Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, D.C.

TSO-C195c

Effective
Date: XX/XX/XXXX

Technical Standard Order

Subject: ***Avionics Supporting Automatic Dependent Surveillance – Broadcast (ADS-B) Aircraft Surveillance Applications (ASA)***

1. PURPOSE. This technical standard order (TSO) is for manufacturers applying for a TSO authorization (TSOA) or letter of TSO design approval (LODA). In it, we (the Federal Aviation Administration, (FAA)) tell you what minimum performance standards (MPS) your ADS-B ASA systems and equipment must meet for approval and identification with the applicable TSO marking.

2. APPLICABILITY. This TSO affects new applications submitted after its effective date.

a. TSO-C195b will also remain effective until {insert date 18 months after publication date}. After this date, we will no longer accept applications for TSO-C195b.

b. ADS-B ASA equipment approved under TSO-C195b may still be manufactured under the provisions of its original approval. The FAA recommends that ADS-B ASA equipment produced under TSO-C195b incorporate either the ADS-B Traffic Advisory System (ATAS) application (Table 1, Application (7) of TSO-C195b), or an interface to Traffic Advisory System (TAS), Traffic Alert and Collision Avoidance System (TCAS), or Airborne Collision Avoidance System (ACAS-X) equipment as described in paragraph **3.a.(4)** of this TSO; and that ATAS provide alerts on Non-Altitude Reporting (NAR) traffic using geometric-to-geometric traffic relative altitude computation in accordance with RTCA/DO-317B, Section 2.2.4.5.2.

Note: For equipment produced under this TSO (except for CDTI (Surface Only) Equipment Class A identified in Table 1 of this TSO), incorporation of the ATAS application (or interface with TAS, TCAS, or ACAS-X) and NAR alerting functionality as recommended above for TSO-C195b are *mandatory*, as specified in paragraphs **3.a.(8)** and **3.a.(10)** below. The FAA's intent is that all ADS-B ASA equipment installed in fixed-wing aircraft provide and utilize a means of alerting the flight crew to predicted traffic conflicts (see Note to paragraph **3.a.(8)** of this TSO). This intent applies equally to the above-referenced new requirements of this

TSO and the above recommendations for ADS-B ASA equipment produced under TSO-C195b.

c. Effective {enter date} pursuant to title 14 of the Code of Federal Regulations (14 CFR) 21.613(a), we are considering withdrawing each TSOA and LODA that lets the holder identify or mark ADS-B ASA with TSO-C195 (original issue) or TSO-C195a. We will publish a notice of consideration of this action in the Federal Register with a request for comments.

Note: The new requirements and recommendations in this TSO for traffic conflict alerting and NAR traffic handling, and consideration of withdrawal of TSOA and LODA for TSO-C195 (original issue) and TSO-C195a are based on recent midair collision accident history. In particular, in its investigation of a recent major midair collision, the National Transportation Safety Board (NTSB) found that aural alerts that draw the pilot's attention to imminent traffic threats can significantly improve the effectiveness of these systems. These findings led to an FAA safety recommendation to require aural and visual conflict alerting functionality for an ADS-B In system. We are considering withdrawal of TSOA for TSO-C195 and TSO-C195a because those two revisions do not provide accepted standards for traffic conflict alerting functionality. TSO-C195b provides the ATAS application for traffic conflict alerting, but ATAS is an optional application under that TSO.

3. REQUIREMENTS. New models of ADS-B ASA systems and equipment identified and manufactured on or after the effective date of this TSO must meet the requirements in Section 2 of RTCA Document No. RTCA/DO-317C, *Minimum Operational Performance Standards for Aircraft Surveillance Applications System*, dated June 11, 2020, as appropriate to the functional equipment classes listed in Table 1 and Appendix 2 of this TSO. For ADS-B ASA equipment incorporating the Flight-deck Interval Management (FIM) or FIM with Data Communications applications (Table 1, Classes [21] or [22], respectively), the FIM or FIM with Data Communications application must meet the MPS qualification and documentation requirements in Section 2 of RTCA Document No. RTCA/DO-361A, *Minimum Operational Performance Standards for Flight-deck Interval Management,* dated March 26, 2020, as modified by the following sections of RTCA Document No. RTCA DO-361A Change 1, dated December 17, 2020:

- Section 2.2.2.1.1: ASSAP Input from ADS-B
- Section 2.2.4.2: Ownship Requirements for IM
- Section 2.2.4.3: Traffic Requirements for IM
- Section 2.2.4.3.3: Validation of ADS-B Version 3 Data from IM Traffic
- Section 2.2.4.4.4: Airspeed Profile
- Section 2.2.4.4.6: Predicted Wind
- Section 2.2.4.5.2.2.2: Maintain Stage – Time-based, Without an Achieve Stage
- Section 2.2.4.9: Recalculation of Ownship and Traffic Trajectories
- Section 2.3.7.1.1: Data-linked Winds and Temperatures

Functional equipment classes for this TSO are defined by the avionics equipment functionality they provide for one or more of the applications listed in Table 1 and Appendix 2.

The four equipment functionalities are Cockpit Display of Traffic Information (CDTI) (Surface Only), CDTI, Airborne Surveillance and Separation Assurance Processing (ASSAP), and ADS-B Traffic Advisory System (ATAS) Annunciator Panel. For Application Classes [1] through [8], applicable performance standards are identified by equipment class in Appendix L of RTCA/DO-317C and are based on Section 2 of RTCA/DO-317C. For Application Class [9], applicable performance standards are identified in Appendix 2 of this TSO. For Application Classes [21] and [22], applicable performance standards are identified by equipment class in Section 2.1.9 of RTCA/DO-361A and are based on Section 2 of RTCA/DO-361A. The functional equipment classes are shown in Table 1 and Appendix 2.

Table 1 – ASA Functional Equipment Classes
(Also see RTCA/DO-317C Table 2-1, Application Classes)

	Criticality		Equipment Class			
Class Number [ ] and Application	**Loss of Function (NOTE 1)**	**Hazardous & Misleading Information**	**CDTI (Surface Only) (A)**	**CDTI (B)**	**ASSAP (C)**	**ATAS Annunciator Panel (D)**
[1] Enhanced Visual Acquisition (EVAcq)	Minor	Major	Not Permitted	B1	C1	Not Permitted
[2] Basic Surface (SURF) (Runways)	Minor	Major (> 80 Knots) Minor (< 80 Knots)	A2	B2	C2	Not Permitted
[3] Basic Surface (SURF) (Runways + Taxiways)	Minor	Major (> 80 Knots) Minor (< 80 Knots)	A3	B3	C3	Not Permitted
[4] Visual Separation on Approach (VSA)	Minor	Major	Not Permitted	B4	C4	Not Permitted
[5] Basic Airborne (AIRB)	Minor	Major	Not Permitted	B5	C5	Not Permitted
[6] In-Trail Procedures (ITP)	Minor	Major	Not Permitted	B6	C6	Not Permitted
[7] ADS-B Traffic Advisory System (ATAS)	Minor	Major (NOTE 2)	Not Permitted	B7	C7	D7
[8] CDTI Assisted Visual Separation (CAVS)	Minor	Major	Not Permitted	B8	C8	Not Permitted
[21] FIM (Flight-deck Interval Management)	Minor	Major	Not Permitted	B21	C21	Not Permitted
[22] FIM with Data Communications	Minor	Major	Not Permitted	B22	C22	Not Permitted

Note 1: Excludes unannunciated loss of function resulting in display of hazardous and misleading information or unannunciated failure to provide a traffic conflict alert.

Note 2: Includes failures, including unannunciated loss of function, that result in unannunciated failure to provide a traffic conflict alert.

a. Functionality. This TSO's standards apply to equipment intended to be used in aircraft to display traffic using ADS-B message data from other aircraft. Application Classes 1 through 5, 7, and 8 in Table 1 and Application Class 9 in Appendix 2 support a pilot's see and avoid responsibility as defined by 14 CFR 91.113(b). Application Classes 21 and 22 support the flight crew's ability to precisely and consistently maintain an air traffic control (ATC) assigned time or distance based spacing from another aircraft on a defined path. Class 22 supports the capability for ATC to communicate the assignment parameters via data communication. No existing responsibility is changed by virtue of installation of this equipment.

(1) The In-Trail Procedures (ITP) application (Table 1, Class [6]) supports a new separation standard in procedural airspace. ITP enables aircraft that desire flight level changes in procedural airspace to achieve these changes on a more frequent basis, thus improving flight efficiency and safety. ITP achieves this objective by permitting a climb-through or descend-through maneuver between properly equipped aircraft, using existing separation standards in procedural airspace. When performing ITP operations, regional air traffic procedures must be observed. Crew training and operational approvals are required. Any operating limitations of the equipment must be clearly stated in the installation documents and in the airplane flight manual. If limitations have geographical boundaries, such as in polar areas, then those boundaries must be included with the relevant limitations. Additional operational guidance has been published by the FAA Flight Standards organization under AC 90-114B, *ADS-B Operations*.

(2) CAVS (Table 1, Class [8]) is an ADS-B In application that assists the flightcrew in maintaining separation from ADS-B Out-equipped aircraft during visual separation. Currently, CAVS authorization is only for the approach phase of flight when cleared by ATC to maintain visual separation from specific traffic. Because of the accuracy and integrity of displayed traffic on ADS-B In systems approved for CAVS, CAVS information may be used as a substitute for continuous visual observation of traffic-to-follow (TTF) under specified conditions. CAVS does not relieve the pilot of the responsibility to see and avoid other aircraft. ATC maintains separation responsibility from all other aircraft and for the orderly flow of traffic to the runway. CDTI traffic information does not replace any traffic advisories (TA) and/or Resolution Advisories (RA) provided by the aircraft's Traffic Alert and Collision Avoidance System (TCAS). RA response is still based on the TCAS display and approved procedures. Traffic information from the CDTI is used to augment out-the-window (OTW) visual contact with an aircraft a flightcrew is assigned to follow. This will enable them to accept separation responsibility from that aircraft. Once the flightcrew has visually acquired and accepted a visual approach clearance behind TTF, the pilot may use the lead aircraft traffic information on the CDTI as a means for maintaining separation while performing a visual approach. CAVS incorporates two alerting features: a caution level minimum range alert and an advisory level selectable range indication. The selectable range indication alert is used to advise the flightcrew that the CAVS aircraft is at a predetermined range from the TTF. The range indication is set in accordance with individual established company procedures and is intended to assist the flightcrew in maintaining a safe distance from the TTF. The caution level minimum range alert is activated when the range to the TTF is less than 1.4 nautical miles (NM) or, in some

installations, when the CAVS system detects a predetermined excessive closure to the TTF. FAA authorization is required for all U.S. aircraft operators to conduct CAVS operations using ADS-B In. For additional information on CAVS, refer to AC 90-114B, Appendix B, *CAVS Using ADS-B In.*

(3) ASSAP equipment authorized under this TSO must contain or support an interface to an ADS-B receiver in accordance with one of the following configurations:

(a) If the receiver is embedded in the equipment and does not support the FIM or FIM with Data Communications applications, it must meet TSO-C154c or TSO-C154d, *Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS-B) Equipment Operating on Frequency of 978 MHz*; or TSO-C166b or TSO-C166c, *Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Service - Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz)*.

(b) If the receiver is embedded in the equipment and supports the FIM or FIM with Data Communications applications, it must meet TSO-C166c, *Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Service - Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz).*

(c) If the receiver is not embedded and the equipment does not support the FIM or FIM with Data Communications applications, the installation manual must have a requirement to interface to a TSO-C154c, TSO-C154d, TSO-C166b, or TSO-C166c approved ADS-B receiver.

(d) If the receiver is not embedded and the equipment supports the FIM or FIM with Data Communications applications, the installation manual must have a requirement to interface to a TSO-C166c approved ADS-B receiver.

(4) If intended for installation on aircraft with TAS, TCAS, or ACAS-Xa/Xo equipment, ASSAP equipment authorized under this TSO must contain or support an interface to equipment complying with TSO-C147(), *Traffic Advisory System (TAS) Airborne Equipment*; TSO-C118(), *Traffic Alert and Collision Avoidance System (TCAS) Airborne Equipment TCAS I*; TSO-C119(), *Traffic Alert and Collision Avoidance System (TCAS) Airborne Equipment, TCAS II* (*with Hybrid Surveillance* for TSO-C119c through TSO-C119e); or TSO-C219(), *Airborne Collision Avoidance System (ACAS) Xa/Xo*, and the installation manual must require interface to supported TAS, TCAS I or II, or ACAS-Xa/Xo equipment. If the ASSAP equipment does not support this functionality, the installation manual must prohibit installation on an aircraft equipped with TAS, TCAS I or II, or ACAS-Xa/Xo. As specified in RTCA/DO-317C, the ATAS application (Table 1, Class [7]) must not be implemented in ASSAP equipment intended for installation on aircraft with any ACAS X variant.

(5) Equipment implementing the applications SURF (Runways) (Table 1, Class [2]) or SURF (Runways + Taxiways) (Class [3]) under this TSO must comply with TSO-C165b, *Electronic Map Display Equipment for Graphical Depiction of Aircraft Position (Own-Ship)*. This TSO takes precedence where it differs from TSO-C165b. Databases used to support moving

maps integrated with the SURF application must meet at least 5 meter accuracy and 1 meter resolution. Databases used to support moving maps integrated with the SURF application must meet RTCA/DO-200B, *Standards for Processing Aeronautical Data,* Data Process Assurance Level 2 for state-provided data with Essential Integrity as defined in RTCA/DO-272D, *User Requirements for Aerodrome Mapping Information*.

(6) Equipment authorized under this TSO may include or interface with airborne multipurpose electronic display equipment complying with TSO-C113b, *Airborne Multipurpose Electronic Displays*.

(7) Equipment authorized under this TSO must contain or support interface to position sources that meet one of the following TSOs:

(a) TSO-C129(), *Airborne Supplemental Navigation Equipment using the Global Positioning System (GPS).*

(b) TSO-C145(), *Airborne Navigation Sensors Using the Global Positioning System Augmented by the Satellite Based Augmentation System.*

(c) TSO-C146(), *Stand-Alone Airborne Navigation Equipment Using The Global Positioning System Augmented by the Satellite Based Augmentation System.*

(d) TSO-C196(), *Airborne Supplemental Navigation Sensors for Global Positioning System Equipment Using Aircraft-Based Augmentation.*

Other equivalent sources that provide position, velocity, altitude, integrity, and accuracy data that meet the requirements of 14 CFR 91.227 are also acceptable.

(8) ADS-B ASA equipment produced under this TSO and intended for installation in fixed-wing aircraft must incorporate either the ATAS application (Table 1, Class [7]), or an interface to TAS, TCAS I or II, or ACAS Xa/Xo equipment as described in paragraph **3.a.(4)** of this TSO.

> **Note:** The overall intent of paragraph **3.a.(8)** of this TSO is to require that all ADS-B ASA equipment produced under this TSO and installed in fixed-wing aircraft provide and utilize a means of alerting the flight crew to predicted traffic conflicts. ATAS may be incorporated in ADS-B ASA equipment installed in rotorcraft; however, current ATAS conflict alerting algorithms are optimized for fixed-wing aircraft flight trajectories and are not yet considered fully mature for rotorcraft-unique flight trajectories. The FAA will consider adding requirements for conflict alerting for ADS-B ASA equipment installed in rotorcraft in a future revision of this TSO once mature rotorcraft conflict alerting algorithms have been developed and verified.

(9) ATAS is the only ADS-B application which can be installed without a traffic display. Requirements for ATAS without a traffic display are specified in RTCA/DO-317C,

Section 2.4.1. All other applications require a traffic display as defined by the CDTI requirements.

(10) If traffic pressure altitude is not available, the ADS-B ASA equipment must use ownship geometric altitude-to-traffic geometric altitude comparison to calculate traffic relative altitude for displaying and ATAS alerting. ADS-B ASA equipment must not use barometric altitude-to-geometric altitude comparison to compute traffic relative altitude. It is *not* acceptable for equipment produced under this TSO to fail to provide a conflict alert based solely on lack of availability of traffic pressure altitude when valid ownship and traffic geometric altitude are available. If traffic is reporting neither barometric nor geometric altitude, ATAS should provide an alert if the traffic's horizontal track is predicted to conflict with ownship's horizontal track. Refer to RTCA/DO-317C, section 2.2.4.5.2, Note 2.

(11) ADS-B ASA equipment that incorporates FIM or FIM with Data Communications must also incorporate CAVS (Table 1, Class [8]) and CAS-D (Appendix 2/Table 2, Class [9]). Additionally, implementations of FIM (Table 1, Class [21]) or FIM with Data Communications (Table 1, Class [22]) must be interfaced with an Advanced Range A3 class of ADS-B receiver meeting TSO-C166c with option code 'r'.

(12) Equipment implementing the ATAS application (Table 1, Class [7]) must also implement the ASSAP functionality of C1 or C5.

(13) Equipment implementing the SURF (Runways) (Table 1, Class [2]) or SURF (Runways + Taxiways) (Class [3]) applications must also implement the ASSAP functionality of C5.

(14) Equipment implementing any of the applications VSA (Table 1, Class [4]), ITP (Table 1, Class [6]), CAVS (Table 1, Class [8]), CAS-D (Appendix 2/Table 2, Class [9]), FIM (Table 1, Class [21]), or FIM with Data Communications (Table 1, Class [22]) must also implement the application AIRB (Table 1, Class [5]).

b. Failure Condition Classifications.

(1) Failure of the function defined in paragraph **3.a** of this TSO for malfunctions (including unannunciated loss of function) causing the display of hazardously misleading information or unannunciated failure to provide a traffic conflict alert in airborne aircraft and aircraft on the ground with groundspeed greater than 80 knots is a *major* failure condition. Failure of the function defined in paragraph **3.a** of this TSO for malfunctions causing the display of hazardously misleading information in aircraft on the ground with a groundspeed of 80 knots or less is a *minor* failure condition.

(2) Loss of function defined in paragraph **3.a**, except for unannunciated loss of function described in paragraph **3.b.(1)** above, is a *minor* failure condition.

(3) For ADS-B ASA equipment that incorporates an interface to TAS, TCAS I or II, or ACAS Xa/Xo equipment as described in paragraph **3.a.(4)** above, the failure condition classifications of the applicable TAS, TCAS I or II, or ACAS Xa/Xo TSO to which the ADS-B

ASA equipment is interfaced apply for failures of the ADS-B ASA equipment that adversely impact the performance or function of the interfaced TAS, TCAS I or II, or ACAS Xa/Xo equipment.

(a) For ADS-B ASA equipment interfaced to TAS or TCAS I, this specifically includes ADS-B ASA equipment failures (including unannunciated loss of function) that result in unannunciated failure to provide a TAS or TCAS I traffic advisory.

(b) For ADS-B ASA equipment interfaced to any version of TCAS II or ACAS Xa/Xo, this specifically includes ADS-B ASA equipment failures (including unannunciated loss of function) that result in an incorrect, missing, or false TCAS II or ACAS Xa/Xo resolution advisory (RA), as defined in TSO-C219 paragraph 3.b Note.

(4) RTCA/DO-317C, Section 2.1.7, contains additional specific requirements and information for ADS-B ASA systems design assurance.

(5) Design the system to at least these failure condition classifications. Except as specified below for failures affecting TCAS II or ACAS Xa/Xo RA, for systems limited to installation in airplanes meeting the definitions in 14 CFR 23.2005(a) and 23.2005(b)(1) through (b)(3) (including airplanes with a certification basis prior to 14 CFR 23 Amendment 23-64), you may design the system to the design assurance level specified in ASTM International Standard F3061/F3061M-20, *Standard Specification for Systems and Equipment in Small Aircraft*, Table 2, Development Assurance Level Requirements, and the quantitative failure probability levels specified in ASTM International Standard F3230-20a, *Standard Practice for Safety Assessment of Systems and Equipment in Small Aircraft*, Table 5, Allowable Quantitative Probabilities, if you include an installation limitation in the installation manual required by paragraph **5.a.(3)** of this TSO limiting installation of the system to airplanes at or below the appropriate Assessment Level as identified in ASTM International Standard F3230-20a, Table 3, Assessment Level Selection Matrix, for which the system is designed. For example, if you design the system to Assessment Level II requirements, you must limit installation of the system to airplanes for which Assessment Level I or II is specified in Standard F3230-20a, Table 3, corresponding to airplanes meeting the definition of Airplane Certification Level 1 or 2 according to 14 CFR 23.2005(b). You may *not* lower design assurance levels or quantitative probability requirements for failures of ADS-B ASA equipment that result in incorrect, missing, or false TCAS II or ACAS Xa/Xo RA as specified in paragraph **3.b.(3)(b)** above. If the system has a TCAS II or ACAS Xa/Xo interface, you must design the system for these failure conditions to the applicable failure condition classifications of TSO-C119() or TSO-C219() without modification.

c. Functional Qualification. Demonstrate the required functional performance under the test conditions specified in RTCA/DO-317C, Section 3. For FIM and FIM with Data Communications, additionally demonstrate the required functional performance under the test conditions specified in RTCA/DO-361A, Section 3, as modified by RTCA/DO-361A Change 1, Section 3. All equipment authorized under this TSO must demonstrate interoperability with an FAA Automatic Dependent Surveillance-Rebroadcast (ADS-R) service broadcast. In addition, equipment authorized under this TSO that includes a Traffic Information Service – Broadcast (TIS-B) function must demonstrate interoperability with a FAA TIS-B service broadcast.

Applicants must propose a method to demonstrate interoperability with FAA ADS-R and TIS-B services. This method must include operation with live data within an ADS-R and/or TIS-B service volume. **Appendix 1** gives guidance for applicants performing interoperability testing with TIS-B services.

> **Note:** Equipment designed for installations that include a TAS, TCAS I or II, or ACAS Xa/Xo processor are not required to implement TIS-B for airborne applications. Equipment designed to support Class C2 and C3 of this TSO must also implement TIS-B for surface applications.

d. Environmental Qualification. Demonstrate the required performance under the test conditions specified in RTCA/DO-317C, Section 3.1 using standard environmental conditions and test procedures appropriate for airborne equipment. You may use a different standard environmental condition and test procedure other than RTCA/DO-160G, *Environmental Conditions and Test Procedures for Airborne Equipment*, dated December 8, 2010, provided the standard is appropriate for the ADS-B ASA equipment.

> **Note:** The use of RTCA/DO-160D, *Environmental Conditions and Test Conditions for Airborne Equipment*, dated July 29, 1997, (with Changes 1 and 2 only, without Change 3 incorporated) or earlier versions is generally not considered appropriate and will require substantiation via the deviation process as discussed in paragraph **3.h** of the TSO.

e. Software Qualification. If the article includes software, develop the software according to RTCA, Inc. document RTCA/DO-178C, *Software Considerations in Airborne Systems and Equipment Certification*, dated December 13, 2011, including referenced supplements as applicable, to at least the software level consistent with the failure condition classification defined in paragraph **3.b** of this TSO. You may also develop the software according to RTCA, Inc. document RTCA/DO-178B, dated December 1, 1992, if you follow the guidance in AC 20-115D, *Airborne Software Assurance,* dated July 21, 2017.

f. Electronic Hardware Qualification. If the article includes complex custom airborne electronic hardware required to meet paragraph **3.b.(1)** or **3.b.(3)** of this TSO, then develop the component according to RTCA, Inc. document RTCA/DO-254, *Design Assurance Guidance for Airborne Electronic Hardware*, dated April 19, 2000, to at least the design assurance level consistent with the failure condition classification defined in paragraph **3.b** of this TSO. For custom airborne electronic hardware determined to be simple, RTCA/DO-254, paragraph 1.6 applies.

g. Aircraft Systems Information Security Protection. If the article includes connectivity to non-trusted services (e.g., non-governmental) and networks, such as internet, portable electronics devices, and commercial-off-the-shelf technologies that is not certified and accredited for secure operations by a government authority or other trusted service provider, then develop security specific assurance, to at least the article or item level consistent with failure condition

classification defined in paragraph 3.b of this TSO. You may also develop the security assurance objectives according to RTCA/DO-356A, *Airworthiness Security Methods and Considerations*, dated June 21, 2018. Appendix A gives guidance for applicants performing security assurance objectives for ITEM level, and security measures for security requirements during aircraft installation approval process according to RTCA/DO-326A, *Airworthiness Security Process Specification*, dated August 6, 2014. Table 4-1 gives airworthiness security process activities guidance.

h. Deviations. We have provisions for using alternate or equivalent means of compliance to the criteria in the MPS of this TSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety. Apply for a deviation pursuant to 14 CFR § 21.618.

4. MARKING.

a. Mark at least one major component permanently and legibly with all the information in 14 CFR § 45.15(b). The marking must include the serial number. The markings must include functional equipment class(es) in accordance with Table **1** (and Appendix 2, if CAS-D is implemented) of this TSO, unless the functional equipment class(es) are identified in the manual referenced in paragraph **5.a**. of this TSO. An example of an acceptable way to mark the supported equipment class is as follows: "TSO-C195c Class C3, C4 and C5" for ASSAP equipment (Table 1, Equipment Class C) incorporating SURF Runways + Taxiways, VSA, and AIRB applications (Table 1, Classes [3], [4], and [5] of this TSO).

b. If the article includes software and/or airborne electronic hardware, then the article part numbering scheme must identify the software and airborne electronic hardware configuration. The part numbering scheme can use separate, unique part numbers for software, hardware, and airborne electronic hardware.

c. You may use electronic part marking to identify software or airborne electronic hardware components by embedding the identification within the hardware component itself (using software) rather than marking it on the equipment nameplate. If electronic marking is used, it must be readily accessible without the use of special tools or equipment.

> **Note:** Similar software versions, developed and tested to different software levels, must be differentiated by part number.

5. APPLICATION DATA REQUIREMENTS. You must give the FAA aircraft certification office (ACO) manager responsible for your facility a statement of conformance, as specified in 14 CFR 21.603(a)(1) and one copy each of the following technical data to support your design and production approval. LODA applicants must submit the same data (excluding paragraph **5.g**) through their civil aviation authority.

a. Manuals containing the following:

(1) Operating instructions and article limitations sufficient to describe the equipment's operational capability. Include detailed operating information on each equipment class incorporated into the ADS-B ASA system.

(2) Detailed description of any deviations.

(3) Installation procedures and limitations sufficient to ensure that the ADS-B ASA equipment, when installed according to the installation or operational procedures, still meets this TSO's requirements. Limitations must identify any unique aspects of the installation, specifically including the following:

(a) For ADS-B ASA equipment without an embedded ADS-B receiver, a requirement to interface the ADS-B ASA equipment with the appropriate type of ADS-B receiver depending on whether or not FIM or FIM with Data Communications capability is supported, in accordance with paragraph **3.a.(3)(c)** or **3.a.(3)(d)** of this TSO.

(b) If the equipment contains an interface to TAS, TCAS I or II, or ACAS Xa/Xo equipment, an installation requirement to interface the ADS-B ASA equipment to supported TAS, TCAS I or II, or ACAS Xa/Xo equipment, as applicable, in accordance with paragraph **3.a.(4)** of this TSO

(c) If the equipment does not contain an interface to TAS, TCAS I or II, or ACAS Xa/Xo equipment, an installation limitation prohibiting installation of the ADS-B ASA equipment on an aircraft with TAS, TCAS I or II, or ACAS Xa/Xo equipment, in accordance with paragraph **3.a.(4)** of this TSO.

(d) If the equipment does not incorporate either the ATAS application or an interface to TAS, TCAS I or II, or ACAS Xa/Xo equipment, an installation limitation prohibiting installation of the ADS-B ASA equipment in fixed-wing aircraft, in accordance with paragraph **3.a.(8)** of this TSO.

(e) For systems designed to ASTM International allowable design assurance levels and quantitative failure probabilities as allowed by paragraph **3.b.(5)** of this TSO for equipment intended for installation only in certain classes of small airplanes, an installation limitation limiting installation of the system to airplanes at or below the appropriate Assessment Level for which the system is designed, as specified in paragraph **3.b.(5)** of this TSO.

The limitations must also include a note with the following statement:

> "This article meets the minimum performance and quality control standards required by TSO-C195c. Installation of this article requires separate approval."

(4) For each unique configuration of software and airborne electronic hardware, reference the following:

(a) Software part number, including revision and design assurance level;

(b) Airborne electronic hardware part number, including revision and design assurance level; and,

(c) Functional description.

(5) A summary of the test conditions used for environmental qualifications for each component of the article. For example, a form as described in RTCA/DO-160G*, Environmental Conditions and Test Procedures for Airborne Equipment,* Appendix A.

(6) Schematic drawings, wiring diagrams, and any other documentation necessary for installation of the ADS-B ASA equipment**.**

(7) By-part-number list of replaceable components that make up the ADS-B ASA equipment**.** Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair, to ensure that the ADS-B ASA equipment continues to meet the TSO approved design. Include recommended inspection intervals and service life, as appropriate.

c. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and software accomplishment summary (SAS).

d. If the article includes simple or complex custom airborne electronic hardware, a plan for hardware aspects of certification (PHAC), hardware verification plan, top-level drawing, and hardware accomplishment summary (or similar document, as applicable).

e. A drawing depicting how the article will be marked with the information required by paragraph **4** of this TSO.

f. Identify functionality or performance contained in the article not evaluated under paragraph **3** of this TSO (defined as non-TSO functions). Non-TSO functions can be accepted in parallel with the TSOA. For those non-TSO functions to be accepted, you must declare these functions and include the following information with your TSO application:

(1) Description of the non-TSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that the non-TSO function(s) do not interfere with the article's compliance with the requirements of paragraph **3**.

(2) Installation procedures and limitations sufficient to ensure that the non-TSO function(s) meets the declared functions and performance specification(s) described in paragraph **5.f.(1)**.

(3) Instructions for continued performance applicable to the non-TSO function(s) described in paragraph **5.f.(1).**

(4) Interface requirements and applicable installation test procedures to ensure compliance with the non-TSO function(s) performance data defined in paragraph **5.f.(1).**

(5) Test plans, analysis and results, as appropriate, to verify that performance of the hosting TSO article is not affected by the non-TSO function(s).

(6) Test plans and results, as appropriate, to verify the function and performance of the non-TSO function(s) as described in paragraph **5.f.(1).**

g. If the article has been determined to require aircraft systems information security protection in accordance with paragraph **3.g** of this TSO: a plan for security aspects of certification (PSecAC), a system security scope definition (SSSD), a system security risk assessment (SSRA), and PSecAC Summary (or similar document, as applicable).

h. The quality manual required by 14 CFR 21.608, including functional test specifications. The quality system should ensure that you will detect any change to the approved design that could adversely affect compliance with the TSO MPS and reject the article accordingly. Applicants who currently hold TSOAs must submit revisions to the existing quality manual as necessary (not required for LODA applicants).

i. A description of your organization as required by 14 CFR 21.605.

j. Material and process specifications list.

k. A list of all drawings and processes (including revision level) that define the article's design.

l. Manufacturer's TSO qualification report showing results of testing accomplished according to paragraph **3.c** of this TSO.

6. MANUFACTURER DATA REQUIREMENTS. Besides the data given directly to the responsible ACO, have the following technical data available for review by the responsible ACO:

a. Functional qualification specifications for qualifying each production article to ensure compliance with this TSO.

b. Article calibration procedures.

c. Schematic drawings.

d. Wiring diagrams.

e. Material and process specifications.

f. The results of the environmental qualification tests conducted according to paragraph **3.d** of this TSO.

g. If the article includes software, the appropriate documentation defined in RTCA/DO-178B or RTCA/DO-178C specified in paragraph **3.e** of this TSO, including all data supporting the applicable objectives in Annex A*, Process Objectives and Outputs by Software Level*.

h. If the article includes complex custom airborne electronic hardware required to meet paragraph **3.b.(1)** or **3.b.(3)** of this TSO, the appropriate hardware life cycle data in combination with design assurance level, as defined in RTCA/DO-254, Appendix A, Table A-l. For simple custom airborne electronic hardware, the following data are required: test cases or procedures, test results, test coverage analysis, tool assessment and qualification data, and configuration management records, including problem reports.

i. If the article contains non-TSO function(s), you must also make available items **6.a** through **6.h**, as they pertain to the non-TSO function(s).

7. FURNISHED DATA REQUIREMENTS.

a. When furnishing one or more articles manufactured under this TSO to one entity (such as an operator or repair station), provide one copy or on-line access to the data in paragraphs **5.a** and **5.b** of this TSO. Add any other data needed for the proper installation, certification, use, or continued compliance with the TSO, of the ADS-B ASA equipment.

b. If the article contains declared non-TSO function(s), include one copy of the data in paragraphs **5.f.(1)** through **5.f.(4).**

c. If the article contains software, include one copy of the Open Problem Reports summary.

8. HOW TO GET REFERENCED DOCUMENTS.

a. Order RTCA documents from RTCA Inc., 1150 18th St, NW, Suite 910, Washington, D.C. 20036. Telephone (202) 833-9339, fax (202) 833-9434. You can also order copies online at www.rtca.org.

b. Order ASTM International documents from ASTM International, 100 Bar Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428. Telephone (877) 909-2786 (US & Canada), (1) 610-832-9585 (international), fax (610) 832-9555, website www.astm.org .

c. Order copies of 14 CFR parts from the Superintendent of Documents, Government Publishing Office, P.O. Box 979050, St. Louis, MO 63197. Telephone (202) 512-1800, fax (202) 512-2104. You can also order copies online at https://bookstore.gpo.gov , or find them online at the following Internet websites:

(1) The FAA Dynamic Regulatory System (DRS) website at https://drs.faa.gov .

(2) The U.S. Government's online Electronic Code of Federal Regulations website, https://www.ecfr.gov (select Title 14 - Aeronautics and Space).

d. You can find a current list of TSOs and advisory circulars on the FAA DRS at https://drs.faa.gov . You will also find the TSO Index of Articles at the same website.

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APPENDIX 1. TIS-B and FIS-B TESTING GUIDANCE

A1.1 Purpose

This appendix provides guidance for testing a device capable of transmitting ADS-B information in order to receive Traffic Information Services-Broadcast (TIS-B) information. It also provides guidance for testing devices capable of receiving Flight Information Services-Broadcast (FIS-B) information. This guidance offers one acceptable option; there may other acceptable ways to test a device. If you intend to use test methods different from those provided in this Appendix, coordinate with the ACO managing your project to obtain acceptance of your proposed test methods before testing.

A1.2 TIS-B Testing

A1.2.1 Obtaining an FCC license

Before testing can begin, a license is needed to broadcast into the NAS. To get a license, you must submit an application to the FCC in accordance with 47 CFR Part 87. This allows the operator to transmit information on the desired frequency.

A1.2.2 Obtaining a temporary 24-bit ICAO address for TIS-B and FIS-B testing

Once a license has been issued by the FCC, the applicant must obtain a 24-bit ICAO address. This can be obtained in two ways. If at an aircraft level, whether the aircraft is in your possession or in production, an application may be submitted to the FAA Aircraft Registry office (AFS-750) in Oklahoma City. However, if testing will be conducted in a laboratory environment, hangar, or other test facility then a temporary 24-bit ICAO address specifically assigned for TIS-B and FIS-B testing must be requested.

To request a 24-bit ICAO address, the applicant must send an e-mail to 9-AVS-9-TIS-B-FIS-B@faa.gov, with the following information:

1) Purpose for the Request
2) Company Name and Location
3) Company Point-of-Contact (POC)
4) Phone, Address, and E-mail for POC

Upon receiving the request, a temporary 24-bit ICAO address will be assigned. The assigned ICAO address may be used until such time the FAA suspends authorization of its use.

A1.2.3 Coordination with local Air Traffic Control

Once a 24-bit address is obtained, the applicant must coordinate with the local Air Traffic Control (ATC) office. This ensures the ATC facility is aware of any testing efforts in the area to prevent confusion and suspicion. In order to standardize testing, the FAA recommends setting Aircraft Identification (for 1090ES) or Call Sign (for UAT) = GNDTEST, and a Mode A code = 1200.

> **Note***:* Any Mode A code assigned by the local ATC facility supersedes that of this guidance.

A1.2.4 Parameters to be verified before TIS-B testing

This test verifies that the ADS-B In equipment can receive TIS-B broadcasts. For this test, the ADS-B Out equipment is set to the minimum performance values required by the FAA ADS-B system to receive TIS-B client status, which are below the minimum required for compliance with 14 CFR 91.227. Therefore, if you are performing this test with an aircraft in flight, you must either obtain advance permission from ATC to enter 91.225 rule airspace, or remain clear of 91.225 rule airspace.

After coordination with ATC, the applicant should verify the following parameters on the transmitting device:

a. The 1090ES IN and/or UAT IN bit is set to “1”, as appropriate to the design.
b. ADS-B device is set to “airborne” status in order to be recognized as a TIS-B client. There are surface service volumes where TIS-B is available, but the FAA does not recommend testing at those sites due to the heavy traffic density at those locations.
c. The emitter category is set to a coding of ALL ZEROs to represent no information available.
d. The SDA and SIL values are set to “1”. This will ensure that your aircraft information is not forwarded to ATC for separation purposes.
e. The altitude value must be set to:
    1. The actual uncorrected pressure altitude; or
    2. Hardcoded to -1000 ft.
f. The Navigation Integrity Category (NIC) and Navigation Accuracy Category-Position (NAC_P) values are set to “5”.

The test antenna must be in coverage of an ADS-B ground station and a Secondary Surveillance Radar (SSR) to receive the TIS-B/ADS-R service status message or the Traffic Uplink Management Message. It is uncommon to be able to test the Service Status Message successfully while on the ground as SSR coverage is unlikely.

The Service Status Message indicates that the system can provide a “complete” set of information for ADS-B equipped aircraft on the opposing link, Automatic Dependent Surveillance- Rebroadcast (ADS-R service), ADS-B Same Link Rebroadcast (ADS-SLR), and transponder equipped aircraft (TIS-B service) within the vicinity of the ADS-B device.

A1.3 FIS-B Testing

No ADS-B transmissions are required in order for the system to receive FIS-B broadcasts. FAA recommends FIS-B testing to be performed with the ADS-B transmitter disabled. The FIS-B products your test station receives will depend on what tier FIS-B radio stations are in line-of-sight. Refer to the Surveillance and Broadcast Services Description Document (SBS DD) at the following hyperlink for more information on this topic: https://drs.faa.gov/SBS DD

Further information on airworthiness certification of FIS-B aircraft equipment and installations is also available in the FIS-B TSO, TSO-C157(), and the FIS-B installation Advisory Circular 20 - 149().

APPENDIX 2. Amendments to DO-317C to support CAS Departure Operations

A2.1 Purpose

This appendix adds an optional functional equipment class, functionality, and amends DO-317C in order to provide additional requirements to support CAS Departure Operations.

Application Class [9] listed in Table 2 below, called CDTI Assisted Separation – Departure (CAS-D), is an additional row to Table 1 in Section 3. Requirements.

Table 2 – Additional ASA Functional Equipment Class for Equipment Class [9]

	Criticality		Equipment Class			
Class Number [ ] and Application	**Loss of Function**	**Hazardous & Misleading Information**	**CDTI (Surface Only) (A)**	**CDTI (B)**	**ASSAP (C)**	**ATAS Annunciator Panel (D)**
[9] CDTI Assisted Separation – Departure (CAS-D)	Minor	Major	Not Permitted	B9	C9	Not Permitted

There is no class [9] equipment defined in Appendix L of RTCA/DO-317C. Equipment class [9] must satisfy all the requirements listed in the CAVS row of Appendix L of RTCA/DO-317C as well as, and as modified by, the requirements and tests defined in this appendix.

A2.2 Requirements to add to DO-317C to allow CAVS for Traffic and Ownship that are on the Ground

In section 2.2.4.6.1 "Ownship Requirements", the following requirements are modified and added (highlighted).

a. When Ownship is airborne and the horizontal or vertical position is invalid, ASSAP **shall** (2231) signal that CAVS is Unavailable (fail) via the CDTI interface.

f. When Ownship is on the ground and the horizontal position is invalid, ASSAP **shall** (2231) signal that CAVS is Unavailable (fail) via the CDTI interface.

In section 2.2.4.6.2 "CAVS Traffic Requirements", the following requirement is modified (highlighted in yellow):

When traffic meets the following criteria, ASSAP **shall** (2236) mark the CAVS Traffic Application Capability as valid on the CDTI interface:

a. Traffic is an ADS-B (required) or ADS-R (optional) source track (not TIS-B).

AND

b. Traffic is reporting valid horizontal position and has a NAC_P of 7 or greater
(< 0.1 NM).

AND

c1. When airborne, Traffic is reporting valid pressure altitude.

OR

c2. When airborne, Version 2 [and later] traffic is reporting valid geometric altitude and has a GVA of 2 or greater (≤ 45 m).

Note: *Geometric altitude from Version 0 or Version 1 may not be used to determine CAVS validity.*

AND

d. Version 2 [and later] traffic is reporting valid velocity and has a NAC_V of 1 or greater (< 10 m/s).

Note: *Many existing Version 0 and Version 1 ADS-B systems do not appropriately output their velocity quality. It is therefore required to validate velocity information from Version 0 and 1 traffic. See §2.2.4.6.2.2.*

AND

e. Traffic has a NIC of 6 or greater (< 0.6 NM).

AND

f. Traffic's State Data is updated within the maximum data age of 11 seconds.

AND

g. Version 2 [and later] traffic has an SDA of 2 or greater (≤ 1.00E-05).

AND

h1. Version 2 [and later] traffic has a SIL of 3 encoded per hour (≤ 1.00E-07/hr).

OR

h2. Version 1 traffic has a SIL of 2 (≤ 1.00E-05) or greater.

Notes:

1. *As with other applications, coasting can be applied to these CAVS requirements for the Traffic Application Capability. ADS-B/ADS-R reports indicating a temporary drop in traffic data quality can be ignored for a limited duration. See §2.2.4.*

2. *Version 1 defines SIL as "Surveillance Integrity Limit"; Version 2 [and later] defines SIL as "Source Integrity Limit". The definition of Version 1 "Surveillance Integrity Limit" is equivalent to a combined Version 2 "Source Integrity Limit" / "System Design Assurance" value. A Version 1 SIL encoding of 2 corresponds to a Version 2 or later SDA of 2 and SIL of 3.*

3. *If an implementation's conditions for traffic designation depend only on the CAVS Application being available and Traffic Application Capability being valid, then a CAVS Surveillance Alert will be triggered for traffic that is designated (a) with a range within 0.42 NM or (b) within a range of 1.4 NM for certain conditions. See §2.2.4.6.3 and §2.3.9.6.4 for details on the CAVS Surveillance Alert.*

A2.3 Requirements to add to DO-317C to inhibit CAVS alerts when Ownship is on the ground

In section 2.2.4.6.3 "Caution CAVS Surveillance Alert", the following requirement is added:

If Ownship is below 400 feet, then ASSAP **shall** inhibit the Caution CAVS Surveillance Alert aural and set the Caution CAVS Surveillance Alert Status to inactive to the CDTI.

Note: *The altitude should be above the takeoff point. This can be determined in multiple ways and not necessarily with a radar altimeter.*

In section 2.3.9.6.3 "CAVS Range Indication Alert", add the following requirement to the section:

If the Ownship is below 400 feet, the CDTI **shall** inhibit the Advisory "Range Indication" Alert.

Note: *The altitude should be above the takeoff point. This can be determined in multiple ways and not necessarily with a radar altimeter.*

A2.4 Requirement to add to Allow Traffic Designation on the Ground for CAVS

In section 2.3.9.6.1 "CAVS Traffic Designation", add the following requirement to the section:

The CDTI **shall** have the capability for the flight crew to designate traffic, when ownship and traffic are on the ground.

A2.5 Requirement to add for Display of Differential Ground Speed and Traffic Range when Ownship is on the Ground

In section 2.3.9.6.2 “CAVS Traffic Identification, Differential Ground Speed, Ownship Ground Speed, Traffic Ground Speed and Traffic Range”, add the following requirements to the section:

If the Ownship is on the ground, the CDTI may remove Differential Ground Speed from the display.

If the Ownship is on the ground, the CDTI may remove Traffic Range from the display.

A2.6 Test Procedure Changes

The following changes add steps to existing test procedures to test the new requirements in the previous sections.

A2.6.1 ASSAP Test Procedure Changes to Section 3.2.4.6.1

Add the following test steps to the test procedure in section 3.2.4.6.1 “Verification of Ownship Requirements (§2.2.4.6.1)”:

Step 7: Generate a Scenario

Generate a ground scenario where Ownship has valid horizontal position with an accuracy of less than 0.1 NM (185.2 m); valid horizontal velocity with an accuracy of less than 10 m/s (19.4 kts); and valid horizontal position integrity bound of less than 0.6 NM at an integrity level of less than or equal to 1.00E-07.

Verify that ASSAP signals that CAVS is available on the CDTI interface.

Step 8: Ownship Horizontal Position Accuracy > 0.1 NM

Repeat Step 7, only set Ownship’s horizontal position accuracy greater than or equal to 0.1 NM.

Verify that 10 seconds after Ownship’s horizontal position accuracy is set to greater than or equal to 0.1 NM, ASSAP signals that CAVS is unavailable on the CDTI interface.

Step 9: Ownship Horizontal Velocity Accuracy > 10 m/s

Repeat Step 7, only set the horizontal velocity accuracy to greater than or equal to 10 m/s (19.4 kts).

Verify that 10 seconds after Ownship's horizontal velocity accuracy is set to greater than or equal to 10 m/s, ASSAP signals that CAVS is unavailable on the CDTI interface.

Step 10: Ownship Horizontal Position Integrity Bound > 0.6 NM, Integrity Level < 1.0E-07

Repeat Step 7, only set Ownship horizontal position integrity bound greater than or equal to 0.6 NM at an integrity level of less than or equal to 1.00E-07.

Verify that 10 seconds after Ownship's horizontal position integrity bound is set to greater than or equal to 0.6 NM, ASSAP signals that CAVS is unavailable on the CDTI interface.

Step 11: Ownship Horizontal Position Integrity Bound < 0.6 NM, Integrity Level > 1.0E-07

Repeat Step 7, only set Ownship horizontal position integrity bound less than 0.6 NM with an integrity level greater than 1.00E-07.

Verify that ASSAP signals that CAVS is unavailable on the CDTI interface.

A2.6.2 ASSAP Test Procedure Changes to Section 3.2.4.6.2

Add the following test steps to the test procedure in section 3.2.4.6.2 "Verification of CAVS Traffic Requirements (§2.2.4.6.2)":

Step 13: Valid CAVS Scenario on the Ground

Generate a ground scenario that includes traffic of each version of ADS-B and optionally ADS-R (but no TIS-B) and have each traffic element report the following parameters as appropriate:

Traffic has valid position and a NACP of 7 or greater (less than 0.1 NM);

horizontal position integrity with a bound of less than 0.6 NM;

Version 2 [or later] traffic has valid velocity and a NACV of 1 or greater (less than 10 m/s);

Version 2 [or later] traffic has a SIL of 3 or greater (less than or equal to 1.00E-07);

Version 1 traffic has a SIL of 2 or greater (less than or equal to 1.00E-05);

Version 2 [or later] traffic's System Design Assurance is less than or equal to 1.00E-05;

Traffic's State Data is updated within the maximum data age of 11 seconds.

Verify that DO-260/ED-102 Version 1 and Version 0 traffic's CAVS Traffic Application Capability are marked as invalid.

Otherwise, verify that the traffic's CAVS Traffic Application Capability is marked as valid on the CDTI interface.

Step 14: Traffic Horizontal Position Accuracy > 0.1 NM

Repeat Step 13, designate a traffic element for CAVS while ownship and traffic are on the ground. Also, set the horizontal position accuracy to greater than or equal to 0.1 NM for all traffic.

Verify that 10 seconds after traffic horizontal position accuracy is set to greater than or equal to 0.1 NM, the affected traffic's CAVS Traffic Application Capability is marked as invalid on the CDTI interface.

Step 15: Traffic Horizontal Position Integrity Bound > 0.6 NM

Repeat Step 13, designate a traffic element for CAVS. Also set the horizontal position integrity bound to greater than or equal to 0.6 NM for all traffic.

Verify that 10 seconds after traffic horizontal position integrity bound is set to greater than or equal to 0.6 NM, the traffic's CAVS Traffic Application Capability is marked as invalid on the CDTI interface.

Step 16: Version 2 Traffic Horizontal Velocity Accuracy > 10 m/s

Repeat Step 13, designate a Version 2 traffic element for CAVS. Also set the horizontal velocity accuracy to greater than or equal to 10 m/s (19.4 kts) for all Version 2 Traffic.

Verify that 10 seconds after traffic horizontal velocity accuracy is set to greater than or equal to 10 m/s, the affected traffic's CAVS Traffic Application Capability is marked as invalid on the CDTI interface.

Step 17: Version 2 Traffic SIL >1.00E-07

Repeat Step 13, designate a Version 2 traffic element for CAVS. Also set the SIL to greater than 1.00E-07 for all Version 2 Traffic.

Verify that the affected traffic's CAVS Traffic Application Capability is marked as invalid on the CDTI interface.

Step 18: Version 1 Traffic SIL >1.00E-05

Repeat Step 13, designate a Version 1 traffic element for CAVS. Also set the SIL to greater than 1.00E-05 for all Version 1 Traffic.

Verify that the traffic's CAVS Traffic Application Capability is marked as invalid on the CDTI interface.

Step 19: System Design Assurance > 1.00E-05 for DO-260/ED-102 Version 2 Traffic

Repeat Step 13, designate a traffic element for. Also set the System Design Assurance to greater than 1.00E-05 for Version 2 [or later] traffic for all traffic.

Verify that the traffic's CAVS Traffic Application Capability is marked as invalid on the CDTI interface.

A2.6.3 ASSAP Test Procedure Changes to Section 3.2.4.6.3

Add the following test step to the test procedure in section 3.2.4.6.3 "Verification of Caution CAVS Surveillance Alert (§2.2.4.6.3)":

Step 18: Ownship is below 400 feet and Generate Airborne

While Ownship is taking off from the ground and until just below 400 feet, generate airborne traffic that is qualified for CAVS and is within the CAVS Surveillance Range Alert Threshold.

Verify that the Caution CAVS Surveillance Alert Status is inactive for all traffic at the CDTI interface and that the Caution CAVS Surveillance Alert aural is inhibited for all traffic.

A2.6.4 CDTI Test Procedure Changes to Section 3.3.1

Add the following rows to Table 3-12 section 3.3.1 “Definition of Terms and Conditions of Test (§3.3.1)”:

Requirement Paragraph	Test Section/ Paragraph	Test Method (A/D/I/T)	Pass/Fail Criteria
2.3.9.6 CAVS			
2.3.9.6.1	3.3.2.24	D	If the installation supports the CAVS application, the traffic can be designated when ownship is on the ground.
2.3.9.6.3 (3180)	3.3.2.24	D	If the installation supports the CAVS application, the Advisory “Range Indication” Alert is inhibit when CAVS Designated Traffic is on the ground.
2.3.9.6.3	3.3.2.24	D	If the installation supports the CAVS application, the Advisory “Range Indication” Alert is inhibit when ownship is below 400ft.

A2.6.5 CDTI Test Procedure Changes to Section 3.3.2.24

Replace the text in section 3.3.2.24 “Verification - CAVS” with the following text:

> For installations supporting CAVS and using test setups #1, #2, #3 and #6 as specified in Sections §3.3.3.1, §3.3.3.2, §3.3.3.3 and §3.3.3.6, verify symbols are displayed.
>
> Provide data to the ASA System simulating Ownship in-trail of traffic at 3 miles.
>
> Designate the traffic symbol for CAVS as described in §3.3.2.6.
>
> Verify that the following are displayed for the Designated Traffic:
>
> 1. Traffic ID
> 2. Traffic Range
> 3. Differential Ground Speed
> 4. Ownship and Traffic ground speeds
>
> Set the ownship status to on ground.

Verify that the traffic symbol can be designated for CAVS as described in §3.3.2.6.

Set the Designated Traffic status to on ground.

Confirm no differential ground speed information is displayed for the Designated Traffic symbol.

Set the traffic status to in air and designate (if undesignated)

Set the conditions for an Advisory “Range Indication” Alert.

Verify the Advisory “Range Indication” Alert is displayed in yellow when active.

Verify the Advisory “Range Indication” Alert threshold value is displayed with a resolution of 0.1NM.

Verify the control allows the range indication to be set from the minimum to 10NM in 0.1 NM increments.

Vary the CAVS range from less than the Designated Traffic range to greater than the designated range and from greater than Designated Traffic range to less than the Designated Traffic range.

Verify the Advisory “Range Indication” Alert is displayed when the Designated Traffic is less than the CAVS range.

Set the Designated Traffic status to on ground.

Verify that the Advisory “Range Indication” Alert is inhibited.

Provide ownship information from ground to just below 400 feet.

Verify that the Advisory “Range Indication” Alert is inhibited.

Set the conditions for a Caution CAVS Surveillance Alert.

Verify the Caution CAVS Surveillance Alert is displayed as a caution level visual alert when active and that the traffic remains designated while the audio portion of the CAVS Surveillance Alert is active.