominal update interval shall (242AR3.15) be 5 seconds for A1, A2, and A3 equipment at ranges of 10 NM and closer.
242AR3.16	The ARV report's nominal update interval shall (242AR3.16) be 7 seconds for A1, A2, and A3 equipment at ranges greater than 10 NM and less than or equal to 20 NM.
242AR3.17	The ARV report's nominal update interval shall (242AR3.17) be 12 seconds for A2 equipment at ranges greater than 20 NM and less than or equal to 40 NM.
242AR3.18	The ARV report's nominal update interval shall (242AR3.18) be 12 seconds for A3 equipment at ranges greater than 40 NM and less than or equal to 90 NM.
242AR3.19	When the ARV report is required as defined in §3.4.6.1, its acquisition range in the forward direction shall (242AR3.19) be:
242AR3.20	The acquisition range requirements in directions other than forward shall (242AR3.20) be consistent with those stated in Note 3 of Table 3-4(a).
242AR3.21	The nominal TS report update period for A2 equipage at ranges within 40 NM and for A3 equipage at ranges in the forward direction within 90 NM shall (242AR3.21) be TU, such that
242AR3.22	If the TS report is implemented in ADS-B systems of equipage class A1, such systems shall (242AR3.22) have a 20 NM acquisition range for TS Report.
242AR3.23	For equipage class A2, the acquisition range for TS reports and TC reports shall (242AR3.23) be 40 NM, with 50 NM desired.
242AR3.24	For equipage class A3, the acquisition range for TC reports in the forward direction shall (242AR3.24) be 90 NM, with 120 NM desired.
242AR3.25	The range requirements in all other directions for A3 equipment shall (242AR3.25) be consistent with those stated in Note 3 of Table 3-4(a).
242AR3.26	If NAC_p is less than 10 and NIC is less than 9, then ADS-B latency of the reported information shall (242AR3.26) be less than 1.2 s with 95 percent confidence.
242AR3.27	If either NAC_p (10 or NIC (9, then ADS-B latency shall (242AR3.27) be less than 0.4 s with 95% confidence.
242AR3.28	The standard deviation of the report time error shall (242AR3.28) be less than 0.5 s (1 sigma).
242AR3.29	The mean report time error for position shall (242AR3.29) not exceed 0.5 s.
242AR3.30	The mean report time error for velocity shall (242AR3.30) not exceed 1.5 s.
242AR3.31	The ADS-B system shall (242AR3.31) 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.
242AR3.32	Requirements specified for en route, Low Density air space shall (242AR3.32) be met in the traffic density shown by the Low Density curve in Figure 3-8.
242AR3.33	The ADS-B RF medium shall (242AR3.33) be suitable for all-weather operation, and ADS-B system performance will be specified relative to a defined interference environment for the medium.
242AR3.34	Radio frequencies used for ADS-B Message transmission shall (242AR3.34) operate in an internationally allocated aeronautical radionavigation band(s).

Shall #	Working Draft DO-242B Requirement
242AR3.35	ADS-B availability shall (242AR3.35) be 0.9995 for class A0 through class A3 and class B0 through class B3 transmission subsystems.
242AR3.36	ADS-B availability shall (242AR3.36) be 0.95 for class A0 receiver subsystems.
242AR3.37	Class A1, A2, and A3 receiver subsystems shall (242AR3.37) have an availability of 0.9995.
242AR3.38	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 that operation, shall (242AR3.38) be no more than 2×10^{-4} per hour of flight.
242AR3.39	The integrity of the ADS-B System shall (242AR3.39) be 10^{-6} or better on a per report basis.
242AR3.40	The messages shall (242AR3.40) 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.
242AR3.41	The message and report assembly processing capability of the receiving subsystem shall (242AR3.41) support the total population of the participants within detection range provided by the specific data link technology.
242AR3.42	Receiving subsystem designs must provide reports based on all decodable messages received, i.e, for each participant the report shall (242AR3.42) 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.
242AR3.43	The applicable reports shall (242AR3.43) be made available to the applications on a continual basis in accordance with the local system interface requirements.
242AR3.44	If the ADS-B design uses the ICAO 24-bit address, then there shall (242AR3.44) 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.
242AR3.45	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 (242AR3.45) set its air/ground state to "known to be airborne" :
242AR3.46	If a transmitting ADS-B participant is <i>not</i> 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 that participant shall (242AR3.46) set its air/ground state to "known to be on the surface" :
242AR3.47	If a transmitting ADS-B participant is <i>not</i> 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 (242AR3.47) set its air/ground state to "uncertain whether airborne or on the surface."
242AR3.48-A	If a transmitting ADS-B participant is <i>not</i> equipped with a means, such as a weight-on-wheels switch, to determine whether it is airborne or on the surface, and its ADS-B emitter category is not one of those listed under tests 1, 2, and 3 above, then that participant's ground speed (GS), airspeed (AS) and radio height (RH) shall (242AR3.48-A) be examined, provided that some or all of those three parameters are available to the transmitting ADS-B subsystem.
242AR3.48-B	If $GS < 100$ knots, or $AS < 100$ knots, or $RH < 50$ feet, then the transmitting ADS-B participant shall (242AR3.48-B) set its Air/Ground state to "known to be on the surface."

Shall #	Working Draft DO-242B Requirement
242AR3.49	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 (242AR3.49) set its air/ground state to “known to be airborne.”
242AR3.50	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 (242AR3.50) be performed to validate the “on-the-surface” condition:
242AR3.51-A	<p>If the participant’s ADS-B emitter category is any of the following: “Small Aircraft” or “Medium Aircraft” or “High-Wake-Vortex Large Aircraft” or “Heavy Aircraft” or “Highly Maneuverable Aircraft” or “Space or Trans-atmospheric Vehicle”</p> <p>and one or more of the following parameters is available to the transmitting ADS-B system: Ground Speed (GS) or Airspeed (AS) or Radio height from radio altimeter (RH)</p> <p>and any of the following conditions is true: GS > 100 knots or AS > 100 knots or RH > 50 ft,</p> <p>then the participant shall (242AR3.51-A) set its Air/Ground state to “known to be airborne.”</p>
242AR3.51-B	Otherwise, the participant shall (242AR3.51-B) set its Air/Ground state to “known to be on the surface.”
242AR3.52	ADS-B participants that are known to be on the surface shall (242AR3.52) transmit those State Vector report elements that are indicated with bullets (“●”) in the “required from surface participants” column of Table 3-6.
242AR3.53	ADS-B participants that are known to be airborne shall (242AR3.53) transmit those SV report elements that are indicated by bullets (“●”) in the “required from airborne participants” column of Table 3-6.
242AR3.54	ADS-B participants for which the air/ground state is uncertain shall (242AR3.54) transmit those SV report elements that are indicated by bullets in the “required from airborne participants” column.
242AR3.55	A receiving ADS-B subsystem shall (242AR3.55) 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.

Shall #	Working Draft DO-242B Requirement
242AR3.56	For ADS-B systems that use segmented messages for SV data, time-critical SV report elements that are not updated in the current received message shall (242AR3.56) be estimated whenever the SV report is updated.
242AR3.57	For time-critical elements of the SV report, a receiving ADS-B subsystem's report assembly function shall (242AR3.57) 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 above).
242AR3.58	The time of applicability (TOA) relative to local system time shall (242AR3.58) be updated with each State Vector report update.
242AR3.59	Horizontal position (§2.1.2.4) shall (242AR3.59) be reported as WGS-84 latitude and longitude.
242AR3.60	Horizontal position shall (242AR3.60) be reported with the full range of possible latitudes (-90° to +90°) and longitudes (-180° to +180°).
242AR3.61	Horizontal position shall (242AR3.61) 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).
242AR3.62	Moreover, horizontal position shall (242AR3.62) 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, σ_{hp} , listed in Table 3-4(a): 20 m for airborne participants, or $\sigma_{hp} = 2.5$ m for surface participants.
242AR3.63-A	The Horizontal Position Valid field in the SV report shall (242AR3.63-A) 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 (242AR3.63-B) be ZERO.
242AR3.63-B	The Horizontal Position Valid field in the SV report shall (242AR3.63-A) 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 (242AR3.63-B) be ZERO.
242AR3.64	Geometric altitude shall (242AR3.64) be reported with a range from -1,000 feet up to +100,000 feet.
242AR3.65	If the NAC _p code reported in the MS report (§2.1.2.13) is 9 or greater, geometric altitude shall (242AR3.65) be communicated and reported with a resolution sufficiently fine that it does not compromise the vertical accuracy reported in the NACP field.
242AR3.66	Moreover, geometric altitude shall (242AR3.66) 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, (v_p , listed in Table 3-4(a): ($v_p = 30$ feet for airborne participants).
242AR3.67	The Geometric Altitude Valid field in the SV report is a one-bit field which shall (242AR3.67) be ONE if valid data is being provided in the Geometric Altitude field (§3.4.3.6), or ZERO otherwise.
242AR3.68	The range of reported horizontal velocity shall (242AR3.68) accommodate speeds of up to 250 knots for surface participants and up to 4000 knots for airborne participants.
242AR3.69	Horizontal velocity shall (242AR3.69) be communicated and reported with a resolution sufficiently fine that it does not compromise the accuracy reported in the NACV field of the Mode-Status report.
242AR3.70	Moreover, horizontal velocity shall (242AR3.70) be communicated and reported with a resolution sufficiently fine that it does not compromise the one-sigma maximum ADS-B contribution to horizontal velocity error, σ_{hv} , 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.

Shall #	Working Draft DO-242B Requirement
242AR3.71-A	The Airborne Horizontal Velocity Valid field in the SV report is a one-bit field which shall (242AR3.71-A) be set to ONE if a valid horizontal geometric velocity is being provided in the “North Velocity while airborne” and “East velocity while airborne” fields of the SV report; otherwise, the “Airborne Horizontal Velocity Valid” field shall (242AR3.71-B) be ZERO.
242AR3.71-B	The Airborne Horizontal Velocity Valid field in the SV report is a one-bit field which shall (242AR3.71-A) be set to ONE if a valid horizontal geometric velocity is being provided in the “North Velocity while airborne” and “East velocity while airborne” fields of the SV report; otherwise, the “Airborne Horizontal Velocity Valid” field shall (242AR3.71-B) be ZERO.
242AR3.72	The ground speed (the magnitude of the geometric horizontal velocity) of an A/V that is known to be on the surface shall (242AR3.72) be reported in the “ground speed while on the surface” field of the SV report.
242AR3.73	For A/Vs moving at ground speeds less than 70 knots, the ground speed shall (242AR3.73) be communicated and reported with a resolution of 1 knot or finer.
242AR3.74	Moreover, the resolution with which the “ground speed while on the surface” field is communicated and reported shall (242AR3.74) be sufficiently fine so as not to compromise the accuracy of that speed as communicated in the NAC _v field of the MS report.
242AR3.75	The Surface Ground Speed Valid field in the SV report is a one-bit field which shall (242AR3.75) be ONE if valid data is available in the Ground Speed While on the Surface field, or ZERO otherwise.
242AR3.76	However, each ADS-B participant that reports a length code of 2 or greater shall (242AR3.76) 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.
242AR3.77-A	Heading shall (242AR3.77-A) be reported for the full range of possible headings (the full circle, from 0° to nearly 360°).
242AR3.77-B	The heading of surface participants shall (242AR3.77-B) be communicated and reported with a resolution of 6 degrees of arc or finer.
242AR3.78-A	The “heading valid” field in the SV report shall (242AR3.78-A) be ONE if a valid heading is provided in the “heading while on the surface” field of the SV report; otherwise, it shall (242AR3.78-B) be ZERO.
242AR3.78-B	The “heading valid” field in the SV report shall (242AR3.78-A) be ONE if a valid heading is provided in the “heading while on the surface” field of the SV report; otherwise, it shall (242AR3.78-B) be ZERO.
242AR3.79	Barometric pressure altitude shall (242AR3.79) be reported referenced to standard temperature and pressure (1013.25 hPa or mB, or 29.92 in Hg).
242AR3.80	Barometric pressure altitude shall (242AR3.80) be reported over the range of -1,000 feet to +100,000 feet.
242AR3.81-A	If a pressure altitude source with 25-foot or better resolution is available to the ADS-B transmitting subsystem, then pressure altitude from that source shall (242AR3.81-A) be communicated and reported with 25-foot or finer resolution.
242AR3.81-B	Otherwise, if a pressure altitude source with 100-foot or better resolution is available, pressure altitude from that source shall (242AR3.81-B) be communicated and reported with 100-foot or finer resolution.
242AR3.82-A	The “pressure altitude valid” field in the SV report is a one-bit field which shall (242AR3.82-A) be ONE if valid information is provided in the “pressure altitude” field; otherwise, the “pressure altitude valid” field shall (242AR3.82-B) be ZERO.
242AR3.82-B	The “pressure altitude valid” field in the SV report is a one-bit field which shall (242AR3.82-A) be ONE if valid information is provided in the “pressure altitude” field; otherwise, the “pressure altitude valid” field shall (242AR3.82-B) be ZERO.

Shall #	Working Draft DO-242B Requirement
242AR3.83	This shall (242AR3.83) 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.
242AR3.84	The range of reported vertical rate shall (242AR3.84) accommodate up to ± 32000 ft/min for airborne participants.
242AR3.85	Geometric vertical rate shall (242AR3.85) be communicated and reported with a resolution sufficiently fine that it does not compromise the accuracy reported in the NACV field of the Mode-Status report.
242AR3.86	Moreover, vertical rate shall (242AR3.86) 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, (vv, listed in Table 3-4(a), that is, 1.0 ft/s for airborne participants.
242AR3.87-A	The “vertical rate valid” field in the SV report is a one-bit field which shall (242AR3.87-A) be ONE if valid information is provided in the “vertical rate” field; otherwise, the “vertical rate valid” field shall (242AR3.87-B) be ZERO.
242AR3.87-B	The “vertical rate valid” field in the SV report is a one-bit field which shall (242AR3.87-A) be ONE if valid information is provided in the “vertical rate” field; otherwise, the “vertical rate valid” field shall (242AR3.87-B) be ZERO.
242AR3.88	The NIC field in the SV report is a 4-bit field that shall (242AR3.88) report the Navigation Integrity Category described in Table 2-2 in §2.1.2.12 above.
242AR3.89	For each participant the Mode-status report shall (242AR3.89) 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 that participant.
242AR3.90-A	The report assembly function shall (242AR3.90-A) provide update when received.
242AR3.90-B	For those elements indicated in Table 3-8 as “elements that require rapid update”, the report assembly function shall (242AR3.90-B) indicate the data has not been refreshed with the “Mode Status Data Available” bit (§3.4.4.7) if no update is received in the preceding 24 second period.
242AR3.91	The time of applicability relative to local system time shall (242AR3.91) be updated with every Mode-Status report update.
242AR3.92	The ADS-B Version Number shall (242AR3.92) be defined as specified in Table 3-9 below.
242AR3.93	The call sign shall (242AR3.93) consist of up to 8 alphanumeric characters.
242AR3.94	The characters of the call sign shall (242AR3.94) consist only of the capital letters A-Z, the decimal digits 0-9, and – as trailing pad characters only – the “space” character.
242AR3.95	Provision in the encoding shall (242AR3.95) be made for at least 24 distinct emitter categories, including the particular categories listed in §2.1.2.2.3 above.
242AR3.96	The aircraft length and width codes shall (242AR3.96) be as described in Table 3-10 below.
242AR3.97	Each aircraft shall (242AR3.97) be assigned the smallest length and width codes for which its overall length and wingspan qualify it.
242AR3.98	Each aircraft ADS-B participant for which the length code is 2 or more (length greater than or equal to 25 m or wingspan greater than 34 m) shall (242AR3.98) transmit its aircraft size code while it is known to be on the surface.
242AR3.99	For this purpose, the determination of when an aircraft is on the surface shall (242AR3.99) be as described in §3.4.3.1.1 above.
242AR3.100-A	The report assembly function shall (242AR3.100-A) set this field to ZERO if no data has be received within 24 seconds under the conditions specified in 3.4.4.1; otherwise the report assembly function shall (242AR3.100-B) set this bit to ONE.

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242AR3.100-B	The report assembly function shall (242AR3.100-A) set this 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 (242AR3.100-B) set this bit to ONE.
242AR3.101	The emergency/priority status field in the MS report is a 3-bit field which shall (242AR3.101) be encoded as indicated in Table 3-11.
242AR3.102-A	The CC code for “TCAS/ACAS operational” shall (242AR3.102-A) be set to ONE if the transmitting subsystem receives information from an appropriate interface that indicates that the TCAS/ACAS system is operational.
242AR3.102-B	Likewise, this CC code shall (R3.102-B) 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.
242AR3.102-C	Otherwise, this CC code shall (242AR3.102-C) be ZERO.
242AR3.103-A	The CC code for “CDTI based traffic display capability” shall (242AR3.103-A) be set to ONE if the transmitting aircraft has a Cockpit Display of Traffic Information (CDTI) installed and is currently operating in a mode capable of displaying nearby ADS-B traffic.
242AR3.103-B	Otherwise, this CC code shall (242AR3.103-B) be ZERO.
242AR3.103-C	The CC Code for “1090ES IN” in shall (242AR3.103-C) be set to ONE (1) if the transmitting aircraft has the capability to receive ADS-B 1090ES Messages.
242AR3.103-D	Otherwise, this CC code subfield shall (242AR3.103-D) be set to ZERO (0).
242AR3.104	At least four bits (sixteen possible encodings) shall (242AR3.104) be reserved in the capability class codes for the “service level” of the transmitting ADS-B participant.
242AR3.105	ADS-B equipment conforming to the current version of this MASPS (DO-242A) shall (242AR3.105) set the Service Level code to ZERO.
242AR3.106	The ARV Report Capability Flag is a one-bit field that shall (242AR3.106) be encoded as in Table 3-12.
242AR3.107	The TS Report Capability Flag is a one-bit field that shall (242AR3.107) be encoded as in Table 3-13.
242AR3.108	The TC Report Capability Level is a two-bit field that shall (242AR3.108) be encoded as in Table 3-14.
242AR3.109-A	The Reporting ADS-B Reference Position Flag is a one-bit subfield within the CC subfield that a transmitting ADS-B participant shall (242AR3.109-A) set to ONE if the A/V position that it transmits (in messages to support the SV report) is that of the participant’s ADS-B position reference point.
242AR3.109-B	Otherwise, the transmitting ADS-B participant shall (242AR3.109-B) set this flag to ZERO.
242AR3.109-C	The “UAT IN” CC Code shall (242AR3.109-C) be set to ZERO (0) if the aircraft is NOT fitted with the capability to receive ADS-B UAT Messages.
242AR3.109-D	The “UAT IN” CC Code shall (242AR3.109-D) be set to ONE (1) if the aircraft has the capability to receive ADS-B UAT Messages.
242AR3.110-A	The CC code for “TCAS/ACAS Resolution Advisory Active” shall (242AR3.110-A) be set to ONE if the transmitting aircraft has a TCAS II or ACAS computer that is currently issuing a Resolution Advisory (RA).

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242AR3.110-B	Likewise, this CC code shall (242AR3.110-B) be set to ONE if the transmitting ADS-B equipment cannot ascertain whether the TCAS II or ACAS computer is currently issuing an RA.
242AR3.110-C	This CC code shall (242AR3.110-C) be ZERO only if it is explicitly known that a TCAS II or ACAS computer is not currently issuing a Resolution Advisory (RA).
242AR3.111-A	Initially, the “IDENT switch active” OM code shall (242AR3.111-A) be ZERO.
242AR3.111-B	Upon activation of the IDENT switch, this flag shall (242AR3.111-B) be set to ONE for a period of 20 +/- 3 seconds; thereafter, it shall (242AR3.111-C) be reset to ZERO.
242AR3.111-C	Upon activation of the IDENT switch, this flag shall (242AR3.111-B) be set to ONE for a period of 20 +/- 3 seconds; thereafter, it shall (242AR3.111-C) be reset to ZERO.
242AR3.112	If implemented into future versions of this MASPS, when set to ONE, this code shall (242AR3.112) indicate that the transmitting ADS-B participant is receiving ATC services; otherwise this flag should be set to ZERO.
242AR3.112-A	The “Single Antenna Flag” is a 1-bit field that shall (242AR3.112-A) be used to indicate that the ADS-B Transmitting Subsystem is operating with a single antenna.
242AR3.112-B	The following conventions shall (242AR3.112-B) apply both to Transponder-Based and Stand Alone ADS-B Transmitting Subsystems:
242AR3.112-C	a. Non-Diversity, i.e., those transmitting functions that use only one antenna, shall (242AR3.112-C) set the Single Antenna subfield to “ONE” at all times.
242AR3.112-D	b. Diversity, i.e., those transmitting functions designed to use two antennas, shall (242AR3.112-D) set the Single Antenna subfield to “ZERO” at all times that both antenna channels are functional.
242AR3.112-E	At any time that the diversity configuration cannot guarantee that both antenna channels are functional, then the Single Antenna Flag shall (242AR3.112-E) be set to “ONE.”
242AR3.112-F	The “System Design Assurance” (SDA) field is a 2-bit field that shall (242AR3.112-F) define the failure condition that the position transmission chain is designed to support as defined in Table 3-3.4.4.10.5.
242AR3.112-G	The “GPS Antenna Offset” field is an 8-bit field in the OM Code Subfield of surface format Aircraft Operational Status Messages that shall (242AR3.112-G) define the position of the GPS antenna in accordance with the following.
242AR3.112-H	The Lateral Axis GPS Antenna Offset shall (242AR3.112-H) be used to encode the lateral distance of the GPS Antenna from the longitudinal axis (Roll) axis of the aircraft.
242AR3.112-I	Encoding shall (242AR3.112-I) be established in accordance with Table 3-3.4.4.10.6A.
242AR3.112-J	The Longitudinal Axis GPS Antenna Offset shall (242AR3.112-J) be used to encode the longitudinal distance of the GPS Antenna from the NOSE of the aircraft.
242AR3.112-K	Encoding shall (242AR3.112-K) be established in accordance with Table 3-3.4.4.10.6B.
242AR3.113	The NAC _P field in the MS report is a 4-bit field which shall (242AR3.113) be encoded as described in Table 2-3 in §2.1.2.13 above.
242AR3.114	The NAC _V field in the MS report is a 3-bit field which shall (242AR3.114) be encoded as described in Table 2-4 in §2.1.2.14 above.
242AR3.115	The SIL field in the MS report is a 2-bit field which shall (242AR3.115) be coded as described in Table 2-5 in §2.1.2.15 above.

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242AR3.116	A 2-bit field in the MS Report shall (242AR3.116) be reserved for future use.
242AR3.117-A	A transmitting ADS-B participant shall (242AR3.117-A) set NIC _{baro} to ONE in the messages 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.
242AR3.117-B	Otherwise, it shall (242AR3.117-B) set this flag to ZERO.
242AR3.118	The True/Magnetic Heading Flag in the Mode-Status report is a one-bit field which shall (242AR3.118) be ZERO to indicate that heading is reported referenced to true north, or ONE to indicate that heading is reported referenced to magnetic north.
242AR3.119	The Primary Vertical Rate Type field in the MS report is a one-bit flag which shall (242AR3.119) be ZERO to indicate that the vertical rate field 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 geometric altitude.
242AR3.120	In the current version (DO-242A) of this MASPS, the “Reserved for Flight Mode Specific Data” field shall (242AR3.120) be ZERO.
242AR3.121	The time of applicability relative to local system time shall (242AR3.121) be updated with every Air-Referenced Velocity report update.
242AR3.122	Reported airspeed ranges shall (242AR3.122) be 0-4000 knots airborne.
242AR3.123	Airspeeds of 600 knots or less shall (242AR3.123) be reported with a resolution of 1 knot or finer.
242AR3.124	Airspeeds between 600 and 4000 knots shall (242AR3.124) be reported with a resolution of 4 knots or finer.
242AR3.125	The Airspeed Type and Validity field in the ARV report is a 2-bit field that shall (242AR3.125) be encoded as specified in Table 3-16.
242AR3.126	If an ADS-B participant broadcasts messages to support ARV reports, and heading is available to the transmitting ADS-B subsystem, then it shall (242AR3.126) provide heading in those messages.
242AR3.127	Reported heading range shall (242AR3.127) cover a full circle, from 0 degrees to (almost) 360 degrees.
242AR3.128	The heading field in ARV reports shall (242AR3.128) be communicated and reported with a resolution at least as fine as 1 degree of arc.
242AR3.129	The “Heading Valid” field in the ARV report shall (242AR3.129) be ONE if the “Heading While Airborne” field contains valid heading information, or ZERO if that field does not contain valid heading information.
242AR3.130	An airborne ADS-B participant of equipage class A2 or A3 shall (242AR3.130) transmit messages to support the TS report when either of the following conditions are met:
242AR3.131	The higher “state change” update interval requirements specified for TS report information in §3.3.3.1.4 and Table 3-4(d) shall (242AR3.131) be met whenever there is a change in the value of any of the following TS report fields:
242AR3.132	The time of applicability relative to local system time shall (242AR3.132) be updated with every Target State report update.
242AR3.132-A	a. Encoding of the “Selected Altitude Type” shall (242AR3.132-A) be in accordance with Table 3-18.
242AR3.132-B	b. Whenever there is no valid MCP / FCU or FMS Selected Altitude data available, then the “Selected Altitude Type” subfield shall (242AR3.132-B) be set to ZERO (0).

Shall #	Working Draft DO-242B Requirement
242AR3.133	The Horizontal Data Available and Horizontal Target Source Indicator field shall (242AR3.133) be encoded as specified in Table 3-18 below.
242AR3.133-A	a. The “MCP / FCU Selected Altitude or FMS Selected Altitude” subfield is an 11-bit field that shall (242AR3.133-A) contain either the MCP / FCU Selected Altitude or the FMS Selected Altitude data in accordance with the following subparagraphs.
242AR3.133-B	b. Whenever valid Selected Altitude data is available from the Mode Control Panel / Flight Control Unit (MCP / FCU) or equivalent equipment, such data shall (242AR3.133-B) be used to encode the Selected Altitude data field in accordance with Table 3-3.4.7.5.
242AR3.133-C	Use of MCP / FCU Selected Altitude shall (242AR3.133-C) then be declared in the “Selected Altitude Type” subfield as specified in Table 3-18.
242AR3.133-D	c. Whenever valid Selected Altitude data is NOT available from the Mode Control Panel / Flight Control Unit (MCP / FCU) or equivalent equipment, but valid Selected Altitude data is available from the Flight Management System (FMS), then the FMS Selected Altitude data shall (242AR3.133-D) be used to encode the Selected Altitude data field in accordance with Table 3-3.4.7.5 provided in paragraph “d.”
242AR3.133-E	Use of FMS Selected Altitude shall (242AR3.133-E) then be declared in the “Selected Altitude Type” subfield as specified in Table 3-18.
242AR3.133-F	d. Encoding of the Selected Altitude data field shall (242AR3.133-F) be in accordance with Table 3-3.4.7.5.
242AR3.133-G	Encoding of the data shall (242AR3.133-G) be rounded so as to preserve accuracy of the source data within $\pm\frac{1}{2}$ LSB.
242AR3.133-H	Whenever there is NO valid MCP / FCU or FMS Selected Altitude data available, then the “MCP / FCU Selected Altitude or FMS Selected Altitude” subfield shall (242AR3.133-H) be set to ZERO (0) as indicated in Table 3-3.4.7.5.
242AR3.134	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 (242AR3.134) be set to “FMS/RNAV system.”
242AR3.135	Target heading or track angle shall (242AR3.135) be reported over the full range of all possible directions, 0° to almost 360°, expressed as an angle measured clockwise from a reference direction.
242AR3.136	Target heading or track angle shall (242AR3.136) be communicated and reported with a resolution at least as fine as one degree of arc.
242AR3.136-A	a. The “Barometric Pressure Setting (Minus 800 millibars)” subfield is a 9-bit field that shall (242AR3.136-A) contain Barometric Pressure Setting data that has been adjusted by subtracting 800 millibars from the data received from the Barometric Pressure Setting source.
242AR3.136-B	b. After adjustment by subtracting 800 millibars, the Barometric Pressure Setting shall (242AR3.136-B) be encoded in accordance with Table 3-3.4.7.6.
242AR3.136-C	c. Encoding of Barometric Pressure Setting data shall (242AR3.136-C) be rounded so as to preserve a reporting accuracy within $\pm\frac{1}{2}$ LSB.
242AR3.136-D	d. Whenever there is NO valid Barometric Pressure Setting data available, then the “Barometric Pressure Setting (Minus 800 millibars) subfield shall (242AR3.136-D) be set to ZERO (0) as indicated in Table 3-3.4.7.6.

Shall #	Working Draft DO-242B Requirement
242AR3.136-E	e. Whenever the Barometric Pressure Setting data is greater than 1208.4 or less than 800 millibars, then the “Barometric Pressure Setting (Minus 800 millibars)” subfield shall (242AR3.136-E) be set to ZERO (0).
242AR3.137	This field shall (242AR3.137) be ZERO to indicate that the “Target Heading or Track Angle” field conveys target heading, or ONE to indicate that it conveys target track angle.
242AR3.137-A	The “Selected Heading Status” is a 1-bit field that shall (242AR3.137-A) be used to indicate the status of Selected Heading data that is being used to encode the Selected Heading data in accordance with Table 3-3.4.7.7.
242AR3.138	In the current version (DO-242A) of the MASPS, the “Reserved for Heading/Track Capability” field shall (242AR3.138) be ZERO.
242AR3.138-A	The “Selected Heading Sign” is a 1-bit field that shall (242AR3.138-A) be used to indicate the arithmetic sign of Selected Heading data that is being used to encode the Selected Heading data in accordance with Table 3-3.4.7.8.
242AR3.139	The Horizontal Mode Indicator shall (242AR3.139) be encoded as specified in Table 3-19 below.
242AR3.139-A	a. The “Selected Heading” is an 8-bit field that shall (242AR3.139-A) contain Selected Heading data encoded in accordance with Table 3-3.4.7.9.
242AR3.139-B	b. Encoding of Selected Heading data shall (242AR3.139-B) be rounded so as to preserve accuracy of the source data within $\pm\frac{1}{2}$ LSB.
242AR3.139-C	Whenever there is NO valid Selected Heading data available, then the Selected Heading Status, Sign, and Data subfields shall (242AR3.139-C) be set to ZERO (0) as indicated in Table 3-3.4.7.9.
242AR3.140	In the current version (DO-242A) of this MASPS, the “Reserved for Horizontal Conformance” field shall (R3.140) be ZERO.
242AR3.140-A	The “Status of MCP / FCU Mode Bits” is a 1-bit field that shall (242AR3.140-A) be used to indicate whether the mode indicator bits are actively being populated (e.g., set) in accordance with Table 3-3.4.7.10.
242AR3.140-B	If information is provided to the ADS-B Transmitting Subsystem to set the Mode Indicator bits to either “0” or “1,” then the “Status of MCP/FCU Mode Bits” shall (242AR3.140-B) be set to ONE (1).
242AR3.140-C	Otherwise, the “Status of MCP/FCU Mode Bits” shall (242AR3.140-C) be set to ZERO (0).
242AR3.141	The Vertical Data Available and Vertical Target Source Indicator field shall (242AR3.141) be encoded as specified in Table 3-20 below.
242AR3.142	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 (242AR3.142) be set to “FMS/RNAV system.”
242AR3.142-A	The “Mode Indicator: Autopilot Engaged” subfield is a 1-bit field that shall (242AR3.142-A) be used to indicate whether the autopilot system is engaged or not.
242AR3.142-B	a. The ADS-B Transmitting Subsystem shall (242AR3.142-B) accept information from an appropriate interface that indicates whether or not the Autopilot is engaged.
242AR3.142-C	The ADS-B Transmitting Subsystem shall (242AR3.142-C) set the Mode Indicator: Autopilot Engaged field in accordance with Table 3-3.4.7.11.

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242AR3.143	Target altitude shall (242AR3.143) be represented as the operational altitude recognized by the transmitting aircraft's guidance system.
242AR3.144	If a substitute value is provided, that value shall (242AR3.144) be consistent with the aircraft's target altitude capability as listed in Table 3-22.
242AR3.145	Target altitude shall (242AR3.145) be provided with a range from -1000 ft to +100,000 feet
242AR3.146	and shall (R3.146) have a resolution of 100 feet.
242AR3.146-A	The "Mode Indicator: VNAV Mode Engaged" is a 1-bit field that shall (242AR3.146-A) be used to indicate whether the Vertical Navigation Mode is active or not.
242AR3.146-B	a. The ADS-B Transmitting Subsystem shall (242AR3.146-B) accept information from an appropriate interface that indicates whether or not the Vertical Navigation Mode is active.
242AR3.146-C	b. The ADS-B Transmitting Subsystem shall (242AR3.146-C) set the Mode Indicator: VNAV Mode Engaged field in accordance with Table 3-3.4.7.12.
242AR3.147	The Target Altitude Type shall (242AR3.147) be encoded as specified in Table 3-21 below.
242AR3.147-A	The "Mode Indicator: Altitude Hold Mode" is a 1-bit field that shall (242AR3.147-A) be used to indicate whether the Altitude Hold Mode is active or not.
242AR3.147-B	a. The ADS-B Transmitting Subsystem shall (242AR3.147-B) accept information from an appropriate interface that indicates whether or not the Altitude Hold Mode is active.
242AR3.147-C	b. The ADS-B Transmitting Subsystem shall (242AR3.147-C) set the Mode Indicator: Altitude Hold Mode field in accordance with Table 3-3.4.7.13.
242AR3.148	The target altitude capability field shall (242AR3.148) be encoded as shown in Table 3-22 below.
242AR3.148-A	The "Mode Indicator: Approach Mode" is a 1-bit field that shall (242AR3.148-A) be used to indicate whether the Approach Mode is active or not.
242AR3.148-B	a. The ADS-B Transmitting Subsystem shall (242AR3.148-B) accept information from an appropriate interface that indicates whether or not the Approach Mode is active.
242AR3.148-C	b. The ADS-B Transmitting Subsystem shall (242AR3.148-C) set the Mode Indicator: Approach Mode field in accordance with Table 3-3.4.7.14.
242AR3.149	The Vertical Mode Indicator shall (242AR3.149) be encoded as shown in Table 3-23 below.
242AR3.149-A	The "Mode Indicator: LNAV Mode Engaged" is a 1-bit field that shall (242AR3.149-A) be used to indicate whether the Lateral Navigation Mode is active or not.
242AR3.149-B	a. The ADS-B Transmitting Subsystem shall (242AR3.149-B) accept information from an appropriate interface that indicates whether or not the Lateral Navigation Mode is active.
242AR3.149-C	b. The ADS-B Transmitting Subsystem shall (242AR3.149-C) set the Mode Indicator: LNAV Mode Engaged field in accordance with Table 3-3.4.7.15.
242AR3.150	In ADS-B systems that conform to this version of this MASPS (DO-242A), the "Reserved for Vertical Conformance" field shall (242AR3.150) be ZERO.

Shall #	Working Draft DO-242B Requirement
242AR3.151	Given that the above conditions are satisfied, and any TC+0 report previously generated is not currently valid, an A2 level system shall (242AR3.151) 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 equipage as specified in Table 3-4(e).
242AR3.152	Similarly, an A3 level system shall (242AR3.152) 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).
242AR3.153	In either event, the Fly-By turn shall (242AR3.153) be sequenced if more than 2 minutes has elapsed since the time of Fly-By transition sequencing.
242AR3.154	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 (242AR3.154) increment the TC report cycle number (modulo 4) for subsequent TC report broadcasts.
242AR3.155	The time of applicability relative to local system time shall (242AR3.155) be updated with every TC report update.
242AR3.156	The "TC Report Sequence Number field in the TC report shall (242AR3.156) contain a value of ZERO for this version of the MASPS.
242AR3.157	The TC Report Cycle Number shall (242AR3.157) increment when any of the following conditions are met:
242AR3.158	The TC Report Cycle Number shall (242AR3.158) be a number in the range from 0 to 3 that is incremented (modulo 4) each time the numbering of TC reports changes.
242AR3.159	For this version of the MASPS (DO-242A), the "Reserved for TC Report Management Indicator field shall (242AR3.159) be given a value of ZERO.
242AR3.160	The TTG field shall (242AR3.160) have a resolution of 4 seconds or better, and shall (242AR3.161-A) have a range from -120 sec to +1200 sec (20 min), and shall (242AR3.161-B) have a means to indicate a TTG value of greater than 20 minutes.
242AR3.161-A	The TTG field shall (242AR3.160) have a resolution of 4 seconds or better, and shall (242AR3.161-A) have a range from -120 sec to +1200 sec (20 min), and shall (242AR3.161-B) have a means to indicate a TTG value of greater than 20 minutes.
242AR3.161-B	The TTG field shall (242AR3.160) have a resolution of 4 seconds or better, and shall (242AR3.161-A) have a range from -120 sec to +1200 sec (20 min), and shall (242AR3.161-B) have a means to indicate a TTG value of greater than 20 minutes.
242AR3.162	The Horizontal TC Type shall (242AR3.162) be encoded as specified in the first column of Table 3-25.
242AR3.163	For each Horizontal TC Type listed, the resolution of the TC report elements listed in the following columns shall (242AR3.163) 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.
242AR3.164	TC Latitude shall (242AR3.164) be reported as WGS-84 latitude.
242AR3.165	TC horizontal position shall (242AR3.165) be reported with the full range of possible latitudes (-90(to +90(.
242AR3.166	Resolution of TC latitude shall (242AR3.166) be 700 m or finer for the horizontal TC types shown in Table 3-25.
242AR3.167	TC Longitude shall (242AR3.167) be reported as WGS-84 longitude.
242AR3.168	TC horizontal position shall (242AR3.168) be reported with the full range of possible longitudes (-180(to +180(.

Shall #	Working Draft DO-242B Requirement
242AR3.169	Resolution of TC longitude shall (242AR3.169) be 700 m or finer for the horizontal TC types shown in Table 3-25.
242AR3.170-A	Turn radius in NM shall (242AR3.170-A) be reported if available as an input to the ADS-B transmitting subsystem for horizontal TC types 3 and 4, i.e when the TC report describes a Fly-By turn.
242AR3.170-B	For horizontal TC type 5 (radius to fix turns), turn radius in nautical miles shall (242AR3.170-B) 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.
242AR3.170-C	Resolution of turn radius shall (242AR3.170-C) be 700 m or finer when reported.
242AR3.171	If the leg type is a Direct to Fix (DF) type, then the bearing from the current position to the endpoint TCP shall (242AR3.171) be used to represent track-to for the active flight segment, e.g. TC+0.
242AR3.172	In ADS-B systems that conform to this version (DO-242A) of this MASPS, the “Reserved for Horizontal Conformance” field shall (242AR3.172) be ZERO.
242AR3.173	The horizontal command/planned flag shall (242AR3.173) be set to “Planned” unless both of the following conditions are met:
242AR3.174	The Vertical TC Type shall (242AR3.174) be encoded as specified in the first column of Table 3-26.
242AR3.175	The ADS-B system shall (242AR3.175) support TC altitudes in the range from -1,000 feet to +100,000 feet.
242AR3.176	The resolution with which TC altitude is reported shall (242AR3.176) be 100 feet.
242AR3.177	The TC Altitude Type shall (242AR3.177) be encoded as specified in Table 3-27 below.
242AR3.178	In ADS-B systems that conform to this version of this MASPS (DO-242A), the “Reserved for Altitude Constraint Type” field shall (242AR3.178) be ZERO.
242AR3.179	In ADS-B systems that conform to this version of this MASPS (DO-242A), the “Reserved for Able/Unable Altitude Constraint” field shall (242AR3.179) be ZERO.
242AR3.180	In ADS-B systems that conform to this version (DO-242A) of this MASPS, the “Reserved for Vertical Conformance” field shall (242AR3.180) be ZERO.
242AR3.181	The vertical command/planned flag shall (242AR3.181) be set to “Planned” unless both of the following conditions are met:
242AR3.182	If the current TC+0 report is being updated or refreshed, the message generation function in the ADS-B transmitting subsystem shall (242AR3.182) do the following:
242AR3.183	If a new TC+0 report is to be generated, then the message generation function in the ADS-B transmitting subsystem shall (242AR3.183) do the following:
242AR3.184	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 (242AR3.184) do the following:
242AR3.185	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 (242AR3.185) 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 §3.3.3.1.4 that has the incremented TC Cycle Number and indicates “no horizontal or vertical data available”.
242AR3.186	In this case the report assembly function in the ADS-B receiving subsystem shall (242AR3.186) refresh the TOA and TTG fields and update the report fields with the received data.

Shall #	Working Draft DO-242B Requirement
242AR3.187	In this case the report assembly function in the ADS-B receiving subsystem shall (242AR3.187) 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.
242AR3.188	The transmit subsystem shall (242AR3.188) 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:
242AR3.189	The transmit subsystem shall (242AR3.189) 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:

Summary of Requirements from the Working Draft of DO-289A

Shall #	Working Draft of DO-289A Requirement
289R2.1	Aircraft that are not qualified for a given ACL due to loss of capability, e.g., equipment failure, shall (289R2.1) indicate a lower ACL for which they are qualified.
289R2.2	Aircraft that no longer qualify for Basic ACL shall (289R2.2) indicate “transmit-only.”
289R2.3	Failure of equipment that affects available ACL shall (289R2.3) be indicated to the flight crew.
289R2.4	An aircraft shall (289R2.4) meet the following requirements in order to be qualified for Transmit-only Capability Level.
289R2.5	Transmit-only aircraft shall (289R2.5) have the installed capability to transmit State Data and ID/Status data (Table 3 4) that meets or exceeds the requirements to support the EVAcq application in accordance with Table 2 3.
289R2.6	An aircraft shall (289R2.6) meet the following requirements in order to be qualified for Basic ASA Capability Level:
289R2.7	The aircraft shall (289R2.7) have the installed capability to transmit State Data and ID/Status data (Table 3 4) that meets or exceeds the requirements to support the EVAcq application in accordance with
289R2.8	b. Aircraft with the Conflict Detection (CD) option shall (289R2.8) be capable of transmitting data that meets the requirements for confliction detection.
289R2.9	Aircraft with the ASSA and FAROA option shall (289R2.9) be capable of transmitting data that meets the requirements for ASSA and FAROA while on the airport surface or within 1000 feet AGL of the airport surface.
289R2.10	c. The aircraft shall (289R2.10) have on-board equipment that supports the Basic ASA Capability Level requirements of Table 2 4, including, requirements for supporting any installed optional applications (i.e., CD, ASSA, FAROA).
289R2.11	d. The aircraft shall (289R2.11) have an on-board ADS-B/TIS-B receiving equipment that supports the requirements of Table 2 3 and §3.3.1 for the options within the basic level that are installed.
289R2.12	e. The aircraft shall (289R2.12) have an on-board ASSAP subsystem that meets the requirements of §3.3.2 for the Basic ASA Capability Level.
289R2.13	f. The aircraft shall (289R2.13) have an on-board display capability that meets the requirements of §3.3.3 for the Basic ASA Capability Level; note as per §3.3.3 that requirements for the basic level are based on any implemented options (i.e., CD, ASSA and FAROA).
289R2.14	g. There shall (289R2.14) be a means for the flight crew to indicate that they are qualified to use basic ASA (the flight crew must indicate to the system that they are so qualified as per §3.3.3.)
289R2.15	In order to be qualified for Intermediate ACL, the aircraft shall (289R2.15) meet all the requirements for the Basic ASA Capability Level listed in §2.4.1.2, and, in addition:
289R2.16	a. The aircraft shall (289R2.16) be capable of transmitting information that supports the requirements for the Intermediate ASA Capability Level of Table 2 3 (i.e., TQL 2).
289R2.17	b. The aircraft shall (289R2.17) have on-board equipment that supports the requirements of Table 2 4.
289R2.18	c. The aircraft shall (289R2.18) have on-board ADS-B/TIS-B receiving equipment that supports the Intermediate ASA Capability Level requirements of Table 2 3, and §3.3.1.

Shall #	Working Draft of DO-289A Requirement
289R2.19	d. The aircraft shall (289R2.19) have an on-board ASSAP subsystem that meets the requirements of §3.3.2 for the Intermediate ASA Capability Level.
289R2.20	e. The aircraft shall (289R2.20) have an on-board display capability that meets the requirements of §3.3.3 for the Intermediate ASA Capability Level.
289R2.21	f. There shall (289R2.21) be a means for the flight crew to indicate that they are qualified to use intermediate ASA (the flight crew must indicate to the system that they are so qualified as per §3.3.3).
289R2.22	Each ASA participant shall (289R2.22) include transmission of data quality metrics, particularly accuracy and integrity in accordance with §3.1.5.
289R2.23	Additionally, each ASA participant shall (289R2.23) transmit its ASA Capability Level (see §2.4.1), and its Transmit Quality Level (see §3.1.1).
289R2.24	The ADS-B/TIS-B Receive subsystem shall (289R2.24) receive surveillance data from ADS-B and TIS-B transmitters on a given data link.
289R2.25	All traffic messages received by the ADS-B/TIS-B Receive subsystem shall (289R2.25) be made available in reports to the ASSAP subsystem as described in §3.3.1.
289R2.26	For each ASA Capability Level, the ADS-B/TIS-B Receive subsystem shall (289R2.26) be capable of processing the expected traffic within the coverage volume described in Table 2 3, row 18.
289R2.27	ASSAP shall (289R2.27) assess the ability of own-ship and traffic targets to support the active applications or applications within an active ACL; this is to be done by ASSAP assessing own-ship performance and transmitted data quality as specified in Table 2 4 and by assessing received traffic-ship data quality as specified in Table 2 1.
289R2.28	For the CD application, intermediate, and advanced ACL applications displays shall (289R2.28) be located so that the pilot flying can use them adequately, without having to assume an uncomfortable position, an awkward position, or a position that could compromise continued safe operation of the aircraft.
289R2.29	The data quality requirements in Table 2 3 shall (289R2.29) be met for each ACL.
289R3.30	The ASA Transmit Subsystem illustrated in Figure 3-1, and represented by interfaces B1 to D in Figure 2-7, shall (289R3.30) consist of an ADS-B Transmit subsystem.
289R3.31	All A/Vs that transmit ASA data (i.e., ADS-B messages) shall (289R3.31) assess and transmit their Transmit Quality Levels.
289R3.32	TIS-B ground stations shall (289R3.32) also assess and transmit an appropriate TQL for each A/V.
289R3.33	The TQL shall (289R3.33) be assessed dynamically, so that changes in capabilities are announced, for example, when the equipment no longer qualifies for its previously announced TQL.

Shall #	Working Draft of DO-289A Requirement
289R3.34	<p>Transmit Quality Level shall (289R3.34) address the following characteristics:</p> <ul style="list-style-type: none"> • Maximum ASA transmit equipment integrity (§3.1.1.1) • Maximum ASA transmit subsystem continuity of service (§3.1.1.2) • Maximum ASA transmit data latency (§3.1.1.3) • Maximum state data latency (§3.1.1.4) • Maximum time error of state data (§3.1.1.5) • Minimum NAC_p for position information (§3.1.1.7) • Minimum NAC_v for velocity information (§3.1.1.8) • Minimum NIC for position information (§3.1.1.9) • Minimum SIL for position information (§3.1.1.10) • Maximum time to indicate integrity change (§3.1.1.11) • Minimum transmitted information requirements (§3.1.1.12)
289R3.35	<p>Transmit Quality Levels shall (289R3.35) be as defined in Table 3-1.</p>
289R3.36	<p>The ASA Transmit subsystem shall (289R3.36) assess that all of the requirements associated with a specific transmit quality level are met before transmitting that transmit quality level.</p>
289R3.37	<p>When specified requirements are no longer met, the change in transmit quality level shall (289R3.37) be transmitted within 1 second.</p>
289R3.38	<p>Failure of equipment that affects available TQL shall (289R2.38) be indicated to the flight crew.</p>
289R3.39	<p>The maximum ASA transmit equipment integrity risk value in Table 3-1 shall (289R3.39) be supported.</p>
289R3.40	<p>The maximum ASA continuity of service risk probability value in Table 3-1 shall (289R3.40) be supported.</p>
289R3.41	<p>The probability shall (289R3.41) include: (1) ASA Transmit subsystem equipment and the surveillance information source equipment failure rates and (2) surveillance source signal-in-space affects that can result in loss of valid surveillance information.</p>
289R3.42	<p>The continuity risk probability shall (289R3.42) be based on the ability to continue to provide surveillance data that meets the minimum NAC_p, NIC, and SIL values associated with the reported Transmit Quality level.</p>
289R3.43	<p>The maximum latency value in Table 3-1 of the transmitted dynamic aircraft state information that is attributable to the ASA Transmitting Subsystem, interfaces B1 to D in Figure 2-7, shall (289R3.43) be supported.</p>
289R3.44	<p>The maximum latency value in Table 3-1 of the transmitted dynamic aircraft state information, interfaces A1 to B1 in Figure 2-7, shall (289R3.44) be supported.</p>

Shall #	Working Draft of DO-289A Requirement
289R3.44-A	The maximum latency value in Table 3-1 of transmitted TIS-B traffic information, interfaces A2 to D2 in <u>Figure 2-7</u> , shall (289R3.44-A) be supported.
289R3.45	The maximum time error value in Table 3-1 of the transmitted dynamic aircraft state information shall (289R3.45) be supported.
289R3.46	The minimum NAC _P value in Table 3-1 for the navigation data source shall (289R3.46) be supported.
289R3.47	The minimum NAC _V value in Table 3-1 for the velocity data source shall (289R3.47) be supported.
289R3.48	The minimum NIC value in Table 3-1 for the navigation data source shall (289R3.48) be supported.
289R3.49	The minimum SIL value in Table 3-1 for the navigation data source shall (289R3.49) be supported.
289R3.50	The maximum time value in Table 3-1 to indicate a reduction in either the NIC or SIL value shall (289R3.50) be supported.
289R3.51	The minimum ADS-B information that is identified in §3.1.5 shall (289R3.51) be transmitted.
289R3.52	The Surveillance Transmit Processing (STP) subsystem, represented by interfaces B1 to C in <u>Figure 2-7</u>, shall (289R3.52) provide the processing, conversion, and formatting of surveillance data obtained from aircraft sensors and systems into the standardized ADS-B message formats that are broadcast to other users.
289R3.53	The “Transmit Quality Level” to be broadcast by the airborne ASA Transmit subsystem shall (289R3.53) be determined by the STP subsystem as defined in §3.1.1.
289R3.54	ADS-B equipment shall (289R3.54) broadcast one of the ASA Capability Levels that are defined in §2.4.1.
289R3.55	The ADS-B Transmit subsystem shall (289R3.55) assign the appropriate NACP value based on the accuracy reported by the selected position source system (e.g., HFOM, VFOM, EPU, or VEPU) or as determined by validated methods when accuracy values are not reported.
289R3.56	The reported values of NAC _P shall (289R3.56) be those identified in §3.1.5.15.
289R3.57	When accuracy values cannot be determined for a geometric position source, the geometric position accuracy shall (289R3.57) be reported as unknown (NAC _P = 0).
289R3.58	The ADS-B Transmit subsystem shall (289R3.58) assign the appropriate NAC _V value based on the velocity accuracy reported by the selected velocity source system or as determined by validated methods when accuracy values are not reported.
289R3.59	The reported values of NAC _V shall (289R3.59) be those identified in §3.1.5.16.
289R3.60	When accuracy values for velocity cannot be determined for a geometric velocity data source, the geometric velocity accuracy shall (289R3.60) be reported as unknown (NAC _V = 0).
289R3.61	The ADS-B Transmit subsystem shall (289R3.61) assign the appropriate NIC value based on the integrity containment region when reported by the selected surveillance source, or as determined by validated methods when containment values are not reported.
289R3.62	The values of NIC shall (289R3.62) be those identified in §3.1.5.9.
289R3.63	When a horizontal position containment limit (RC) is not available, the geometric integrity shall (289R3.63) be reported as unknown (NIC=0).
289R3.64	The reported values of SIL shall (289R3.64) be those identified in §3.1.5.17.

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289R3.65	When an alternate navigation data source is selected for ASA, the reported SIL shall (289R3.65) become the value for the new source that is selected.
289R3.66	For a specific data link, if a time of applicability value from the transmitting participant is needed to meet this requirement, then the STP subsystem shall (289R3.66) determine a transmit time of applicability for the transmitted aircraft state data.
289R3.66-A	The procedure for determining the A/V Length and Width Code and the Surveillance Position reference point shall (289R3.66-A) be as follows:
289R3.67	The defining rectangle for an A/V's Surveillance Position Reference Point shall (289R3.67) have length and width equal to the upper-bound length and upper-bound width from Table 3-2 for the length/width code that is reported for that A/V.
289R3.68	The defining rectangle for an A/V's Surveillance Position Reference Point shall (289R3.68) be aligned parallel to the A/V's heading.
289R3.69	The Surveillance Position Reference Point (the center of the defining rectangle) shall (289R3.69) lie on the axis of symmetry of the A/V for an A/V's Surveillance Position Reference Point.
289R3.70	In the case of an asymmetrical A/V, the center of the rectangle shall (289R3.70) lie midway between the port and starboard extremities of the A/V.
289R3.71	The forward extremity of the A/V shall (289R3.71) just touch the forward end of the defining rectangle for the A/V's Surveillance Position Reference Point.
289R3.72	When multiple sources are available, the selection of the source shall (289R3.72) meet the following requirements:
289R3.73	A transmitting participant's air/ground state shall (289R3.73) have the following possible values:
289R3.74	A transmitting ADS-B participant shall (289R3.74) apply the following tests to determine its air/ground state:
289R3.75	When using ground surveillance data sources, the TIS-B ground surveillance processing shall (289R3.75) provide the following:
289R3.76	The continuity risk, and integrity risk requirements of Table 3-1 shall (289R3.76) be met by the ADS-B/TIS-B Transmit Subsystem.
289R3.77	The availability requirements of Table 3-3 shall (289R3.77) be met by the ADS-B/TIS-B transmit subsystem.
289R3.78	When a surveillance element is available, TIS-B shall (289R3.78) transmit the surveillance data element.
289R3.79	The ASA Transmit subsystem shall (289R3.79) be capable of transmitting messages containing the surveillance information specified in the following subsections.
289R3.80	It shall (289R3.80) be possible for a receiving participant to assess the time of applicability of the received aircraft state data.
289R3.80-A	Transmitted aircraft state data shall (289R3.80-A) meet the data latency requirements specified in <u>Table 3-1</u> .
289R3.81	The maximum time to indicate changes in the aircraft ID/status data between interfaces A1 or A2 and D in Figure 2-7 shall (289R3.81) be less than or equal to 13.1 seconds.
289R3.82	The horizontal position of the A/V shall (289R3.82) be transmitted in a form that can be translated, without loss in accuracy and integrity for the reported NACP and NIC codes, into latitude and longitude referenced to WGS-84 ellipsoid.
289R3.83	Horizontal position communicated shall (289R3.83) support the full range of possible latitudes (-90° to +90°) and longitudes (-180° to +180°).
289R3.84	The validity of the horizontal position information shall (289R3.84) be transmitted.

Shall #	Working Draft of DO-289A Requirement
289R3.85	Horizontal position shall (289R3.85) be communicated and reported with a resolution sufficiently fine that it does not compromise the accuracy reported in the NACP code.
289R3.86	The transmitted ADS-B horizontal position shall (289R3.86) be corrected to this reference position when necessary to achieve the reported accuracy and containment in the NAC _P and NIC values.
289R3.87	When the transmitted position is either not corrected to the Surveillance Position Reference Point or is corrected with potential compensation uncertainties or errors, the resulting error in position shall (289R3.87) be included in the NAC _P and NIC values that are reported.
289R3.88	The horizontal velocity with respect to WGS-84 coordinates of the A/V shall (289R3.88) be transmitted.
289R3.89	If the velocity is represented in polar coordinates (speed and track angle) then the track angle shall (289R3.89) be referenced to true north.
289R3.90	The validity of the horizontal velocity information shall (289R3.90) be transmitted.
289R3.91	Horizontal velocity shall (289R3.91) be provided with a range to accommodate speeds of up to 4000 knots for airborne participants and up to 250 knots for surface participants.
289R3.92	Horizontal velocity shall (289R3.92) be communicated and reported with a resolution sufficiently fine that it does not compromise the accuracy reported in the NAC _V code.
289R3.93	The ground speed of an A/V that is known to be on the surface shall (289R3.93) be transmitted.
289R3.94	For A/Vs moving at ground speeds less than 70 knots, the ground speed shall (289R3.94) be reported with a resolution of 1 knot or finer.
289R3.95	Moreover, the resolution reported shall (289R3.95) be sufficiently fine so as to not compromise the accuracy of that speed as communicated in the NAC _V value.
289R3.96	Ground speed shall (289R3.96) be provided with a range to accommodate speeds of up to 250 knots for surface operations.
289R3.97	Geometric Altitude (height above the WG84 ellipsoid) and pressure altitude shall (289R3.97) both be transmitted, if available to the ASA Transmit subsystem, except when an A/V is operating on the airport surface and is indicating that it is on the surface.
289R3.98	Altitude shall (289R3.98) be provided with a range from -1,000 ft up to +100,000 ft.
289R3.99	For fixed or movable obstacles the Altitude of the highest point shall (289R3.99) be transmitted.
289R3.100	When only one Altitude type (Geometric Altitude or Pressure Altitude) is available, the update interval requirement in row #11 of Table 2-3 shall (289R3.100) apply to that Altitude type.
289R3.101	Therefore, when NAC _P is > 9, the SV receive interval requirements of Table 2-3 shall (289R3.101) be based on the receipt of Geometric Altitude measurements.
289R3.102	The Geometric Altitude of the A/V, when available, shall (289R3.102) be transmitted as the shortest distance from the current aircraft position to the surface of the WGS-84 ellipsoid.
289R3.103	Geometric Altitude shall (289R3.103) be indicated as positive for positions above the WGS-84 ellipsoid surface, and negative for positions below that surface.
289R3.104	The validity of the Geometric Altitude information shall (289R3.104) be transmitted.

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289R3.105	Geometric Altitude shall (289R3.105) be communicated and reported with a resolution sufficiently fine that it does not compromise the vertical accuracy reported in the NACP code.
289R3.106	The Pressure Altitude of the A/V shall (289R3.106) be transmitted referenced to standard temperature and pressure.
289R3.107	The Pressure Altitude transmitted shall (289R3.107) be derived from the same source as the Pressure Altitude reported in Mode C or Mode S transmissions for aircraft equipped with both transponders and ADS-B.
289R3.108	The validity of the Pressure Altitude information shall (289R3.108) be transmitted.
289R3.109	If a Pressure Altitude source with 25 foot or better resolution is available to the ADS-B transmitting subsystem, then Pressure Altitude from that source shall (289R3.109) be communicated and reported with 25 foot or finer resolution.
289R3.110	Otherwise, if a Pressure Altitude source with 100 foot or better resolution is available, Pressure Altitude from that source shall (289R3.110) be communicated and reported with 100 foot or finer resolution.
289R3.111	A/Vs that are not fixed or movable obstacles and that are not known to be on the airport surface shall (289R3.111) provide vertical rate.
289R3.112	Vertical Rate shall (289R3.112) be designated as climbing or descending and shall (289R3.113) be reported up to 32,000 feet per minute (fpm).
289R3.113	Vertical Rate shall (289R3.112) be designated as climbing or descending and shall (289R3.113) be reported up to 32,000 feet per minute (fpm).
289R3.114	The validity of the vertical rate information shall (289R3.114) be transmitted.
289R3.115	At least one of the two types of vertical rate (barometric and geometric) shall (289R3.115) be transmitted.
289R3.116	An indication of which type of altitude rate is being transmitted shall (289R3.116) be provided.
289R3.117	Geometric vertical rate shall (289R3.117) be communicated and reported with a resolution sufficiently fine that it does not compromise the accuracy reported in the NACV code.
289R3.118	Barometric vertical rate shall (289R3.118) be communicated with a resolution sufficiently fine that it does not compromise the accuracy of the barometric vertical rate source.
289R3.119	An A/V on the surface (other than a fixed or movable obstacle) shall (289R3.119) provide an indication of its directionality (either heading or ground track angle).
289R3.120	Heading shall (289R3.120) be indicated as an angle measured clockwise from true north or magnetic north.
289R3.121	An indication shall (289R3.121) be provided as to whether the heading is referenced true north or magnetic north.
289R3.122	The heading transmitted shall (289R3.122) support the full range of possible headings (full circle from 0° to nearly 360°).
289R3.123	The heading of surface participants shall (289R3.123) be communicated with a resolution of 6° of arc or finer.
289R3.124	The accuracy (95%) of the heading source shall (289R3.124) be ±10° or better.
289R3.125	The validity of the heading information shall (289R3.125) be transmitted.
289R3.126	Track angle shall (289R3.126) be referenced to true north.
289R3.127	The track angle shall (289R3.127) be communicated with a resolution of 6° of arc or finer.
289R3.128	The validity of the track angle information shall (289R3.128) be transmitted.

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289R3.129	The accuracy (95%) of the track angle source shall (289R3.129) be $\pm 10^\circ$ or better; otherwise, the track angle shall (289R3.130) be indicated as invalid.
289R3.131	Table 3-5 defines the navigation integrity categories that transmitting ADS B participants shall (289R3.131) use to describe the integrity containment region associated with the geometric position information in ADS B messages.
289R3.132	The ADS-B transmitting subsystem shall (289R3.132) use own aircraft's air/ground state to affect which surveillance elements are to be broadcast.
289R3.133	The air/ground state shall (289R3.133) be broadcast in ADS-B messages to other participants.
289R3.134	The ASA Transmit subsystem shall (289R3.134) convey an aircraft Call Sign or Flight ID of up to 8 alphanumeric characters in length.
289R3.135	The ASA Transmit subsystem shall (289R3.135) transmit a unique address as defined below, that enables a user to:
289R3.136	The ASA Transmit subsystem shall (289R3.136) transmit either the ICAO 24-bit addressed assigned to the A/V or another kind of address that is unique within the operational domain, as determined by the A/V Address Qualifier.
289R3.137	The A/V Address Qualifier shall (289R3.137) be used to describe whether or not the A/V Address contains the 24-bit ICAO address for the A/V or another kind of address.
289R3.138	The ASA Transmit subsystem shall (289R3.138) transmit an Emitter Category code.
289R3.139	The Emitter Category transmitted shall (289R3.139) be one of the following A/V types:
289R3.140	The ASA Transmit subsystem shall (289R3.140) transmit codes that identify the A/V Length and Width, per Table 3-2 in §3.1.2.3.2, when the A/V code is 2 or more and the A/V is known to be on the surface.
289R3.141	Table 3-6 defines the navigation accuracy categories that shall (289R3.141) be used to describe the accuracy of positional information in ADS B messages from transmitting ADS B participants.
289R3.142	The velocity accuracy category of the least accurate velocity component being supplied by the reporting A/V's source of velocity data shall (289R3.142) be as indicated in Table 3-7.
289R3.143	The Source Integrity Limit encoding shall (289R3.143) be as indicated in Table 3-8.
289R3.144	The Barometric Altitude Quality code, BAQ, shall (289R3.144) indicate the accuracy quality of the pressure altitude transmitted and shall (289R3.145) be encoded as defined in Table 3-9.
289R3.145	The Barometric Altitude Quality code, BAQ, shall (289R3.144) indicate the accuracy quality of the pressure altitude transmitted and shall (289R3.145) be encoded as defined in Table 3-9.
289R3.146	The Barometric Altitude Integrity Level code, SIL _{BARO} , shall (289R3.146) indicate the undetected error rate of the barometric altitude data source equipment and shall (289R3.147) be encoded as defined in Table 3-10.
289R3.147	The Barometric Altitude Integrity Level code, SIL _{BARO} , shall (289R3.146) indicate the undetected error rate of the barometric altitude data source equipment and shall (289R3.147) be encoded as defined in Table 3-10.
289R3.148	The True/Magnetic Heading flag shall (289R3.148) indicate that the reported heading is referenced to true north or that the reported heading is referenced to magnetic north.
289R3.149	The Vertical Rate Type flag shall (289R3.149) indicate that the reported vertical rate is rate of change of pressure altitude or that the reported vertical rate is rate of change of geometric altitude.

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289R3.150	The ADS-B transmitting subsystem shall (289R3.150) provide for the transmission of Transmit Quality Level codes as defined in §3.1.2.1.
289R3.151	The ADS-B transmitting subsystem shall (289R3.151) provide for the transmission of ASA Capability Level codes as defined in §2.4.1.
289R3.151-A	The ADS-B transmitting subsystem shall (289R3.151-A) transmit a version number.
289R3.151-B	It shall (289R3.151-B) be possible to correlate the received version number to an ASA version number.
289R3.152	The ADS-B transmitting subsystem shall (289R3.152) provide for the transmission of operational mode parameters.
289R3.152-A	The ADS-B transmitting subsystem shall (289R3.152-A) support the transmission of application specific information elements for ACLs or applications requiring such data.
289R3.153	The ASA surveillance data link (i.e., ADS-B, TIS-B) RF medium shall (289R3.153) be suitable for all-weather operation.
289R3.154	Radio frequencies used for ASA surveillance message transmission shall (289R3.154) operate in an internationally allocated aeronautical radionavigation band(s).
289R3.155	The ASA surveillance data link medium shall (289R3.155) be able to support air-to-air and air-to-ground transmission and reception of data for ADS-B systems and ground-to-air transmission and reception of data for TIS-B systems.
289R3.156	Messages shall (289R3.156) be encoded such that the transmitting system of the message (i.e., ADS-B, TIS-B) can be identified.
289R3.157	Further, every system shall (289R3.157) convey the installed version number to which it complies.
289R3.158	All data link systems supporting a particular ASA Capability Level shall (289R3.158) meet those performance requirements.
289R3.159	The data transmitted by an ASA participant shall (289R3.159) be of sufficient quality (as specified in Table 2-3) to support those applications that the ASA participant can perform as indicated by its ASA Capability Level.
289R3.160	ADS-B data link equipment supporting the Basic and Intermediate ASA Capability Levels shall (289R3.160) meet all performance requirements specified in Table 2-3 (requirements 11 through 18) for the high density traffic scenarios Core Europe 2015 (§3.2.2.1.1) and LA 2020 (§3.2.2.2.2), as defined below.
289R3.161	For each ASA Capability Level defined in this MASPS, the data link shall (289R3.161) acquire all ID/Status and State data 95% of the time in the head-on scenario for the appropriate air traffic density model(s) at the farthest operational range specified in Table 2-3 for the Coverage Volume requirement (row 18).
289R3.162	For each ASA Capability Level, the data link shall (289R3.162) meet the most stringent requirements shown in Table 2-3 for Update Interval (requirement #11) within the operational range specified by the Coverage Volume requirement (#18) at the percentile specified by the confidence level requirement (#13) for all State data.
289R3.163	The ADS-B data link shall (289R3.163) provide sufficiently fine resolution so as not to degrade the accuracy values specified in §3.1
289R3.164	For each ASA Capability Level, the data link shall (289R3.164) meet the latency requirements specified in Table 3-12, between interfaces C1 to E and C2 to E as depicted in Figure 2-6.
289R3.165	The ADS-B / TIS-B receive subsystem shall (289R3.165) receive link dependent messages from all ADS-B / TIS-B Transmit subsystems within coverage volume as per §3.2.

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289R3.166	The ADS-B / TIS-B receiver shall (289R3.166) assemble ADS-B and TIS-B reports, containing State Data (see Table 3-18) and ID/Status (Table 3-18), and when required, application specific information for all received data.
289R3.167	The appropriate ADS-B report shall (289R3.167) be updated and made available to ASSAP each time any new (changed) information is received for an A/V across the ADS-B / TIS-B link.
289R3.168	The continuity risk and integrity risk requirements of Table 3-13 shall (289R3.168) be met by the ADS-B/TIS-B receiver subsystem.
289R3.169	ASSAP shall (289R3.169) provide a tracking function.
289R3.170	The tracking function shall (289R3.170) maintain, for each A/V under track, a file that contains, at a minimum, the elements listed in Table 3-4.
289R3.171	The tracking function shall (289R3.171) determine all fields in Table 3-4 that are not directly provided in measurements.
289R3.172	The tracking function shall (289R3.172) include a correlation function that associates traffic data from different surveillance sources that relate to the same aircraft/vehicle track, i.e., the correlation function is required to associate and cross-reference traffic data from ADS-B traffic, TIS-B traffic, and TCAS traffic
289R3.173	The correlation function shall (289R3.173) update traffic cross references when new information is available from the ADS-B/TIS-B receive subsystem or TCAS.
289R3.174	The tracking function shall (289R3.174) include an estimation function that estimates track state based on one or more surveillance source inputs.
289R3.175	ASSAP surveillance processing shall (289R3.175) optimize the quality of the information best suited to the applications being run (e.g., accuracy, integrity containment bound, or integrity containment risk).
289R3.176	ASSAP shall (289R3.176) estimate the quality of the track state information that is maintained in the track file, and maintain quality measures for the track state information, as indicated in Table 3-15.
289R3.177	The tracking function shall (289R3.177) initiate a track for each observed A/V when sufficient measurement information is received to form a minimum track state.
289R3.178	The tracking function shall (289R3.178) terminate a track when the maximum coast interval (Table 2-3, row 17) has been exceeded for all of the applications for which the track is potentially being used.
289R3.179	Correlation of TCAS data: If TCAS data is to be integrated on the CDTI, ASSAP shall (289R3.179) correlate the TCAS tracks with its internal tracks to the extent practicable.
289R3.180	For correlated TCAS tracks, ASSAP shall (289R3.180) recognize if a track has an active TCAS resolution advisory or traffic advisory, and shall (289R3.181) provide that information in the track file (see Table 3-4).
289R3.181	For correlated TCAS tracks, ASSAP shall (289R3.180) recognize if a track has an active TCAS resolution advisory or traffic advisory, and shall (289R3.181) provide that information in the track file (see Table 3-4).
289R3.182	The probability of mismatching TCAS/ADS-B tracks, or not matching TCAS/ADS-B tracks, should be minimized (the criterion for minimizing shall (289R3.182) be defined in the ASAS MOPS).
289R3.183	Therefore, ASSAP surveillance processing shall (289R3.183) cross-correlate the traffic from TIS-B and ADS-B reports supplied by the ADS-B receiver.

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289R3.184	The probability of mismatching TIS-B/ADS-B tracks, or not matching TIS-B/ADS-B tracks, should be minimized (the criterion for minimizing shall (289R3.184) be defined in the ASAS MOPS).
289R3.185	ADS-B / ADS-B correlation: if the aircraft ADS-B installation includes multiple ADS-B links, ASSAP surveillance processing shall (289R3.185) correlate (cross-reference) traffic from the different links and associate the traffic with the appropriate ASSAP track.
289R3.185-A	The ASSAP shall (289R3.185-A) assess the TQL and ACL from all A/Vs to determine the ability of those A/Vs' equipment and broadcast data to support the installed applications.
289R3.186	ASSAP shall (289R3.186) provide current traffic state position information to the interface with the CDTI with at least a 1 Hz rate.
289R3.187	ASSAP shall (289R3.187) make ASSAP track reports available to the CDTI for all active applications.
289R3.188	ASSAP shall (289R3.188) deliver track reports to the CDTI for all aircraft of sufficient quality for at least enhanced visual acquisition, extrapolated to a common time that is within 1 second of the time the data is delivered to the CDTI, with at least a 1 Hz rate.
289R3.189	In this case, ASSAP shall (289R3.189) estimate the velocity accuracy, and use the estimated value to determine traffic qualification as appropriate as indicated by Table 2-3.
289R3.190	The horizontal position of the target track relative to own-ship shall (289R3.190) be computed by applying the appropriate coordinate transformations between the track's latitude and longitude and own-ship's latitude and longitude and the display coordinates.
289R3.191	Supported application shall (289R3.191) indicate the ASA Capability Level of the target track, and shall (289R3.192) indicate any optional applications that are being processed for the track (i.e., CD, ASSA, FAROA).
289R3.192	Supported application shall (289R3.191) indicate the ASA Capability Level of the target track, and shall (289R3.192) indicate any optional applications that are being processed for the track (i.e., CD, ASSA, FAROA).
289R3.193	The degraded data field shall (289R3.193) indicate if the data is considered to be degraded for an active application.
289R3.194	The selected target closure rate shall (289R3.194) indicate the radial line of sight closure rate between own-ship and the selected target.
289R3.195	ASSAP track quality (§3.3.2.1.1) shall (289R3.195) be compared with acceptable values for basic and intermediate applications, as per Table 2-3.
289R3.196	If the sole surveillance source of information is ADS-B or TIS-B, the track quality assessment shall (289R3.196) be based on the transmit quality level (TQL) transmitted by the source and, for TQL > 1, the NIC, NAC _p , NAC _v , and SIL requirements specified in Table 2-3.
289R3.197	The ASSAP track report shall (289R3.197) be updated to reflect any degraded condition for EVAcq or ASSA/FAROA, as appropriate, as per Table 2-3.
289R3.198	The ASSAP track report shall (289R3.198) indicate if the track's quality is insufficient for a basic application.
289R3.199	If the installed system has the option for conflict detection (CD), ASSAP shall (289R3.199) determine if each track is eligible for CD processing, as per Table 2-3.

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289R3.200	Each track that is eligible for CD shall (289R3.200) be processed by the CD alerting function, and CAZ alerts or CDZ alerts shall (289R3.201) be issued as appropriate.
289R3.201	Each track that is eligible for CD shall (289R3.200) be processed by the CD alerting function, and CAZ alerts or CDZ alerts shall (289R3.201) be issued as appropriate.
289R3.202	ASSAP shall (289R3.202) include in the ASSAP track report the status of the CAZ alert and the CDZ alert.
289R3.203	a. The ASA MASPS version number (§3.1.5.24) shall (289R3.203) be used to coordinate applications processing appropriately for the version combination on own-ship and the target ship.
289R3.204	b. Call Sign / Flight ID shall (289R3.204) be included in the ASSAP track file (Table 3-15) and shall (289R3.205) be provided to the CDTI in the ASSAP/CDTI report (Table 3-16).
289R3.205	b. Call Sign / Flight ID shall (289R3.204) be included in the ASSAP track file (Table 3-15) and shall (289R3.205) be provided to the CDTI in the ASSAP/CDTI report (Table 3-16).
289R3.206	c. ASA Category shall (289R3.206) be forwarded to the CDTI.
289R3.207	d. A/V length and width codes shall (289R3.207) be forwarded to the CDTI.
289R3.208	e. Emergency / priority status shall (289R3.208) be forwarded to the CDTI.
289R3.209	f. ASSAP shall (289R3.209) convert heading from true or magnetic heading to the appropriate orientation for consistent display on the CDTI.
289R3.210	Latency for the combination of ASSAP and the CDTI (interface E to interface G in Figure 2-7) shall (289R3.210) be less than 400 ms for targets that are used by coupled applications, targets against which there is an alert, and the 10 highest priority targets.
289R3.211	For all other targets, data latency shall (289R3.211) be less than 1 second.
289R3.212	ASSAP shall (289R3.212) achieve the subsystem integrity risk and continuity risk requirements listed in Table 3-17.
289R3.213	All data indicated by a dot (•) shall (289R3.213) be provided to the ASSAP function, with the exception of those items labeled “future.”
289R3.214	For these configurations, the data items in the following subparagraphs shall (289R3.214) be provided to ASSAP for each TCAS track that is to be displayed.
289R3.215	The RA Active flag indicates that a TCAS Resolution Advisory is currently in progress for the track; ASSAP shall (289R3.215) accept an RA active flag from the TCAS equipment.
289R3.216	The TA active flag indicates that a Traffic Advisory is currently in progress for the track; ASSAP shall (289R3.216) accept a TA active flag from the TCAS equipment.
289R3.217	ASSAP shall (289R3.217) provision for the acceptance of these parameters.
289R3.218	The CDTI shall (289R3.218) display the position of traffic relative to the own-ship and relative to any displayed underlying surface map.
289R3.219	The following features shall (289R3.219) be continuously displayed, except when other traffic display criteria (§3.3.3.1.3.1) are being applied:
289R3.220	The requirements in the corresponding sub-sections shall (289R3.220) be met for any feature that is implemented.
289R3.221	It shall (289R3.221) be possible for the flight crew to adjust the CDTI display range / map scale.

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289R3.222	The minimum CDTI display range shall (289R3.222) be 10 NM or less in the direction of own-ship travel, from the own-ship position to the edge of the field of view on the CDTI display.
289R3.223	The maximum CDTI display range shall (289R3.223) be 40 NM or more in the direction of own-ship travel, from the own-ship position to the edge of the field of view on the CDTI display.
289R3.224	If the CDTI function is being displayed simultaneously with another display function on a shared multifunction display (MFD), the display range / map scale of the CDTI subsystem shall (289R3.224) be the same as the display range / map scale for that other display function that shares the same MFD.
289R3.225	For installations in which the Airport Surface Situational Awareness (ASSA) or Final Approach and Runway Occupancy Awareness (FAROA) application is supported, the CDTI shall (289R3.225) be capable of a reduced display range of 1.0 NM or less in the direction of own-ship travel, as measured from the own-ship position to the edge of the field of view on the CDTI display.
289R3.226	An indication of the currently selected CDTI display range or map scale shall (289R3.226) be shown on the CDTI display.
289R3.227	The CDTI shall (289R3.227) be capable of orienting its display in at least one of the following ways:
289R3.228	An indication of the value of the current own-ship CDTI display orientation (e.g., the value of the own-ship heading if in heading-up mode, or the value of the own-ship track angle if in track-up mode) shall (289R3.228) be continuously provided on the CDTI display.
289R3.229	CDTI installations that support the FAROA application shall (289R3.229) provide a graphical depiction of runways.
289R3.230	CDTI installations that support the ASSA application shall (289R3.230) provide a graphical depiction of the airport surface including runways and taxiways, and may include other features.
289R3.231	CDTI installations that support the FAROA application shall (289R3.231) be capable of depicting either (a) extended runway center lines or (b) the final approach path.
289R3.232	CDTI installations that support the CD application shall (289R3.232), and those that support the ACM application will, provide for the display of the currently selected value of the ANSD.
289R3.233	CDTI installations that support the CD application shall (289R3.233), and those that support the ACM will, provide an indication as to whether the low-level alert is disabled.
289R3.234	The traffic display shall (289R3.234) have a symbol representing the location of the own-ship.
289R3.235	The own-ship symbol shall (289R3.235) be distinctive from all other symbols.
289R3.236	The CDTI shall (289R3.236) display a symbol for traffic about which the ASSAP subsystem provides reports that meet the traffic display criteria.
289R3.237	The depiction of traffic on the CDTI display shall (289R3.237) convey the following information elements to the flight crew:
289R3.238	The CDTI display shall (289R3.238) provide an indication of which specific traffic, if any, has been designated by the flight crew as the selected target.
289R3.239	In any CDTI installation that supports a coupled application, the CDTI display shall (289R3.239) provide some means of distinguishing coupled traffic from other traffic.
289R3.240	Any CDTI installation shall (289R3.240) include a means to indicate which traffic is of degraded quality (see Table 2-3).

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289R3.241	Also, any CDTI installation that supports the Intermediate or above ASA Capability Level shall (289R3.241) provide a means to indicate which specific traffic are providing information of sufficient quality to support any of the installed coupled applications.
289R3.242	Regardless of any traffic display criteria which the flight crew may have selected, the CDTI shall (289R3.242) indicate any traffic for which the ASSAP subsystem or TCAS/ACAS has determined that an alert (§3.3.3.1.6) is active.
289R3.243	The CDTI shall (289R3.243) show the positions of all displayed traffic at the same time of applicability.
289R3.244	As a minimum requirement, CDTI installations that support the CD application and those that support the Intermediate or above ASA Capability Level shall (289R3.244) be capable of depicting the traffic ID.
289R3.245	Such CDTI installations shall (289R3.245) be capable of displaying traffic IDs of up to eight alphanumeric characters.
289R3.246	The traffic identification information for given traffic shall (289R3.246) be associated visually with the symbol for that traffic.
289R3.247	A CDTI installation that supports the ASSA or FAROA application shall (289R3.247) accept aircraft/vehicle length and width codes from A/Vs on the surface and use them when depicting those A/Vs, at least when display range / map scale is such that the extent of an A/V, at map scale, is comparable to the size of the symbol used to represent that A/V on the display.
289R3.248	The CDTI shall (289R3.248) accept horizontal position information (e.g., latitude and longitude, or range and bearing from own-ship) for traffic to be displayed and use that information to position the depictions of traffic on its display.
289R3.249	The CDTI shall (289R3.249) position traffic symbols at a location on its display representing the traffic's range and bearing with respect to the own-ship.
289R3.250	If traffic is depicted together with a map, the depictions of traffic shall (289R3.250) be placed at their correct geographical positions on that map.
289R3.251	CDTI installations shall (289R3.251) be capable of depicting the air/ground state (airborne or on the surface) of traffic.
289R3.252	CDTI installations shall (289R3.252) be capable of displaying the relative altitude of traffic.
289R3.253	Altitude values shall (289R3.253) be displayed for airborne traffic.
289R3.254	Altitudes for traffic simultaneously displayed shall (289R3.254) be consistent, the altitudes of all traffic and of the own-ship being displayed either as relative altitude or actual altitude.
289R3.255	The CDTI shall (289R3.255) be capable of indicating which traffic is climbing or descending at a rate greater than the specified threshold.
289R3.256	CDTI installations that support the Intermediate or above ASA Capability Level shall (289R3.256) be capable of depicting the magnitude and direction of the horizontal velocity of traffic.
289R3.257	The traffic horizontal velocity shall (289R3.257) be with respect to the surface of the earth, or with respect to a coordinate system, such as WGS-84, that is fixed with respect to the surface of the earth.
289R3.258	When horizontal velocity vector is displayed, units of measurement shall (289R3.258) be the same between all displayed traffic and own-ship.
289R3.259	CDTI installations that support the ASSA and FAROA applications shall (289R3.259) be capable of indicating the heading of traffic for which heading information is available.

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289R3.260	CDTI installations shall (289R3.260) be capable of highlighting the depictions of selected targets.
289R3.261	CDTI installations that support the Intermediate or Advanced ASA Capability Level shall (289R3.261) be capable of displaying the Traffic Identification (§3.3.3.3.1.2.2) of selected targets.
289R3.262	CDTI installations that support the Intermediate or Advanced ASA Capability Level shall (289R3.262) be capable of displaying the Traffic Category (§3.3.3.1.4.3) of the selected target.
289R3.263	CDTI installations that support the Intermediate or above ASA Capability Level shall (289R3.263) be capable of displaying the ground speed of the selected target.
289R3.264	CDTI installations that support the Intermediate or above ASA Capability Level shall (289R3.264) be capable of displaying the range from the own-ship to the selected target.
289R3.265	CDTI installations that support the Intermediate or above ASA Capability Levels shall (289R3.265) be capable of displaying the closure rate of the selected target.
289R3.266	If the selected target is beyond the currently selected display range, an indicator shall (289R3.266) show the bearing of the selected target from the own-ship.
289R3.267	CDTI installations that support the Conflict Detection (CD) application or that support the Intermediate or above ASA Capability Level shall (289R3.267) provide some means, (for example, a distinct alerted traffic symbol) of distinguishing the traffic that is that is causing an alert from other traffic that are represented on the CDTI display.
289R3.268	CDTI installations that support the CD application (in the Basic ASA Capability Level) or that support the Advanced ASA Capability Level shall (289R3.268) provide off-display alerted traffic bearing indicator.
289R3.269	CDTI installations that include the CD option shall (289R3.269) be capable of displaying alerts to the flight crew.
289R3.269-A	TCAS/ACAS alerts shall (289R3.269-A) have priority over all ASA alerts.
289R3.270	The CDTI shall (289R3.270) support the display at least 30 traffic symbols.
289R3.271	The CDTI shall (289R3.271) achieve the subsystem integrity risk and continuity risk requirements listed in Table 3-20.
289R3.271b	The ASSAP subsystem shall (289R3.272) provide to the CDTI, and the CDTI subsystem shall (289R3.271b) accept from the ASSAP subsystem, a unique ASSAP track ID for traffic to be displayed.
289R3.272	The ASSAP subsystem shall (289R3.272) provide to the CDTI, and the CDTI subsystem shall (289R3.271b) accept from the ASSAP subsystem, a unique ASSAP track ID for traffic to be displayed.
289R3.272b	In any CDTI installation that supports the CD application or that supports the Intermediate or above ASA Capability Level, the ASSAP subsystem shall (289R3.273) be capable of providing, and the CDTI subsystem shall (289R3.272b) be capable of accepting from the ASSAP subsystem, the traffic ID for all traffic to be displayed.
289R3.273	In any CDTI installation that supports the CD application or that supports the Intermediate or above ASA Capability Level, the ASSAP subsystem shall (289R3.273) be capable of providing, and the CDTI subsystem shall (289R3.272b) be capable of accepting from the ASSAP subsystem, the traffic ID for all traffic to be displayed.
289R3.273b	Any CDTI installation that supports the Intermediate or Advanced ASA Capability Level, the ASSAP subsystem shall (289R3.274), and basic CDTI installations should, be capable of providing, and the CDTI subsystem shall (289R3.273b) be capable of accepting from the ASSAP subsystem, the traffic category for traffic to be displayed.

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289R3.274	Any CDTI installation that supports the Intermediate or Advanced ASA Capability Level, the ASSAP subsystem shall (289R3.274), and basic CDTI installations should, be capable of providing, and the CDTI subsystem shall (289R3.273b) be capable of accepting from the ASSAP subsystem, the traffic category for traffic to be displayed.
289R3.274b	In any CDTI installation that supports the ASSA or FAROA application, the ASSAP subsystem shall (289R3.275) be capable of providing, and the CDTI subsystem shall (289R3.274b) be capable of accepting from the ASSAP subsystem, the A/V Length/Width Codes for traffic on the airport surface.
289R3.275	In any CDTI installation that supports the ASSA or FAROA application, the ASSAP subsystem shall (289R3.275) be capable of providing, and the CDTI subsystem shall (289R3.274b) be capable of accepting from the ASSAP subsystem, the A/V Length/Width Codes for traffic on the airport surface.
289R3.275b	The ASSAP subsystem shall (289R3.276) provide to the CDTI subsystem, and the CDTI subsystem shall (289R3.275b) accept from the ASSAP subsystem, the horizontal positions of traffic to be displayed.
289R3.276	The ASSAP subsystem shall (289R3.276) provide to the CDTI subsystem, and the CDTI subsystem shall (289R3.275b) accept from the ASSAP subsystem, the horizontal positions of traffic to be displayed.
289R3.277	The horizontal positions of traffic shall (289R3.277) be at a common time of applicability for all traffic to be displayed.
289R3.278	In installations that support the Intermediate and above ASA Capability Levels, the ASSAP subsystem shall (289R3.278) be capable of providing, and the CDTI subsystem shall (289R3.277b) be capable of accepting from the ASSAP subsystem, horizontal velocity information about traffic to be displayed.
289R3.279	In such installations, the ASSAP subsystem shall (289R3.279) provide the CDTI subsystem with horizontal velocity information all traffic for which it has that information.
289R3.280	The traffic horizontal velocity shall (289R3.280) be velocity with respect to the surface of the earth, or with respect to a coordinate system, such as WGS-84, that is fixed with respect to the surface of the earth.
289R3.280b	The ASSAP subsystem shall (289R3.281) be capable of providing, and the CDTI subsystem shall (289R3.280b) be capable of accepting from the ASSAP subsystem, pressure altitude information about airborne traffic to be displayed.
289R3.281	The ASSAP subsystem shall (289R3.281) be capable of providing, and the CDTI subsystem shall (289R3.280b) be capable of accepting from the ASSAP subsystem, pressure altitude information about airborne traffic to be displayed.
289R3.282	If the Actual Altitude feature is implemented then the ASSAP subsystem shall (289R3.282) be capable of providing and the CDTI subsystem shall (289R3.281b) be capable of accepting from the ASSAP subsystem the local pressure setting of the own-ship.
289R3.282b	The ASSAP subsystem shall (289R3.283) be capable of providing, and the CDTI subsystem shall (289R3.282b) be capable of accepting from the ASSAP subsystem, geometric altitude information about airborne traffic to be displayed.
289R3.283	The ASSAP subsystem shall (289R3.283) be capable of providing, and the CDTI subsystem shall (289R3.282b) be capable of accepting from the ASSAP subsystem, geometric altitude information about airborne traffic to be displayed.
289R3.283b	The ASSAP subsystem shall (289R3.284) be capable of providing, and the CDTI subsystem shall (289R3.283b) be capable of accepting from the ASSAP subsystem, information about the directionality of traffic to be displayed.
289R3.284	The ASSAP subsystem shall (289R3.284) be capable of providing, and the CDTI subsystem shall (289R3.283b) be capable of accepting from the ASSAP subsystem, information about the directionality of traffic to be displayed.

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289R3.285	For traffic, this directionality information shall (289R3.285) include:
289R3.286	The ASSAP subsystem shall (289R3.286) be capable of providing, and the CDTI subsystem shall (289R3.285b) be capable of accepting from the ASSAP subsystem, an indication of the quality of the directionality information provided for traffic to be displayed.
289R3.287	This indication shall (289R3.287) provide for at least three conditions, as follows:
289R3.287b	The ASSAP subsystem shall (289R3.288) provide to the CDTI, and the CDTI subsystem shall (289R3.287b) accept from the ASSAP subsystem, an indication of the usability of information about displayed traffic for the currently selected ASSAP application or applications.
289R3.288	The ASSAP subsystem shall (289R3.288) provide to the CDTI, and the CDTI subsystem shall (289R3.287b) accept from the ASSAP subsystem, an indication of the usability of information about displayed traffic for the currently selected ASSAP application or applications.
289R3.289	This indication shall (289R3.289) provide for at least three conditions, as follows:
289R3.289b	The ASSAP subsystem shall (289R3.290) provide to the CDTI, and the CDTI subsystem shall (289R3.289b) accept from the ASSAP subsystem, for traffic to be displayed, an indication of whether or not that traffic is suitable for use with the coupled applications supported by that CDTI installation.
289R3.290	The ASSAP subsystem shall (289R3.290) provide to the CDTI, and the CDTI subsystem shall (289R3.289b) accept from the ASSAP subsystem, for traffic to be displayed, an indication of whether or not that traffic is suitable for use with the coupled applications supported by that CDTI installation.
289R3.291	Alerts shall (289R3.291) be provided to the CDTI with an appropriate indication of the associated ASSAP track, that is, of the associated traffic to which the alert refers.
289R3.292	For this version of the ASA MASPS, CAZ and CDZ alerts shall (289R3.292) be issued as required by ASSAP if the optional CD application is implemented.
289R3.293	When only TCAS information is available for traffic, i.e., the TCAS traffic is not correlated with ADS-B/TIS-B traffic, then that traffic shall (289R3.293) be designated on the display using the TCAS symbology and display requirements of §2.2.6.1.2.1.3 in [RTCA DO-185A].
289R3.294	When both TCAS/ADS-B and TCAS/TIS-B traffic data are correlated, only a single representation of the traffic shall (289R3.294) be displayed.