

# Definitions, System Description and Requirements for CDTI

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## Summary

This paper proposes text to definitions, systems descriptions and requirements for the CDTI for the new combined MASPS.

It also includes a traceability matrix from DO-317 Draft v3.0 to DO-289 Vol. 1

## Proposed Text

### **3 ADS-B and Airborne Systems Definition and Performance Requirements**

#### **3.1 System Scope and Definition of Terms**

##### **3.1.1 ASA System Scope and Definition of Terms**

###### **3.1.1.1 Cockpit Display of Traffic Information (CDTI)**

The CDTI subsystem includes the actual display media and the necessary controls to interface with the flight crew. Thus the CDTI consists of all displays and controls necessary to support the applications.

###### **3.1.1.2 Cockpit Display of Traffic Information (CDTI) Display**

A single CDTI display format. A physical display screen may have more than one instance of a CDTI Display on it. For example, a display with a split screen that has a Traffic Display on one half of the screen and a list of targets on the other half has two instances of CDTI Displays.

###### **3.1.1.3 Traffic Display**

The Traffic Display is a graphical plan-view (top down) traffic display. The Traffic Display may be a stand-alone display or displays (dedicated display(s)) or the CDTI information may be present on an existing display(s) (e.g., multi-function display) or an EFB.

### **3.2 Systems Descriptions**

#### **3.2.1 Aircraft Systems**

##### **3.2.1.1 CDTI**

The CDTI subsystem includes the actual display media and the necessary controls to interface with the flight crew. Thus the CDTI consists of all displays and controls necessary to support the applications. The controls may be a dedicated CDTI control panel or it may be incorporated into other controls, (e.g., multifunction control display unit (MCDU) or Electronic Flight Bag (EFB)). Similarly, the CDTI display may be a stand-alone display or displays (dedicated display(s)) or the CDTI information may be present on an existing display(s) (e.g., multi-function display) or an EFB. At a minimum, CDTI includes a graphical plan-view (top down) traffic display (a “Traffic Display”), and the controls for the display and applications (as required). Additional graphical and non-graphical display surfaces may also be included. The CDTI receives position information of traffic and Ownship from the airborne surveillance and separation assurance processing (ASSAP) function. The ASSAP receives such information from the surveillance sensors and Ownship position sensors.

A physical display screen may have more than one instance of a CDTI Display on it. For example, a display with a split screen that has a Traffic Display on one half of the screen and a list of targets on the other half has two instances of CDTI Displays.

The Traffic Display is a graphical plan-view (top down) traffic display. Every CDTI installation includes a Traffic Display. The Traffic Display may be a stand-alone display or displays (dedicated display(s)) or the CDTI information may be present on an existing display(s) (e.g., multi-function display) or an EFB.

Specific requirements for the Traffic Display are shown in the ASA MOPS. The Traffic Display is required to indicate ownship position and, to show the positions, relative to the ownship, of traffic.

The Traffic Display is also required to provide specific traffic information elements in associated data tag and traffic symbology.

### 3.3 Broadcast Information Elements Requirements

### 3.4 System Requirements (and ACL)

#### 3.4.1 CDTI

Editorial Note: Sections “3.4.1.1 CDTI for ACL=1” and “3.4.1.2 CDTI for ACL=2”, as proposed in WP24-03R1, are presumed to be OBE.

*Note: The requirements in this section are extended in the ASA MOPS.*

#### 3.4.1.1 Scope of Requirements

[Not sure what to do here – ASA MOPS specifically excludes the following:

##### 1.5.2.2 CDTI Display Platform

The CDTI data may be presented on a standalone display dedicated to traffic information only, or part of a shared/multi-function display, or an EFB.

This MOPS does not include an exhaustive or comprehensive list of shared/multi-function display considerations or requirements.

##### 1.5.2.3 Display Depictions

The requirements are focused on 2-dimensional plan view graphical display depictions. This MOPS does not address 3-dimensional, non-graphical, or head-up displays (HUDs).

##### 1.5.2.4 Integration of CDTI with other Display Functions

The CDTI and associated alerting, if any, will be properly integrated with other display functions and will not interfere with critical functions or other alerting.

##### Applications not covered

Does the MASPS need to address these at a high level?]

#### 3.4.1.2 Applications Supported

The CDTI **shall** (####) support the AIRB application.

*Note: Other applications are optional.*

CDTI installations supporting multiple applications or functional capabilities **shall** (####) prevent the simultaneous execution of applications or functional capabilities whose objectives are mutually exclusive. [May be more of an ASSAP requirement].

CDTI installations supporting multiple applications or functional capabilities **shall** (####) not present conflicting information or guidance.

*Note: ASSAP or CDTI may arbitrate outputs from multiple applications to determine which are most appropriate for display.*

### 3.4.1.3 General CDTI Requirements

The CDTI **shall** (####) satisfy all applicable requirements listed in this document in all flight environments (e.g.: expected temperatures and pressures) and operating areas (e.g. domestic and oceanic airspaces) for which it is intended.

*Note: In order to satisfy this requirement fully, CDTI's intended for operation over or in the vicinity of the geographic poles would have to include an adequate provision for representing directionality of displayed traffic elements. A suitable coordinate transformation may be required and could be allocated to the ASSAP or the CDTI function.*

The CDTI display should be consistent with the requirements of current airborne display standards. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.

### 3.4.1.4 Units of Measure

The CDTI should portray data using units of measure that are consistent with the design of the flight deck in which it is installed.

The CDTI **shall** (####) portray all data using consistent units of measure and reference frames.

### 3.4.1.5 Information Exchange with ASSAP

The CDTI **shall** (####) accept all information provided by ASSAP.

The CDTI **shall** (####) provide ASSAP the information needed for the activation and deactivation of foreground applications, including those that operate on specifically designated traffic. [Do we need to ensure that "foreground applications" is defined somewhere?]

### 3.4.1.6 Inputs From Other (Non-ADS-B) Data Sources [move to an assumptions section?]

Data originating from non-ADS-B sources that will be represented on the CDTI is assumed to comply with appropriate standards pertinent to such data and sources. Sources might include airport surface moving map databases or navigation systems.

### 3.4.1.7 Traffic

The CDTI **shall** (####) display one traffic symbol for each traffic report received from ASSAP that meets the traffic display criteria subject to the maximum number of traffic elements. [Do we need to ensure that "traffic display criteria" is defined somewhere?]

The CDTI **shall** (####) be capable of displaying a number of traffic elements commensurate with the requirements of the installed applications.

### 3.4.1.8 TCAS Integration

In order to provide more complete traffic situational awareness, the Traffic Alert and Collision Avoidance System (TCAS) display should be integrated with the CDTI on aircraft equipped with TCAS.

On TCAS-integrated CDTI systems, the display of TCAS information **shall** (####) be prioritized in such a manner as to preserve the integrity of the safety objectives for TCAS.

On TCAS-integrated CDTI systems, TCAS and ADS-B information should be synthesized in such a manner as to:

- (a) Present a coherent traffic situation.
- (b) Present only one symbol per target, when correlation of ADS-B and TCAS sources is possible.

#### **3.4.1.9 Multi-Function Display (MFD) Integration**

If non-traffic information is integrated with the traffic information on the display, the directional orientation, range, and ownship position **shall** (####) be consistent among the different information sets.

Symbols, colors, and other encoded information that have a certain meaning in the traffic display function should not have a different meaning in another MFD function.

The MFD system should provide the capability to enable and disable display of traffic information (i.e., to overlay traffic or turn traffic information off).

#### **3.4.1.10 Failure Annunciations**

The CDTI **shall** (####) be capable of annunciating all failure / abnormal conditions of the CDTI or its inputs that affect the proper operation of the CDTI or the ability to conduct applications, including the loss of surveillance data needed for an application.

#### **3.4.1.11 Suitability of Traffic for Applications**

If any additional applications are installed (beyond AIRB), there **shall** (####) be a means to determine the traffic's application capability with respect to each installed application.

#### **3.4.1.12 Warning and Alerts**

The CDTI **shall** (####) provide sufficiently and appropriately salient warnings and alerts for all warning and alert conditions.

The CDTI **shall** (####) provide sufficient awareness as to the causes for the warnings and alerts.

Aural alerts **shall** (####) be audible and distinguishable in all expected flight deck ambient noise conditions.

CDTI alerts should be consistent with, and capable of being integrated into the flight deck alerting system, giving proper priority to alerts with regard to safety of flight.

#### **3.4.1.13 Display Configuration**

The CDTI **shall** (####) be configurable in all manner necessary to support the installed applications.

The CDTI **shall** (####) provide a sufficient set of controls to enable and disable all configuration s, enable and disable all installed applications and to exercise all of its features.

The CDTI **shall** (####) provide a sufficient set of indications to portray its current configuration and the status of installed applications in a readily appreciable manner.

#### 3.4.1.14 **Accessibility of Controls**

The equipment **shall** (####) be designed so that controls intended for use during flight cannot be operated in any position, combination or sequence that would result in a condition detrimental to the operation of the aircraft or the reliability of the equipment.

#### 3.4.1.15 **Information Displayed**

The CDTI **shall** (####) be capable of displaying the types of information needed for the execution of the installed applications.

#### 3.4.1.16 **Symbols**

Each CDTI symbol **shall** (####) be identifiable and distinguishable from other CDTI symbols.

The shape, color, dynamics, and other symbol characteristics should have the same meaning within the CDTI.

CDTI symbol modifiers should follow rules that are consistent across the symbol set.

If symbols are used to depict elements that have standard symbols (such as navigational fixes), the CDTI should use symbols that are consistent with established industry standards.

The CDTI system should be consistent with the rest of the flight deck in terms of color, standardization, automation, symbology, interaction techniques and operating philosophy.

#### 3.4.1.17 **Testing**

The CDTI **shall** (####) be subjected to and pass a series of certification tests as specified in the ASA MOPS.

#### 3.4.1.18 **Unambiguous Guidance**

#### 3.4.1.19 **Integration of Multiple Applications**

Research WP109-30

#### 3.4.1.20 **Failure Protection**

Any probable failure of the CDTI **shall** [####] not degrade the normal operation of equipment or systems connected to it.

The failure of interfaced equipment or systems shall [####] not degrade normal operation of the CDTI.

#### 3.4.1.21 **Interference Effects**

The equipment **shall** [###] not be the source of harmful conducted or radiated interference nor be adversely affected by conducted or radiated interference from other equipment or systems installed in the aircraft.

### 3.4.2 **ASSAP**

## Outstanding Issues

- Need definitions to cover selected and designated aircraft and designated applications. Perhaps up-level these and talk about foreground and background applications. **(leave open, not just a CDTI issue)**
- Present the idea of architecture independence in section 1.2.3. **(leave open, not just a CDTI issue)**
- Up-leveled requirement to assess suitability of targets for applications; could also mention ownership here, if not mentioned in previous requirement. **(leave open, more of an ASSAP requirement).**
- Add an umbrella requirement to cover the need for certification testing of ASSAP and who can provide test results.
- Add a failure protection requirement for ASSAP.
- Add an interference requirement for ASSAP.
- What is to be done with latency?

DRAFT

# Traceability Matrix

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<p><b>Placeholder for new ASSAP definition</b> Has it changed?</p> <p><b>Existing v3.0 definition</b> 1.2.2.1 ASSAP ASSAP is the processing subsystem that accepts surveillance inputs, (e.g., ADS-B reports, performs surveillance processing to provide reports and tracks, and performs application-specific processing. Surveillance reports, tracks, and any application-specific alerts or guidance are output by ASSAP to the CDTI function. ASSAP surveillance processing consists of track processing and correlation of ADS-B, TIS-B, ADS-R, and TCAS reports).</p>	<p><b>1.3.5 ASSAP</b> Airborne Surveillance and Separation Assurance Processing (ASSAP) is the processing of surveillance and other data in support of ASA applications. In addition to surveillance processing, ASSAP provides application-specific processing for the applications described in Appendices C - J.</p>	<p>TODO</p>
<p><b>Placeholder for new CDTI definition</b> Do-317 will make a distinction between the CDTI and the Traffic Display and any given requirement may apply to one the other or both. However, the latest version lives somewhere in an edited version of a working paper. Waiting for a new draft to emerge.</p> <p><b>Existing v3.0 definition</b> 1.2.2.2 CDTI The CDTI subsystem includes the actual display media and the necessary controls to interface with the flight crew. Thus the CDTI consists of all displays and controls necessary to support the applications. The controls may be a dedicated CDTI control panel or it may be incorporated into other controls, (e.g., multifunction control display unit (MCDU) or Electronic Flight Bag (EFB)). Similarly, the CDTI display may be a stand-alone display or displays (dedicated display(s)) or the CDTI information may be present on an existing display(s) (e.g., multi-function display) or an EFB.</p>	<p><b>1.3.6 CDTI</b> Cockpit Display of Traffic Information (CDTI) is the flight crew interface to the ASA system. Depending on the application, this may include graphical and aural features necessary to display traffic information, guidance and alerts. CDTI also includes a control panel so that the flight crew may choose applications, parameters and features.</p>	<p>Add definition that is consistent with ASA MOPS Draft v4.0</p>
<p><b>1.5.2.1 Source Selection</b> If multiple sources of surveillance data are used, ASSAP will provide the best source information available.</p>	<p>More of a transmit "requirement", whereas the 317 assumption seems to apply to the receive side: <b>2.4.2 Requirements for Data Transmission</b></p>	<p>TODO  (This could be a good high-level requirement, especially since it seems to be presented as an assumption here.)</p>

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	<p>Each ASA participant <b>should</b> transmit the highest quality state data that is available for transmission from the aircraft. Normally the best quality state data source <b>should</b> be used. In the case of a failure of the best quality source, an alternate source <b>should</b> be chosen. It is recommended that back-up navigation sources intended to be used for ADS-B have a characterization of integrity with a SIL parameter greater than 0 and an associated NIC.</p> <p>For example, for horizontal data, the best quality sensor may be determined as follows. For Advanced ACLs select the navigation source with the smallest containment region that meets the navigation integrity risk of <math>10^{-5}</math> per flight hour or better. For transmit-only, basic, and intermediate ACLs select the navigation source with the smallest containment region that meets the navigation integrity risk of <math>10^{-3}</math> per flight hour or better. When there are no navigation sources available with an integrity risk of <math>10^{-3}</math> per flight hour or better, select the navigation source with the highest navigation accuracy. This selection criteria is illustrated in <a href="#">Figure 2-8</a>.</p> <p>Here is what seems to be a receive requirement:</p> <p><b>3.3.2.1.1 ASSAP Surveillance Processing Requirements</b></p> <p>...</p> <p>1.f. The estimation function may combine information from different data sources in order to improve the track state estimate.</p> <p>. ASSAP surveillance processing <b>shall</b> (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). ASSAP may enhance the quality of the track information, using techniques such as Kalman filters. ASSAP <b>shall</b> (289R3.176) estimate the quality of</p>	

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	<p>the track state information that is maintained in the track file, and maintain quality measures for the track state information, as indicated in <u>Table 3-15</u>.</p> <p>...</p> <p><b>3.3.2.1.2.1 Basic and Intermediate ASA</b> Application Eligibility: •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. Note that if the track is being surveilled by multiple sources, the determination of acceptability for applications should be based on the track quality as derived by ASSAP, rather than on quality of any individual source. 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 &gt; 1, the NIC, NACP, NACV, and SIL requirements specified in Table 2 3.</p>	
<p><b>1.5.2.2 CDTI Display Platform</b> The CDTI data may be presented on a standalone display dedicated to traffic information only, or part of a shared/multi-function display, or an EFB. This MOPS does not include an exhaustive or comprehensive list of shared/multifunction display considerations or requirements.</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The display of traffic information may be integrated into an existing display (e.g., a multi-function display [MFD]), or may take place on a dedicated, stand-alone display. Similarly, flight crew inputs for ASA may be integrated into an existing avionics interface (e.g., FMS), or a stand-alone control interface may be provided.</p>	<p>TODO  (Existing MASPS language seems basically ok. It's probably also ok to retain the language in both the MOPS and the MASPS.)</p>
<p><b>1.5.2.3 Display Depictions</b> The requirements are focused on 2-dimensional plan view graphical display depictions. This MOPS does not address 3-dimensional, non-graphical, or head-up displays (HUDs).</p>	<p>No equivalent found.</p>	<p>TODO  (What happens if someone comes along with a 3-D display?)</p>
<p><b>1.5.2.4 Integration of CDTI with other Display Functions</b> The CDTI and associated alerting, if any, will be properly integrated with other display functions and will not interfere with critical functions or other alerting.</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display <b>should</b> be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls <b>should</b> be designed to maximize usability, minimize flight crew workload,</p>	<p>Interestingly, Do-317 states this as an assumption, whereas there may be something closer to a requirement in the MASPS.  We should retain the idea that some things are beyond the scope of the MASPS.</p>

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	<p>and reduce flight crew errors. ... <b>3.3.3.3 Expected CDTI Interface Requirements</b> ... It is expected that the CDTI will ultimately integrate data and alarms from other sources of information beyond surveillance processing, such as weather, terrain, etc., but these additional data sources and their integration are beyond the scope of this MASPS.</p>	<p>Could we elevate the requirement for non-interference with other alerting function to the level of a requirement? We would not have to go any further than that, i.e. there we would not have to say how that would be achieved.</p>
<p><b>1.5.2.5 Units of Measure</b> The ASA MOPS requirements assume a flight deck philosophy based on the use of nautical miles for distance, knots for speed and feet for altitude. If the requirements are implemented in a flight deck using different units of measure, the requirements for distance, speed and altitude should be changed to equivalent or appropriate values.</p>	<p><b>3.3.3.1.1.1 Display Range / Map Scale</b> ... The CDTI display range is the horizontal distance (in nautical miles or other appropriate units) between the own-ship position and the edge of the field of view on the CDTI display. ... <b>3.3.3.1.4.9 Horizontal Velocity Vector</b> ... When horizontal velocity vector is displayed, units of measurement shall (289R3.258) be the same between all displayed traffic and own-ship. ...</p>	<p>Assumption in Do-317 could be a “shall” or “should” in MASPS?  The 289 requirements listed here are not quite equivalent and could probably be uplevled.</p>
<p><b>1.5.2.6 Map Database</b> The ASSA/FAROA application assumes an underlying airport surface map. This map database is assumed to meet the medium data quality requirement of DO-272A.</p>	<p><b>3.4.5.2 Quality</b> Airport surface map database quality is assessed in terms of feature position accuracy, resolution, integrity, and timeliness (currency). The accuracy, resolution, and integrity quality of the airport surface map database are assumed to comply with at least one of the following: 1. The database requirements specified in [RTCA DO-257A] (or subsequent revision) for the Aerodrome Moving Map Display (AMMD), or 2. [RTCA DO 272] (or subsequent revision) “Medium” or higher quality database standard (see note below), or 3. Database judged by the approval authority to be current and operationally acceptable for the intended application(s). Note 1: Airport map database requirements are defined in [RTCA/DO 272]. [RTCA DO 272] defines three categories of airport map data including “Coarse,” “Medium,” and “Fine.” The categories are groupings for the minimum</p>	<p>Up-level to talk about other sources of data, in general.</p>

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	<p>required accuracy, resolution, and integrity quality of the database. The database is assumed to be current. Note 2: The valid dates of applicability for the airport surface map database are defined by the Aeronautical Information Regulation and Control (AIRAC).</p> <p><b>Notes for Table 2-4:</b></p> <p>1. The own-ship data requirements for the ASSA and FAROA applications are the same as those specified for the “Aerodrome Moving Map Display” (AMMD) in the MOPS for the Depiction of Navigation Information on Electronic Maps [RTCA DO-257A] (or subsequent revision).</p> <p><b>3.3.3.1.1.3.1 Airport Surface Map</b> CDTI installations that support the FAROA application shall (289R3.229) provide a graphical depiction of runways. 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.</p> <p>Notes:</p> <p>1. See [RTCA DO-272] for a listing and description of these features. 2. [RTCA DO-257A] defines the requirements for an airport surface map to be used to support the Taxi Position Awareness application. These same requirements could be used as a basis for developing requirements for a surface map to support the FAROA and ASSA applications.</p> <p><b>3.3.3.1.2.1 Own-Ship Symbol</b> ...</p> <p>Notes:</p> <p>1. For CDTI displays that include a moving map, see [RTCA DO-257A], which also imposes requirements on the own-ship symbol.</p>	
<p><b>1.5.2.7 Select and Couple</b> Flight crew action is required to control ASA. Applications may be selected for use, and specific traffic aircraft may be selected for additional information. Also, some applications may operate only on specific aircraft that have been coupled to</p>	<p><b>1.3.7.2 Coupled Applications</b> Coupled applications are those applications that operate only on specifically-chosen (either by the flight crew or automation) traffic. They generally operate only for a specific flight operation. Coupled applications include</p>	<p>Note that 289 has two definitions of “coupled target”.</p> <p>P.S.: found many references to ARINC 735A</p>

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<p>the application. Select and couple, as used in this document, are high-level terms for these functions, and do not imply specific flight crew action as specified in ARINC A735B.</p>	<p>Enhanced Visual Approach, Approach Spacing for Instrument Approaches, and Independent Closely Spaced Parallel Approaches. Note that these applications may not necessarily require any cooperation from the traffic, other than that the necessary information to support the application must be provided through ADS-B or TIS-B.</p> <p><b>3.3.2.3.4 Flight Crew Inputs</b> A flight crew input may be required to display desired target parameters. For certain applications, the flight crew must select a specific target.</p> <p><b>3.3.2.3.4.1 Application Selection</b> An application selection is the selection of a desired application that is to be run.</p> <p><b>3.3.2.3.4.2 Coupled Target</b> A coupled target is a target upon which a coupled application is to be conducted.</p> <p><b>3.3.2.3.4.3 Selected Target</b> A selected target is a target for which additional information is requested by the flight crew.</p> <p><b>3.3.3.1.2.5 Coupled Target</b> A coupled target is a specific aircraft or vehicle that the flight crew has designated, or that has been automatically designated by a coupled application, so that the system can provide specific guidance or alerting relating to the coupled application. ...</p>	<p>The MOPS is developing specific definitions of to cover these concepts. Could the MASPS talk in more general terms about foreground and background applications and traffic about which additional information is sought? (Keeping in mind that existing language covering selection and coupling will likely also be up-leveled).</p>
<p><b>2.2.1 Introduction</b> ... It is recognized that manufacturers may implement separate ASSAP and CDTI functions, or a single integrated function that satisfies the requirements of both the ASSAP and CDTI functions.</p>	<p><b>2.3.1 ASA Subsystems</b> ... Note: The subsystem terminology used in this document, and represented in Figure 2 1, does not imply or impose an ASA equipment architecture.</p>	<p>May do well to include some language to this effect in “1.2.3 ASA Architecture”.  This is plenty of language to talk about ASA-TCAS integration, integration with existing displays and input devices, but less about ASSAP-CDTI integration.</p>
<p><b>2.2.2.5.1.15 Traffic TCAS Correlated Status</b> ... <i>Note: In order to provide more complete traffic situational awareness, the Traffic Alert and Collision Avoidance System (TCAS) display should be integrated with</i></p>	<p><b>1.2.3. ASA Architecture</b> ... The TCAS traffic display may be a separate display or TCAS traffic may be integrated with ASA surveillance data and presented in a combined format. If TCAS traffic is integrated with other</p>	<p>Retain language close to this. Use (slightly) stronger language from 317.</p>

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<p><i>the CDTI on aircraft equipped with TCAS.</i></p>	<p>surveillance data, only one symbol should be displayed to the flight crew for any one aircraft. Notes: 1. It is highly desirable that the TCAS traffic display be integrated with the CDTI.</p>	
<p><b>2.2.4.1.1 Ownship Requirements for AIRB</b> ... When Ownship horizontal position is invalid, ASSAP <b>shall</b> (2136) signal that AIRB is Unavailable (fail) via the CDTI interface.</p>	<p><b>2.4.3.4 Requirement for ASSAP</b> ... 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.</p> <p><b>3.4.1 Navigation Data Source</b> ... 6. There will be a means to determine when a navigation data source has failed so that an alternate navigation source may be selected.</p>	<p>The requirement to signal in 317 seems stronger than the requirements in 289.</p> <p>Up-level.</p> <p>There could be a general requirement covering various modes of failure and degradation of available data, which might say that ASSAP shall provide a means of assessing and CDTI a means of representing certain conditions.</p>
<p><b>2.2.4.1.1 Ownship Requirements for AIRB</b> ... When Ownship horizontal position uncertainty (95%) is worse than 0.5 NM, ASSAP <b>shall</b> (2137) signal that AIRB is inoperative via the CDTI interface.</p>	<p><b>2.4.5.2 Data Quality</b> ... (Table 2-4)</p> <p>Relevant perhaps: <b>3.3.3.1.3.2 Loss of Own-Ship Directionality</b> If all own-ship directionality information (that is, both heading and ground track angle) becomes unusable (such as from equipment failure, degraded signals, or insufficient ground-track speeds), several display issues must be addressed. These display issues are considered MOPS-level requirements and are expected to be addressed in the future ASAS MOPS.</p>	<p>Covered in resolution above.</p>
<p><b>2.2.4.2.1 Ownship Requirements for SURF</b> When airborne, Ownship data must meet the following criteria or ASSAP <b>shall</b> (2143) signal that SURF is inoperative via the CDTI interface: ...</p>	<p>No direct reference</p>	<p>Covered in resolution above.</p>
<p><b>2.2.4.2.1 Ownship Requirements for SURF</b> ... When on ground, Ownship data must meet the following criteria or ASSAP <b>shall</b></p>	<p>No direct reference</p>	<p>Covered in resolution above.</p>

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(2144) signal that SURF is inoperative via the CDTI interface:		
<p><b>2.2.4.2.1 Ownship Requirements for SURF</b></p> <p>...</p> <p>If a Runway database is not available for depiction of the Runway Surfaces and Extended Centerline, or Final Approach Course, ASSAP <b>shall</b> (2145) signal that SURF is Unavailable (fail) via the CDTI interface.</p>	No direct reference	Covered in resolution above.
<p><b>2.2.4.2.1 Ownship Requirements for SURF</b></p> <p>...</p> <p>If an Airport Surface database is not available for depiction of the Runway Surfaces, Extended Centerline or Final Approach Course, Taxiways, and Movement Surfaces, ASSAP <b>shall</b> (2146) signal that SURF is Unavailable (fail) via the CDTI interface.</p>	No direct reference	Covered in resolution above.
<p><b>2.2.4.2.2 Traffic Requirements for SURF</b></p> <p>...</p> <p>When AIRBORNE traffic meets the following criteria, ASSAP <b>shall</b> (2147) mark the traffic valid for SURF on the CDTI interface:</p> <p>...</p>	<p><b>3.3.2.1.1 ASSAP Surveillance Processing Requirements</b></p> <p>...</p> <p>5. The ASSAP shall (289R3.200185-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. Table 3-14 indicates the required TQL to support the applications in each ACL.</p> <p><b>3.3.2.1.2 ASSAP Applications Processing Requirements</b></p> <p>...</p> <p>Note: Precise conditions under which airborne and surface traffic is to be displayed and filtered is to be developed in the ASAS MOPS. See §3.3.3 for filtering requirements on the CDTI.</p> <p>...</p> <p><b>Table 3-16: ASSAP to CDTI Report Elements</b></p> <p>Supported Application 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).</p> <p>Degraded Data The degraded data field shall (289R3.193)</p>	<p>The 317 requirement seems to apply both to ASSAP and CDTI.</p> <p>Up-leveled requirement to assess suitability of targets for applications.</p> <p>Up-leveled requirement to provide a means to display suitability or, alternatively, the lack of suitability on the CDTI.</p>

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	<p>indicate if the data is considered to be degraded for an active application.</p> <p><b>3.3.2.1.2.1 Basic and Intermediate ASA Application Eligibility:</b></p> <ul style="list-style-type: none"> <li>• 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.</li> </ul> <p>Note that if the track is being surveilled by multiple sources, the determination of acceptability for applications should be based on the track quality as derived by ASSAP, rather than on quality of any individual source. 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 &gt; 1, the NIC, NACP, NACV, and SIL requirements specified in Table 2 3.</p> <p>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. The ASSAP track report shall (289R3.198) indicate if the track's quality is insufficient for a basic application.</p> <p>....</p> <p><b>3.3.3.1.2.6 Traffic Information Quality</b> Any CDTI installation shall (289R3.240) include a means to indicate which traffic is of degraded quality (see Table 2-3). 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.</p> <p><b>3.3.3.3.1.2.12 Traffic Usability for Active Applications</b> 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. This</p>	

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	<p>indication shall (289R3.289) provide for at least three conditions, as follows:</p> <ul style="list-style-type: none"> <li>a. Traffic information is fully usable for the application, or</li> <li>b. Traffic information is degraded, but can be used for the application, or</li> <li>c. Traffic information is of insufficient quality to support the application.</li> </ul>	
<p><b>2.2.4.2.2 Traffic Requirements for SURF</b> ... When ON GROUND traffic meets the following criteria, ASSAP shall (2148) mark the traffic valid for SURF on the CDTI interface: ...</p>	See above	Covered by above resolution.
<p><b>2.2.4.2.2 Traffic Requirements for SURF</b> ... Version 2 SURF traffic with an SDA less than 1 shall (#####) not be marked valid for SURF on the CDTI interface.</p>	See above	Covered by above resolution.
<p><b>2.2.4.4.1 Own Aircraft Requirements</b> ... a. When own aircraft horizontal or vertical position is invalid, ASSAP shall (2165) signal that VSA is Unavailable (fail) via the CDTI interface. ...</p>	No direct reference	Covered by previous resolution.
<p><b>2.2.4.4.1 Own Aircraft Requirements</b> ... b. When own aircraft horizontal position uncertainty (95%) is greater than 0.3 NM (185.2 m), ASSAP shall (2166) signal that VSA is Unavailable (fail) via the CDTI interface. ...</p>	No direct reference	Covered by previous resolution.
<p><b>2.2.4.4.1 Own Aircraft Requirements</b> ... c. When geometric altitude is used for vertical position and own aircraft vertical position uncertainty (95%) is greater than 45 m, ASSAP shall (2167) signal that VSA is Unavailable (fail) via the CDTI interface. ASSAP can only perform the Visual Separation on Approach application when own aircraft horizontal velocity is of sufficient quality. ...</p>	No direct reference	Covered by previous resolution.
<p><b>2.2.4.4.1 Own Aircraft Requirements</b> ... d. When own aircraft horizontal velocity uncertainty (95%) is greater than or equal to 10 m/s, ASSAP shall (2168) signal that VSA is Unavailable (fail) via the CDTI interface.</p>	No direct reference	Covered by previous resolution.

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<p>...</p> <p><b>2.2.4.4.1 Own Aircraft Requirements</b></p> <p>...</p> <p>e. When the ownship SIL is zero or the horizontal position Radius of Containment (RC) is greater than 0.6 NM, ASSAP shall (2169) signal that VSA is Unavailable (fail) via the CDTI interface.</p> <p>...</p>	<p>No direct reference</p>	<p>Covered by previous resolution.</p>
<p>...</p> <p><b>2.2.4.4.1 Own Aircraft Requirements</b></p> <p>...</p> <p>Equipment supporting the VSA application shall be designed to meet a System Design Assurance Level of 2 or greater.</p> <p>...</p>	<p>No direct reference</p>	<p>No MASPS requirement needed.</p>
<p>...</p> <p><b>2.2.4.5.1.1 Ownship Requirements</b></p> <p>...</p> <p>When they are invalid, ASSAP <b>shall()</b> signal that ITP is Unavailable (fail) via the CDTI interface:</p> <p>...</p>	<p>No direct reference</p>	<p>Covered by previous resolution.</p>
<p>...</p> <p><b>2.2.4.5.2.5 ITP Traffic Geometric Pass/Fail Status</b></p> <p>...</p> <p>ASSAP shall signal via the CDTI interface that ITP Traffic is suitable for performing the ITP application when the following ITP initiation criteria are valid. When they are invalid, ASSAP shall signal that ITP Traffic is unsuitable (fail) via the CDTI interface. The ITP geometric initiation criteria are:</p> <p>...</p>	<p>See above (more general requirement to assess all traffic for suitability to applications)</p>	<p>Covered by previous resolution.</p>
<p>...</p> <p><b>2.3.1 General CDTI Requirements</b></p> <p>...</p> <p>At a minimum, CDTI includes a graphical plan-view (top down) traffic display, hereafter referred to as the Traffic Display, and the controls for the display and applications (as required).</p> <p>...</p>	<p><b>1.3.6 CDTI</b></p> <p>Cockpit Display of Traffic Information (CDTI) is the flight crew interface to the ASA system. Depending on the application, this may include graphical and aural features necessary to display traffic information, guidance and alerts. CDTI also includes a control panel so that the flight crew may choose applications, parameters and features.</p>	<p>317 wording is not a shall, but could be construed as a requirement – perhaps it should be a shall.</p>
<p>...</p> <p><b>2.3.1 General CDTI Requirements</b></p> <p>...</p> <p>CDTI <b>shall</b> (3000) support the AIRB requirements.</p> <p>...</p>	<p>Table 2-1 shows that EVAcq is not an optional application for Basic ACL, i.e. that it is required.</p> <p><b>1.4.1.1 Enhanced Visual Acquisition (EVAcq)</b></p> <p>The Enhanced Visual Acquisition (EVAcq) application represents the most basic of ASA applications, and use of the CDTI. The CDTI provides relative range, altitude</p>	<p>One can infer a requirement in 289 to the effect that if a CDTI is installed, it must support at least the basic ACL, which would mean EVAcq. However, the requirement is not specifically articulated.</p> <p>This would probably be a good high level requirement to keep in the new MASPS.</p>

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	<p>and bearing data for participating aircraft, which will assist the flight crew in their aircraft visual search task. The complete application description is included in Appendix C. EVAcq is considered a background application.</p> <p><b>2.1.1 Enhanced Visual Acquisition (EVAcq)</b> The Enhanced Visual Acquisition application is the most basic use of the CDTI, as well as a building block for other applications. It describes the basic use of displayed traffic on the CDTI. ...</p> <p><b>2.2.3.2 Basic ASA Capability Level</b> ... Basic ACL includes the EVAcq application, and optionally any combination of CD, FAROA, or ASSA.</p> <p>Table 3-19 shows the minimum functional requirements for the CDTI for each application.</p>	
<p><b>2.3.1 General CDTI Requirements</b> ... Additionally, the CDTI may support these applications: 1. Basic Surface Situation Awareness (SURF). 2. Visual Separation on Approach (VSA). 3. In Trail Procedures (ITP)</p> <p>The minimum CDTI requirements specified in this version of the MOPS are based on these four operational applications. For each application that is implemented, all of the application's requirements must be met. <i>Note: Even though the requirements are based on the above applications, they may also support future applications. Designers are expected to carefully consider the use and expandability of the equipment for additional applications and make sufficient provisions for future changes and expansion. Applications in addition to the ones listed above may be implemented, but these MOPS do not provide requirements for them. They may be added in a future version.</i> ...</p>	<p>Table 2-1 shows additional, optional applications.</p>	<p>The additional applications in 289 are not quite the same as those in 317. 289 does not mention ITP. 317 does not address the advanced applications in 289. It would make sense to reconcile the applications covered in 317, and revisit the advanced applications in 289.</p>
<b>2.3.1 General CDTI Requirements</b>	<b>1.2.3 ASA Architecture</b>	Covered by previous resolution.

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<p>... CDTI may also support integration with TCAS. Requirements for TCAS support are only applicable in such installations.</p>	<p>... The TCAS traffic display may be a separate display or TCAS traffic may be integrated with ASA surveillance data and presented in a combined format.</p>	
<p><b>2.3.1.1 Traffic Display Criteria (TDC)</b> ... a. All traffic causing a warning level alert (including TCAS Resolution Advisories (RA) or caution level alert (including TCAS Traffic Advisories (TA) <b>shall</b> (3001) be displayed on the Traffic Display. ...</p>	<p><b>3.3.3.1.3.1 Traffic Display</b> ... 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.</p> <p><b>3.3.3.1.6 Alerts</b> ... Alerting should be integrated with a spatial presentation of the traffic. For example, with a plan view CDTI format, the specific aircraft involved in generating the alert may be highlighted and the projected point of closest approach may also be highlighted. In addition, the alerting may also be displayed on a separate section of a CDTI outside of the area dedicated for traffic information.</p> <p><b>3.3.3.3.2 ASA Alerts and Advisories</b> 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.</p>	<p>Up-level to a requirement stating that ASSAP and CDTI must provide sufficient and appropriate awareness of traffic causing warnings and/or alerts.</p> <p>TODO: confirm that these 289 requirements are covered somewhere in 317.</p>
<p><b>2.3.1.1 Traffic Display Criteria (TDC)</b> ... b. When a TCAS TA or RA is present, all airborne traffic within +/-1200 ft altitude and 6 nm range <b>shall</b> (3002) be displayed — subject to the selected display range and the maximum number of traffic that can be displayed.</p>	<p>No equivalent requirement found.</p>	<p>No action.</p>
<p><b>2.3.1.1.1 Default Traffic Display Criteria</b> a. ... When airborne, the default traffic display criteria <b>shall</b> (3003) be one of the following: ...</p>	<p>No equivalent requirement found.</p>	<p>No action.</p>
<p><b>2.3.1.1.1 Default Traffic Display Criteria</b> ... b. When on the ground, the default Traffic Display Criteria <b>shall</b> (3004) be one of the following:</p>	<p>No equivalent requirement found.</p>	<p>No action.</p>

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<p><b>2.3.1.1.1 Default Traffic Display Criteria</b> ... c. All non-default TDC <b>shall</b> (3005) be annunciated.</p>	No equivalent requirement found.	No action.
<p><b>2.3.1.1.2 Alternate Traffic Display Criteria</b> An alternate set of traffic display criteria may be used.</p> <p><i>Notes:</i> 1. Unless there is strong rationale to remove traffic that meets the default TDC, the traffic is expected to be retained on the display. 2. The default TDC and all alternate TDC are expected to be clearly documented and the flight crew are expected to be trained accordingly.</p>	No equivalent requirement found.	No action.
<p><b>2.3.1.2 Required Information</b> At a minimum, all CDTI installations provide information needed to support the Basic Airborne Situation Awareness (AIRB) application. (ref RTCA DO-289 Table 3-19 – UPDATE THIS REF) Additional applications may require additional information (see Section 2.3.9)</p>	See above	Include requirement to support AIRB as the minimum application.
<p><b>2.3.1.2 Required Information</b> ... a. The CDTI <b>shall</b> (3006) provide the following information with regards to the Traffic Display: <input type="checkbox"/> Display range/map scale (see Section 2.3.5.12). <input type="checkbox"/> Altitude band <i>Note 1: The default altitude band need not be displayed.</i> <i>Note 2: Altitude band can be indicated by a selector knob.</i> <input type="checkbox"/> Ownship Position.</p>	<p>Table 3-19 lists “Range/Map Scale” as a required display element for all applications.</p> <p><b>3.3.3.1.1.3 Range Reference</b> An indication of the currently selected CDTI display range or map scale shall (289R3.226) be shown on the CDTI display.</p>	Perhaps there can be an umbrella requirement that says the CDTI shall provide a sufficient set of indication to guarantee satisfactory awareness of the configuration of the display, yadda, yadda.
<p><b>2.3.1.2 Required Information</b> ... b. If the CDTI supports more than one directional reference (e.g., heading and track), then the directional reference <b>shall</b> (3007) be indicated.</p>	<p><b>3.3.3.3.1.2.10 Traffic Directionality</b> The ASSAP subsystem shall (289R3.284) be capable of providing, and the CDTI subsystem shall (R3.283b) be capable of accepting from the ASSAP subsystem, information about the directionality of traffic to be displayed. For traffic, this directionality information shall (289R3.285) include: a. The traffic’s ground track angle or its heading, b. An indication of which of the two kinds of directionality information is being provided for that traffic, and c. If the traffic heading is provided,</p>	Covered by above resolution.

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	<p>whether that heading is referenced to true north or to magnetic north.</p> <p><b>3.3.3.1.1.2.2 Display Orientation Value</b> 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.</p>	
<p><b>2.3.1.2 Required Information</b> ... c. The CDTI shall (3008) be capable of displaying traffic within a minimum of +/- 9900 feet altitude of ownship.</p>	<p>No equivalent requirement found.</p>	<p>No action.</p>
<p><b>2.3.1.2 Required Information</b> ... d. The CDTI shall (3009) have the capability to provide the following traffic information for each displayed traffic element. Unless specifically noted, the information can be conveyed graphically (e.g., in the traffic symbol), or as part of a data tag, or a data block.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Horizontal position (range and azimuth of traffic symbol on display).</li> <li><input type="checkbox"/> Traffic directionality.</li> <li><input type="checkbox"/> Traffic altitude (see 2.3.5.5).</li> <li><input type="checkbox"/> Air/Ground status.</li> <li><input type="checkbox"/> Traffic Vertical Direction Indicator.</li> <li><input type="checkbox"/> Traffic ID</li> </ul>	<p><b>3.3.3.1.2.2 Traffic Symbols - Basic</b> ... If valid directional data (i.e., ground track angle or heading) about traffic is available, the traffic symbol should indicate directionality.</p> <p><b>3.3.3.1.4 Traffic Information Elements</b> The following subparagraphs state requirements about the information associated with traffic, i.e., aircraft or vehicles other than the own-ship that may be depicted on the CDTI display.</p> <p><b>3.3.3.1.4.2 Traffic Identification</b> ... It is desirable for all CDTI installations to depict the traffic ID. 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. Such CDTI installations shall (289R3.245) be capable of displaying traffic IDs of up to eight alphanumeric characters. ...</p> <p><b>3.3.3.1.4.5 Traffic Horizontal Position</b> ...</p> <p><b>3.3.3.1.4.6 Traffic On-Ground / In-Air Status</b> ...</p> <p><b>3.3.3.1.4.7 Traffic Altitude</b> ...</p> <p><b>3.3.3.1.4.8 Traffic Vertical Rate Indicator</b> ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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<p><b>2.3.1.2 Required Information</b></p> <p>...</p> <p>e. The CDTI shall ( ) have the capability for the flight crew to select the display of additional information. The additional information includes:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Traffic ID</li> <li><input type="checkbox"/> Traffic Ground Speed</li> </ul>	<p><b>3.3.3.1.4.2 Traffic Identification</b></p> <p>...</p> <p>It is desirable for all CDTI installations to depict the traffic ID. 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. Such CDTI installations shall (289R3.245) be capable of displaying traffic IDs of up to eight alphanumeric characters.</p> <p>...</p> <p><b>3.3.3.1.5.4 Selected Target Ground Speed</b></p> <p>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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.1.2 Required Information</b></p> <p>...</p> <p>f. The CDTI should have the capability for the flight crew to select a specific traffic element for additional information. The selected traffic information includes:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Traffic Category.</li> <li><input type="checkbox"/> Traffic Differential Ground Speed.</li> <li><input type="checkbox"/> Traffic Range.</li> </ul>	<p><b>3.3.3.1.4.3 Traffic Category</b></p> <p>...</p> <p>The CDTI should have a means to indicate to the flight crew the category of traffic being displayed.</p> <p><b>3.3.3.1.5.5 Selected Target Range</b></p> <p>...</p> <p>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.</p> <p>Closest equivalent to differential ground speed:</p> <p><b>3.3.3.1.5.6 Selected Target Closure Rate</b></p> <p>...</p> <p>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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.2.1 Latency Requirement</b></p> <p>...</p> <p>a. Maximum latency between interfaces F and G shall (3010) be 0.5 seconds.</p> <p>...</p>	<p><b>3.3.2.2 ASSAP Performance Requirements</b></p> <p>...</p> <p>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. For all other targets, data latency shall (289R3.211) be less</p>	<p>TODO</p> <p>Seems as though this requirement should be retained and updated.</p>

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	<p>than 1 second. Note: The prioritization of targets is application-specific and is to be specified in the ASAS MOPS. The specific allocation of latency to ASSAP and CDTI is also to be specified in the MOPS, including bus latencies.</p>	
<p><b>2.3.2.1 Latency Requirement</b> ... b. Human Interface Latency: The ASA latency from activation of a control input to the appearance of the response on the CDTI <b>shall</b> (3011) be less than 1.1 seconds (0.25 seconds is recommended). ...</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action, other than to retain and update references to current airborne display standards.</p>
<p><b>2.3.2.1 Latency Requirement</b> ... If this value exceeds 0.25 seconds, an indication that the system has recognized the input <b>shall</b> (3012) be provided until the response appears on the CDTI.</p>	<p>See above</p>	<p>No action.</p>
<p><b>2.3.2.2 Time of Applicability of Traffic State Vector (SV) Data</b> a. The CDTI <b>shall</b> (3013) update the traffic data at a minimum of once per second. ...</p>	<p><b>3.3.2.1.1 ASSAP Surveillance Processing Requirements</b> ... 6. ASSAP shall (289R3.186) provide current traffic state position information to the interface with the CDTI with at least a 1 Hz rate.  <b>3.3.2.1.2 ASSAP Applications Processing Requirements</b> ASSAP shall (289R3.187) make ASSAP track reports available to the CDTI for all active applications. 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.</p>	<p>Does “update” mean extrapolate if no new data received?</p>
<p><b>2.3.2.2 Time of Applicability of Traffic State Vector (SV) Data</b> ... b. The CDTI <b>shall</b> (3014) show the position of all displayed traffic and ownship position at the same time of applicability. ...</p>	<p><b>3.3.3.1.4.1 Time of Applicability of Traffic SV Data</b> The CDTI shall (289R3.243) show the positions of all displayed traffic at the same time of applicability. Note: The ASSAP subsystem will assure that the position of traffic is extrapolated to a common time of applicability when it</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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	sends the traffic positions to the CDTI function.	
<p><b>2.3.2.3 CDTI Input Requirements from ASSAP</b> ... The CDTI function <b>shall</b> (3015) be capable of receiving and processing the ASSAP outputs to the CDTI.</p>	<p>Example: <b>3.3.3.1.4.5 Traffic Horizontal Position</b> 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</p> <p><b>3.3.3.3.1 CDTI Inputs from ASSAP</b> Table 3 21 summarizes the required inputs to the CDTI from ASSAP. (subparagraphs outline individual required parameters)</p>	<p>The 317 language represents a good, high-level requirement. Adopt in new MASPS.</p> <p>Remove individual “you-must-receive-what-I-send” requirements from MASPS.</p>
<p><b>2.3.2.4.1 Application Selection</b> If the capability for application selection exists within the CDTI, the CDTI <b>shall</b> (3016) output the application selection status of each selectable application to ASSAP. ...</p>	<p>Table 3-18 lists “Application Selection” as a required interface to ASSAP. It’s not clear, however, where the application selection information originates.</p>	<p>Remove Table 3-18. The detailed information requirements can be handled at the MOPS level.</p> <p>Add general requirement that the CDTI must provide enough information back to ASSAP to allow for the activation and deactivation of foreground applications, including those that operate on specifically designated traffic.</p>
<p><b>2.3.2.4.2 Coupled Traffic</b> ... If the flight crew has the ability to choose traffic to couple, the CDTI <b>shall</b> (3017) output to ASSAP the Track ID of the traffic being coupled, and an identifier for the associated application.</p>	<p>Table 3-18 lists “Coupled Traffic” as a required interface to ASSAP. It’s not clear, however, where the application selection information originates.</p>	<p>Covered by above resolution.</p>
<p><b>2.3.2.4.3 Selected Traffic</b> ... If the flight crew has the ability to select traffic, the CDTI <b>shall</b> (3018) output the selected traffic Track ID(s) to ASSAP.</p>	<p>Table 3-18 lists “Selected Traffic” as a required interface to ASSAP. It’s not clear, however, where the application selection information originates.</p>	<p>Covered by above resolution.</p>
<p><b>2.3.2.4.5 Traffic Display Criteria</b> The CDTI may output the traffic display criteria to ASSAP. <i>Note: The TDC could be used to filter the traffic sent across the ASSAP to CDTI interface in some implementations.</i></p>	<p>No reference found.</p>	<p>No action.</p>
<p><b>2.3.3.1 Display Characteristics</b> CDTI information should be discernable, legible, and unambiguous within all flight environments (e.g., ambient illumination), even when displayed in combination with other information (e.g., electronic map). ...</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-</p>	<p>No action, other than to retain and update references to current airborne display standards.</p>

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	185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.	
<p><b>2.3.3.1 Display Characteristics</b> ... The operating range of display luminance and contrast <b>shall</b> (3021) be sufficient to ensure display readability through the full range of normally expected flight deck illumination conditions (Reference Society of Automotive Engineers (SAE) ARP4256).</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action, other than to retain and update references to current airborne display standards.</p>
<p><b>2.3.3.2 Dynamics</b> a. Movement of CDTI information should not result in objectionable jitter, jerkiness, or ratcheting effects. ...</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action, other than to retain and update references to current airborne display standards.</p>
<p><b>2.3.3.2 Dynamics</b> ... b. Movement of CDTI information should not blur, shimmer, or produce unintended dynamic effects such that the information becomes distracting or difficult to interpret. ...</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action, other than to retain and update references to current airborne display standards.</p>
<p><b>2.3.3.2 Dynamics</b> ... c. Filtering or coasting of CDTI data intended to smooth the movement of CDTI information should not introduce significant positioning errors or create system lag that makes it difficult to perform the intended task.</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action, other than to retain and update references to current airborne display standards.</p>
<p><b>2.3.3.3 Labels</b></p>	<p>No reference found.</p>	<p>No action.</p>

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<p>... Standard or unambiguous abbreviations, symbols and nomenclature should be used for labeling. (Reference ICAO Doc 8400 "ICAO Abbreviations and Codes, sixth edition" 2004)</p>		
<p><b>2.3.3.3 Labels</b> ... a. Data fields should include a clear identifier. Example identifiers include a descriptive label, dedicated field location, or unit of measurement. ...</p>	No reference found.	No action.
<p><b>2.3.3.3 Labels</b> ... b. When a label occurs in multiple places, its meaning should be consistent across all occurrences. ...</p>	No reference found.	No action.
<p><b>2.3.3.3 Labels</b> ... c. Labels should be consistent with related labels located elsewhere in the flight deck. ...</p>	No reference found.	No action.
<p><b>2.3.3.3 Labels</b> ... d. The spatial relationships between labels and the objects they reference should be clear. ...</p>	No reference found.	No action.
<p><b>2.3.3.3 Labels</b> ... e. Labels should be oriented to facilitate readability. For example, the labels can continuously maintain an upright orientation when associated with a rotated traffic symbol. ...</p>	No reference found.	No action.
<p><b>2.3.3.4 Symbols</b> a. Each CDTI symbol <b>shall</b> (3022) be identifiable and distinguishable from other CDTI symbols. ...</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p> <p>Partial: <b>3.3.3.1.2.1 Own-Ship Symbol</b> ... The own-ship symbol shall (289R3.235) be</p>	Adopt MOPS language

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	<p>distinctive from all other symbols. ...</p> <p>Partial: <b>3.3.3.1.4.3 Traffic Category</b> ...</p> <p>The CDTI should have a means to indicate to the flight crew the category of traffic being displayed. The traffic category may be used to determine the symbol used to depict the traffic on the CDTI display, as follows:</p> <ul style="list-style-type: none"> <li>• Fixed or movable obstructions might be depicted using a different symbol than the symbol or symbols used for aircraft and ground vehicles.</li> <li>• Surface vehicles might be depicted using different symbols than those used for aircraft.</li> </ul>	
<p><b>2.3.3.4 Symbols</b> ...</p> <p>b. The shape, color, dynamics, and other symbol characteristics should have the same meaning within the CDTI. ...</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>Adopt MOPS language</p>
<p><b>2.3.3.4 Symbols</b> ..</p> <p>c. CDTI symbol modifiers should follow rules that are consistent across the symbol set.</p>	<p>Does one of these references address this requirement? <b>2.4.3.5 Requirements for CDTI</b> ...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>Adopt MOPS language</p>
<p><b>2.3.4 Display Elements</b> ...</p> <p><i>Note: Specific symbols, controls, and alerting are expected to be consistent with cockpit design philosophy.</i></p>	<p>Does one of these references address this notion? <b>2.4.3.5 Requirements for CDTI</b> ...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize</p>	<p>No action. (Removed in v4.0)</p>

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	usability, minimize flight crew workload, and reduce flight crew errors.	
<p><b>2.3.4.1 Ownship</b> a. The CDTI <b>shall</b> (3023) display a symbol indicating the location of the ownship. ...</p>	<p><b>3.3.3.1.2.1 Own-Ship Symbol</b> The traffic display shall (289R3.234) have a symbol representing the location of the own-ship. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.1 Ownship</b> ... b. If valid ownship position is not available, the CDTI <b>shall</b> (3024) display an indication of CDTI failure. (e.g., CDTI displays an “ownship data quality failure” message.) ...</p>	<p>Closest equivalent found: <b>3.3.3.1.3.2 Loss of Own-Ship Directionality</b> If all own-ship directionality information (that is, both heading and ground track angle) becomes unusable (such as from equipment failure, degraded signals, or insufficient ground-track speeds), several display issues must be addressed. These display issues are considered MOPS-level requirements and are expected to be addressed in the future ASAS MOPS.  Requirement to assess the data, but not necessarily to fail a display: <b>2.4.3.4 Requirements for ASSAP</b> 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.  Do-257A seems to allow for non-directional own-ship symbols.</p>	<p>Covered by previous resolution. Remove these requirements from MASPS.</p>
<p><b>2.3.4.1 Ownship</b> ... c. The ownship symbol <b>shall</b> (3026) be distinctive from all other symbols on the traffic display. ...</p>	<p><b>3.3.3.1.2.1 Own-Ship Symbol</b> ... The own-ship symbol shall (289R3.235) be distinctive from all other symbols. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.1 Ownship</b> ... d. The ownship symbol should be unobstructed. ...</p>	<p>Do-257A  <b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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<p><b>2.3.4.1 Ownship</b> ... e. If ownship directionality is valid, the ownship symbol <b>shall</b> (3027) be directional (e.g., not a circle or square). ...</p>	<p>Do-257A</p> <p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.1 Ownship</b> ... f. The manufacturer <b>shall</b> (3025) specify (e.g., in the system manual) the ownship horizontal position reference point location on the ownship symbol (i.e., the point on the ownship symbol that represents the reported ownship horizontal position). <i>Notes:</i> 1. <i>The location of the ownship with reference to the ownship symbol is expected to be consistent with the flight deck philosophy.</i> 2. <i>The ownship symbol is an abstract representation and does not reflect the physical extent of the aircraft. This is an important consideration when correlating the aircraft symbol with a highly magnified/zoomed-in (small range on a large display) airport surface map. The length and width codes, if available, can be used to display the physical extent of the aircraft.</i> ...</p>	<p>Do-257A specifies the location of ownship position on directional and non-directional symbols for airport moving map displays (AMMD). However, requirements for general displays are not addressed.</p>	<p>No action.</p>
<p><b>2.3.4.1 Ownship</b> ... g. The position of the ownship symbol should allow the display of traffic in all directions around the ownship. ...</p>	<p>Perhaps, the following references combine to represent this requirement?</p> <p><b>1.3.2 Traffic</b> Traffic refers to aircraft or vehicles within the operational vicinity of own-ship.</p> <p><b>2.4.3.3 Requirements for the ADS-B / TIS-B Receive Subsystem</b> ... 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, row18.</p> <p><b>2.4.5.3.4 Coverage Volume</b> ...</p>	<p>No action.</p>

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	<p>2. It is implicit within these requirements that all ASA and external subsystems, e.g., navigation, will function to meet their requirements within the coverage volume for a given application.</p>	
<p><b>2.3.4.1 Ownship</b> ... h. If ownship directionality (heading or track) is invalid, then: <input type="checkbox"/> In installations supporting the ASSA/FAROA application, if ownship is on the surface and the ASSA/FAROA application is On, then traffic and ownship may be displayed relative to the displayed map orientation (i.e., North-up orientation). In this situation, the ownship symbol <b>shall</b> (3028) be non-directional, and the ownship horizontal position reference point <b>shall</b> (3500) be the center of the symbol. <input type="checkbox"/> Otherwise, the CDTI <b>shall</b> (3029) display an indication of CDTI failure. (e.g., CDTI displays an “ownship data quality failure” message.) <i>Note: Ownship directionality is required for traffic situational awareness. TCAS/ASA integrated systems will be unable to correlate ASA and TCAS traffic without ownship directionality.</i></p>	<p><b>3.3.3.1.3.2 Loss of Own-Ship Directionality</b> If all own-ship directionality information (that is, both heading and ground track angle) becomes unusable (such as from equipment failure, degraded signals, or insufficient ground-track speeds), several display issues must be addressed. These display issues are considered MOPS-level requirements and are expected to be addressed in the future ASAS MOPS.</p>	<p>Covered by previous resolution. Remove these requirements from MASPS.</p>
<p><b>2.3.4.2.1 Data Tags</b> ... If data tag information is available, then: a. A data tag <b>shall</b> (3030) be provided for all displayed airborne traffic. ...</p>	<p>No equivalent found.</p>	<p>‘No action.</p>
<p><b>2.3.4.2.1 Data Tags</b> ... b. A means <b>shall</b> (3031) be provided to associate the data tag with the traffic symbol. ...</p>	<p>Closest equivalent: <b>3.3.3.1.4.2 Traffic Identification</b> ... The traffic identification information for given traffic shall (289R3.246) be associated visually with the symbol for that traffic. Here, “associated visually” means that the traffic ID is either placed in close proximity to the symbol for the traffic or linked to that symbol by some visual cue on the CDTI display.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.2.1 Data Tags</b> ... c. A data tag for airborne traffic <b>shall</b> (3032) include: <input type="checkbox"/> Traffic altitude. <input type="checkbox"/> Traffic vertical direction indicator (an</p>	<p><b>3.3.3.1.1 CDTI Display Features</b> The following features shall (289R3.219) be continuously displayed, except when other traffic display criteria (§3.3.3.1.3.1) are being applied: • ... • ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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<p>indication of climb or descent) when vertical speed is available and is equal to or more than 500 fpm. ...</p>	<ul style="list-style-type: none"> <li>• Traffic altitude (§3.3.3.1.4.7);</li> <li>• Traffic vertical rate indicator (§3.3.3.1.4.8);</li> <li>• ...</li> <li>• Traffic airborne/surface status (§3.3.3.1.4.6).</li> </ul>	
<p><b>2.3.4.2.1 Data Tags</b> ... d. The color of the traffic altitude and traffic vertical direction indicator <b>shall</b> (3502) match the associated traffic symbol. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.1 Data Tags</b> ... e. Data tag information that is invalid or unavailable should be indicated in the respective field of the data tag. ...</p>	<p><b>Notes for Table 2 3:</b> ... 22. If altitude is unavailable, the target should still be displayed and the lack of altitude should be indicated.</p> <p><b>3.3.3.1.4.7 Traffic Altitude</b> ... If altitude is unavailable, the target should still be displayed and the lack of altitude should be indicated.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.2.1 Data Tags</b> ... f. A data tag may optionally include additional elements, for example: <input type="checkbox"/> Traffic ID. <input type="checkbox"/> Traffic Ground Speed. <input type="checkbox"/> Traffic category. <input type="checkbox"/> Whether tracked by TCAS. <input type="checkbox"/> Air/ground status.</p>	<p>Partial: <b>3.3.3.1.4.2 Traffic Identification</b> ... Note 2: The traffic identification should be displayed as part of a data tag that is associated with the traffic symbol, assuming that the flight crew has not chosen, as part of a de-cluttering function, to remove Traffic ID information from the data tags.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.2.2 Data Blocks</b> ... More than one data block may be displayed. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.2 Data Blocks</b> ... Data block(s) should be displayed at a fixed location on the Traffic Display or other display unit. ...</p>	<p>Closest equivalent: <b>3.3.3.1.2.4 Selected Target</b> A selected target is traffic that the flight crew has designated as a target about which more information is to be displayed, usually in a data block: a region of the display that is outside the part of the display where traffic symbols are shown and that shows additional information about a single target.</p>	<p>No action.</p>
<p><b>2.3.4.2.2 Data Blocks</b></p>	<p>Closest equivalent:</p>	<p>No action.</p>

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<p>...</p> <p>a. A means <b>shall</b> (3033) be provided to associate the data block with corresponding traffic symbol (e.g., association may be achieved by use of the same border, color, or a line.)</p> <p>...</p>	<p><b>3.3.3.1.4.2 Traffic Identification</b></p> <p>...</p> <p>Note 2:</p> <p>...</p> <p>The Traffic ID may also be shown as part of the data block of information associated with the current selected target.</p>	
<p><b>2.3.4.2.2 Data Blocks</b></p> <p>...</p> <p>b. If traffic selection is implemented, the CDTI <b>shall</b> (3034) have the capability to display the following information in the selected traffic data block:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Traffic ID.</li> <li><input type="checkbox"/> Traffic Ground Speed</li> <li><input type="checkbox"/> Traffic Category.</li> <li><input type="checkbox"/> Traffic Differential Ground Speed.</li> <li><input type="checkbox"/> Traffic Range.</li> </ul>	<p><b>3.3.3.1.4.2 Traffic Identification</b></p> <p>...</p> <p>Note 2:</p> <p>...</p> <p>The Traffic ID may also be shown as part of the data block of information associated with the current selected target.</p> <p><b>3.3.3.1.5.4 Selected Target Ground Speed</b> 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.</p> <p><b>3.3.3.1.4.3 Traffic Category</b></p> <p>...</p> <p>The CDTI should have a means to indicate to the flight crew the category of traffic being displayed.</p> <p><b>3.3.3.1.5.3 Selected Target Traffic Category</b> 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.</p> <p><b>3.3.3.1.5.4 Selected Target Ground Speed</b> 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.</p> <p><b>3.3.3.1.5.5 Selected Target Range</b></p> <p>...</p> <p>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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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	<p><b>3.3.3.1.5.6 Selected Target Closure Rate</b> ... 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.</p>	
<p><b>2.3.4.2.3 Traffic Symbols</b> a. The CDTI shall (3035) display one traffic symbol for each traffic report received from ASSAP that meets the traffic display criteria subject to the maximum number of traffic elements. ...</p>	<p><b>3.3.3.1.2.2 Traffic Symbols - Basic</b> ... The CDTI shall (289R3.236) display a symbol for traffic about which the ASSAP subsystem provides reports that meet the traffic display criteria. (See §3.3.3.1.3.1 for a discussion of traffic display criteria.)</p>	Adopt MOPS language.
<p><b>2.3.4.2.3 Traffic Symbols</b> ... b. Ground vehicles should be distinguishable from aircraft.</p>	<p><b>3.3.3.1.4.3 Traffic Category</b> ... The CDTI should have a means to indicate to the flight crew the category of traffic being displayed. The traffic category may be used to determine the symbol used to depict the traffic on the CDTI display, as follows: • Fixed or movable obstructions might be depicted using a different symbol than the symbol or symbols used for aircraft and ground vehicles. • Surface vehicles might be depicted using different symbols than those used for aircraft.</p>	Leave to MOPS. Remove these requirements from MASPS.
<p><b>2.3.4.2.3.1 Traffic Symbol Location</b> a. The CDTI shall (3036) position each traffic symbol at a location representing its relative position with respect to ownship. ...</p>	<p><b>3.3.3.1.1 CDTI Display Features</b> The CDTI shall (289R3.218) display the position of traffic relative to the own-ship and relative to any displayed underlying surface map.</p>	Leave to MOPS. Remove these requirements from MASPS.
<p><b>2.3.4.2.3.1 Traffic Symbol Location</b> ... b. The manufacturer shall (3037) specify (e.g., in the system manual) the traffic horizontal position reference point location on the traffic symbol (i.e., the point on the traffic symbol that represents the reported traffic horizontal position). ...</p>	Do-257A specifies the location of ownship position on directional and non-directional symbols for airport moving map displays (AMMD). However, requirements for general displays are not addressed.	This appears to be a duplicated requirement in 317 (see 2.3.4.1.f)  No action.
<p><b>2.3.4.2.3.1 Traffic Symbol Location</b> ... c. The traffic horizontal position reference point, when using non-directional symbols, should be the center of the symbol. ...</p>	No equivalent found.	No action.
<p><b>2.3.4.2.3.1 Traffic Symbol Location</b> ...</p>	<p><b>3.3.3.1.4.4 Traffic Length/Width Codes</b> A CDTI installation that supports the ASSA</p>	Leave to MOPS. Remove these requirements from MASPS.

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<p><i>Note: A traffic symbol is an abstract representation and does not reflect the physical extent of the aircraft. This is an important consideration when correlating the aircraft symbol with a highly magnified/zoomed-in (small range on a large display) airport surface map. The length and width codes, if available, can be used to display the physical extent of the aircraft.</i></p>	<p>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.</p>	
<p><b>2.3.4.2.3.2.1 Basic Directional</b> a. If directionality is valid, the basic directional traffic symbol <b>shall</b> (3503) be depicted with an arrowhead shape. ...</p>	<p><b>3.3.3.1.2.2 Traffic Symbols - Basic</b> ... If valid directional data (i.e., ground track angle or heading) about traffic is available, the traffic symbol should indicate directionality.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.2.3.2.1 Basic Directional</b> ... b. The color <b>shall</b> (3504) be cyan or white. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.1 Basic Directional</b> ... c. The color <b>shall</b> (3505) be the same color as the basic non-directional symbol. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.1 Basic Directional</b> ... d. The color should not be the same color as the ownship symbol. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.1 Basic Directional</b> ... e. For displays that do not integrate ASA with TCAS, the symbol may be filled or unfilled. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.1 Basic Directional</b> ... f. For TCAS/ASA integrated systems, the symbol <b>shall</b> (3506) be unfilled.</p>	<p>Closest equivalent: <b>3.3.3.1.2 CDTI Symbols</b> If symbols are used to depict elements that have standard symbols (such as navigational fixes), the CDTI should use symbols that are consistent with established industry standards. ...</p>	<p>No action. Retain current MASPS language.</p>
<p><b>2.3.4.2.3.2.2 Basic Non-directional</b> a. If directionality is invalid, the basic non-directional traffic symbol <b>shall</b> (3507) be depicted with a diamond shape. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.2 Basic Non-directional</b> ... b. The color <b>shall</b> (3508) be cyan or white. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.2 Basic Non-directional</b></p>	<p>No equivalent found.</p>	<p>No action.</p>

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<p>...</p> <p>c. The color <b>shall</b> (3509) be the same color as the basic directional symbol.</p> <p>...</p>		
<p><b>2.3.4.2.3.2.2 Basic Non-directional</b></p> <p>...</p> <p>d. The color should not be the same color as the ownship symbol.</p> <p>...</p>	No equivalent found.	No action.
<p><b>2.3.4.2.3.2.2 Basic Non-directional</b></p> <p>...</p> <p>e. For displays that do not integrate ASA with TCAS, the symbol may be filled or unfilled.</p> <p>...</p>	No equivalent found.	No action.
<p><b>2.3.4.2.3.2.2 Basic Non-directional</b></p> <p>...</p> <p>f. For TCAS/ASA integrated systems, the symbol <b>shall</b> (3510) be unfilled.</p>	No equivalent found.	No action.
<p><b>2.3.4.2.3.2.3 Traffic Directionality</b></p> <p>a. If the traffic symbol indicates directionality, the directionality of the traffic symbol <b>shall</b> (3039) be displayed relative to the display orientation.</p>	No equivalent found.	No action.
<p><b>2.3.4.2.3.2.4 Traffic Application Capability</b></p> <p>a. The traffic symbol may provide an indication of traffic application capability.</p>	<p>Table 3-21 outlines inputs from ASSAP to CDTI. These include "Traffic Usability for Active Apps" and "Qualification for Coupled Apps".</p> <p><b>3.3.3.3.1.2.12 Traffic Usability for Active Applications</b></p> <p>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. This indication shall (289R3.289) provide for at least three conditions, as follows:</p> <p>a. Traffic information is fully usable for the application, or</p> <p>b. Traffic information is degraded, but can be used for the application, or</p> <p>c. Traffic information is of insufficient quality to support the application.</p> <p><b>3.3.3.3.1.2.13 Traffic Qualification for Coupled Applications</b></p> <p>...</p> <p>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</p>	Covered in previous resolution.

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	be displayed, an indication of whether or not that traffic is suitable for use with the coupled applications supported by that CDTI installation.	
<p><b>2.3.4.2.3.2.5 Traffic On-Ground Status</b> a. If traffic is on-ground, the basic traffic symbol <b>shall</b> (3511) be modified by changing the color. ...</p>	<p><b>3.3.3.1.4.6 Traffic On-Ground / In-Air Status</b> CDTI installations shall (289R3.251) be capable of depicting the air/ground state (airborne or on the surface) of traffic. (In particular, for traffic determined to be on the ground, an indication that the traffic is on the ground is to be provided.)</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.2.3.2.5 Traffic On-Ground Status</b> ... b. The color may be brown/tan. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.5 Traffic On-Ground Status</b> ... c. The size of on-ground traffic symbols may be decreased for additional encoding, and/or to reduce clutter. ...</p>	<p><b>3.3.3.1.4.4 Traffic Length/Width Codes</b> 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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.2.3.2.5 Traffic On-Ground Status</b> ... d. The symbol may be filled or unfilled.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.6 Alerts</b> ... Traffic that triggers an alert <b>shall</b> (3040) be indicated on the traffic display with a symbol variation. ...</p>	<p><b>3.3.3.1.6 Alerts</b> ... Alerting may be implemented in a variety of ways (e.g., aural, visual, tactile). Alerting should be integrated with a spatial presentation of the traffic. For example, with a plan view CDTI format, the specific aircraft involved in generating the alert may be highlighted and the projected point of closest approach may also be highlighted. In addition, the alerting may also be displayed on a separate section of a CDTI outside of the area dedicated for traffic information.</p> <p><b>3.3.3.1.6.1 Alerted Traffic Symbol</b> ... 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</p>	<p>Covered by previous resolution.</p>

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	from other traffic that are represented on the CDTI display.	
<p><b>2.3.4.2.3.2.6 Alerts</b> ... a. If traffic directionality is valid, directionality information <b>shall</b> not (3041) be removed during alerts. ...</p>	No equivalent found.	No action.
<p><b>2.3.4.2.3.2.6 Alerts</b> ... b. The traffic symbol <b>shall</b> (3042) change to amber/yellow for caution level alerts. ...</p>	<p><b>3.3.3.1.2.3 Traffic Symbol Variations</b> The depiction of traffic on the CDTI display shall (289R3.237) convey the following information elements to the flight crew: ... • Whether there is an alert with respect to the particular traffic: a. no alert, b. “caution” alert, or c. “warning” alert. Note: Other methods than varying the traffic symbols may be used to convey some or all of the information elements listed above.</p>	Covered by previous resolution.
<p><b>2.3.4.2.3.2.6 Alerts</b> ... c. The traffic symbol <b>shall</b> (3043) change to red for warning level alerts. ...</p>	See above.	Covered by previous resolution.
<p><b>2.3.4.2.3.2.6 Alerts</b> ... d. For traffic without valid directionality: <input type="checkbox"/> If traffic has a caution level alert, the traffic symbol may be modified by changing the shape to a circle. <input type="checkbox"/> If traffic has a warning level alert, the traffic symbol may be modified by changing the shape to a square. ...</p>	<p><b>3.3.3.1.2.3 Traffic Symbol Variations</b> The depiction of traffic on the CDTI display shall (289R3.237) convey the following information elements to the flight crew: ... • Whether there is an alert with respect to the particular traffic: a. no alert, b. “caution” alert, or c. “warning” alert. Note: Other methods than varying the traffic symbols may be used to convey some or all of the information elements listed above.</p>	Covered by previous resolution.
<p><b>2.3.4.2.3.2.6 Alerts</b> ... e. For traffic with valid directionality: <input type="checkbox"/> If traffic has a caution level alert, the traffic symbol may be modified by changing the shape to a circle with a directional inlay. <input type="checkbox"/> If traffic has a warning level alert, the traffic symbol may be modified by changing the shape to a square with a</p>	No equivalent found.	Covered by previous resolution.

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directional inlay. ...		
<p><b>2.3.4.2.3.2.6 Alerts</b> ... f. Alerting traffic that lies outside the configured traffic display range should be positioned at the measured relative bearing, and at the configured display maximum range (i.e., edge of display), and with a symbol shape modification that indicates that the traffic is off-scale.</p>	<p><b>3.3.3.1.6.2 Off-Display Alerted Traffic Bearing Indicator</b> ... 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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.4.2.3.2.7 Proximate Traffic</b> a. For TCAS/ASA integrated systems, the traffic symbol <b>shall</b> (3512) indicate airborne Proximate status. ...</p>	<p>Partial equivalent: <b>3.3.3.4 TCAS Integration on a CDTI</b> ... 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].</p>	<p>Add a high-level requirement that the integration of TCAS systems into ASSAP/CDTI must respect the requirements of the TCAS system in an appropriate fashion, perhaps so as to not materially alter the safety and benefits cases of the technology.</p>
<p><b>2.3.4.2.3.2.7 Proximate Traffic</b> ... b. If Proximate traffic is displayed, the basic traffic symbol <b>shall</b> (3513) be displayed as filled. Figure 2-8 provides example notional depictions.</p>	<p>Partial equivalent: <b>3.3.3.4 TCAS Integration on a CDTI</b> ... 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]. ... When no TA or RA condition exists for correlated traffic, the traffic may be represented using ASA CDTI symbology and information.</p>	<p>Covered by above resolution.</p>
<p><b>2.3.4.2.3.2.8 Selected Traffic</b> ... If traffic selection is implemented: a. There <b>shall</b> (3044) be some means of distinguishing the selected traffic from other traffic. ...</p>	<p><b>3.3.3.1.2.4 Selected Target</b> A selected target is traffic that the flight crew has designated as a target about which more information is to be displayed, usually in a data block: a region of the display that is outside the part of the display where traffic symbols are shown and that shows additional information about a single target. 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</p>	<p>Leave to MOPS. Remove these requirements from MASPS</p>
<p><b>2.3.4.2.3.2.8 Selected Traffic</b> ... b. A border <b>shall</b> (3514) not be used to indicate selected traffic.</p>	<p>No equivalent found.</p>	<p>No action.</p>

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<p>...</p> <p><b>2.3.4.2.3.2.8 Selected Traffic</b></p> <p>...</p> <p>c. When a traffic is selected, additional information on that traffic <b>shall</b> (3045) be displayed in a data block or a data tag.</p> <p>...</p>	<p><b>3.3.3.1.2.4 Selected Target</b></p> <p>A selected target is traffic that the flight crew has designated as a target about which more information is to be displayed, usually in a data block: a region of the display that is outside the part of the display where traffic symbols are shown and that shows additional information about a single target.</p> <p>...</p>	<p>No action. Retain definition.</p>
<p><b>2.3.4.2.3.2.8 Selected Traffic</b></p> <p>...</p> <p>d. There <b>shall</b> (3046) be an indication of off-scale selected traffic.</p>	<p><b>3.3.3.1.5.7 Off-Display Selected Target Bearing Indicator</b></p> <p>...</p> <p>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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS</p>
<p><b>2.3.4.2.3.2.9 Coupled Traffic</b></p> <p>...</p> <p>If traffic coupling is implemented:</p> <p>a. There <b>shall</b> (3047) be some means of distinguishing the coupled traffic from other traffic.</p> <p>...</p>	<p><b>3.3.3.1.2.5 Coupled Target</b></p> <p>...</p> <p>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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS</p>
<p><b>2.3.4.2.3.2.9 Coupled Traffic</b></p> <p>...</p> <p>b. If traffic is Coupled, the basic traffic symbol should be modified by adding a shape conforming border. Figure 2-9 provides example notional depictions.</p> <p>...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.9 Coupled Traffic</b></p> <p>...</p> <p>c. There <b>shall</b> (3048) be an indication of off-scale coupled traffic.</p> <p>...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.2.9 Coupled Traffic</b></p> <p>...</p> <p>d. The loss of “coupled” status (e.g., due to signal loss or invalid data) <b>shall</b> (3049) be indicated to the flight crew.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.4.2.3.3 TCAS Alert Symbolology for TCAS/ASA Integrated Systems.</b></p> <p>a. If traffic directionality is valid, directionality information <b>shall not</b> (3050) be removed during a TCAS Traffic Advisory or Resolution Advisory.</p>	<p><b>3.3.3.1.2.2 Traffic Symbols - Basic</b></p> <p>...</p> <p>If valid directional data (i.e., ground track angle or heading) about traffic is available, the traffic symbol should indicate directionality.</p>	<p>Leave to MOPS. Remove these requirements from MASPS</p>
<p><b>2.3.4.2.3.3.1 Traffic Advisories</b></p> <p>a. If traffic has a Traffic Advisory (TA), the traffic symbol <b>shall</b> (3515) be modified by changing the color to amber/yellow,</p>	<p>No equivalent found.</p>	<p>No action.</p>

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and changing the shape to a circle. ...		
<b>2.3.4.2.3.3.1 Traffic Advisories</b> ... b. Traffic with valid directionality <b>shall</b> (3516) include a directional inlay. ...	<b>3.3.3.1.2.2 Traffic Symbols - Basic</b> ... If valid directional data (i.e., ground track angle or heading) about traffic is available, the traffic symbol should indicate directionality.	Leave to MOPS. Remove these requirements from MASPS
<b>2.3.4.2.3.3.1 Traffic Advisories</b> ... c. The size of TA traffic symbols may be increased to accommodate the shape modification. ...	No equivalent found.	No action.
<b>2.3.4.2.3.3.1 Traffic Advisories</b> ... d. Line widths and fill may be changed to improve color interpretation and saliency.	No equivalent found.	No action.
<b>2.3.4.2.3.3.2 Resolution Advisories</b> a. If traffic has a Resolution Advisory (RA), the traffic symbol <b>shall</b> (3517) be modified by changing the color to red, and changing the shape to a square. ...	No equivalent found.	No action.
<b>2.3.4.2.3.3.2 Resolution Advisories</b> ... b. Traffic with valid directionality <b>shall</b> (3518) include a directional inlay. ...	<b>3.3.3.1.2.2 Traffic Symbols - Basic</b> ... If valid directional data (i.e., ground track angle or heading) about traffic is available, the traffic symbol should indicate directionality.	Leave to MOPS. Remove these requirements from MASPS
<b>2.3.4.2.3.3.2 Resolution Advisories</b> ... c. The size of RA traffic symbols may be increased to accommodate the shape modification. ....	No equivalent found.	No action.
<b>2.3.4.2.3.3.2 Resolution Advisories</b> ... d. Line widths and fill may be changed to improve color interpretation and saliency.	No equivalent found.	No action.
<b>2.3.4.2.3.4 Other Traffic Symbol Considerations</b> a. If circle and square shapes are used to depict alerted traffic, then circle or square shapes should not be used to depict other traffic information. ...	No equivalent found.	No action.
<b>2.3.4.3 Number of Traffic Elements</b> ... a. The CDTI <b>shall</b> (3051) be capable of displaying at least 16 traffic elements. <i>Note 1: This requirement is based on providing a minimum capability to display 8 airborne and 8 ground traffic elements</i>	<b>3.3.3.2 CDTI Performance Requirements</b> The CDTI shall (289R3.270) support the display at least 30 traffic symbols.	Modify the MASPS language to support the display of the number of traffic elements commensurate with the requirements of the installed applications.

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<p><i>concurrently.</i> <i>Note 2: A smaller number of traffic elements for display may be selected ...</i></p>		
<p><b>2.3.4.3 Number of Traffic Elements</b> ... b. The CDTI should provide an indication when the number of traffic elements meeting the traffic display criteria exceeds the maximum number of traffic elements that can be displayed. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.5.1 Traffic Monitored by TCAS</b> ... A means may be provided for the flight crew to determine if traffic of interest is monitored by TCAS (i.e., is either a TCAS-only or a TCAS correlated traffic element). ...</p>	<p><b>3.3.3.4 TCAS Integration on a CDTI</b> ... 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].  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.  When no TA or RA condition exists for correlated traffic, the traffic may be represented using ASA CDTI symbology and information. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS</p>
<p><b>2.3.5.1 Traffic Monitored by TCAS</b> ... This information may be conveyed as part of the symbol, or in a data tag or data block or by other means, and does not have to be continuously displayed.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.5.2 Traffic Application Capability</b> ... If any additional applications are installed (beyond AIRB), there <b>shall</b> (3052) be a means to determine the traffic's application capability with respect to each installed application. ...</p>	<p><b>3.3.3.1.2.6 Traffic Information Quality</b> Any CDTI installation shall (289R3.240) include a means to indicate which traffic is of degraded quality (see Table 2-3). 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.</p>	<p>Covered by previous resolution.</p>
<p><b>2.3.5.3 Traffic Air/Ground Status</b> The CDTI <b>shall</b> (3053) continuously indicate the air/ground status of all aircraft.</p>	<p><b>3.3.3.1.2.3 Traffic Symbol Variations</b> The depiction of traffic on the CDTI display shall (289R3.237) convey the following information elements to the flight crew: ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS</p>

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	<ul style="list-style-type: none"> <li>• The traffic's air/ground state:               <ul style="list-style-type: none"> <li>a. airborne, or</li> <li>b. on the surface;</li> </ul> </li> </ul> <p><b>3.3.3.1.4.6 Traffic On-Ground / In-Air Status</b> CDTI installations shall (289R3.251) be capable of depicting the air/ground state (airborne or on the surface) of traffic. (In particular, for traffic determined to be on the ground, an indication that the traffic is on the ground is to be provided.)</p>	
<p><b>2.3.5.4 Differential Ground Speed (DGS)</b> Differential ground speed may be displayed either graphically or alphanumerically. ...</p>	No equivalent found.	Leave to MOPS. Remove these requirements from MASPS.
<p><b>2.3.5.4 Differential Ground Speed (DGS)</b> ... a. A positive differential ground speed (i.e., OGS is faster) shall (3054) be distinguishable from a negative differential ground speed (i.e., TGS is faster).</p>	No equivalent found.	No action.
<p><b>2.3.5.4 Differential Ground Speed (DGS)</b> ... b. Differential ground speed information shall (3055) be distinguishable from other information. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.4 Differential Ground Speed (DGS)</b> ... c. If an alphanumeric differential ground speed is displayed, the CDTI shall (3056) be capable of displaying it with a minimum resolution of 1 knot or equivalent. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.4 Differential Ground Speed (DGS)</b> ... d. The CDTI shall (3057) be capable of displaying differential ground speeds of at least +/- 199 knots. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.4 Differential Ground Speed (DGS)</b> ... e. An indication should be displayed when the maximum differential ground speed display capability of the CDTI is exceeded.</p>	No equivalent found.	No action.
<p><b>2.3.5.5 Traffic Altitude</b> a. As the nominal case, the CDTI shall (3058) display relative altitude (see 2.3.5.5.1). ...</p>	<p><b>3.3.3.1.4.7 Traffic Altitude</b> ... CDTI installations shall (289R3.252) be capable of displaying the relative altitude of traffic.</p>	Leave to MOPS. Remove these requirements from MASPS.

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<p><b>2.3.5.5 Traffic Altitude</b> ... b. Alternately, Traffic Altitude may be displayed as Actual Altitude (see 2.3.5.5.2). ...</p>	<p><b>3.3.3.1.4.7 Traffic Altitude</b> ... CDTI installations should be capable of displaying the actual altitude of traffic ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.5 Traffic Altitude</b> ... c. Altitudes for all displayed traffic <b>shall</b> (3059) be consistent, with all altitudes being either actual or relative. ...</p>	<p><b>3.3.3.1.4.7 Traffic Altitude</b> ... 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. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.5 Traffic Altitude</b> ... d. If the capability exists to display both relative and actual altitudes, the display <b>shall</b> (3060) indicate whether actual or relative altitude is displayed. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.5.5 Traffic Altitude</b> ... e. The altitude information <b>shall</b> not (3061) be displayed if the traffic altitude is not available. ...</p>	<p><b>3.3.3.1.4.7 Traffic Altitude</b> ... If altitude is unavailable, the target should still be displayed and the lack of altitude should be indicated. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.5 Traffic Altitude</b> ... f. The altitude information <b>shall</b> not (3062) be displayed for on-ground traffic. ...</p>	<p><b>3.1.5.6 Altitude</b> 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.  <b>3.3.3.1.4.7 Traffic Altitude</b> ... Altitude values shall (289R3.253) be displayed for airborne traffic. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.5 Traffic Altitude</b> ... g. The traffic altitude <b>shall</b> (3063) be displayed, when available, in the associated data tag. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.5.5 Traffic Altitude</b> ... h. The traffic altitude <b>shall</b> (3064) be displayed with a minimum resolution of 100 feet or equivalent.</p>	<p>No equivalent found.</p>	<p>No action.</p>

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<p><b>2.3.5.5.1 Traffic Relative Altitude</b> a. For traffic above ownship, the altitude value in the data tag <b>shall</b> (3065) be preceded by a “+” sign and be placed above the traffic symbol. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.5.1 Traffic Relative Altitude</b> ... b. For traffic below ownship, the altitude value in the data tag <b>shall</b> (3066) be preceded by a “-” sign and be placed below the traffic symbol. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.5.1 Traffic Relative Altitude</b> ... c. The relative altitude <b>shall</b> (3067) consist of at least two digits indicating the altitude difference in hundreds of feet. For example, “+70” would represent 7,000 ft above ownship and “-01” would represent 100 feet below ownship. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.5.1 Traffic Relative Altitude</b> ... d. The data tag for co-altitude traffic (traffic at the same altitude as the ownship) <b>shall</b> (3068) be displayed as the digits “00”. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.5.1 Traffic Relative Altitude</b> ... e. The “00” characters should be placed above the traffic symbol if the traffic descended from above; below the symbol if the traffic climbed from below to the ownship altitude. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.5.1 Traffic Relative Altitude</b> ... f. If ownship climbed to the traffic altitude, the “00” characters should be placed above the traffic symbol, if the ownship descended to the traffic altitude, the “00” characters should be placed below the traffic symbol. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.5.1 Traffic Relative Altitude</b> ... g. If traffic is at co-altitude with ownship when initially displayed, the “00” characters should be placed below the traffic symbol.</p>	No equivalent found.	No action.
<p><b>2.3.5.5.2 Traffic Actual Altitude</b> ... A clear and unambiguous indication <b>shall</b></p>	No equivalent found.	No action.

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(3069) be provided on the display that the actual altitude mode has been selected. ...		
<b>2.3.5.5.2 Traffic Actual Altitude</b> ... Actual altitude tags <b>shall</b> (3070) be positioned above or below the traffic symbol in a manner consistent with relative altitude data tags. ...	No equivalent found.	No action.
<b>2.3.5.5.2 Traffic Actual Altitude</b> ... Actual altitude <b>shall</b> (3071) be displayed as a 3-digit number representing hundreds of feet above MSL. (e.g., “007” represents 700 feet MSL and “250” represents 25,000 feet MSL.) ...	No equivalent found.	No action.
<b>2.3.5.5.2 Traffic Actual Altitude</b> ... The display of actual barometric altitude below the transition altitude (18,000 MSL in the U.S.) <b>shall</b> (3072) incorporate a barometric pressure correction from ownship.	<b>3.3.3.1.4.7 Traffic Altitude</b> ... Actual altitude may be uncorrected (i.e., pressure altitude) if the local pressure setting of the own-ship is unavailable. ... <b>3.3.3.3.1.2.8 Local Pressure Correction</b> 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.	Leave to MOPS. Remove these requirements from MASPS.
<b>2.3.5.5.3 Traffic Geometric Altitude</b> a. If traffic pressure altitude is not available, then traffic geometric altitude may be utilized to calculate the relative altitude for display. ...	<b>3.3.3.1.4.7 Traffic Altitude</b> Relative altitude is the difference between own-ship and traffic altitude, calculated either using either the pressure altitudes of both aircraft or using the geometric altitudes of both aircraft. ...	Leave to MOPS. Remove these requirements from MASPS.
<b>2.3.5.5.3 Traffic Geometric Altitude</b> ... b. If Geometric altitude is displayed, it <b>shall</b> (3073) be displayed as relative altitude. ...	<b>3.3.3.3.1.2.9 Traffic Geometric Altitude</b> ... Note: The geometric altitude information about traffic may be represented either as (a) the relative geometric altitude of traffic with respect to own-ship, i.e., traffic altitude minus own-ship altitude, or (b) the geometric altitude of traffic and the geometric altitude of the own-ship.	Leave to MOPS. Remove these requirements from MASPS.
<b>2.3.5.5.3 Traffic Geometric Altitude</b> ... c. If Geometric altitude is displayed, it <b>shall</b> (3074) not be displayed as actual altitude.	<b>3.3.3.3.1.2.9 Traffic Geometric Altitude</b> ... Note: The geometric altitude information about traffic may be represented either as (a) the relative geometric altitude of	Leave to MOPS. Remove these requirements from MASPS.

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	<p>traffic with respect to own-ship, i.e., traffic altitude minus own-ship altitude, or (b) the geometric altitude of traffic and the geometric altitude of the own-ship.</p>	
<p><b>2.3.5.6 Traffic Vertical Direction</b> a. Traffic with a climb or descent rate greater than or equal to 500 fpm <b>shall</b> (3075) include a traffic vertical direction indicator. ...</p>	<p><b>3.3.3.1.4.8 Traffic Vertical Rate Indicator</b> ... The CDTI shall (289R3.255) be capable of indicating which traffic is climbing or descending at a rate greater than the specified threshold.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.6 Traffic Vertical Direction</b> ... b. The traffic vertical direction indicator <b>shall</b> (3501) be a vertical arrow placed to the immediate right of the traffic symbol.</p>	<p><b>3.3.3.1.4.8 Traffic Vertical Rate Indicator</b> ... The vertical rate indication may be an up or down arrow. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.7 Traffic Identification</b> a. The traffic identification field <b>shall</b> (3076) be capable of displaying eight alphanumeric characters. ...</p>	<p><b>3.3.3.1.4.2 Traffic Identification</b> ... 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. Such CDTI installations shall (289R3.245) be capable of displaying traffic IDs of up to eight alphanumeric characters.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.7 Traffic Identification</b> ... b. The location of traffic identification field with respect to the traffic symbol should be consistent for all displayed traffic.</p>	<p><b>3.3.3.1.4.2 Traffic Identification</b> ... The traffic identification information for given traffic shall (289R3.246) be associated visually with the symbol for that traffic. Here, “associated visually” means that the traffic ID is either placed in close proximity to the symbol for the traffic or linked to that symbol by some visual cue on the CDTI display. Note 2: The traffic identification should be displayed as part of a data tag that is associated with the traffic symbol, assuming that the flight crew has not chosen, as part of a de-cluttering function, to remove Traffic ID information from the data tags. The Traffic ID may also be shown as part of the data block of information associated with the current selected target.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.8 Traffic Ground Speed</b> a. The CDTI <b>shall</b> (3077) be capable of displaying ground speeds up to at least 999 knots. ...</p>	<p>No direct equivalent found.  This applies to the transmit side: <b>3.1.5.4 Horizontal Velocity</b> ... Horizontal velocity shall (289R3.91) be provided with a range to accommodate speeds of up to 4000 knots for airborne</p>	<p>No action.</p>

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	participants and up to 250 knots for surface participants.	
<p><b>2.3.5.8 Traffic Ground Speed</b> ... b. An indication should be displayed if ground speed exceeds the indicator limit. ...</p>	No equivalent found.	No action.
<p><b>2.3.5.8 Traffic Ground Speed</b> ... c. Ground speed <b>shall</b> (3078) be displayed with a minimum resolution of 1 knot.</p>	<p><b>3.1.5.5 Ground Speed</b> ... Moreover, the resolution reported shall (289R3.95) be sufficiently fine so as to not compromise the accuracy of that speed as communicated in the NACV value. ...</p>	TODO
<p><b>2.3.5.9 Traffic Category (Emitter Category)</b> ... a. The CDTI <b>shall</b> (3079) be capable of displaying the traffic category. ...</p>	<p><b>3.3.3.1.4.3 Traffic Category</b> ... The CDTI should have a means to indicate to the flight crew the category of traffic being displayed.  <b>3.3.3.1.5.3 Selected Target Traffic Category</b> 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.</p>	Covered by previous resolution.
<p><b>2.3.5.9 Traffic Category (Emitter Category)</b> ... b. The traffic category (emitter category), when displayed, should be displayed with sufficient descriptive quality</p>	No equivalent found.	No action.
<p><b>2.3.5.10 Traffic Emergency Priority Status</b> The CDTI may display the emergency status information on traffic. The emergency status may be displayed as part of a traffic symbol variation (i.e., some characteristic of the symbol, such as shape, changes), and/or as part of a data tag or data block.</p>	<p><b>3.3.2.1.2.1 Basic and Intermediate ASA</b> ... Required processing of certain elements of surveillance status are indicated below: ... e. Emergency / priority status shall (289R3.208) be forwarded to the CDTI. ...</p>	TODO
<p><b>2.3.5.11 Traffic Horizontal Velocity Vector</b> a. Traffic horizontal velocity vector information should be depicted graphically. ...</p>	<p><b>3.3.3.1.4.9 Horizontal Velocity Vector</b> ... Traffic horizontal velocity vector information should be depicted graphically. ...</p>	Leave to MOPS. Remove these requirements from MASPS.
<p><b>2.3.5.11 Traffic Horizontal Velocity Vector</b> ... b. The same scale (e.g., 60 seconds) <b>shall</b> (3080) be used for all displayed horizontal velocity vectors.</p>	<p><b>3.3.3.1.4.9 Horizontal Velocity Vector</b> ... When horizontal velocity vector is displayed, units of measurement shall (289R3.258) be the same between all displayed traffic and own-ship.</p>	Leave to MOPS. Remove these requirements from MASPS.

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<p>...</p> <p><b>2.3.5.11 Traffic Horizontal Velocity Vector</b></p> <p>...</p> <p>c. If the length of the horizontal velocity vector represents a set prediction time (e.g., 60 seconds), the velocity vector's size <b>shall</b> (3081) scale according to a fixed time when the display's range is changed.</p> <p>...</p>	<p>...</p> <p><b>3.3.3.1.4.9 Horizontal Velocity Vector</b></p> <p>...</p> <p>If the horizontal velocity vector is depicted in terms of time, the prediction time should remain the same regardless of the selected display range.</p> <p>...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.11 Traffic Horizontal Velocity Vector</b></p> <p>...</p> <p>d. If the flight crew has the capability to change the scale of the velocity vector, the scaling value <b>shall</b> (3082) be displayed.</p> <p>...</p>	<p><b>3.3.3.1.4.9 Horizontal Velocity Vector</b></p> <p>...</p> <p>The units of the horizontal velocity vector should be displayed.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.11 Traffic Horizontal Velocity Vector</b></p> <p>...</p> <p>e. Horizontal velocity vectors <b>shall</b> (3083) be distinguishable from Traffic Vertical Direction Indicators.</p>	<p>Does this reference address this requirement?</p> <p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action.</p>
<p><b>2.3.5.12 Display Range</b></p> <p>a. The CDTI <b>shall</b> (3084) be adjustable to a range of 10 NM or less in the direction of ownship travel as measured from the ownship position to the edge of the viewable screen.</p> <p>...</p>	<p><b>3.3.3.1.1.1 Display Range / Map Scale</b></p> <p>...</p> <p>It shall (289R3.221) be possible for the flight crew to adjust the CDTI display range / map scale.</p> <p>...</p> <p>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.</p>	<p>Add requirement that there must be appropriate means for the crew to configure the display to fulfill the needs of the installed applications.</p>
<p><b>2.3.5.12 Display Range.</b></p> <p>...</p> <p>b. The CDTI <b>shall</b> (3085) be adjustable to a range of 40 NM or greater in the direction of ownship travel as measured from the ownship position to the edge of the viewable screen.</p> <p>...</p>	<p><b>3.3.3.1.1.1 Display Range / Map Scale</b></p> <p>...</p> <p>It shall (289R3.221) be possible for the flight crew to adjust the CDTI display range / map scale.</p> <p>...</p> <p>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.</p>	<p>Covered by above resolution.</p>
<p><b>2.3.5.12 Display Range</b></p> <p>...</p>	<p><b>3.3.3.1.1.1.3 Range Reference</b></p> <p>An indication of the currently selected</p>	<p>Covered by previous resolution.</p>

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<p>c. The selected display range <b>shall</b> (3086) be indicated on the traffic display. ...</p>	<p>CDTI display range or map scale shall (289R3.226) be shown on the CDTI display.</p>	
<p><b>2.3.5.12 Display Range</b> ... d. Range markings relative to ownship position should be provided.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.5.13 Display Orientation</b> a. The CDTI <b>shall</b> (3087) provide the Capability for Track-up or Heading-up orientation mode. ...</p>	<p><b>3.3.3.1.1.2.1 Display Orientation Mode</b> The CDTI shall (289R3.227) be capable of orienting its display in at least one of the following ways: Track Up: with the up (12 o'clock) direction on the display representing the direction of the own-ship ground velocity vector (the direction in which the aircraft is moving); or Heading Up: with the up (12 o'clock) direction representing the direction towards which the nose of the aircraft is pointing.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.13 Display Orientation</b> ... b. If multiple orientations modes are implemented, the CDTI <b>shall</b> (3088) display the current ownship orientation (e.g., heading-up, track-up, north-up). ...</p>	<p><b>3.3.3.1.1.2.2 Display Orientation Value</b> 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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.5.13 Display Orientation</b> ... c. The CDTI <b>shall</b> (3089) display all traffic with respect to the display orientation.</p>	<p><b>3.3.2.1.2.1 Basic and Intermediate ASA</b> ... f. ASSAP shall (289R3.209) convert heading from true or magnetic heading to the appropriate orientation for consistent display on the CDTI.</p> <p><b>3.3.3.1.4.5 Traffic Horizontal Position</b> ... 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. 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.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.6.1 CDTI Symbol Prioritization for Overlay</b> To ensure visibility of the most important symbols and their associated proximate data (i.e., data tags), the following prioritization should be followed for information overlay, from highest to lowest priority:</p>	<p>No equivalent found.</p>	<p>No action.</p>

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<ol style="list-style-type: none"> <li>1. Ownship.</li> <li>2. Airborne traffic with warning level alerts (including TCAS RAs).</li> <li>3. Surface traffic with warning level alerts (...).</li> <li>4. Airborne traffic with cautions level alerts (including TCAS TAs).</li> <li>5. Surface traffic with caution level alerts (...).</li> <li>6. Airborne coupled traffic.</li> <li>7. Surface coupled traffic (...).</li> <li>8. Airborne selected traffic.</li> <li>9. Surface selected traffic.</li> <li>10. Other airborne traffic.</li> <li>11. Other surface traffic.</li> <li>12. Other CDTI features.</li> </ol>		
<p><b>2.3.6.2 Decluttering</b></p> <p>a. The capability <b>shall</b> (3090) be provided for removing all optional CDTI information (e.g., traffic identification and horizontal velocity vector) from the display and returning to the basic traffic display features. Intermediate levels of decluttering may remove a subset of the optional CDTI information.</p> <p>...</p>	<p><b>3.3.3.1.4.2 Traffic Identification</b></p> <p>...</p> <p>Note 2: The traffic identification should be displayed as part of a data tag that is associated with the traffic symbol, assuming that the flight crew has not chosen, as part of a de-cluttering function, to remove Traffic ID information from the data tags.</p>	<p>No action.</p>
<p><b>2.3.6.2 Decluttering</b></p> <p>...</p> <p>b. The following basic traffic display features <b>shall</b> (3091) not be removed by decluttering:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Ownship symbol.</li> <li><input type="checkbox"/> Traffic symbols, including symbol variations (e.g., alerted, coupled, selected, air/ground status).</li> <li><input type="checkbox"/> Traffic altitude.</li> <li><input type="checkbox"/> Traffic vertical direction indicator.</li> <li><input type="checkbox"/> Display range indication.</li> <li><input type="checkbox"/> Ownship directional reference (if displayed).</li> <li><input type="checkbox"/> Traffic Display Criteria (if displayed).</li> <li><input type="checkbox"/> Application and related information (if displayed).</li> <li><input type="checkbox"/> Altitude band, (if not default value).</li> </ul> <p>...</p>	<p>No equivalent found, although table 3-19 lists optional information. Supposedly, anything listed therein as optional could be removed by a decluttering function.</p>	<p>Leave to MOPS. Remove table 3-19 from MASPS.</p>
<p><b>2.3.6.2 Decluttering</b></p> <p>..</p> <p>c. Decluttering may be selected manually by the flight crew or automatically, such as during a traffic alert.</p> <p>...</p>	<p>No equivalent found.</p>	<p>No action.</p>

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<p><b>2.3.6.2 Decluttering</b> ... d. If decluttering is active, an indication that decluttering is active <b>shall</b> (3092) be provided on the CDTI.</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.3.6.3 CDTI Monitoring Function</b> The CDTI <b>shall</b> (3093) be capable of displaying the health of the ASA system to the flight crew.</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.3.6.4 Display of Status Indication</b> Status Indication which the CDTI displays can come from several sources such as ASSAP function, ASSAP Application(s), the CDTI function, or the system self test and monitoring functions. Status Indication may be displayed on the same display device showing traffic information, or on a fault page accessible to the user.</p>	<p><b>2.4.1 Qualification for ASA Capability Levels</b> ... Failure of equipment that affects available ACL shall (289R2.3) be indicated to the flight crew.</p>	Covered by previous resolution.
<p><b>2.3.6.4.1 System Status</b> a. The CDTI <b>shall</b> (3094) indicate the absence of power (e.g., blank display). ...</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.3.6.4.1 System Status</b> ... b. The CDTI <b>shall</b> (3095) indicate any non-normal status from the ASSAP and CDTI self test. ...</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.3.6.4.1 System Status</b> ... c. The CDTI <b>shall</b> (3096) provide an indication of any non-normal ASSAP status from the continuous monitoring function. ...</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.3.6.4.1 System Status</b> ... d. The CDTI <b>shall</b> (3097) provide an indication of any non-normal CDTI status from the continuous monitoring function. ...</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.3.6.4.1 System Status</b> ... e. The CDTI <b>shall</b> (3098) remove traffic from the display if the following occurs: 1. The CDTI monitor (Section 2.3.6.3) indicates CDTI failure. 2. The ASSAP monitor (Section 2.2.5) indicates ASSAP failure. ...</p>	No equivalent found.	No action.
<p><b>2.3.6.4.1 System Status</b> ... f. ASSAP will also provide status of its</p>	No equivalent found.	Covered by previous resolution.

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<p>inputs such as ADS-B and TCAS. The CDTI <b>shall</b> (3099) display an appropriate input failure message when ASSAP has indicated its input has failed (e.g., ADS-B fail/TCAS input fail).</p>		
<p><b>2.3.6.4.2 ASA Application Status</b> a. The equipment <b>shall</b> (3100) be capable of indicating any applications that are: <input type="checkbox"/> On. <input type="checkbox"/> Available to run. <input type="checkbox"/> Unavailable to run. <input type="checkbox"/> Unavailable – Fault. ...</p>	<p><b>2.4.1 Qualification for ASA Capability Levels</b> ... Failure of equipment that affects available ACL shall (289R2.3) be indicated to the flight crew.</p> <p><b>3.3.3.1.6.3 Application Alerts</b> CDTI installations that support the Advanced ASA Capability Level will be capable of displaying alerts. CDTI installations that include the CD option shall (289R3.269) be capable of displaying alerts to the flight crew.</p>	<p>Covered by previous resolution.</p>
<p><b>2.3.6.4.2 ASA Application Status</b> ... b. The equipment <b>shall</b> (3101) indicate any application that was on, but becomes: <input type="checkbox"/> Unavailable to run. <input type="checkbox"/> Unavailable – Fault. ...</p>	<p>Table 2-3 refers to a maximum time to indicate a change in integrity data. This may imply the need for an indication, if an application relying on a given integrity can no longer run.</p> <p><b>3.3.3.1.6.3 Application Alerts</b> CDTI installations that support the Advanced ASA Capability Level will be capable of displaying alerts. CDTI installations that include the CD option shall (289R3.269) be capable of displaying alerts to the flight crew.</p>	<p>Covered by previous resolution.</p>
<p><b>2.3.6.4.2 ASA Application Status</b> ... c. The equipment may be capable of indicating any application that is not configured.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.6.4.3 TIS-B/ADS-R Service Status</b> a. For systems that are not integrated with TCAS, the CDTI <b>shall</b> (3519) display TISB/ADS-R Service Status received from ASSAP. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.6.4.3 TIS-B/ADS-R Service Status</b> ... b. TIS-B/ADS-R Service Status should be displayed in a manner consistent with the overall flight deck design philosophy. An example is included in Appendix H.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.6.5 Alerting - General</b> Alerts should be consistent with the flight deck alerting system and philosophy, and should not interfere with higher priority alerts.</p>	<p>No equivalent found.</p>	<p>No action.</p>

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<p>...</p> <p><b>2.3.6.5 Alerting - General</b></p> <p>...</p> <p>a. If alerts are disabled by the pilot, the system alert status <b>shall</b> (3102) indicate that alerts are disabled.</p> <p>...</p>	<p><b>3.3.3.1.1.3.4 Low Level Alert Disabled Indication</b></p> <p>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. The low-level alert feature is optional.</p>	<p>Covered by previous resolution.</p>
<p><b>2.3.6.5 Alerting - General</b></p> <p>...</p> <p>b. CDTI alerts should be consistent with, and capable of being integrated into the flight deck alerting system, giving proper priority to alerts with regard to safety of flight.</p> <p>...</p>	<p>Closest equivalents:</p> <p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The display of traffic information may be integrated into an existing display (e.g., a multi-function display [MFD]), or may take place on a dedicated, stand-alone display.</p> <p><b>3.3.3.3 Expected CDTI Interface Requirements</b></p> <p>...</p> <p>It is expected that the CDTI will ultimately integrate data and alarms from other sources of information beyond surveillance processing, such as weather, terrain, etc., but these additional data sources and their integration are beyond the scope of this MASPS.</p>	<p>Adopt MOPS language.</p>
<p><b>2.3.6.5 Alerting - General</b></p> <p>...</p> <p>c. Aural alerts <b>shall</b> (3103) be audible and distinguishable in all expected flight deck ambient noise conditions.</p>	<p>Does this fit?</p> <p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p> <p>....</p>	<p>Adopt MOPS language.</p>
<p><b>2.3.7.1 Display Range</b></p> <p>A control <b>shall</b> (3104) be provided to adjust the display range between the minimum and maximum values.</p>	<p><b>3.3.3.1.1.1 Display Range / Map Scale</b></p> <p>...</p> <p>It shall (289R3.221) be possible for the flight crew to adjust the CDTI display range / map scale.</p> <p>...</p>	<p>Covered in previous resolution.</p>
<p><b>2.3.7.2 Altitude Band</b></p> <p>A control <b>shall</b> (3105) be provided to adjust the altitude band between the minimum and maximum values.</p>	<p><b>3.3.3.1.3.1 Traffic Display Criteria</b></p> <p>The CDTI subsystem may include a capability by which the flight crew can cause the display not to show traffic that are not of interest or concern. For example:</p> <p>...</p> <ul style="list-style-type: none"> <li>• Altitude Selection. By selecting a range of altitudes for traffics to be displayed, the flight crew could avoid displaying</li> </ul>	<p>Covered in previous resolution.</p>

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	traffic that is well separated from the own-ship altitude.	
<p><b>2.3.7.3 Relative/Actual Altitude Selection</b> If the ability to display actual altitude is implemented, a control <b>shall</b> (3106) be provided to select between relative and actual altitude.</p>	<p>Closest equivalent: <b>3.3.3.1.3.1 Traffic Display Criteria</b> ... If traffic filtering is implemented wholly or partially within the equipment that houses the ASSAP function, then it will be necessary for the equipment that houses the CDTI subsystem to provide the ASSAP equipment with information from the CDTI control panel about which filtering limits have been selected by the flight crew.</p>	Leave to MOPS.
<p><b>2.3.7.4 Traffic Selection</b> If traffic selection is implemented, a means <b>shall</b> (3107) be provided for the flight crew to select at least one traffic element.</p>	<p>Closest equivalent: <b>1.2.3 ASA Architecture</b> ... The CDTI subsystem shown in Figure 1 2 includes the actual display media and the necessary controls to interface with the flight crew. ... <b>1.3.6 CDTI</b> ... CDTI also includes a control panel so that the flight crew may choose applications, parameters and features ... <b>2.3.2 ASA System Boundaries – Primary Interfaces</b> ... The CDTI control interface is also used by the flight crew to select the presentation of traffic data, e.g., display range / map scale, display orientation, traffic data block, etc. on the CDTI display.</p>	Covered in previous resolution.
<p><b>2.3.7.5 Traffic Display Criteria Selection</b> If alternate display criteria (see section 2.3.1.1.2) are implemented, appropriate control(s) <b>shall</b> (3108) be provided.</p>	<p>Closest equivalent: <b>1.2.3 ASA Architecture</b> ... The CDTI subsystem shown in Figure 1 2 includes the actual display media and the necessary controls to interface with the flight crew. ... <b>1.3.6 CDTI</b> ... CDTI also includes a control panel so that the flight crew may choose applications, parameters and features ... <b>2.3.2 ASA System Boundaries – Primary Interfaces</b> ...</p>	Covered in previous resolution.

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	<p>The CDTI control interface is also used by the flight crew to select the presentation of traffic data, e.g., display range / map scale, display orientation, traffic data block, etc. on the CDTI display.</p>	
<p><b>2.3.7.6 Decluttering</b> If decluttering is implemented: a. A means <b>shall</b> (3019) be provided for the flight crew to control the decluttering. ...</p>	<p>Closest equivalent: <b>1.2.3 ASA Architecture</b> ... The CDTI subsystem shown in Figure 1 2 includes the actual display media and the necessary controls to interface with the flight crew. ... <b>1.3.6 CDTI</b> ... CDTI also includes a control panel so that the flight crew may choose applications, parameters and features ... <b>2.3.2 ASA System Boundaries – Primary Interfaces</b> ... The CDTI control interface is also used by the flight crew to select the presentation of traffic data, e.g., display range / map scale, display orientation, traffic data block, etc. on the CDTI display.</p>	<p>Covered in previous resolution.</p>
<p><b>2.3.7.6 Decluttering</b> ... b. The flight crew <b>shall</b> (3110) be able to perform the declutter operation by a Simple Action.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.7.6 Decluttering</b> ... c. The flight crew should be able to return to the previous state by a Simple Action. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.7.6 Decluttering</b> ... If automatic decluttering is implemented, a means <b>shall</b> (3111) be provided for the flight crew to control the automated decluttering function.</p>	<p>Closest equivalent: <b>1.2.3 ASA Architecture</b> ... The CDTI subsystem shown in Figure 1 2 includes the actual display media and the necessary controls to interface with the flight crew. ... <b>1.3.6 CDTI</b> ... CDTI also includes a control panel so that the flight crew may choose applications, parameters and features ... <b>2.3.2 ASA System Boundaries – Primary Interfaces</b></p>	<p>No action.</p>

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	<p>...</p> <p>The CDTI control interface is also used by the flight crew to select the presentation of traffic data, e.g., display range / map scale, display orientation, traffic data block, etc. on the CDTI display.</p>	
<p><b>2.3.7.7 Panning</b> If panning is implemented: a. There <b>shall</b> (3112) be a means to control panning. ...</p>	<p>Closest equivalent: <b>1.2.3 ASA Architecture</b> ... The CDTI subsystem shown in Figure 1 2 includes the actual display media and the necessary controls to interface with the flight crew. ... <b>1.3.6 CDTI</b> ... CDTI also includes a control panel so that the flight crew may choose applications, parameters and features ... <b>2.3.2 ASA System Boundaries – Primary Interfaces</b> ... The CDTI control interface is also used by the flight crew to select the presentation of traffic data, e.g., display range / map scale, display orientation, traffic data block, etc. on the CDTI display.</p>	<p>No action.</p>
<p><b>2.3.7.7 Panning</b> ... b. There <b>shall</b> (3113) be a means to return to the default view (i.e., with the ownship symbol displayed) with no more than two actions.</p>	<p>Closest equivalent: <b>1.2.3 ASA Architecture</b> ... The CDTI subsystem shown in Figure 1 2 includes the actual display media and the necessary controls to interface with the flight crew. ... <b>1.3.6 CDTI</b> ... CDTI also includes a control panel so that the flight crew may choose applications, parameters and features ... <b>2.3.2 ASA System Boundaries – Primary Interfaces</b> ... The CDTI control interface is also used by the flight crew to select the presentation of traffic data, e.g., display range / map scale, display orientation, traffic data block, etc. on the CDTI display.</p>	<p>No action.</p>
<p><b>2.3.7.8 Application and Coupling Control</b> a. For installations that support more than the AIRB. ASSA/FAROA, and ITP [...]</p>	<p>No equivalent found.</p>	<p>No action.</p>

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<p>applications, a means <b>shall</b> (3114) be provided for the flight crew to manually enable and disable the additional applications. In addition, automatic enabling/disabling may be provided.</p> <p>...</p>		
<p><b>2.3.7.8 Application and Coupling Control.</b></p> <p>...</p> <p>b. If ITP is implemented, a means <b>shall</b> (3115) be provided for the flight crew to manually couple and decouple traffic elements.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.7.9 Brightness Control</b></p> <p>A means <b>shall</b> (3116) be provided to adjust the brightness of the display.</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.8 Flight Deck Integration</b></p> <p>The CDTI system should be consistent with the rest of the flight deck in terms of color, standardization, automation, symbology, interaction techniques and operating philosophy Reference AC 25-11A and AC 23.1311B.</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p> <p>...</p>	<p>Covered by previous resolution.</p>
<p><b>2.3.8.1 Multi-function Display</b></p> <p>a. If non-traffic information is integrated with the traffic information on the display, the directional orientation, range, and ownship position <b>shall</b> (3117) be consistent among the different information sets.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>Note: It is recognized that own-ship navigation source information used for own-ship position on a CDTI that is integrated in a multi-function display may differ from that which is provided to ASSAP and used for data transmission on ADS-B.</p> <p><b>3.3.3.1.4.5 Traffic Horizontal Position</b></p> <p>...</p> <p>Note: It is recognized that the source of information for own-ship position used for the CDTI may differ from that used for ASSAP. Traffic information should be displayed relative to the navigation position used on the CDTI for own-ship.</p>	<p>Adopt MOPS language.</p>
<p><b>2.3.8.1 Multi-function Display</b></p> <p>...</p> <p>b. Symbols, colors, and other encoded information that have a certain meaning in the traffic display function should not have a different meaning in another MFD function.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p> <p>Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p> <p><b>3.3.3.1.2 CDTI Symbols</b></p>	<p>Adopt MOPS language.</p>

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	<p>If symbols are used to depict elements that have standard symbols (such as navigational fixes), the CDTI should use symbols that are consistent with established industry standards.</p> <p>Note: Guidelines for electronic display symbology for navigation aids are provided in [SAE ARP5289].</p>	
<p><b>2.3.8.1 Multi-function Display</b> ... c. The MFD system should provide the capability to enable and disable display of traffic information (i.e., to overlay traffic or turn traffic information off). ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.8.1 Multi-function Display</b> ... d. A means should be provided to select the display of traffic information by Simple Action(s) by the pilot. ...</p>	<p><b>3.3.3.1.3.1 Traffic Display Criteria</b> The CDTI subsystem may include a capability by which the flight crew can cause the display not to show traffic that are not of interest or concern.</p>	<p>Leave to MOPS. Remove this requirement from MASPS.</p>
<p><b>2.3.8.1 Multi-function Display</b> ... e. An indication that the CDTI function is active and included as part of the MFD, other than the display of traffic itself, <b>shall</b> (3118) be present during normal operation (when displaying of traffic is enabled) so that if display of traffic is disabled, it is obvious to the pilot. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.8.1 Multi-function Display</b> ... f. CDTI cautions and warnings <b>shall</b> (3119) be immediately provided, regardless of the active MFD function. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.8.1 Multi-function Display</b> ... g. A mechanism may be provided to select the CDTI-only mode of operation. ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.8.1 Multi-function Display</b> ... h. Traffic and other CDTI information should be easily discernible across all MFD functions.</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action.</p>
<p><b>2.3.9.2 SURF</b> a. The CDTI <b>shall</b> (3134) be capable of</p>	<p><b>3.3.3.1.2.2 Traffic Symbols - Basic</b> ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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<p>indicating the directionality of traffic for which directional information is available. ...</p>	<p>If valid directional data (i.e., ground track angle or heading) about traffic is available, the traffic symbol should indicate directionality.</p> <p><b>3.3.3.1.4.10 Heading</b> 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.</p>	
<p><b>2.3.9.2 SURF</b> ... b. The CDTI should provide this additional information: <input type="checkbox"/> Traffic ID. ...</p>	<p><b>3.3.3.1.4.2 Traffic Identification</b> ... It is desirable for all CDTI installations to depict the traffic ID. 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. Such CDTI installations shall (289R3.245) be capable of displaying traffic IDs of up to eight alphanumeric characters.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.9.2 SURF</b> ... d. Ownship and traffic vehicle position symbology <b>shall</b> (3136) correspond to the underlying airport map, when displayed. ...</p>	<p><b>1.2.4.1 Navigation Source, ADS-B, ASSAP and CDTI</b> ... Accurate navigation is required to support ASA applications, such as Airport Surface Situational Awareness, where the ownship and other traffic must be properly located on an airport map display. ...</p> <p><b>3.3.3.1.1 CDTI Display Features</b> The CDTI shall (289R3.218) display the position of traffic relative to the ownship and relative to any displayed underlying surface map. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.9.2 SURF</b> ... Aircraft positions <b>shall</b> (3137) not be adjusted to snap to runways or taxiways. (i.e., They should reflect the received position.) ...</p>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.9.2 SURF</b> ... e. The CDTI <b>shall</b> (3138) be adjustable to a range of 1.0 NM or less in the direction of ownship travel as measured from the ownship position to the edge of the viewable screen.</p>	<p><b>3.3.3.1.1.1.1 Reduced Display Range</b> ... 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</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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...	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. ...	
<p><b>2.3.9.2 SURF</b> ...</p> <p>f. When the SURF application is active, a graphical depiction of the airport surface <b>shall</b> (3139) be present as an underlay.</p>	<p><b>1.2.4.1 Navigation Source, ADS-B, ASSAP and CDTI</b> ...</p> <p>Accurate navigation is required to support ASA applications, such as Airport Surface Situational Awareness, where the own-ship and other traffic must be properly located on an airport map display. ...</p> <p><b>3.3.3.1.1.3.1 Airport Surface Map</b> CDTI installations that support the FAROA application shall (289R3.229) provide a graphical depiction of runways. 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. ...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.9.3 VSA</b> a. The CDTI <b>shall</b> (3141) provide this additional information:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Coupled traffic symbol.</li> <li><input type="checkbox"/> Selected traffic, which includes: <ul style="list-style-type: none"> <li>– Traffic ID.</li> <li>– Traffic Category.</li> <li>– Traffic ground Speed or Differential Ground Speed.</li> <li>– Traffic Range.</li> </ul> </li> </ul> <p>...</p>	<p><b>2.1.5 Enhanced Visual Approach (EVApp)</b> ...</p> <p>The overall requirement for this application is to provide the flight crew with relative position and state information, as well as Call Sign / Flight ID, to allow the flight crew to locate and follow a particular aircraft. Table G-2 summarizes the requirements to support this application as determined by the analyses. ...</p> <p>Table 3-19 lists requirements that are basically compatible with the 317 requirements.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>2.3.9.3 VSA</b> ...</p> <p>b. The CDTI should provide this additional information:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Traffic horizontal velocity vector or traffic directionality.</li> </ul>	<p><b>2.1.5 Enhanced Visual Approach (EVApp)</b> ...</p> <p>The overall requirement for this application is to provide the flight crew with relative position and state information, as well as Call Sign / Flight ID, to allow the flight crew to locate and follow a particular aircraft. Table G-2 summarizes the requirements to support this application as determined by the analyses.</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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	<p>...</p> <p>Table 3-19 lists requirements that are basically compatible with the 317 requirements.</p>	
<p><b>2.3.9.4 In Trail Procedure (ITP)</b> For installations supporting the ITP application, the CDTI shall have the capability to display to the flight crew the following information for all ITP Traffic that pass the traffic application capability status:</p> <ul style="list-style-type: none"> <li>a. Traffic ID</li> <li>b. ITP distance</li> <li>c. Ahead or behind status</li> <li>d. ITP Traffic geometric pass/fail status</li> </ul>	<p>No equivalent found.</p>	<p>No action.</p>
<p><b>2.3.10 Accessibility of Controls</b> a. The equipment <b>shall</b> (3142) be designed so that controls intended for use during flight cannot be operated in any position, combination or sequence that would result in a condition detrimental to the operation of the aircraft or the reliability of the equipment. ...</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... 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. ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>Adopt MOPS language, which is more general.</p>
<p><b>2.3.10 Accessibility of Controls</b> ... b. Controls that are normally operated by the flight crew <b>shall</b> (3143) be readily accessible. ...</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... 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.</p>	<p>No action.</p>
<p><b>2.3.10 Accessibility of Controls</b> ... c. Controls <b>shall</b> (3144) provide feedback (e.g., tactile, visual) when operated. ...</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p>	<p>No action.</p>

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	Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.	
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>d. Controls <b>shall</b> (3145) be resistant to inadvertent activation.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p> <p>Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>e. Controls used in flight <b>shall</b> (3146) be operable with one hand.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p> <p>Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>f. The function for each control <b>shall</b> (3147) be indicated.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p> <p>Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>g. If a control can be used for multiple functions, the current and inactive functions should be distinguishable.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p> <p>Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>h. Controls / input devices should be organized according to the following principles, when feasible:</p> <p><input type="checkbox"/> Controls should be organized in logical groups according to function and frequency of use.</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A.</p> <p>Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.

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<p><input type="checkbox"/> Controls should be collocated with the associated displays.</p> <p><input type="checkbox"/> Controls used most frequently should be the most accessible.</p> <p><input type="checkbox"/> Dedicated controls should be used for frequently used functions.</p> <p><input type="checkbox"/> Line select function keys should align with adjacent text.</p> <p>...</p>		
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>i. Control operating force should be appropriate for its intended function.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>j. Use of two or more controls simultaneously (e.g., pushing two buttons at once) in flight should not be required to perform a function.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>k. Controls that do not require adjustment by the flight crew (e.g., maintenance functions) should not be readily accessible to the flight crew.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p> <p>l. Controls and their labels should be identifiable during all normally expected ambient light conditions, including direct sunlight and nighttime.</p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p> <p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	No action.
<p><b>2.3.10 Accessibility of Controls</b></p> <p>...</p>	<p><b>2.4.3.5 Requirements for CDTI</b></p> <p>...</p>	No action.

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<p>m. Control identifiers and other information should not be obstructed by the control input devices.</p>	<p>The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	
<p><b>2.3.11 Color</b> a. Color-coded information should be accompanied by another distinguishing characteristic such as shape, location, or text. ...</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action.</p>
<p><b>2.3.11 Color</b> ... b. No more than six colors should be used for color-coded information on the display. ...</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action.</p>
<p><b>2.3.11 Color</b> ... c. For color-coded information, the color <b>shall</b> (3148) be discriminable and identifiable under the normally expected ambient light conditions. ...</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action.</p>
<p><b>2.3.11 Color</b> ... d. Color-coding should be consistent across all CDTI displays and controls. ...</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action.</p>
<p><b>2.3.11 Color</b> ... e. Any use of color should not adversely affect the flight crew's ability to use color-coded information. In particular, the</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-</p>	<p>No action.</p>

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<p>use of red and yellow/amber for functions other than crew alerting should be limited, and should not adversely affect crew alerting. ...</p>	<p>11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	
<p><b>2.3.11 Color</b> ... f. Industry standard colors should be used within the CDTI.</p>	<p><b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.</p>	<p>No action.</p>
<p><b>2.4.1 Environmental Test Conditions</b> ... Each ASA performance test <b>shall</b> (4000) (R2.4001.) be validated under all of the environmental procedures in the groups required for that test as indicated in Table 2-5. ...</p>	<p>No equivalent found.</p>	<p>Add an umbrella requirement to cover the need for certification testing of ASSAP and CDTI.</p>
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... Power Input Voltage – Unless otherwise specified, all tests <b>shall</b> [6000] be conducted with the power input voltage adjusted to design voltage <math>\square</math>2%. ...</p>	<p>No equivalent found.</p>	<p>Covered by above resolution.</p>
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... The input voltage <b>shall</b> [6001] be measured at the input terminals of the equipment under test. Power Input Frequency ...</p>	<p>No equivalent found.</p>	<p>Covered by previous resolution.</p>
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... – In the case of equipment designed for operation from an AC power source of essentially constant frequency (e.g., 400 Hz), the input frequency <b>shall</b> [6002] be adjusted to design frequency <math>\square</math>2%. ...</p>	<p>No equivalent found.</p>	<p>Covered by previous resolution.</p>
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... In the case of equipment designed for operation from an AC power source of</p>	<p>No equivalent found.</p>	<p>Covered by previous resolution.</p>

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<p>variable frequency (e.g., 300 to 1,000 Hz), unless otherwise specified, tests <b>shall</b> [6003] be conducted with the input frequency adjusted to within <input type="checkbox"/>5% of a selected frequency and within the range for which the equipment is designed. ...</p>		
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... Adjustment of Equipment – The circuits of the equipment under test <b>shall</b> [6004] be properly aligned and otherwise adjusted in accordance with the manufacturer’s recommended practices prior to application of the specified tests. ...</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... Test Equipment – All equipment used in the performance of the tests should be identified by make, model and serial number where appropriate, and its latest calibration date. ...</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... When appropriate, all test equipment calibration standards should be traceable to national and/or international standards. ...</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... Test Instrument Precautions – Due precautions <b>shall</b> [6005] be taken during tests to prevent the introduction of errors resulting from the connection of voltmeters, oscilloscopes and other test instruments across the input and output impedances of the equipment under test. ...</p>	No equivalent found.	Covered by previous resolution.
<p><b>2.6.1 Definition of Terms and Conditions of Test</b> ... Ambient Conditions – Unless otherwise specified, all tests <b>shall</b> [6006] be conducted under the following ambient conditions: <input type="checkbox"/> Temperature: +15 to +35 degrees C (+59 to +95 degrees F).</p>	No equivalent found.	Covered by previous resolution.

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<input type="checkbox"/> Relative Humidity: Not greater than 85%. <input type="checkbox"/> Ambient Pressure: 84 to 107 kilo Pascal (kPa) (equivalent to +5,000 to -1,500 ft) (+1,525 to -460 m).		
<b>2.6.1 Definition of Terms and Conditions of Test</b> ... When tests are conducted at ambient conditions that differ from the above values, allowances <b>shall</b> [6007] be made and the differences recorded. ...	No equivalent found.	Covered by previous resolution.
<b>2.6.1 Definition of Terms and Conditions of Test</b> ... Connected Loads – Unless otherwise specified, all tests <b>shall</b> [6008] be performed with the equipment connected to loads having the impedance values for which it is designed. ...	No equivalent found.	Covered by previous resolution.
<b>2.6.1 Definition of Terms and Conditions of Test</b> ... Warm-up – Unless otherwise specified, all tests <b>shall</b> [6009] be conducted after the manufacturer’s specified warm-up period. ...	No equivalent found.	Covered by previous resolution.
<b>3.1.1 Accessibility</b> Controls and monitors provided for in-flight operations <b>shall</b> [7000] be readily accessible from the pilot’s normal seated position. ...	<b>2.4.3.5 Requirements for CDTI</b> ... 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. ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.	Covered by previous resolution.
<b>3.1.1 Accessibility</b> ... The appropriate operator/crew member(s) <b>shall</b> [7001] have an unobstructed view of	<b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne	Covered by previous resolution.

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displayed data when in the normal seated position.	display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.	
<b>3.1.2 Aircraft Environment</b> Equipment <b>shall</b> [7002] be compatible with the environmental condition present in the specific location in the aircraft where the equipment is installed.	No equivalent found.	Covered by previous resolution.
<b>3.1.3 Display Visibility</b> Display intensity <b>shall</b> [7003] be suitable for data interpretation under all cockpit ambient light conditions ranging from total darkness to reflected sunlight.	<b>2.4.3.5 Requirements for CDTI</b> ... The CDTI display should be consistent with the requirements of current airborne display standards, e.g., AC 25-11, AC 23-11, AC 23-1311, AC 27-2, AC 29-2, DO-185A, DO-259, DO-243, DO-257A. Controls should be designed to maximize usability, minimize flight crew workload, and reduce flight crew errors.	Covered by previous resolution.
<b>3.1.4 Dynamic Environment</b> Operation of the equipment <b>shall</b> [7004] not be adversely affected by aircraft maneuvering or changes in attitude encountered in normal flight conditions.	No equivalent found.	Covered by previous resolution.
<b>3.1.5 Failure Protection</b> Any probable failure of the equipment <b>shall</b> [7005] not degrade the normal operation of equipment or systems connected to it. ...	No equivalent found.	Adopt MOPS language.
<b>3.1.5 Failure Protection</b> ... Likewise, the failure of interfaced equipment or systems <b>shall</b> [7006] not degrade normal operation of this equipment.	<b>2.4.1 Qualification for ASA Capability Levels</b> ... Failure of equipment that affects available ACL shall (289R2.3) be indicated to the flight crew. ...	Adopt MOPS language.
<b>3.1.6 Interference Effects</b> The equipment <b>shall</b> [7007] not be the source of harmful conducted or radiated interference nor be adversely affected by conducted or radiated interference from other equipment or systems installed in the aircraft. ...	No equivalent found.	Adopt MOPS language.
<b>3.1.7 Inadvertent Turnoff</b> Appropriate protection <b>shall</b> [7008] be provided to avert the inadvertent turnoff of the equipment.	No equivalent found.	Leave to MOPS. Remove these requirements from MASPS.
<b>3.1.8 Other Requirements</b> If the CDTI is installed on an MFD and utilizes an ownship position source other	No equivalent found.	No action.

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<p>than that provided by ASSAP, then that source <b>shall</b> [7009] meet the requirements defined in Table 2-5.</p> <p>...</p>		
<p><b>3.1.8 Other Requirements</b></p> <p>...</p> <p>The pressure altitude source <b>shall</b> [7010] be the same source as that being used by the transponder for transmission.</p>	<p>Notes for Table 3-4:</p> <p>...</p> <p>9. This field is not used by the initial applications but will be required for future applications. It is assumed that aircraft transmitting valid pressure altitude data are using the same pressure altitude source that is being reported in Mode C or Mode S transmissions, per §3.1.5.6.2. A pressure altitude source that meets the minimum requirements for Mode C or Mode S transmissions will meet the minimum requirements for the initial applications.</p>	<p>Leave to MOPS.</p>
<p><b>3.1.9 Airport Surface Map</b></p> <p>Installations supporting ASSA and/or FAROA application(s) <b>shall</b> [7011] have airport surface map features displayed as an underlay.</p> <p>...</p>	<p><b>2.1.3 Airport Surface Situational Awareness (ASSA)</b></p> <p>...</p> <p>The ASSA application is flight deck-based and includes the depiction of own-ship position, traffic position, and a surface map, including runways and taxiways, and may include holding areas, ramps, hangars, and prominent airport structures, etc. on a cockpit display.</p> <p>...</p> <p>Table E-13 summarizes the requirements to support this application as determined by the analyses.</p> <p><b>3.4.5 Airport Surface Maps</b></p> <p>An airport surface map is necessary to support the ASSA and FAROA applications for each airport where these applications are used.</p> <p>...</p>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>
<p><b>3.1.9 Airport Surface Map</b></p> <p>...</p> <p>The displayed airport surface map <b>shall</b> [7012] be based on the DO-272A medium (or better) data quality requirement for the airport surface map data base.</p>	<p><b>3.3.3.1.1.3.1 Airport Surface Map</b></p> <p>...</p> <p>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.</p> <p>Notes:</p> <ol style="list-style-type: none"> <li>1. See [RTCA DO-272] for a listing and description of these features.</li> <li>2. [RTCA DO-257A] defines the requirements for an airport surface map to be used to support the Taxi Position Awareness application. These same</li> </ol>	<p>Leave to MOPS. Remove these requirements from MASPS.</p>

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	requirements could be used as a basis for developing requirements for a surface map to support the FAROA and ASSA applications.	
<p><b>3.2 Installed Equipment Performance Requirements</b> The installed equipment <b>shall</b> [7013] meet the requirements of Subsections 2.1, 2.2, and 2.3. ...</p>	Covered in those sections.	No action.
<p><b>3.2 Installed Equipment Performance Requirements</b> ... In order to meet these requirements, test results supplied by the equipment manufacturer may be accepted in lieu of tests performed by the equipment installer. ...</p>	No equivalent found.	Covered in previous resolution.
<p><b>3.2 Installed Equipment Performance Requirements</b> ... However, performance characteristics such as interaction with other installed equipment and power sources, which cannot be tested by the equipment manufacturer, <b>shall</b> [7014] be tested by the installer.</p>	No equivalent found.	Covered in previous resolution.
<p><b>3.3 Conditions of Test</b> The following subparagraphs define conditions under which tests, specified in paragraph 3.4, <b>shall</b> [7015] be conducted.</p>	No equivalent found.	Leave to MOPS.
<p><b>3.3.1 Safety Precautions</b> Standard safety precautions (best industry practices, in addition to those outlined in DO-160F) should be observed.</p>	No equivalent found.	Leave to MOPS.
<p><b>3.3.2 Power Input</b> Unless otherwise specified, all aircraft electrically operated equipment and systems <b>shall</b> [7016] be turned ON before conducting interference testing.</p>	No equivalent found.	Leave to MOPS.
<p><b>3.3.3 Environment</b> During testing, the equipment <b>shall</b> [7017] not be subjected to environmental conditions that exceed those specified by the equipment manufacturer.</p>	No equivalent found.	Leave to MOPS.
<p><b>3.3.4 Adjustment of Equipment</b> Circuits of the equipment under test <b>shall</b> [7018] be properly aligned and otherwise adjusted in accordance with the manufacturer's recommended practices prior to application of the specified tests.</p>	No equivalent found.	Leave to MOPS.
<p><b>3.3.5 Warm-up Period</b> Unless otherwise specified, tests <b>shall</b> [7019] be conducted after a warm-up</p>	No equivalent found.	Leave to MOPS.

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(stabilization) period of not more than fifteen (15) minutes.		
<p><b>3.4 Test Procedures for Installed Equipment Performance</b></p> <p>The following test procedures provide one means of determining installed equipment performance. Although specific test procedures are cited, it is recognized that other methods may be preferred by the installing activity. These alternate procedures may be used if they provide at least equivalent information. In such cases, the procedures cited herein should be used as one criterion in evaluating the acceptability of the alternate procedures. The equipment <b>shall</b> [7020] be tested to determine compliance with the minimum requirements stated in Subsection 2.2. In order to meet this requirement, test results supplied by the equipment manufacturer or other proof of conformity may be accepted in lieu of bench tests performed by the installing activity.</p>	<p>No equivalent found.</p>	<p>Leave to MOPS.</p>

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