



List of Available Documents

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New in this Edition

DO-178C, *Software Considerations in Airborne Systems and Equipment Certification*

DO-224C, *Signal-In-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications Including Compatibility with Digital Voice Techniques*

DO-248C, *Supporting Information for DO-178C and DO-278A*

Corrigendum 1 to DO-260B, *Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)*

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DO-278A, *Software Integrity Assurance Considerations for Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems*

Corrigendum 1 to DO-282B, *Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance – Broadcast (ADS-B)*

DO-282B with Corrigendum 1, *Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance – Broadcast (ADS-B)*

DO-317A, *Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications (ASA) System*

Supplement to DO-317A, *Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications (ASA) System*

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DO-332, *Object-Oriented Technology and Related Techniques Supplement to DO-178C and DO-278A*

DO-333, *Formal Methods Supplement to DO-178C and DO-278A*

FOREWORD

RTCA, Inc. is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal advisory committee and develops consensus-based recommendations on contemporary aviation issues. RTCA's objectives include, but are not limited to:

- Coalescing aviation system user and provider technical requirements, knowledge and practices in a manner that helps government and industry meet their mutual objectives and responsibilities.
- Analyzing and recommending solutions to system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency.
- Developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation.
- Assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization, the International Telecommunication Union, and other appropriate international organizations can be based.

The organization's recommendations are often used as the basis for government and private sector decisions, as well as the foundation for many Federal Aviation Administration Technical Standard Orders.

RTCA is not an official agency of the U.S. Government; its recommendations may not be regarded as statements of official government policy unless so enunciated by the U.S. Government organization or agency having statutory jurisdiction over any matters to which the recommendations relate.

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NUMBERED DOCUMENTS

DO-333, Formal Methods Supplement to DO-178C and DO-278A

Issued 12-13-11 ♦ Prepared by SC-205

This supplement identifies the additions, modifications and substitutions to DO-178C and DO-278A objectives when formal methods are used as part of a software life cycle, and the additional guidance required. It discusses those aspects of airworthiness certification that pertain to the production of software, using formal methods for systems approved using DO-178C.

Formal methods are mathematically-based techniques for the specification, development and verification of software aspects of digital systems. The mathematical basis of formal methods consists of formal logic, discrete mathematics and computer-readable languages. The use of formal methods is motivated by the expectation that, as in other engineering disciplines, performing appropriate mathematical analyses can contribute to establishing the correctness and robustness of a design.

DO-332, Object-Oriented Technology and Related Techniques Supplement to DO-178C and DO-278A

Issued 12-13-11 ♦ Prepared by SC-205

This supplement identifies the additions, modifications and deletions to DO-178C and DO-278A objectives when object-oriented technology or related techniques are used as part of the software development life cycle and additional guidance is required. This supplement, in conjunction with DO-178C, is intended to provide a common framework for the evaluation and acceptance of object-oriented technology (OOT) and related techniques (RT)-based systems.

OOT has been widely adopted in non-critical software development projects. The use of this technology for critical software applications in avionics has increased, but there are a number of issues that need to be considered to ensure the safety and integrity goals are met. These issues are both directly related to language features and to complications encountered with meeting well-established safety objectives.

DO-331, Model-Based Development and Verification Supplement to DO-178C and DO-278A

Issued 12-13-11 ♦ Prepared by SC-205

This supplement contains modifications and additions to DO-178C and DO-278A objectives, activities, explanatory text and software life cycle data that should be addressed when model-based development and verification are used as part of the software life cycle. This includes the artifacts that would be expressed using models and the verification evidence that could be derived from them. Therefore, this supplement also applies to the models developed in the system process that define software requirements or software architecture.

A model is an abstract representation of a set of software aspects of a system that is used to support the software development process or the software verification process. This supplement addresses model(s) that have the following characteristics:

- The model is completely described using an explicitly identified modeling notation. The modeling notation may be graphical and/or textual.
- The model contains software requirements and/or software architecture definition.

- The model is of a form and type that is used for direct analysis or behavioral evaluation as supported by the software development process or the software verification process.

DO-330, Software Tool Qualification Considerations

Issued 12-13-11 ♦ Prepared by SC-205

Software tools are widely used in multiple domains to assist in developing, verifying and controlling other software. In the context of this document a tool is a computer program or a functional part thereof, used to help develop, transform, test, analyze, produce or modify another program, its data or its documentation. Examples are automated code generators, compilers, test tools and modification management tools. This document explains the process and objectives for qualifying tools.

This document provides software tool qualification guidance. Additionally, clarification material is provided in the form of Frequently Asked Questions (FAQs). The document was developed for the following reasons:

- Tools are different from the software using the tools and form a unique domain; therefore, tool-specific guidance for both tool developers and tool users is needed.
- Tools are often developed by teams other than those who use the tools to develop software. These tool development teams frequently do not have software guidance background (examples of guidance include DO-178C or DO-278A). This tool-specific document benefits tool development teams and helps them avoid confusion and misinterpretation.
- It provides guidance for airborne and ground-based software. It may also be used by other domains, such as automotive, space, systems, electronic hardware, aeronautical databases and safety assessment processes.

DO-329, Aircraft Secondary Barriers and Alternative Flight Deck Security Procedures

Issued 09-28-11 ♦ Prepared by SC-221

This document provides guidance for the use of various Secondary Barrier Systems as acceptable means of compliance with current U.S. regulations, as well as an evaluation of best practices, and other considerations to be taken into account when determining compliance with these regulations. The guidance recommended is one means of ensuring that the equipment will perform its intended function satisfactorily under all conditions normally encountered in routine operations. Any regulatory application of these standards is the sole responsibility of the appropriate governmental agencies.

DO-328, Safety, Performance and Interoperability Requirements Document for Airborne Spacing – Flight Deck Interval Management (ASPA-FIM)

Issued 06-21-11 ♦ Prepared by SC-186

This document provides the minimum operational, Safety and Performance Requirements (SPR) and Interoperability Requirements (INTEROP) to implement Airborne Spacing (ASPA) - Flight Deck Interval Management (FIM) in support of an identified set of operational scenarios. ASPA-FIM is defined as the flight deck component of a larger Interval Management (IM) System. It defines and allocates the set of minimum requirements for the end-to-end operational, safety, performance, and interoperability aspects for

implementations of an initial set of IM Operations. The document was developed jointly by ADS-B Requirements Focus Group (RFG) within RTCA Special Committee 186 and EUROCAE Working Group 51.

DO-327, Assessment of the LightSquared Ancillary Terrestrial Component Radio Frequency Interference Impact on GNSS L1 Band Airborne Receiver Operations

Issued 06-03-11 ♦ Prepared by SC-159

This report documents a study conducted by RTCA Special Committee 159 in response to a request from the Federal Aviation Administration to address the issue of compatibility between the operation of a terrestrial wireless broadband network in the bands 1525-1559/1626.5-1660.5 MHz by LightSquared, pursuant to its FCC license, and GPS receivers onboard aircraft. The report addresses the issues analytically based on existing domestic and international standards and includes results of tests of four certified aircraft GPS receivers.

DO-326, Airworthiness Security Process Specification

Issued 12-08-10 ♦ Prepared by SC-216

The guidance of this document is intended to augment current guidance for aircraft certification to handle the information security threat to aircraft safety. It adds data requirements and compliance objectives, as organized by generic activities for aircraft development and certification. The document is the first of a series of documents on Aeronautical Systems Security that together will address information security for the overall Aeronautical Information System Security (AISS) of airborne systems with related ground systems and environment. It addresses only Aircraft Type Certification. Because of the impending introduction of aircraft with significant security-related features, this document is proposed for approval in advance of the other documents in this series to address immediate industry concerns and to establish feedback on its implementation challenges.

DO-325, Minimum Operational Performance Standards (MOPS) for Automatic Flight Guidance and Control Systems and Equipment

Issued 12-08-10 ♦ Prepared by SC-220

This document contains Minimum Operational Performance Standards (MOPS) for Automatic Flight Guidance and Control Systems (AFGCS) and applicable interfaces. These standards specify system characteristics that should be useful to designers, manufacturers, installers and users of the system and equipment. The system may also provide workload relief to pilots and provide a means to fly a flight path more accurately to support specific operational requirements. Standards are included for the automatic flight guidance and control functions consisting of four equipment classes: Class A, autopilot, Class B, yaw damper, Class C, flight director, Class D, auto-thrust/auto-throttle and two categories of aircraft: Airplanes and Rotorcraft.

DO-324, Safety and Performance Requirements (SPR) for Aeronautical Information Services (AIS) and Meteorological (MET) Data Link Services

Issued 12-08-10 ♦ Prepared by SC-206

This document specifies minimal baseline operational Safety and Performance Requirements (SPR) for the data link delivery of AIS and MET information as the primary means of communications between air and ground. The aim of the AIS and MET data link services is to provide aeronautical and meteorological information for flight efficiency and/or hazard avoidance in all flight environments. Four AIS/MET data link services are covered in this SPR: an aeronautical update service that provides current updates of aeronautical information; and three weather decision services that provide current updates of meteorological information designed to support flight crew decisions in three time categories (planning, near term and immediate decisions). The document is based on a notional architecture and is not intended for implementation and operational use until validation activities are completed. It provides a framework and a methodology to be used as the basis for assessing implementation of new data link systems or architectures as candidates for AIS and/or MET data link services.

DO-323, Safety, Performance and Interoperability Requirements Document for Enhanced Traffic Situational Awareness on the Airport Surface with Indications and Alerts (SURF IA)

Issued 12-08-10 ♦ Prepared by SC-186

This document provides the minimum Operational, Safety, and Performance Interoperability Requirements (SPR) for the implementation of Enhanced Traffic Situational Awareness on the Airport Surface with Indications and Alerts (SURF IA). The SURF IA application is fully defined in the Operational Services and Environment Definition (OSSED) found in SPR Appendix A. The SPR can be used as a starting point for the development of Minimum Operational Performance Standards (MOPS), Technical Standard Orders (TSOs) or other material to support SURF IA system development or certification.

Supplement to DO-323, Safety, Performance and Interoperability Requirements Document for Enhanced Traffic Situational Awareness on the Airport Surface with Indications and Alerts (SURF IA)

Issued 12-08-10 ♦ Prepared by SC-186

This supplement to DO-323 is in the form of a single zip archive.

This analysis package provides detailed information about SURF IA. The supplement consists of seven Excel files containing the bowtie analysis and other details that are not included in the SURF IA SPR document, Appendix C (Operational Safety Analysis, OSA). These supplemental files are provided for safety analysts who want to understand the SURF IA safety analysis in more detail.

This Supplement is available only by electronic download.

DO-322, Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application

Issued 12-08-10 ♦ Prepared by SC-186

This document provides the minimum operational, Safety, and Performance Requirements (SPR) and Interoperability Requirements (INTEROP) for the implementation of enhanced Airborne Traffic Situational Awareness (ATSA) for Surface (SURF) Operations. The primary goal of the ATSA-SURF application is to reduce the potential for errors, runway and taxiway incursions, and collisions by providing enhanced situational awareness to the flight crew operating an aircraft on the airport surface, and including final approach, landing and takeoff operations in the vicinity of the airport surface.

DO-321, Safety, Performance and Interoperability Requirements Document for ADS-B Airport Surface Surveillance Application (ADS-B-APT)

Issued 12-08-10 ♦ Prepared by SC-186

This document provides the minimum operational, Safety and Performance Requirements (SPR) and Interoperability Requirements (INTEROP) for the implementation of the Automatic Dependent Surveillance-Broadcast Airport Surface Surveillance Application (ADS-B-APT). The ADS-B-APT application aims at enhancing aerodrome operations by adding ADS-B surveillance to a non-surveilled aerodrome and providing the controller with an appropriate graphical display to view the surveillance data.

This document is intended to support the approval of all elements of the CNS/ATM system relating to the ADS-B-APT application.

DO-320, Operational Services and Environmental Definition (OSED) for Unmanned Aircraft Systems

Issued 06-10-10 ♦ Prepared by SC-203

This document provides a basis for assessing and establishing operational, safety, performance, and interoperability requirements for UAS operations in the US National Airspace System (NAS). An Unmanned Aircraft System is an unmanned aircraft and its associated components and persons required for operation. The OSED encompasses:

- All current and planned UAS operations that may occur prior to 2025, except those intended to operate strictly within visual line of sight
- All UAS types that are in use or in the final stages of development
- All airspace and operating environments in the current NAS (as described in the FAA NAS Enterprise Architecture, September 2007) including airport surface and off-airport operations
- The operational performance and characteristics of UAS based on known values of existing systems

DO-319, Safety, Performance and Interoperability Requirements Document for Enhanced Traffic Situational Awareness During Flight Operations (ATSA-AIRB)

Issued 03-17-10 ♦ Prepared by SC-186

The document provides the minimum operational, Safety and Performance Requirements (SPR) and Interoperability Requirements (INTEROP) for the implementation of Airborne Traffic Situational Awareness (ATSAW) for "Enhanced Traffic Situational Awareness during flight operations" (ATSA-AIRB). This

application provides flight crews with a graphical display of AIRB Traffic relative to their aircraft together with supporting information on that traffic.

The requirements are necessary to provide adequate assurance that the appropriate aspects of the relevant Communication Navigation Surveillance and Air Traffic Management (CNS/ATM) system, when operating together, will perform their intended function in an acceptably safe manner for the operations defined in the Operational Services and Environment Definition (OSD).

The document is intended to support the approval of elements of the CNS/ATM system relating to the ATSA-AIRB application.

DO-318, Safety, Performance and Interoperability Requirements Document for Enhanced Air Traffic Services in Radar-Controlled Areas Using ADS-B Surveillance (ADS-B-RAD)

Issued 09-09-09 ♦ Prepared by SC-186

This document defines and allocates a set of minimum requirements for the end-to-end operational, safety, performance and interoperability aspects for the implementations of the ADS-B-RAD application. The requirements are necessary to provide adequate assurance that the elements of the relevant Communication, Navigation, and Surveillance and Air Traffic Management (CNS/ATM) system, when operating together, will perform their intended function in an acceptably safe manner for the operations defined in the Operational Services and Environment Definition (OSD). This system includes ground and airborne elements. In addition, the document defines ADS-B requirements applicable to dense airspaces such as those found in Europe and the USA.

DO-317A, Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications (ASA) System

Issued 12-13-11 ♦ Prepared by SC-186

This document contains the recommended requirements for the processing and display of traffic Ownship information for use by the flight crew in processing airborne applications. The document considers functional requirements consisting of Airborne Surveillance and Separation Assurance Processing (ASSAP) and Cockpit Display of Traffic Information (CDTI) as described in DO-289, *Minimum Aviation System Performance Standards (MASPS) for Aircraft Surveillance Applications (ASA)*. It includes requirements to support the initial five applications included in DO-289 – Enhanced Visual Acquisition (EVAcq), Conflict Detection (CD), Airport Surface Situational Awareness (ASSA), Final Approach and Runway Occupancy Awareness (FAROA) and Enhanced Visual Approach (EVAp). Operational performance standards for functions or components that exceed the stated minimum requirements are identified as optional features.

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. This document provides requirements and guidance for integration of TCAS with ASAS.

DO-317A incorporates the following “prime” differences from DO-317:

- Incorporation of Airborne Surveillance Application requirements for the situational awareness applications ATSA-AIRB (ED-164/DO-319), ATSA-SURF (ED-165/DO-322), ATSA-VSA (ED-160/DO-314) and ATSA-ITP (ED-159/DO-312), jointly developed and published by EUROCAE WG-51 and RTCA SC-186 within the framework of the ADS-B Requirements Focus Group (RFG). This includes the related ADS-B data quality requirements for traffic and Ownship (including relevant qualification schemes thereof) and ASA system latency requirements.

- Harmonization of application transition requirements, in particular between the surface application and the airborne applications.
- Use of the 1090 MHz Extended Squitter MOPS (ED-102A/DO-260B) as the ADS-B data transmission and receipt baseline, in line with the European and US airspace regulations with respect to ADS-B Out.
- Refinement of expected regulatory ASA system design assurance requirements and the related definition of equipment classes.
- Integration of relevant VDL Mode 4 provisions.
- Maintenance of the RTCA-defined EVAcq application as the only application originally contained in DO-317, defining the minimum set of requirements ASA systems must meet for a minimum stand-alone traffic situation awareness application in smaller aircraft.
- Provision of additional updates, including:
 - o Traffic display prioritization;
 - o Support of TIS-B and ADS-R services (as defined by FAA);
 - o Data age requirements;
 - o Test scenarios and procedures.

Supplement to DO-317A, Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications (ASA) System

Issued 12-13-11 ♦ Prepared by SC-186

This supplement to DO-317A is a single zip file archive that contains test data scenarios described in Sections 2.5.7 through 2.5.9 and MATLAB implementations of sample algorithms for an airborne surveillance processor and In-Trail Procedure (ITP) application. Appendix I describes the test data generation processes. The data files for any particular scenario reflect all appropriate surveillance sources (e.g., ADS-B, ADS-R, TIS-B, and TCAS) and are provided separately for 1090ES, UAT, and VDL4 installations where necessary due to the differences in state vector construction for each. Test data files are provided in Comma Separated Value (CSV) format and content represents input to end user or manufacturer systems. The zip file archive will extract into two subdirectories: "ASSAP test data" which includes Application processing test data and Surveillance processing test data. Sample implementations include ASA sample 1090ES implementation and ITP sample implementation.

DO-317, Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications System (ASAS)

Issued 04-14-09 ♦ Prepared by SC-186

This document contains the recommended requirements for the processing and display of traffic Ownship information for use by the flight crew in processing airborne applications. The document considers functional requirements consisting of: Airborne Surveillance and Separation Assurance Processing (ASSAP), and Cockpit Display of Traffic Information (CDTI) as described in DO-289, *Minimum Aviation System Performance Standards (MASPS) for Aircraft Surveillance Applications (ASA)*. It includes requirements to support the initial five applications included in DO-289: Enhanced Visual Acquisition (EVAcq), Conflict Detection (CD), Airport Surface Situational Awareness (ASSA), Final Approach and Runway Occupancy Awareness (FAROA) and Enhanced Visual Approach (EVApp). Operational performance standards for functions or components that exceed the stated minimum requirements are identified as optional features.

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. This document provides requirements and guidance for integration of TCAS with ASAS.

Supplement to DO-317, Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications System (ASAS)

Issued 04-14-09 ♦ Prepared by SC-186

This supplement to DO-317 is in the form of a single zip archive. One portion of this archive decompresses into the stimulus test data described in Section 2.5.7 of this MOPS. The stimulus scenarios reflect all the appropriate surveillance sources for the scenario (i.e., ADS-B, ADS-R, TIS-B and TCAS) are provided separately for 1090ES and UAT implementations (due to the difference in State Vector construction for each). Appendix C of this MOPS describes an example implementation of the ASSAP algorithms. A MATLAB implementation of these algorithms (oriented to a 1090ES split state vector implementation) was developed in support of this MOPS. The other portion of the archive contains the MATLAB files that constitute this ASSAP implementation.

This zip file will extract into two subdirectories: "ASSAP_test_data" which includes the stimulus scenarios and "ASAS_simulation_1090ES_implementation" which includes the MATLAB files.

This Supplement is available only by electronic download.

DO-316, Minimum Operational Performance Standards (MOPS) for Global Positioning System/Aircraft Based Augmentation System Airborne Equipment

Issued 04-14-09 ♦ Prepared by SC-159

This document contains Minimum Operational Performance Standards for single-frequency airborne navigation sensor equipment not augmented by ground or space-based systems. The standards define minimum performance, functions and features for GPS sensors that provide position information to a multi-sensor system or separate navigation system. They also address Area Navigation (RNAV) equipment to be used for the en route, terminal, and Lateral Navigation (LNAV) phases of flight.

The basis for this document is RTCA/DO-229D - MOPS for GPS/WAAS Airborne Equipment, Class Beta 1 receiver without SBAS requirements.

In comparison with the older GPS MOPS - RTCA/DO-208... the document reflects:

- 1) An updated signal operating environment (updated interference environment),
- 2) The absence of Selective Availability (SA) (which was turned off on May 1st 2001 as a result of a Presidential Directive),
- 3) Updated RAIM (Receiver Autonomous Integrity Monitoring) for GPS and,
- 4) Optional GPS receiver velocity accuracy and velocity FOM (Figure of Merit) computation.

Note:

WAAS: Wide Area Augmentation Systems

ABAS: Aircraft Based Augmentation Systems

DO-315B, Minimum Aviation System Performance Standards (MASPS) for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems

Issued 06-21-11 • Prepared by SC-213

This document addresses Enhanced Vision Systems (EVS), Synthetic Vision Systems (SVS) and Combined Vision Systems (CVS) technologies. DO-315B adds system design criteria for use of SVS for lower-than-standard Category I ILS minima. Specific features include SVS with system performance, database, alerts, pilot controls, display and symbology requirements. Respective flight test and rationale appendices were added.

For the FAA, EVS for operational credit is called an Enhanced Flight Vision System (EFVS), and the term "EFVS" is used in this document. The EFVS subsections of this MASPS provide the high-level system requirements for Enhanced Flight Vision Systems when installed in aircraft with the express purpose of gaining additional operational credit under FAA Order 8400.13. EFVS performance requirements were not changed but updates are planned for in future revisions.

The European Aviation Safety Agency (EASA) uses the term "EVS" as equivalent to the FAA description of EFVS.

DO-314, Safety, Performance and Interoperability Requirements Document for Enhanced Visual Separation on Approach (ATSA-VSA)

Issued 12-16-08 • Prepared by SC-186

This document provides the minimum operational, Safety, and Performance Requirements (SPR) and Interoperability Requirements (INTEROP) for the implementation of Airborne Traffic Situational Awareness (ATSA) for "Enhanced Visual Separation on Approach" (VSA). The ATSA-VSA application is fully defined. The document defines and allocates the set of minimum requirements for the end-to-end operational, safety, performance, and interoperability aspects for implementations of the ATSA-VSA application.

The requirements contained in this document are necessary to provide adequate assurance that the appropriate aspects of the relevant Communication Navigation Surveillance and Air Traffic Management (CNS/ATM) system, when operating together, will perform their intended function in an acceptably safe manner for the operations defined in the OSED. The system here includes ground and airborne elements.

The document was developed jointly by RTCA Special Committee 186 and EUROCAE Working Group 51 - within the group commonly referred to as the "ADS-B Requirements Focus Group" (RFG).

DO-313, Certification Guidance for Installation of Non-Essential, Non-Required Aircraft Cabin Systems and Equipment

Issued 10-02-08 • Prepared by SC-210

This document provides certification guidance on how to meet the airworthiness requirements for the installation of non-essential, non-required aircraft Cabin Systems and Equipment (CS&E) and in doing so enable a standardized approach across equipment manufacturers and installers. The information contained herein is applicable to installation methodologies of aircraft CS&E approved under 14 CFR parts 23, 25, 27 and 29. Both aerospace manufactured equipment and commercial off the shelf (COTS) equipment is considered.

DO-312, Safety, Performance and Interoperability Requirements Document for the In-Trail Procedure in Oceanic Airspace (ATSA-ITP) Application

Issued 06-19-08 ♦ Prepared by SC-186

This document provides the minimum operational, safety, and performance requirements (SPR) and interoperability requirements (INTEROP) for the implementation of enhanced Airborne Traffic Situational Awareness (ATSA) for "In-Trail Procedure" (ITP). The objective of the In-Trail Procedure (ITP) is to enable aircraft that desire Flight Level changes in Procedural Airspace to achieve these changes on a more frequent basis, thus improving flight efficiency while maintaining safe separation from other aircraft. The requirements contained in the document are necessary to provide adequate assurance that the appropriate aspects of the relevant Communication Navigation Surveillance and Air Traffic Management (CNS/ATM) system, when operating together, will perform their intended function in an acceptable safe manner for the defined operations. The requirements can be used for approval processes including aircraft type design approval, aircraft operator operational approval, and Air Traffic Services provider operational approval.

DO-311, Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems

Issued 03-13-08 ♦ Prepared by SC-211

This document contains Minimum Operational Performance Standards (MOPS) for rechargeable Lithium battery systems to be used as permanently installed power sources on aircraft. Compliance with these standards is recommended as a means of assuring that the Lithium battery will perform its intended function(s) safely, under conditions normally encountered in aeronautical operations. These standards apply to the chemical composition, cell size, cell construction, cell interconnection methods within batteries, venting provisions, operational and storage environments, packaging, handling, test, storage and disposal of rechargeable Lithium batteries, installed separately or in avionics equipment aboard aircraft.

DO-310, Minimum Operational Performance Standards for GPS Ground-based Regional Augmentation System Airborne Equipment

Issued 03-13-08 ♦ Prepared by SC-159

The document contains Minimum Operational Performance Standards (MOPS) for airborne navigation equipment using signals from the Global Navigation Satellite System (GNSS) augmented by a Ground-based Regional Augmentation System (GRAS). The document defines minimum performance requirements, functions and features for GRAS airborne equipment to support all phases of flight including en-route, terminal, LNAV (Lateral NAVigation), LNAV/VNAV (Lateral NAVigation/Vertical NAVigation), LP (Localizer Approach with FAS data but without vertical guidance), LPV (Localizer Precision with Vertical guidance) (but not CAT-I/II/III). GRAS equipment will be compatible with the Ground Based Augmentation System (GBAS) and will be able to use the signal in space for approved approach operations. Compliance with these standards by manufacturers, installers and users is recommended as a means of assuring that the equipment will satisfactorily perform its intended functions under conditions encountered in routine aeronautical operations.

DO-309, Minimum Operational Performance Standards (MOPS) for Helicopter Terrain Awareness and Warning System (HTAWS) Airborne Equipment

Issued 03-13-08 ♦ Prepared by SC-212

This MOPS defines a Helicopter Terrain Awareness and Warning System (HTAWS), Airborne System. The HTAWS is an alerting system intended to provide terrain and obstacle aural and visual alerts. It is designed to reduce the risk of Controlled Flight into Terrain (CFIT) accidents by providing increased situational awareness of the surrounding terrain and obstacles, mainly during the cruise phase in Visual Meteorological Condition (VMC) and in Instrument Meteorological Condition (IMC) under Instrument Flight Rules (IFR). HTAWS is not intended to be used as an aid for navigation.

DO-308, Operational Services and Environment Definition (OSED) for Aeronautical Information Services (AIS) and Meteorological (MET) Data Link Services

Issued 12-06-07 ♦ Prepared by SC-206

The document presents the AIS and MET data link services that are envisaged to be implemented within the next decade in both the USA and Europe. It is presented in an Operational Service and Environment Definition (OSED) form, which is based on the criteria set forth in RTCA DO-264 / EUROCAE ED-78A - *Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications*. The OSED describes the intended AIS and MET data link services and the assumptions about the environment in which they operate. It intends to provide the aeronautical information for pilot decision support and Collaborative Decision Making (CDM) between ground services, the flight deck, Air Traffic Control (ATC) and, as appropriate, Airline Operations Centers (AOCs) in all flight environments for flight efficiency and/or hazard avoidance.

DO-307, Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance

Issued 10-11-07 ♦ Prepared by SC-202

This document recommends aircraft design and certification criteria to tolerate the operation of PEDs. These aircraft design and certification recommendations, when implemented in an aircraft design, would reduce the need for restricting the use of PEDs.

Change 1 to DO-307

Issued 12-16-08

Change 1 to DO-307 - *Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance* corrects typographical errors, clarifies document language in several places, and aligns calculated values for Target IPL with the values in DO-294C.

DO-306, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard)

Issued 10-11-07 ♦ Prepared by SC-189

This document provides the operational, safety, and performance requirements (SPR) for the implementation of air traffic data link services in oceanic and remote airspace, referred to as Oceanic SPR Standard. It is intended to support the implementation of communication, navigation, and surveillance/air traffic management (CNS/ATM) systems in worldwide application. It provides the minimum operational, safety, and performance requirements and allocations based on the results of a coordinated requirements determination process, which included operational services and environment information capture, operational safety assessment (OSA), and an operational performance assessment (OPA).

Change 1 to DO-306

Issued 03-17-11 ♦ Prepared by SC-214

Change 1 to DO-306 - *Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard)* provides unambiguous Controller-Pilot Datalink Communications (CPDLC) Message definitions that will be used by FANS 1/A Datalink systems in support of In-Trail Procedures (ITP) operations. It includes changes resulting from work on Advanced ATS Datalink services definition. The Sections and Tables affected are provided.

DO-305, Future Air Navigation System 1/A (FANS 1/A) - Aeronautical Telecommunications Network (ATN) Interoperability Standard

Issued 06-26-07 ♦ Prepared by SC-189

This document provides interoperability requirements to enable FANS 1/A aircraft and ATN aircraft to co-exist in the same operational environment. The standard was developed to enable air traffic service providers (ATSPs) to interoperate with data link equipped aircraft, regardless of which technology is installed on the aircraft. The standard is intended for the convergence of oceanic and continental data link applications. It provides the interoperability requirements for an aeronautical telecommunication network baseline 1 (ATN B1) ground system that provides air traffic data link services to future air navigation system 1/A (FANS 1/A) aircraft in continental airspace.

DO-304, Guidance Material and Considerations for Unmanned Aircraft Systems

Issued 03-22-07 ♦ Prepared by SC-203

This document addresses all Unmanned Aircraft Systems (UAS) and UAS operations being considered for realistic implementation in the US National Airspace System (NAS) in the foreseeable future. It is intended to educate the community and be used to facilitate future discussions on UAS standards. It provides the aviation community a definition of UAS, a description of the operational environment, and a top-level functional break down. The guidance material provides a framework for developing standards through RTCA Special Committee 203.

DO-303, Safety, Performance and Interoperability Requirements Document for the ADS-B Non-Radar-Airspace (NRA) Application

Issued 12-13-06 ♦ Prepared by SC-186

This document addresses the operational concept and minimum requirements for the use of ADS-B Surveillance for ATS services in Non-Radar Areas (ADS-B-NRA). Annexes of the document contain the Operational Services and Environment Definition (OSED), a comparative Operational Performance Assessment (OPA), an Operational Safety Assessment (OHA), and a summary of a published comparative risk assessment. The results of these assessments have been compiled into Section 3 of the main body which specifies the minimum operational safety and performance requirements (SPR). Interoperability requirements specifying the needed transfer of data between transmitting aircraft and ground domains is provided in section 4 (INTEROP). This INTEROP specification is presented at a link-neutral (i.e. MASPS) level. Annex H provides traceability of Section 4 to specific 1090MHz Extended Squitter interoperability requirements. It was developed jointly with EUROCAE.

DO-302, Minimum Operational Performance Standards (MOPS) for Surveillance Transmit Processing (STP)

Issued 12-13-06 ♦ Prepared by SC-186

This document contains requirements for interfacing ADS-B avionics to on-board position sources such as GPS and Flight Management Systems. Proper integration and installation of ADS-B equipment into aircraft is essential to successful implementation of ADS-B air-to-ground and air-to-air applications. The Surveillance Transmit Processing (STP) subsystem prepares the required surveillance information from on-board aircraft sensors for the ADS-B Transmit Subsystem. STP is a critical subsystem of the end-to-end system defined in the Minimum Aviation System Performance Standards (MASPS) for Aircraft Surveillance Application (ASA), (RTCA DO-289). The standards defined in this version of the STP MOPS have been scoped to support parameters required for five applications defined in the ASA MASPS:

- Enhanced Visual Acquisition (EVAcq)
- Conflict Detection (CD)
- Airport Surface Situational Awareness (ASSA)
- Final Approach and Runway Occupancy Awareness (FAROA)
- Enhanced Visual Approach (EVApp)

DO-301, Minimum Operational Performance Standards for Global Navigation Satellite System (GNSS) Airborne Active Antenna Equipment for the L1 Frequency Band

Issued 12-13-06 ♦ Prepared by SC-159

This document contains Minimum Operational Performance Standards (MOPS) for GNSS airborne active antenna equipment designed to use the GPS or Galileo L1 frequency augmented by other systems/equipment/techniques as appropriate to meet the performance requirements for primary means of navigation for en route, terminal, non-precision, and precision approach phases of flight. An active antenna is one integrated with a preamplifier. Minimum requirements for passive designs are specified in DO-228 and DO-228, Change 1. This MOPS specifies an alternative to active antenna requirements specified in DO-228 and DO-228, Change 1

DO-300, Minimum Operational Performance Standards (MOPS) for Traffic Alert and Collision Avoidance System II (TCAS II) Hybrid Surveillance

Issued 12-13-06 ♦ Prepared by SC-147

This document will allow TCAS to lower the number of aircraft it actively tracks through the use of passive tracking aircraft via the Extended Squitter. (Active tracking is used intermittently to validate the ADS-B data.) This will allow TCAS to increase its operational range as it will not need to initiate interference limiting since the number of actively tracked aircraft will be lower. Hybrid Surveillance will also decrease the overall RF environment which will bring operational benefits to ADS-B.

Change 1 to DO-300

Issued 07-01-09

Change 1 to DO-300 provides corrections to the test section and provides linkage to DO-185B.

The change corrects short comings in the test procedures and highlights the DO-185B requirements on how a DO-300 compliant TCAS II system should broadcast its hybrid surveillance capability.

DO-299, Report - Assessment and Recommendations on Visual Alerts and Aural Annunciations for TCAS II

Issued 03-14-06 ♦ Prepared by SC-147

Since the introduction of TCAS II, opposite reactions to Negative Resolution Advisories (RAs) have been regularly identified and have continued with TCAS II Version 7. Special Committee 147 was tasked to analyze the display configurations and aural alerts for Negative RAs. The purpose of this work was to determine whether problems exist with current display and annunciation requirements for this class of RA. This report documents results of SC-147's analysis and recommends an approach for resolving identified problems.

The report is structured as follows:

- Section 1 provides an introduction into the issues being investigated and a high level overview of the work.
- Section 2 describes the implementation of various types of RA displays
- Section 3 describes the data used in developing the conclusions and recommendations.
- Section 4 presents the conclusions reached.
- Section 5 presents recommendations for corrective actions to reduce the frequency of opposite responses to Negative RAs. The section also presents recommendations for further work on other related issues.
- Appendices are also included in the report to provide additional details on related issues, data collection methodology, and data results.

DO-298, Safety Analysis of Proposed Change to TCAS RA Reversal Logic

Issued 11-08-05 ♦ Prepared by SC-147

DO-298 is an SC-147 report which documents analyses recommending changes to the TCAS II Version 7 collision avoidance logic (Section 2.0 item 2) in accordance with SC-147 Terms of Reference guidance.

The report was developed to perform a detailed analysis of the TCAS II Version 7 Resolution Advisory (RA) sense reversal logic, investigating the safety impacts of revising the collision avoidance logic to improve the

performance of RA reversals for certain encounter geometries. Some encounter geometries have been shown to exist which TCAS II Version 7 may not appropriately resolve with RA sense reversals in certain airspaces. SC-147 has studied the frequency with which these geometries are operationally experienced and recommends the changes specified in this report to reduce collision risk in these encounter geometries.

DO-297, Integrated Modular Avionics (IMA) Development Guidance and Certification Considerations

Issued 11-08-05 ♦ Prepared by SC-200

DO-297 contains guidance for Integrated Modular Avionics (IMA) developers, application developers, integrators, certification applicants, and those involved in the approval and continued airworthiness of IMA systems in civil certification projects. It is focused on IMA-specific aspects of design assurance.

IMA is described as a shared set of flexible, reusable, and interoperable hardware and software resources that, when integrated, form a platform that provides services, designed and verified to a defined set of requirements, to host applications performing aircraft functions. The primary industry-accepted guidance for satisfying airworthiness requirements for IMA components is included and it describes application properties as they relate to their integration with a platform.

DO-296, Safety Requirements for Aeronautical Operational Control (AOC) Datalink Messages

Issued 10-19-04 ♦ Prepared by SC-201

This document provides minimum safety requirements for Aeronautical Operational Control (AOC) and certain Air Traffic Services (ATS) datalink messages. Approval via design assurance alone or design assurance in conjunction with risk reduction strategies are two means of addressing the hazards identified. This document recommends alternative strategies for demonstrating to a regulatory authority a composite approach to safety that is deemed equivalent to that provided solely by a design assurance solution.

DO-295, Civil Operators' Training Guidelines for Integrated Night Vision Imaging System Equipment

Issued 10-19-04 ♦ Prepared by SC-196

This document presents training guidance that has been generated from lessons learned by agencies having many years of experience in the training and operational application of night vision imaging systems. By tapping this experience base it is hoped that civil aircrew, through appropriate ground and flight training, will learn how to properly use night vision imaging systems, thus enhancing the effectiveness of night operations while mitigating the potential for mishaps relating to the use of these systems.

DO-294C, Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft

Issued 12-16-08 ♦ Prepared by SC-202

DO-294C completes the work of Special Committee (SC) -202 and provides the results of work on dialog with consumer electronics manufacturers' associations on consensus recommendations for facilitating safe use of PEDs onboard aircraft. Further, the document incorporates the previously released Change 1 to DO-294B, and addresses changes to align with the work done for DO-307. Changes were made to introductory materials in Appendix 5.B, Appendix 5.C, Appendix 6.D, and Appendix 10.

The document addresses near-term T-PED technologies such as existing devices enabled with cellular technologies, wireless local area networks (WLANS), and wireless personal area networks (WPANS) as well as emerging PED technologies, for example active RF Identification (RFID) tags, transmitting medical devices, and picocells for devices enabled by cellular technologies for use on board aircraft. The document defines and recommends a process by which aircraft operators and/or manufacturers may assess the risk if interference due to a specific T-PED technology within any aircraft type and model. It also provides a means for aviation authorities and others to determine acceptable and enforceable policies and processes for passenger and crew use of T-PEDs.

DO-293A, Minimum Operational Performance Standards for Nickel-Cadmium, Nickel Metal-Hydride, and Lead Acid Batteries

Issued 12-02-09 ♦ Prepared by SC-211

This document provides guidance for avionics manufacturers developing Nickel-Cadmium, Nickel Metal-Hydride, and Lead-Acid batteries to be used as power sources for equipment installed in aircraft. Specifically, the document addresses the chemical composition, cell size, cell construction, interconnection of the cell into batteries, venting, operational and storage environments, packaging, handling, test, storage and disposal. The document includes the new Nickel Metal-Hydride guidance and the earlier Change 1 that addressed testing concerns identified by industry.

DO-292, Assessment of Radio Frequency Interference Relevant to the GNSS L5/E5A Frequency Band

Issued 07-29-04 ♦ Prepared by SC-159

DO-292 addresses potential radio frequency interference (RFI) to the future GNSS L5 signal when used for aeronautical radio navigation, and where feasible includes RFI considerations relating to the Galileo E5A signal as well. The report also evaluates the potential effects of external and on-board signal environment on the performance of an L5 receiver.

DO-291B, Minimum Interchange Standards for Terrain, Obstacle, and Aerodrome Mapping Data

This document recommends guidelines and requirements for developing a data interchange format for terrain, obstacle, and aerodrome data. A common database interchange standard is a key factor in successfully implementing digital functions in the aviation domain. Use of information contained in this document will help system designers assure a common interchange between data originators and data integrators.

DO-291B reflects all of the changes generated from the DO-272C updates to reflect Temporality, Aerodrome Surface Routing Network (ASRN) and the new data attributes. Editorial errors were also corrected.

Two related documents specify requirements for database content and quality:

- DO-272C, *User Requirements for Aerodrome Mapping Information*
- DO-276A, *User Requirements for Terrain and Obstacle Data*

DO-291A, Interchange Standards for Terrain, Obstacle, and Aerodrome Mapping Data

Issued 04-14-09 ♦ Prepared by SC-217/EUROCAE WG-44

This document recommends guidelines and requirements for developing a data interchange format for terrain, obstacle, and aerodrome data. A common database interchange standard is a key factor in successfully implementing digital functions in the aviation domain. Use of information contained in this document will help system designers assure a common interchange between data originators and data integrators. The updated version for the exchange standard is published to reflect the industry changes to the requirement document:

- Includes additional features and attributes derived from the changes contained in DO-272B
- Makes editorial corrections.

Two related documents specify requirements for database content and quality:

- DO-272B, *User Requirements for Aerodrome Mapping Information*
- DO-276A, *User Requirements for Terrain and Obstacle Data*

DO-290, Safety and Performance Requirements Standard for Air Traffic Data Link Services in Continental Airspace (Continental SPR Standard)

Issued 04-29-04 ♦ Prepared by SC-189

The document provides the operational, safety, and performance requirements (SPR) for the implementation of data link services that support air traffic services (ATS) in continental airspace. It is intended to support the implementation of communication, navigation, and surveillance / air traffic management (CNS/ATM) systems in worldwide application.

The SPR standard is intended for use with interoperability requirements (INTEROP) standards, and the guidelines described in RTCA DO-264 "Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications." These requirements are necessary to provide adequate assurance that the elements of the CNS/ATM system, when operating together, will perform their intended function in an acceptably safe manner.

Change 1 to DO-290

Issued 12-13-06 ♦ Prepared by SC-189

This change minimizes nuisance error messages being sent to the aircraft when the flight crew initiates a request to the receiving ATSU prior to the connection being enabled. The current system provides indication of when the connection has been established but not when the CPDLC connection has been enabled. The change minimizes nuisance error messages to the flight crew by providing them indication of the CPDLC connection being enabled when the R-ATSU sends a CPDLC message to the aircraft containing the facility designation, facility name, and facility function. Correct errors: This change corrects an error in the safety requirement SR 11 for ACL, DCL, and DSC. The corresponding latency requirement $ET_{RESPONDER}$ is associated with the time needed to "send" the message, not "receive the message".

Change 2 to DO-290

Issued 06-26-07 ♦ Prepared by SC-189

Change 2 includes clarification and additional guidance for:

- 1) A Continental Controller Pilot Data Link Communications (CPDLC) message set
- 2) Specifying CPDLC [level] parameter as a vertical range
- 3) Mimicking ICAO Doc 4444 message elements using free text
- 4) Establishing CPDLC
- 5) CPDLC emergency messages

DO-289, Minimum Aviation System Performance Standards (MASPS) for Aircraft Surveillance Applications (ASA)

Issued 12-09-03 ♦ Prepared by SC-186

This document contains minimum performance standards for airborne equipment to support Airborne Surveillance Applications. Requirements for five applications are specified in detail; these are Enhanced Visual Acquisition, Conflict Detection, Enhanced Visual Approach, Airport Surface Situational Awareness, and Final Approach and Runway Occupancy Awareness. Preliminary requirements are provided for three applications; these are Approach Spacing for Instrument Approaches, Independent Closely Spaced Parallel Runways, and Airborne Conflict Management.

Section 1 contains background and introductory material, Section 2 contains system level requirements, and Section 3 contains subsystem requirements. There are 11 appendices including eight application appendices that describe the applications in detail, and explain the analysis that resulted in the requirements in the body of the document.

Change 1 to DO-289

Issued 12-13-06 ♦ Prepared by SC-186

This change to DO-289 mainly clarifies the definitions of several parameters transmitted by aircraft in ADS-B messages. These parameters provide information to the recipient of the ADS-B message about the quality of the transmitted aircraft position. The change has been developed in a manner that reflects typically available aircraft position sources and should not impact ADS-B equipment previously certified using RTCA DO-260A for 1090 MHz Extended Squitter or RTCA DO-282A for the Universal Access Transceiver (UAT).

DO-288, Next Generation Air/Ground Communication System (NEXCOM) Implementation Considerations: Factors and Issues to be Considered in Planning for the Transition to Air/Ground, ICAO, VDL Mode 3 Based Integrated Voice Data Communications in the U.S. National Airspace System

Issued 10-28-03 ♦ Prepared by SC-198

The document describes the current situation as well as goals and objectives for transition from analog Air/Ground (A/G) telecommunications to A/G Very High Frequency (VHF) Digital Link Mode 3 (VDL Mode 3) based integrated voice and data communications. It includes a transition strategy from analog voice to VDL Mode 3 digital voice and Aeronautical Telecommunications Network (ATN) based data communications via VHF Digital Link Mode 2 and VDL Mode 3.

DO-287, Plans and Principles for the Implementation of Aeronautical Data Link System (ADLS) Edition 1. Aeronautical Telecommunication Network (ATN) Baseline 1 Implementation and ADSL Build IIA & IIB

Issued 6-25-03 ♦ Prepared by SC-194

This document addresses the phased implementation process of the ADLS beyond Build 1A in all operational domains and phases of flight. It focuses on Build IIA for domestic en route and Build IIB for terminal area operations. Issues addressed include accommodation, transition and the development of new operational services using data link and integration with ATS decision support tools. It also describes the aviation community consensus regarding the evolution and implementation path for the provision of ATS over ATN in the NAS.

DO-286B, Minimum Aviation System Performance Standards (MASPS) for Traffic Information Service – Broadcast (TIS-B)

Issued 10-11-07 ♦ Prepared by SC-186 *Supersedes DO-286A*

This revision to DO-286A separates Automatic Dependent Surveillance - Rebroadcast (ADS-R) from the TIS-B MASPS. The basic TIS-B services described in DO-286A remain fundamentally unchanged. The revision includes changes related to those previously made to RTCA DO-242 - *MASPS for Automatic Dependent Surveillance - Broadcast (ADS-B)* and DO-289 - *MASPS for Aircraft Surveillance Applications (ASA)*. The revision should not impact equipment previously certified using DO-260A - *MOPS for 1090 MHz Extended Squitter (ADS-B) and TIS-B* or DO-286A.

DO-285, Next Generation Air/Ground Communications (NEXCOM) VDL Mode 3 Interoperability

Issued 4-10-03 ♦ Prepared by SC-198

This document provides the interoperability requirements for Air Traffic Services (ATS) supported by NEXCOM Very High Frequency (VHF) Digital Link (VDL) Mode 3. It identifies NEXCOM interoperability requirements for ATS supported by digital voice communications in the U.S. National Airspace System (NAS). Interoperability requirements are the minimum technical and functional requirements that provide the basis for ensuring compatibility between the aircraft system, the ATS Provider system, and the operator's provisions to use the air traffic services.

DO-284, Next Generation Air/Ground Communication System (NEXCOM) Safety and Performance Requirements (SPR)

Issued 1-23-03 ♦ Prepared by SC-198

This NEXCOM SPR document defines the operational safety hazards and performance requirements of the NEXCOM system (both airborne and ground subsystems). The SPR will be used to coordinate safety objectives and to allocate performance requirements for the system. It has been developed using the NEXCOM Operational Safety Assessment (OSA) and the NEXCOM Operational Performance Assessment (OPA). These two assessments define the safety functions, performance expectations, and characteristics of the operational environments needed to support the Air Traffic Services (ATS) identified in the NEXCOM Operational Services and Environment Definition (OSSED). The SPR document identifies the objectives and allocated requirements (including substantiation) for a specific operation.

Change 1 to DO-284

Issued 6-25-03 ♦ Prepared by SC-198

Change 1 adds new safety requirements to DO-284. The bit error rate (BER) is now indicated in the integrity value and this update is included throughout the document.

The number of operational hazards are increased in the Operational Hazard Assessment as outlined below:

- Hazard Class 2 (must be extremely remote) 4 hazards
- Hazard Class 3 (must be remote) 20 hazards
- Hazard Class 4 (may be probable) 5 hazards

Safety goal requirements now total 33. In Appendix B1, Operational Safety Assessment, several tables are updated with new information regarding loss of communication hazards related to interference caused by an analog transmission.

Numerous other minor changes are also included.

DO-283A, Minimum Operational Performance Standards for Required Navigation Performance for Area Navigation

Issued 10-28-03 ♦ Prepared by SC-181 *Supersedes DO-283*

This document supersedes RTCA DO-283, *Minimum Operational Performance Standards for Required Navigation Performance for Area Navigation*, published in October 2002. The document provides guidance to support the graphic depiction of navigation data on an electronic map display and is consistent with the implementation of navigation functions defined in the RNP MASPS, DO-236B. DO-283A provides map display information in Appendix K, which is new in this version.

Corrigendum 1, DO-282B, Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance - Broadcast

Issued 12-13-11 ♦ Prepared by SC-186

This document is a supplement to DO-282B. It contains corrections to typographical errors, corrections to test procedures and notes added to clarify existing text. These changes represent feedback from industry use of the published version of DO-282B. This supplement does not alter any existing requirements and does not affect the compliance of any equipment designed to meet the original published document. (Note: Those that have previously purchased DO-282B, issued December 2, 2009, need only this Corrigendum to have complete information.)

DO-282B with Corrigendum 1, Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance - Broadcast

Issued 12-13-11 ♦ Prepared by SC-186

This document is DO-282B issued December 2, 2009 with Corrigendum 1 (described above) issued December 13, 2011 included as Appendix T. The Corrigendum is also incorporated throughout the document.

The document contains Minimum Operational Performance Standards for airborne equipment to support Automatic Dependent Surveillance – Broadcast utilizing the Universal Access Transceiver (UAT). UAT is a multi-purpose aeronautical data link intended to support not only ADS-B, but also Flight Information Service – Broadcast (FIS-B), Traffic Information Service – Broadcast (TIS-B) and, if required in the future, supplementary ranging and positioning capabilities.

The document was developed in parallel with DO-260B.

DO-281A, Minimum Operational Performance Standards for Aircraft VDL Mode 2 Physical, Link and Network Layer

Issued 11-08-05 ♦ Prepared by SC-172

The changes in DO-281A were made to maintain requirement traceability and harmonization with the updated ICAO VDL Mode 2 Technical Manual as well as AEEC 631 implementation characteristics.

This document presents Minimum Operational Performance Standards (MOPS) and test procedures for Aircraft Very High Frequency (VHF) Digital Link (VDL) Mode 2 physical link and network layer protocol components of an avionics transmitter/receiver (transceiver). These transceivers are intended for air-ground

(A/G) data communications. Equipment certified to standards in this MOPS will be compatible with the relevant Minimum Aviation System Performance Standards (MASPS) in RTCA DO-224B, *Signal-in-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications Including Compatibility with Digital Voice Techniques*, and with the International Civil Aviation Organization (ICAO) VDL Mode 2 Technical Manual. Compliance with this MOPS is one means of assuring that the VDL Mode 2 equipment will function satisfactorily under all conditions normally encountered in the air traffic control A/G operations and that data formats will be compatible with the Aeronautical Telecommunication Network (ATN).

This document supersedes DO-281.

DO-280B, Interoperability Requirements Standard For ATN Baseline 1 (INTEROP ATN B1)

Issued 06-26-07 ♦ Prepared by SC-189

This update to DO-280, initially issued in June 2002, includes:

- 1) The Controller Pilot Data Link Communications (CPDLC) protected mode feature
- 2) Revisions to the ACM Service
- 3) An update CPDLC message set per ICAO Doc 4444 & DO-290 – Ch. 2/ED-120 – Ch. 2
- 4) Aircraft timer (tts) made optional
- 5) Corrections to the DO-280 "A" version.

DO-280B provides interoperability requirements for ATN B1 ground systems providing continental data link services to ATN B1 aircraft.

This document is compiled in two volumes which are not sold separately:

- Volume 1, Sections 1 – 4
- Volume 2, Annexes A – C; Appendices A - C

DO-279, Next Generation Air/Ground Communications (NEXCOM) Principles of Operation VDL Mode 3

Issued 3-5-02 ♦ Prepared by SC-198

This document characterizes the operational use of VDL Mode 3 integrated voice and data systems for air/ground communications in the U.S. National Airspace System. The principles defined are for Air Traffic Control related air/ ground communications services that apply to both voice and data operations.

DO-278A, Software Integrity Assurance Considerations for Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems

Issued 12-13-11 ♦ Prepared by SC-205

This document provides guidelines for the assurance of software contained in non-airborne CNS/ATM systems and provides recommendations for the production of that software commensurate with a level of confidence in safety. DO-278A defines a set of objectives recommended to establish assurance that the developed CNS/ATM software has the integrity needed for use in a safety-related application.

DO-278, Guidelines for Communications, Navigation, Surveillance, and Air Traffic Management (CNS/ATM) Systems Software Integrity Assurance

Issued 3-5-02 ♦ Prepared by SC-190

This document provides guidelines for the assurance of software contained in non-airborne CNS/ATM systems. It is intended to be an interpretive guide for the application of DO-178B/ED-12B, Software Considerations in Airborne Systems and Equipment Certification, to non-airborne CNS/ATM systems. DO-178B/ED-12B defines a set of objectives that are recommended to establish assurance that airborne software has the integrity needed for use in a safety-related application. These objectives have been reviewed, and in some cases, modified for application to non-airborne CNS/ATM systems.

DO-277, Minimum Aviation System Performance Standards (MASPS) for the High Frequency Data Link Operating in the Aeronautical Mobile (Route) Service (AM(R)S)

Issued 3-5-02 ♦ Prepared by SC-188

This document contains Minimum Aviation System Performance Standards (MASPS) for communications utilizing High Frequency Data Link systems for the air-ground communications sub-network in an Aeronautical Telecommunications Network (ATN) environment. The FANS 1/A data link environment is also addressed. Where systems are global in nature, the system may have international applications that are taken into consideration. Compliance with these standards is recommended as one means of assuring that the system and each subsystem will perform its intended functions(s) satisfactorily.

DO-276A, User Requirements for Terrain and Obstacle Data

Issued 8-3-05 ♦ Prepared by SC-193

The document is harmonized with ICAO SARPS and establishes EGM-96 as the required gravity model for vertical reference systems. It accommodates ICAO Annex 15, Aeronautical Information Services, Amendment 33, and harmonizes the glossary with the latest ICAO annexes. Definitions, features, and attribute names are now harmonized with DO-291, Interchange Standards for Terrain, Obstacle, and Aerodrome Mapping Data. It simplifies the definition of obstacles and terrain and mandated geographical coordinates. New additional data as well as time stamps, effectivity, lighting, and marking attributes accommodate user requirements and insure compliance with the ISO 19000 series. User feedback is added to the list of verification and validation methods.

DO-275, Minimum Operational Performance Standards for Integrated Night Vision Imaging System Equipment

Issued 10-12-01 ♦ Prepared by SC-196

This document contains Minimum Operational Performance Standards (MOPS) for the aviation night vision imaging system (NVIS) used to supplement night VFR operations. NVIS consists of the night vision goggle, interior and exterior lighting, cockpit transparencies and crew station design and components. Performance and test procedures are provided for the night vision goggle and lighting. A section on continued airworthiness contains guidance to ensure the integrated NVIS equipment installation continues to meet the minimum performance standard once in operational use.

DO-274, Next Generation Air/Ground Communications (NEXCOM) Principles of Operation

Issued 10-12-01 ♦ Prepared by SC-198

This document characterizes the principles of operational use of integrated digital air/ground voice and data systems in the domestic National Airspace System (NAS). Ideas presented are intended to provide a framework for NAS communications subsequent to 2010. NEXCOM operational objectives, intentions and capabilities are found in section three and form the basis for success criteria used to determine system acceptability. Section four describes the operational communications services to be used for Air Traffic operations. Operational Scenarios are included that describe how air traffic operations are supported. Section five characterizes the environment within which NEXCOM is expected to operate.

DO-273, Response to the Report of the RTCA Chairman's Committee on NEXCOM

Issued 10-12-01 ♦ Prepared by SC-198

In response to a request from the FAA, the RTCA Chairman's Committee produced a NEXCOM report that identifies issues attendant with transitioning Air Traffic Control communications to a digital voice and data communications system. The Chairman's Report, completed in August 2000, provides observations and recommendations that highlight the need for a systems approach in addressing issues of spectrum, policy, procedure, acquisition, certification, training, facilities, and maintenance. This document reports the actions being taken by the FAA, SC-198, and the NEXCOM Aviation Rulemaking Committee that address these observations and recommendations.

DO-272C, User Requirements for Aerodrome Mapping Information

Issued 09-28-11 ♦ Prepared by SC-217/EUROCAE WG-44

This document provides industry requirements for airport mapping databases for aeronautical use. It identifies aeronautical applications, which may use airport-mapping databases to define airport database standards. This document attempts to state the information requirements for users. The expectation is that aerodrome mapping database (AMDB) originators and integrators would use this document when providing those data to system designers and/or the end-users.

This revision adds new Sections and text to reflect new features and rules; definitions, attributes, and data content were revised; new text was added to cover the requirements related to the Aerodrome Surface Routing Network (ASRN). Appendix-A was re-written, numerical requirements tables were updated following harmonization with ICAO Annexes 4, 14 and 15 and editorial errors were corrected.

DO-272B, User Requirements for Aerodrome Mapping Information

Issued 04-14-09 ♦ Prepared by SC-217/EUROCAE WG-44

There are a large number of avionics systems in use today that implement DO-272A and DO-291 requirements. Additional equipment in the design phase, including airport moving map systems, need aeronautical information in addition to the current published RTCA documents. This information includes additional data and specifications on terrain and airport information. To satisfy this need DO-272B is published to:

- Include requirements listed in ARINC 816-1.
- Include requirements listed in AIXM5.0 for Airport Data for all features & attributes, and numerical requirements that have a positive industry business impact.
- Make editorial corrections.

DO-271C, Minimum Operational Performance Standards for Aircraft VDL Mode 3 Transceiver Operating in the Frequency Range 117.975-137.000 MHz.

Issued 11-8-05 ♦ Prepared by SC-172

DO-271C provides verification procedures for an aircraft Very High Frequency (VHF) Digital Link (VDL) Mode 3 Transceiver used for air-ground (A/G) voice and data communications. This revision includes updates based on changes to RTCA DO-224B, *Signal-in-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications Including Compatibility with Digital Voice Techniques*, and includes errata and vocoder test vectors.

This document supersedes DO-271B.

DO-270, Minimum Aviation System Performance Standards (MASPS) for the Aeronautical Mobile-Satellite (R) Service (AMS(R)S) as Used in Aeronautical Data Links

Issued 10-12-01 ♦ Prepared by SC-165

The document provides Minimum Aviation System Performance Standards for data communications utilizing aeronautical mobile satellite systems for the air-ground communications subnetwork in an Aeronautical Telecommunications Network (ATN) environment. The document focuses on data versus voice and covers a broad range of satellite systems to include the current and next generation satellites. The FANS 1/A data link environment is also addressed. Where systems are global in nature, the system may have international applications that are taken into consideration. Communications supporting the Air Traffic Service (ATS) and Aeronautical Operational Control (AOC) may be provided by one or more satellite systems, each of which has particular operating characteristics. This document anticipates that the system-specific attachment(s) will provide one means of assessing whether a particular AMS(R)S system is appropriate for a specific operational environment. The requirements for operational environments are consistent with DO-264.

Change 1 to DO-270

Issued 04-14-09 ♦ Prepared by SC-215

Communications supporting the Air Traffic Service (ATS) and Aeronautical Operational Control (AOC) may be provided by one or more satellite system, each of which has particular operating characteristics. Change 1 to DO-270 - *Minimum Aviation System Performance Standards (MASPS) for the Aeronautical Mobile-Satellite (R) Service (AMS(R)S) as Used in Aeronautical Data Links* provides a system specific description of the Iridium Satellite communication system configuration including Ground Sub-networks; Iridium Satellite Sub-networks, of which the Aircraft Earth Station (AES) is one part; and Aircraft Sub-networks. The minimum system performance standards in Change 1 address only the Satellite Sub-network.

DO-269, Concepts For Services Integrating Flight Operations and Air Traffic Management Using Addressed Data Link

Issued 6-12-01 ♦ Prepared by SC-194

This document proposes nine integrated service concepts identified from a wide list of potential services. The integrated service concepts were selected as those that may yield attractive benefits to all stakeholders through integration of Aeronautical Data Link System (ADLS) with airborne systems and/or ground automation. The services are Basic Information Exchange: 1) FMS-ATM-AOC Calibration; 2) NAS Status

Information; 3) UPT Flight Planning/ Re-planning; 4) Flexible Arrival and Departure Routing; 5) Surface Movement; Reduced Separation; 6) Non-radar Environment; 7) Radar Environment; Communications Management; 8) Automatic Voice Frequency Change; and 9) Emergency Notification.

DO-268, Concept of Operations, Night Vision Imaging System for Civil Operators

Issued 3-27-01 • Prepared by SC-196

This document describes the concept of operations supporting the implementation of aviation night vision imaging system (NVIS) technology into the National Airspace System by civilian aviation operators. Terminology, capabilities, limitations and operations for NVIS are discussed as well as training and supporting agencies. The focus of the document is the safe and efficient implementation of NVIS during various phases of flight.

DO-267A, Minimum Aviation System Performance Standards (MASPS) for Flight Information Services-Broadcast (FIS-B) Data Link

Issued 04-29-04 • Prepared by SC-195 *Supersedes DO-267*

The revised MASPS removes the binary test data sets and establishes a publicly accessible FIS-B Product Registry that facilitates coordination and publication of specifications for Application Protocol Data Unit Payload encoding of new FIS products.

The document contains the MASPS for FIS-B, an automated, digital data link system that provides timely access to data link updates of non-control, advisory information needed by pilots to operate safely and efficiently in the National Airspace System and in international airspace.

It supports interoperability between providers of ground and airborne FIS processing systems by defining a broadcast protocol that may be used in any broadcast medium (i.e., VHF, satellite). The FIS-B broadcast network organization consists of a physical layer, an International Standards Organization (ISO) standard-based Data Link Services (DLS) layer, a Network layer, a FIS-B Application Service Element (ASE), and a FIS-B Application. The physical layer is supplied by the manufacturer with all the other layers and/or elements defined in the MASPS.

DO-266, Government and Industry Guidelines and Concepts for NAS Analysis and Redesign

Issued 12-14-00 • Prepared by SC-192

This document consists of three volumes. "Volume I: User Priorities for the National Airspace Redesign" is a summary of user comments from six recent meetings held throughout the United States. "Volume II: High Altitude Airspace Concept" defines how one segment of the NAS could provide more of the freedoms described in the Free Flight Concept while permitting transparent operation for aircraft entering from and leaving to adjacent airspace. "Volume III: Recommendations on Special Use Airspace in National Airspace Redesign" identifies known types of airspace users and describes how each of the current and future users is affected by special use airspace. It includes a vision of the future airspace system and the role special use airspace will play in the future NAS.

DO-265, Minimum Operational Performance Standards for Aeronautical Mobile High Frequency Data Link (HF DL)

Issued 12-14-00 ♦ Prepared by SC-188

This document encompasses standards and descriptions of a system configuration including Ground Sub-networks; HF Data Link Sub-networks, of which the aircraft is one part; and aircraft Sub-networks. However, the specified MOPS in this document address only the aircraft HF Data Link Sub-network function.

DO-264, Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications

Issued 12-14-00 ♦ Prepared by SC-189

This document provides guidance material intended for stakeholders and approval authorities involved in the operational implementation of the provision and use of air traffic services (ATS) supported by data communications. These communication services include those such as communication management and clearances; navigation services such as flight planning, required navigation performance (RNP) monitoring and gross navigation error (GNE) prevention and detection; surveillance services such as position and intent reporting; and services that support ATM automation.

DO-263, Application of Airborne Conflict Management: Detection, Prevention, & Resolution

Issued 12-14-00 ♦ Prepared by SC-186

This document presents an operational concept for the Application of Airborne Conflict Management (ACM) using Automatic Dependent Surveillance-Broadcast (ADS-B). The ACM concept includes detecting conflicts, monitoring for potential conflicts and suggesting resolutions to prevent a violation of airspace separation criteria against all other properly equipped aircraft/vehicles. ACM is a core enabling function for the global implementation of the Free Flight concept, as it will aid pilots to fly user-preferred trajectories while avoiding conflicts with other aircraft.

DO-262A, Minimum Operational Performance Standards for Avionics Supporting Next Generation Satellite Systems (NGSS)

Issued 12-16-08 ♦ Prepared by SC-215

This document contains Minimum Operational Performance Standards (MOPS) for avionics that provide Aeronautical Mobile Satellite (R) Services (AMS(R)S) by means of satellite communications technologies. Each of these technologies is individually and collectively referred to as a "Next Generation Satellite System" (NGSS).

Iridium Satellite Normative Appendix: This normative appendix provides Iridium-specific technical requirements and information regarding the technical characteristics of an Aircraft Earth Station (AES) operating over the Iridium satellite network for the purpose of providing Aeronautical Mobile Satellite (Route) Service or AMS(R)S. The International Civil Aviation Organization (ICAO) and International Telecommunications Union (ITU) reserve the designation "(Route)" for services related to the "safety and regularity of flight along national and international air routes."

DO-261, NAVSTAR GPS L5 Signal Specification

Issued 12-14-00 ♦ Prepared by SC-159

This Specification defines the requirements related to the signal interface between the Space Segment (SS) of the Global Positioning System (GPS) and the GPS Navigation Users for the L5 Navigation Signal.

Corrigendum 1, DO-260B, Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)

Issued 12-13-11 ♦ Prepared by SC-186

This document is a supplement to DO-260B. It contains corrections to typographical errors, corrections to test procedures and notes added to clarify existing text. These changes represent feedback from industry use of the published version of DO-260B. This supplement does not alter any existing requirements and does not affect the compliance of any equipment designed to meet the original published document.

DO-260B with Corrigendum 1, Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B)

Issued 12-13-11 ♦ Prepared by SC-186

This document is DO-260B issued December 2, 2009 with Corrigendum 1 (described above) issued December 13, 2011 included as Appendix W. The Corrigendum is also incorporated throughout the document.

This document contains Minimum Operational Performance Standards (MOPS) for airborne equipment for Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Service – Broadcast (TIS-B) utilizing 1090 MHz Mode-S Extended Squitter (1090ES). Compliance with these standards by manufacturers, installers and users is recommended as one means of assuring that the equipment will satisfactorily perform its intended functions under conditions encountered in routine aeronautical operations.

This revision supersedes DO-260A and incorporates the earlier Changes 1 and 2. FAA Technical Standard Order (TSO) C-166b references this document.

The document was developed in parallel with DO-282B.

DO-260, Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B)

Issued 09-13-00 ♦ Prepared by SC-186

This document contains the Minimum Operational Performance Standards (MOPS) for airborne equipment for Automatic Dependent Surveillance-Broadcast (ADS-B) utilizing 1090MHz Mode-S extended squitter. ADS-B is a system for aircraft or surface vehicles, operating within the airport surface movement area, that periodically transmits its state vector (horizontal and vertical position, horizontal and vertical velocity) and other information.

This MOPS describes typical equipment applications and operational goals and along with DO-242, *Minimum Aviation System Performance Standards for ADS-B*, forms the basis for the recommended performance standards and test procedures.

Change 1 to DO-260, Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B)

Issued 06-27-06 ♦ Prepared by SC-186

Change 1 prescribes the changes to DO-260 required for those manufacturers that produce 1090 MHz equipment for broadcast-only that comply only with DO-260. It provides additional changes to the changes which first appeared in Section 1 of the Appendix of FAA TSO C166, which has been removed from the draft of TSO C166A. Manufacturers that produce 1090 MHz equipment which will include the ADS-B receive capability must comply with DO-260A, Change 1 and the latest available version of FAA TSO C166. Change 1 provides changes for the Air/Ground Determination and its recommended test procedures, and for the definition of how to encode Navigation Uncertainty Category (NUC) if the Horizontal Protection Limit (HPL) is not available. Direction is provided for deleting the Aircraft Trajectory Intent Messages and Aircraft Operational Coordination Messages. The requirements for the optional transmission of the ADS-B TEST Message (TYPE Code =23) for transmitting the Mode 3/A (4096) Code in the USA is defined and the test procedures are added.

DO-259, Applications Descriptions for Initial Cockpit Display of Traffic Information (CDTI) Applications

Issued 9-13-00 ♦ Prepared by SC-186

This document provides a preliminary description of four potential applications utilizing a CDTI that may enhance current air traffic operations, describes underlying pilot and controller tasks and responsibilities, and derives required CDTI capabilities that enable the pilot to perform these tasks. The application definitions provide sufficient detail to allow a specification of required CDTI capabilities, so when the applications are fully developed, tested and evaluated, and certified for use, the equipment may be capable of facilitating the implementation.

DO-258A, Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications

Issued 4-07-05 ♦ Prepared by SC-189 *Supersedes DO-258* ♦ Errata Issued 01-11-08

This update aligns the scope of interoperability requirements for the FANS 1/A technology with the Continental SPR Standard (DO-290) to include interoperability for interface with HF Data Link (HF DL). The document, initially issued in September 2000, defines interoperability requirements for communication services and Air Traffic Services (ATS) applications and allocates these requirements to stakeholders. It covers: the ATS Facilities Notification (ATN) application, the Automatic Dependent Surveillance (ADS) application, the Controller Pilot Data Link Communication (CPDLC) application and the ARINC data communication.

DO-257A, Minimum Operational Performance Standards for the Depiction of Navigation Information on Electronic Maps

Issued 6-25-03 ♦ Prepared by SC-181 *Supersedes DO-257*

DO-257A supports the electronic depiction of airport surface situation awareness (SA) maps and vertical situation awareness displays. The revision includes requirements and guidelines for the electronic depiction of airport surface diagrams, ownship, ground path and vertical profile aspects of the display and associated controls. Two new Sections were added: Section 2.3 - Aerodrome Moving Map Display (AMMD) and Section 2.4 - Vertical Situation Awareness Displays (VSAD). Consensus was reached on hazard classifications by removing the Major hazard classification for airborne display from the document. It is understood that a FAA Technical Standard Order referencing DO-257A will further address hazard classifications.

DO-256, Minimum Human Factors Standards for Air Traffic Services Provided Via Data Communications Utilizing the ATN, Builds I and IA

Issued 6-20-00 ♦ Prepared by SC-194

DO-256 defines minimum human factors requirements and guidelines for air traffic services (ATS) data link communications between air traffic specialist and a pilot utilizing Aeronautical Telecommunications Network (ATN). The scope is the initial Controller-Pilot Data Link Communications (CPDLC) capabilities, which comprise the Build I and Build IA phases of the United States implementation path. CPDLC initial communications capabilities will generally encompass the transition and cruise phases of flight and be implemented in Air Route Traffic Control Centers (ARTCCs).

DO-255, Requirements Specification for Avionics Computer Resource (ACR)

Issued 6-20-00 ♦ Prepared by SC-182

DO-255 provides the Requirements Specifications for the Avionics Computer Resource (ACR) intended to facilitate certification efficiency and economy of scale for the computer platform. These Requirements Specifications define a computer platform suitable for hosting multiple, independent software applications and are seen as an enabling step towards standardized, re-usable avionics software applications.

DO-254, Design Assurance Guidance for Airborne Electronic Hardware

Issued 4-19-00 ♦ Prepared by SC-180

This document is intended to help aircraft manufacturers and the suppliers of aircraft electronic systems assure that electronic airborne equipment safely performs its intended function. The document identifies design life cycle processes for hardware that includes line replaceable units, circuit board assemblies, application specific integrated circuits (ASICs), programmable logic devices, etc. It also characterizes the objective of the design life cycle processes and offers a means of complying with certification requirements.

DO-253C, Minimum Operational Performance Standards for GPS Local Area Augmentation System Airborne Equipment

Issued 12-16-08 ♦ Prepared by SC-159

This document provides the Minimum Operational Performance Standards (MOPS) for Airborne Navigation Equipment Using the Global Positioning System (GPS) Augmented by the Local Area Augmentation System (LAAS). The standards in the document define minimum performance requirements, functions, and features for LAAS airborne equipment to support CAT I, II and III precision approach operations. Compliance with these standards by manufacturers, installers, and users is recommended as a means of assuring that the equipment will satisfactorily perform its intended functions under conditions encountered in routine aeronautical operations. DO-253A superseded DO-253 and included: 1) Recommendations harmonized with the ICAO GNSS Panel Standards and Recommended Practices (SARPs), 2) The use of LAAS differential position to support area navigation, and 3) The easing of the LAAS Ground Subsystem Siting constraints (Ephemeris Error Protection). DO-253B harmonized the LAAS MOPS with the revised WAAS MOPS - DO-229D. DO-253C includes the earlier revisions and provides the requirements / standards for LAAS to support Cat. II and III precision approaches. In addition, the revision incorporates changes to existing Cat. I and positioning service standards, and includes velocity requirements to further support ADS-B.

DO-252, Minimum Interoperability Standards (MIS) for Automated Meteorological Transmission (AUTOMET)

Issued 1-11-00 ♦ Prepared by SC-195

This document specifies a set of encoding and decoding rules to apply to the message format types found in the document. Message formats are independent of media and protocols used to transfer encoded AUTOMET messages. AUTOMET operational requirements are not explicitly specified. This standard ensures that all AUTOMET-compliant air- and ground-based systems will be able to decode and interpret AUTOMET uplink and downlink messages.

DO-251, U.S. National Airspace System (NAS) Plan for Air Traffic Services Data Link (Phase 1, En Route CONUS Implementation)

Issued 1-11-00 ♦ Prepared by SC-194

The "Plan" document captures the work of the data link issues team from which SC-194 evolved. This publication documents the aviation community's consensus on the evolution and implementation path for Air Traffic Services via data link utilizing the ATN in the U.S. National Airspace System.

DO-250, Guiding Principles for Air Traffic Services Provided via Data Communications Utilizing the ATN, Builds I and IA

Issued 1-11-00 ♦ Prepared by SC-194.

The Aeronautical Data Link System will be incrementally deployed to leverage existing and evolving technology investments and emphasize newly developed procedures in the initial steps. This publication includes sections on infrastructure, procedural requirements, data link services, and operational scenarios.

DO-249, Development and Implementation Planning Guide for Automatic Dependent Surveillance Broadcast (ADS-B) Applications

Issued 10-6-99 ♦ Prepared by SC-186

This planning Guide outlines suggested activities for the development and implementation of ADS-B applications. It documents the range of activities that need to be in place to bring an application from an initial concept to operational use.

DO-248C, Supporting Information for DO-178C and DO-278A

Issued 12-13-11 ♦ Prepared by SC-205

This document addresses the questions of both the industry and regulatory authorities. It contains frequently asked questions (FAQs), discussion papers (DPs) and rationale. Many of the FAQs and DPs are based on the previous version of this document, DO-248B; however, some have been modified to address the changes from DO-178B to DO-178C and to make it applicable to DO-278A. Additionally, some new FAQs and DPs have been added to provide additional clarification on DO-178C and/or DO-278A. The errata against DO-178B (which were in section 2 of DO-248B) have been incorporated into DO-178C. Rationale for DO-178C and DO-278A objectives has also been included in DO-248C.

DO-248B, Final Annual Report For Clarification Of DO-178B “Software Considerations In Airborne Systems And Equipment Certification”

Issued 10-12-01 ♦ Prepared by SC-190 *Supersedes DO-248A*

DO-178B was published December 1, 1992. Since that date the aviation community has gained experience using the document and has raised a number of questions regarding the document's content and application. DO-248B includes the material from the Second Annual Report, DO-248A, and adds new Frequently Asked Questions and Discussion Papers resulting from the committee's review of over 330 issues.

DO-247, The Role of the Global Navigation Satellite System (GNSS) in Supporting Airport Surface Operations

Issued 1-7-99 ♦ Prepared by SC-159

The report presents material on airport surface operations and relates it to the use of GNSS. It is intended that the report provide background information for airport operators/users and equipment suppliers on the role of GNSS to support airport surface operations, and to provide guidance for the further development of performance standards. The report culminates with conclusions pertaining to the use of GNSS for airport surface operations and identifies issues requiring further study.

DO-246D, GNSS Based Precision Approach Local Area Augmentation System (LAAS) – Signal-in-Space Interface Control Document (ICD)

Issued 12-16-08 ♦ Prepared by SC-159 *Supersedes DO-246C*

DO-246D includes the earlier document revisions and incorporates the standards for LAAS to support Cat. II and III precision approaches. DO-246C included changes to harmonize the document with DO-245A, LAAS MASPS. The three primary areas of change were:

1. Definition of additional data for supporting Cat. II/III precision approach operations [Additional data blocks 3 and 4 for Message Type 2].
2. Definition of LAAS uplinked Terminal Area Paths (TAP) data for supporting additional Terminal Area Procedures [Provisions for TAP data to be included in Message Type 4].
3. All references to pseudolites / Ground Based Ranging Sources were removed.

DO-245A, Minimum Aviation System Performance Standards for Local Area Augmentation System (LAAS)

Issued 12-09-04 ♦ Prepared by SC-159 *Supersedes DO-245*

This document contains the Minimum Aviation System Performance Standards for the Local Area Augmentation System (LAAS), a system developed to support precision approach and landing operations and other navigation and surveillance applications, within a local area including and surrounding an airport.

This revision harmonizes the LAAS requirements for supporting Category I operations and the LAAS differential positioning service with the LAAS MOPS [DO 253A] and the ICAO Annex 10 GBAS SARPs through Amendment 79. The requirements to support LAAS Category II and III precision approach operations are added/updated as well as requirements for the LAAS when supporting complex terminal procedures through the broadcast of Terminal Area Path (TAP) data using the LAAS VHF Data Broadcast (VDB).

Note: Readers should be aware that DO-245A has not yet been updated to be consistent with the current evolution of LAAS requirements.

DO-244, Government/Industry Guidelines and Concept for National Airspace Analysis and Redesign

Issued 6-8-98 ♦ Prepared by SC-192

This document contains two volumes - Volume I, entitled *A Concept Document for the Optimization of the NAS Airspace Structure*, presents concepts for a national airspace assessment and redesign that addresses significant changes to matters pertaining to the national airspace by the year 2005. Volume II, entitled *Guidelines for Conducting Airspace Analysis*, contains the general guidelines for airspace analysis, including metrics, modeling, and data requirements.

DO-243, Guidance for Initial Implementation of Cockpit Display of Traffic Information

Issued 2-19-98 ♦ Prepared by SC-186

This document provides manufacturers a set of guidelines in the design and development of an initial set of Cockpit Display of Traffic Information (CDTI) features. CDTI is the function of presenting surveillance information about the surrounding traffic to the flight crew. This guidance document is advisory in nature and

its contents are expected to be a subset of the final CDTI MOPS. That MOPS, when published, will replace this document. In order to comply with certification standards, manufacturers will be required to demonstrate that 1) CDTI meets its intended functions, and 2) CDTI does not interfere with any other aircraft systems. This interim guidance provides a description of the intended functions of CDTI and as such may aid the certification process.

DO-242A, Minimum Aviation System Performance Standards for Automatic Dependent Surveillance Broadcast (ADS-B)

Issued 6-25-02 ♦ Prepared by SC-186 *Supersedes DO-242*

This document supersedes DO-242 and provides an up-to-date view of the system-wide operational use of ADS-B. This revised ADS-B MASPS concentrates on four major areas of development: 1) Separating the accuracy and integrity components of the Navigation Uncertainty Category (NUC) into the new fields Navigation Accuracy (NAC) and Navigation Integrity Category (NIC); 2) Reorganization of the State Vector, Mode-Status, and On-condition reports; 3) Restructuring the content and manner in which intent information is broadcast; and 4) Clarification that system requirements at the MASPS level are based on operational ranges and not particular applications.

Change 1 to DO-242A

Issued 12-13-06 ♦ Prepared by SC-186

This change to DO-242A mainly clarifies the definitions of several parameters transmitted by aircraft in ADS-B messages. These parameters provide information to the recipient of the ADS-B message about the quality of the transmitted aircraft position. The change has been developed in a manner that reflects typically available aircraft position sources and should not impact ADS-B equipment previously certified using RTCA DO-260A for 1090 MHz Extended Squitter or RTCA DO-282A for the Universal Access Transceiver (UAT).

DO-241, Operational Concepts and Data Elements Required to Improve Air Traffic Management (ATM) Aeronautical Operational Control (AOC) Ground-Ground Information Exchange to Facilitate Collaborative Decision Making

Issued 10-6-97 ♦ Prepared by SC-169

The document identifies information to be exchanged by the ATM system and AOCs using automation and ground-ground communications. It identifies information needed for both domestic and oceanic operations. The information presented extends beyond what is necessary for today's operation paradigm to include requirements that will facilitate more user flexibility in the future. Operational scenarios are included.

DO-240, Minimum Operational Performance Standards for Aeronautical Telecommunication Network (ATN) Avionics

Issued 7-29-97 ♦ Prepared by SC-162

This document provides standards for Aeronautical Telecommunication Network functions for aircraft systems and equipment. These standards are in the form of performance criteria for ATN functions; qualification criteria for demonstrating performance requirements; descriptions of evidence that indicate that

performance objectives have been satisfied. Performance objectives, qualification and evidence are discussed as they relate to satisfying the requirements for airworthiness approval of ATN functions. The functions covered by the MOPS can be incorporated in a wide variety of hardware configurations onboard an aircraft. Section 2 of the document expresses the requirements for airborne ATN systems. Section 3 describes the means of qualification by providing an overview of the testing process and listing detailed tests.

DO-239, Minimum Operational Performance Standards for Traffic Information Service (TIS) Data Link Communications

Issued 4-2-97 ♦ Prepared by SC-169 Errata Issued 10-17-97

This document presents requirements for the aircraft equipment associated with Traffic Information Service Data Link (TISDL) communications. The TIS data link function is intended to improve the safety and efficiency of “see and avoid” flight by providing pilots with automatic display of nearby traffic and warnings of any potentially threatening conditions. The source of TIS information is the file of aircraft tracks maintained by the ground Mode S sensor providing coverage for a region of airspace. TIS generates alerts for any traffic aircraft in Mode S coverage that carry a transponder (ATCRBS or Mode S). TIS provides traffic advisories similar to those of TCAS-1, but does not provide resolution advisories. Section 1 provides information and assumptions needed to understand the rationale for equipment characteristics and requirements. Section 2 contains the minimum performance standards for the equipment. Section 3 describes the performance required of the installed equipment and Section 4 describes the operational performance characteristics for equipment installations.

NOTE: The electronic DO-239 is a pdf file but it is not in searchable format.

DO-238, Human Engineering Guidance for Data Link Systems

Issued 4-2-97 ♦ Prepared by SC-169

This document sets forth general, functional, procedural, and design criteria and recommendations concerning human engineering of data link systems. The document focuses primarily on recommendations for data link communications between an air traffic specialist and a pilot. The document is intended as a guide for the development and evaluation of data link systems.

DO-237, Aeronautical Spectrum Planning for 1997- 2010

Issued 1-27-97 ♦ Prepared by SC-185

The report examines aeronautical Communications, Navigation, and Surveillance (CNS) services to determine the spectrum requirements of existing and planned new systems. It represents a major effort by the aeronautical community to assess “the state of the spectrum” as requirements change and new technologies are introduced.

DO-236B, Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation

Issued 10-28-03 ♦ Supersedes DO-236A ♦ Prepared by SC-181

This document supersedes RTCA DO-236A, *Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation*, published in September 2000.

Special Committee 181 added two new Appendices to DO-236B:

- Appendix H, Temperature Compensation Information
- Appendix I, RNP RNAV Less Than 0.3NM

Paragraph 3.2.8.6, Temperature Compensation, is updated with additional notes based upon the new material in Appendix H.

DO-235B, Assessment of Radio Frequency Interference Relevant to the GNSS L1 Frequency Band

Issued 03-13-08 ♦ Prepared by SC-159 *Supersedes DO-235A*

This document supersedes DO-235A. It departs from the previous assessment reports by characterizing the "external" (non-aeronautical) Radio Frequency Interference (RFI) as an aggregate effect. Terrestrial RFI sources are modeled as being distributed to the radio horizon for the Global Navigation Satellite System (GNSS) aircraft antenna. On-board non-aeronautical RFI is also characterized as an aggregate effect from multiple sources distributed throughout the passenger cabin. Explicit location-dependent GNSS inter- and intra-system RFI power spectral density values are computed based on "critical-satellite" configurations for a 30-satellite GPS constellation. RFI components for new Space Based Augmentation System (SBAS), Quasi-Zenith Satellite System (QZSS) and Galileo satellite constellations are also determined. Receiver MOPS RFI test condition modifications are proposed to better address the composite aeronautical and non-aeronautical RFI environment for certain flight phases and operations. New potential RFI sources (Mobile Satellite Service ancillary terrestrial component terminals, GPS re-radiators) are discussed. Other potential RFI sources are reviewed and a set of RFI mitigations discussed.

DO-234, Minimum Performance and Installation Standards for Runway Guard Lights (RGLs)

Issued 11-15-96 ♦ Prepared by SC-184

This document contains minimum performance and installation standards for elevated and in-pavement runway guard lights (RGLs). These standards provide guidance to designers, installers, manufacturers, service providers and users of these lights. RGLs are used to enhance the conspicuity of the runway holding position at airports and are useful for low visibility operations, situational awareness by pilots and vehicle drivers, and runway incursion prevention.

DO-233, Portable Electronic Devices Carried on Board Aircraft

Issued 8-20-96 ♦ Prepared by SC-177 Errata Issued 8-18-99

This document addresses the potential interference to installed aircraft electrical and electronic systems from Portable Electronic Devices (PEDs) carried aboard by passengers. It defines the potential interference phenomena; outlines the risk potential from interference events; provides test methods to determine whether or not a potential for interference exists for certain PEDs, aircraft and combinations thereof; and

addresses acceptable levels of interference. The report also recommends modification of Federal Aviation Regulation 91.21, continued PEDs testing to identify and better define the possibility of interference to aircraft electronic systems, increased public awareness of the potential for interference from PEDs, and the development and use of devices to detect spurious PEDs emissions.

DO-232, Operations Concepts for Data Link Applications of Flight Information Services

Issued 3-13-96 ♦ Prepared by SC-169

This document provides the framework for development of future FIS data link systems and associated MOPS. The document is designed to: present the user's perspective of operational concepts and system characteristics for FIS data link applications; identify, describe, and prioritize the FIS data link products and services needed to support both current and future flight operations in the National Airspace System, including international oceanic operations; identify infrastructure barriers to successful implementation and utilization of the priority FIS products.

DO-231, Design Guidelines and Recommended Standards for the Implementation and Use of AMS(R)S Voice Services in a Data Link Environment

Issued 3-13-96 ♦ Prepared by SC-165

This document contains functional and interface requirements for the implementation and use of Aeronautical Mobile Satellite Service (AMSS) voice communications in an environment where satellite voice is a required capability. The information contained herein describes satellite voice services in the Air Traffic Management (ATM) and Aeronautical Operational Control (AOC) environments-including requirements for aircraft installations, satellite services, ground interconnection facilities, and Air Traffic Service facility capabilities. The scope of this document is focused primarily on the use of satellite voice in Oceanic and Remote airspace areas.

DO-230C, Integrated Security System Standard for Airport Access Control

Issued 06-21-11 ♦ Prepared by SC-224

This document supersedes DO-230B published in 2008. It provides standards and guidelines for implementing access control systems in the context of an Integrated Security System for an Airport. DO-230C aligns the standard to the new version of the "Recommended Security Guidelines for Airport Planning, Design & Construction", issued by the Transportation Security Administration in 2011. The document contains the most current information regarding aviation credentialing initiatives – the introduction of new Personal Identity Verification (PIV) Interoperable (I) and Compatible (C) specifications.

DO-230B, Integrated Security System Standard for Airport Access Control

Issued 06-19-08 ♦ Prepared by SC-207

This document supersedes DO-230A, "Standards for Airport Security Access Control Systems," originally published in 2003. It provides standards and guidelines for implementing access control systems in the context of an Integrated Security System for an Airport. The document provides guidance on acquiring and

designing such systems, testing and evaluating system performance, and operational requirements. The document incorporates the latest technological advances in security access control systems and identity management technologies, including smart cards and biometrics. The major areas covered are: system level requirements, identity management requirements, physical access control requirements, video surveillance requirements, security operating center requirements, intrusion detection requirements, communications infrastructure requirements and general procurement level guidance.

The document indicates not only what are the current best practices and system requirements to meet the current regulatory requirements, but also provides guidance for those airports who wish to go beyond these requirements, and provides guidance for what the committee believes are logical and reasonable methods for implementing the advances in security technology.

DO-230A, Standards for Airport Security Access Control Systems

Issued 4-10-03 ♦ Prepared by SC-199 *Supersedes DO-230*

This document updates RTCA DO-230, *Standards for Airport Security Access Control Systems*, originally published in 1996. Using the original DO-230 format, the document has been expanded into the following sections: □ **Section 1 introduces the Access Control** systems (ACS), purpose, scope, goals, and operational requirements. Section 2 provides guidance for system performance. Section 3 addresses subsystem performance of access media and hardware. Section 4 provides guidance for system verification and validation. The document also contains the three appendixes that provide guidance and reference material: Appendix A provides detailed guidance on biometrics and smart card technologies. □ **Appendix B provides** reference examples of sample reports commonly found in ACS. Appendix C provides a list of acronyms and abbreviations used in the document. This material should be useful to airport operators as a tool to assist in obtaining Airport Improvement Program (AIP) funding.

DO-229D, Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment

Issued 12-13-06 ♦ Prepared by SC-159 *Errata Issued 07-31-08*

This document contains Minimum Operational Performance Standards (MOPS) for airborne navigation equipment (2D and 3D) using the Global Positioning System (GPS) augmented by the Wide Area Augmentation System (WAAS). The primary areas of change from DO-229C to DO-229D are:

1. Clarifications: Numerous changes have been incorporated to more clearly describe the meaning and intent of the requirements. To accomplish this there have been changes in the requirements text, explanatory notes added to clarify intent, or both.
2. Appendix Updates: Appendixes F and I from DO-229C have been deleted and replaced with entirely new material. Appendix F now addresses SBAS capability considerations for ADS-B. Appendix I now contains mode switching process flow diagrams to aid in understanding the mode transition requirements.

There are three new appendixes in DO-229D, Appendix S, Appendix T and Appendix U. Appendix S contains process flow diagrams that are examples of the computation and logic flow to meet MOPS requirements for the possible operational modes. Appendix T is a description of the tool used to determine GEO bias error in receiver correlator designs. Appendix U contains guidance information for interfacing WAAS with ADS-B equipment.

3. Corrections: There are numerous changes in DO-229D to correct errors in equations and to update references to other documents. For example, equations in several places had incorrect signs, symbols, and/or nomenclature. Some of these errors were noted in the errata sheet and TSO-C145a/C146a. The errors documented by those sources have been incorporated; and, many additional errors were found during the review.

Further, the update to DO-229D includes changes related to the changing environment for GPS and service provider experience gained thru operating SBAS systems. For example, the narrow-band geostationary satellites in the WAAS system are in the process of being replaced with wide-band satellites. A result is that major requirement changes have been incorporated in DO-229D related to noise, minimum/maximum satellite power levels, and antenna gains.

4. New Requirements: There are new requirements either embedded within previously existing requirements from DO-229C, or, captured as entirely new sections that never previously existed. Some examples are:

1. There is a new requirement for Fault Detection Prediction so that SBAS equipment provides at least the same capability as TSO-C129a equipment when operating outside of SBAS coverage.
2. There is a new GEO bias error requirement to account for the net group delay through the receiver correlator that results from the signal bandwidth of SBAS satellites compared to GPS satellites.
3. There is a requirement to only use weighted solutions for FDE algorithms.

Section 2.3 for Delta-class receivers has been extensively re-written and expanded.

GEO Bias Modeling Tool for DO-229D

Issued 12-13-06 ♦ Prepared by SC-159

The GEO Bias tool is a MATLAB script. The GEO Bias tool is intended to be used by the manufacturer to demonstrate that their GNSS receiver is compliant with the GEO Bias requirements in DO-229D as described in section 2.1.4.1.5. Appendix T in DO-229D provides a description of this tool and associated test procedure.

DO-229C, Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment

Issued 11-28-01 ♦ Prepared by SC-159 *Supersedes DO-229B* Errata Issued 8-16-02

This document contains Minimum Operational Performance Standards (MOPS) for airborne navigation equipment (2D and 3D) using the Global Positioning System (GPS) augmented by the Wide Area Augmentation System (WAAS). DO-229C supersedes DO-229B and includes: 1) Message Type 28 information, 2) Modification of the satellite tracking constraints, 3) Changes to the equipment classifications and the accommodating document realignment, 4) Interference environment revisions in Appendix C and 5) New GPS/Inertial requirements in Appendix R. The regulatory application of these standards is the responsibility of appropriate government agencies. In the United States, the Federal Aviation Administration (FAA) plans to publish Technical Standard Order (TSO) C-145 and C-146 for GPS/ WAAS equipment. TSO C-146 will reference the requirements and bench tests procedures in Section 2.

FAA Technical Standard Order (TSO) - C145 references this document.

DO-228, Minimum Operational Performance Standards for Global Navigation Satellite Systems (GNSS) Airborne Antenna Equipment

Issued 10-20-95 ♦ Prepared by SC-159

Defines the antenna performance for antennas that will be used with GNSS receiver equipment. Contains Minimum Operational Performance Standards (MOPS) for GNSS airborne antenna equipment designed to use GPS or GLONASS augmented by other systems/equipment/techniques as appropriate to meet the performance requirements for primary means of navigation for en route, terminal, non-precision, and precision approach phases of flight. Incorporated within these standards are equipment characteristics that should be useful to users, designers, manufacturers, and installers of equipment.

Change 1 to DO-228

Issued 1-11-00 ♦ Prepared by SC-159

This change was developed in response to inputs from antenna manufactures. Changes include references to RTCA DO-160D vice DO-160C, updates minimum frequency range, axial ration, frequency selectivity requirements, and differential group delay to insure airborne equipment is protected by the LAAS and WAAS ground monitoring facilities during precision approach operations.

DO-227, Minimum Operational Performance Standards for Lithium Batteries

Issued 6-23-95 ♦ Prepared by SC-168

Contains both requirements and general guidelines regarding the design, testing, application, handling, storage, and disposal of lithium cells and batteries. It provides designers, manufacturers, and users of equipment installed in aircraft with information on the performance characteristics and operating and environmental limitations of lithium cells and batteries powering such equipment. Two categories of maximum cell and battery sizes are identified.

Category I: Solid-cathode cells that contain less than 0.15 grams of lithium or lithium alloy, and batteries that use not more than four such cells.

Category II: Liquid-cathode cells that contain less than 0.15 grams of lithium or lithium alloy, or batteries comprised of these cells. Cells that contain 0.15 to not more than 5 grams of lithium or lithium alloy. Batteries that contain not more than 25 grams lithium or lithium alloy. Cells containing more than 5 grams of lithium or lithium alloy, or batteries that contain more than 25 grams of lithium or lithium alloy are beyond the scope of this document.

FAA Technical Standard Order (TSO) – C97 references this document.

NOTE: The electronic DO-227 is a pdf file but it is not in searchable format.

DO-226, Guidance Material for Evolving Airborne Precision Area Navigation Equipment with Emphasis on MLS

Issued 5-25-95 ♦ Prepared by SC-171 *Supersedes DO-198 (SC-151)*

This document spans a decade of work by two RTCA Special Committees (151/171). During this period, alternative technologies to the Microwave Landing System (e.g., satellite navigation) have evolved. Yet the need for precision, near-airport area navigation continues. Whatever the navigation source for an operational capability, much of the material in this document is germane to any precision, terminal-area navigation system. The philosophy used in preparing the document was to provide guidance for any terminal area navigation system, although the specific performance requirements and test procedures assume the MLS Random (Area) Navigation (RNAV) sensor inputs.

DO-225, VHF Air-Ground Communications System Improvements Alternatives Study and Selection of Proposals for Future Action

Issued 11-17-94 ♦ Prepared by SC-172

This report represents a broad study of very high frequency (VHF) air-ground communications system improvements. The study includes: (1) gaining an understanding of the present VHF air-ground communications system, (2) developing future Air Traffic Service (ATS) and Aeronautical Operational Control (AOC) communications functional requirements and desirable features, (3) studying present system improvements, (4) selecting a future system candidate to pursue towards implementation, and (5) developing recommendations resulting from this study. Seven candidate future system alternatives were evaluated against future system requirements and desirable features and as a result of this study, six recommendations to pursue present and future system improvements were adopted.

NOTE: The electronic DO-225 is a pdf file but it is not in searchable format.

DO-224C, Signal-in-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications Including Compatibility with Digital Voice Techniques

Issued 12-13-11 ♦ Prepared by SC-214

This document provides the final planned version of the VDL Mode 2 and Mode 3 MASPS consolidated from previous documents. It is synchronized with ICAO SARPS and Technical Manuals for VDL Modes 2 and 3. Future updates to DO-281A, *MOPS for VDL Mode 2*, and DO-271C, *MOPS for VDL Mode 3*, will be synchronized with DO-224C.

DO-224C provides VDL Mode 2 refinements for operating/system parameters, technical descriptions and other considerations to be taken into account when determining compliance. The key improvements include separating frequency selection list (FSL) into airborne-FSL and ground-FSL, refining FSL-based handoff procedures, introducing "ground" bit usage in the Aviation VHF Link Control (AVLC) specific options parameter, refining frequency recovery and missing parameter handling. No refinements were made to VDL Mode 3.

DO-224B, Signal-in-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications Including Compatibility with Digital Voice Techniques

Issued 8-03-05 ♦ Prepared by SC-172

This final planned version of the VDL Mode 2 and Mode 3 MASPS consolidates previous documents. It is synchronized with ICAO SARPS and Technical Manuals for VDL Modes 2 and 3. Future updates to DO-281A, MOPS for VDL Mode 2, and DO-271C, MOPS for VDL Mode 3, will be synchronized with DO-224B. Specific changes include:

- VDL Mode 2 – minor updates
- VDL Mode 3 – aircraft address space is increased, the aircraft cross-link buss requirement is removed, ground system requirements are added to accommodate changes, and clarifying definitions are added.

DO-223, Minimum Operational Performance Standards for Context Management (CM) Equipment

Issued 7-13-94 ♦ Prepared by SC-169

Identifies aircraft equipment requirements to support the forwarding of addresses, such as “log-on”, between aircraft systems and ground systems. Context management will support Air Traffic Service communications, such as ATC Two-Way Data Link communications, Automatic Dependent Surveillance, Flight Information Services, as well as satellite voice and Aeronautical Operational Communications. Broadcast communications will probably not use context management.

DO-222, Guidelines on AMS(R)S Near-Term Voice Implementation and Utilization

Issued 4-29-94 ♦ Prepared by SC-165 Errata Issued 6-21-94

Contains operational guidelines and recommendations for the implementation and utilization of Aeronautical Mobile Satellite (Route) Services, voice communication functions in the near-term (circa 1993-1996) air traffic environment. It presents a system-level view of how satellite voice services can be implemented and used in the Air Traffic Services (ATS) and Aeronautical Operational Control (AOC) environments inclusive of aircraft installation requirements, ground infrastructure requirements, and available AMS(R)S services. This document defines the functions and performance needed to facilitate the development, implementation, certification, and operational use of satellite voice in an environment where satellite voice communication is not yet a required capability for air navigation. It uses as its basis the existing standards for satellite avionics and ground equipment. It should be useful to designers, manufacturers, installers, and operators of equipment used in AMSS voice service.

DO-221, Guidance and Recommended Requirements for Airport Surface Movement Sensors

Issued 4-29-94 ♦ Prepared by SC-178

Provides recommended standards for both sensor and system characteristics. The primary purpose for these sensors is to operate stop bars located on taxiways which provide entrance to low visibility runways. The sensors may also be used for other low visibility functions such as taxiway light sequencing, runway

exiting notification, and presence detection. This document provides guidance to airport system designers, manufacturers, installers, and users.

DO-220, Minimum Operational Performance Standards (MOPS) for Airborne Weather Radar with Forward-Looking Windshear Detection Capability

Issued 9-21-93 ♦ Prepared by SC-173 ♦ Change 1 issued 6-23-95

Incorporates new radar technology and serves as a standard for both air carrier and general aviation aircraft. It considers those requirements and technologies pertinent to general aviation, where limitations on space and/or weight apply. Compliance with these standards by manufacturers, installers, and users is recommended as one means of assuring the equipment will perform its intended function under conditions normally encountered in routine aeronautical operations.

FAA Technical Standard Order (TSO) – C117a references this document.

NOTE: The electronic DO-220 is a pdf file but it is not in searchable format.

Change 1 to DO-220

Issued 6-23-95

Change 1 adds new data contained within the NASA Windshear Simulation Data Sets, standard deviation of rain velocities calculated by AWDRS, and expanded explanatory notes to the data sets.

NOTE: The electronic DO-220, Change 1 is a pdf file but it is not in searchable format.

DO-219, Minimum Operational Performance Standards for ATC Two-Way Data Link Communications

Issued 8-27-93 ♦ Prepared by SC-169

Presents the requirements for Two-Way Data Link Communication (TWDL) services. TWDL services include predeparture clearance, clearances, reports, and requests. In addition to testing standards, the document includes functional, performance, interface, and equipment standards for "ATCCOMM." The term "ATCCOMM" as used in this document includes all components and units, including software, necessary for the aircraft equipment to support TWDL services with an ATC ground system peer via the Aeronautical Telecommunications Network (ATN).

DO-218B, Minimum Operational Performance Standards for the Mode S Airborne Data Link Processor

NOTE: DO-218B was removed as an active document as of July 1, 2009. The RTCA Program Management Committee recommended at their October 2, 2008 meeting that DO-218B be retired. The requirements that remain relevant, Appendices B and C, are retained in DO-181D.

DO-217, Minimum Aviation System Performance Standards DGNSS Instrument Approach System: Special Category 1 (SCAT-1) Revised to Include Change 1

Issued 8-27-93 ♦ Prepared by SC-159 ♦ Change 1, Issued 7-13-94

Reprinted in April 1995 to include Change 1

Provides the guidelines for a system to support differential GNSS (DGNSS) special instrument approaches. Requested by the FAA and consistent with the recommendations of the RTCA GNSS Task Force Report, the recommended standards in this document are specifically oriented toward supporting Special Category I precision approaches - specially authorized approaches made to MLS/ILS Category I minima with DGNSS used to provide navigation guidance. These approaches are expected to be authorized for specific aircraft approaching specific airports; thereby, providing the civil aviation community the basis for developing precision approaches using satellite technology.

Note: For those who currently possess a copy of DO-217 printed before April 1994, the following change may be purchased separately. The prices above reflect the inclusion of Change 1 into the body of the document.

Change 1 to DO-217, Minimum Aviation System Performance Standards DGNSS Instrument Approach System: Special Category 1 (SCAT-1)

Issued 8-13-94

Replaces the original Appendix F with one method of implementing the differential message format described in Appendix A, using VHF data link. The data link characterized is more robust and may provide growth potential for Category II/III precision approaches. This change is included in the April 1995 printing of DO-217.

NOTE: The electronic DO-217, Change 1 is a pdf file but it is not in searchable format.

Change 2 to DO-217, Minimum Aviation System Performance Standards DGNSS Instrument Approach System: Special Category 1 (SCAT-1)

Issued 11-15-96

This document recognizes the technology developments since the original issuance of DO-217 in August 1993. While RTCA/DO-217 including this change does not guarantee interoperability with a future GNSS CAT-I system, this change does address interoperability among SCAT I systems and provides a means to improve interoperability.

DO-216, Minimum General Specification for Ground-Based Electronic Equipment

Issued 7-14-93 ♦ Prepared by SC-175

Contains general specification for the procurement of ground-based electronic equipment by the Federal Aviation Administration. This material incorporates industry standards to facilitate use of Commercial Off The Shelf/Non-Development Items (COTS/NDI). This updated Version Downloadable of FAA Standard G-2100e also contains revised quality assurance provisions and is expected to be used as a key element in FAA future procurement.

DO-215A, Guidance on Aeronautical Mobile Satellite Service (AMSS) End-to-End System Performance

Issued 2-21-95 ♦ Prepared by SC-165 *Supersedes DO-215*

This document contains guidance for the system and service requirements performance, availability, and integrity for an End-to-End System providing Aeronautical Mobile Satellite Services (AMSS) to end users. The primary elements of the End-to-End System are also considered individually. The material should be useful to users, designers, manufacturers, and installers of the AMSS system and its elements.

NOTE: The electronic DO-215A is a pdf file but it is not in searchable format.

Change 1 to DO-215A

Issued 9-28-98

DO-215 originally published May 1993, was updated as DO-215A in February 1995. It offers the only currently published guidance for performance, integrity, and availability for data and voice over end-to-end links and their individual subsystems. New AMSS development activities in industry and government require criteria for establishing their feasibility and acceptability. DO-215A is in widespread use in those regards, and will fill those needs until a new AMSS MASPS is available. This change provides needed clarifications and corrections required for applying DO-215A methodologies to an evolved geo-stationary satellite communications system.

NOTE: The electronic DO-215A, Change 1 is a pdf file but it is not in searchable format.

DO-214, Audio Systems Characteristics and Minimum Operational Performance Standards for Aircraft Audio Systems and Equipment

Issued 3-2-93 ♦ Prepared by SC-164 *Supersedes DO-170*

This document defines audio systems response characteristics that affect the intelligibility of air-ground speech communication including review and evaluation of design measures giving promise of audio response characteristics. It recommends a means for improvement by users and designers of communications equipment. In addition to postulating goals and applications, it recommends minimum standards and test procedures for aircraft microphones (except carbon), aircraft headsets, handsets and loudspeakers, and aircraft audio systems.

DO-213, Minimum Operational Performance Standards for Nose-Mounted Radomes

Issued 1-14-93 ♦ Prepared by SC-173 ♦ Change 1 issued 6-23-95

Contains minimum operational performance standards for radomes for use with airborne doppler weather radars having forward-looking windshear detection capability and for use with airborne weather radars. These standards specify radome characteristics for designers, manufacturers, installers, and users of the equipment.

Change 1 to DO-213

Issued 6-23-95

Change 1 adds definitions for "Transmission Efficiency, Minimum," and "Transmission Efficiency, Average." The change also includes new material in Section 2.1.5, Maintenance Performance Rules and Section 2.1.6, Documentation and Identification; redefines "Side Lobe Upper Limits."

DO-212, Minimum Operational Performance Standards for Airborne Automatic Dependent Surveillance (ADS) Equipment

Issued 10-26-92 ♦ Prepared by SC-170

Addresses application of the ADS function and recommends standards for Automatic Dependent Surveillance (ADS) hardware. The document provides assumptions and information needed to understand the rationale for equipment requirements and characteristics. The standard defines required performance under standard operating conditions and stressed physical environment conditions.

DO-211, User Requirements for Future Airport and Terminal Area Communications, Navigation, and Surveillance

Issued 10-26-92 ♦ Prepared by SC-166

Presents a comprehensive statement of user requirements for the next quarter century (to the year 2015). It examines the potential capabilities of developmental and proposed communications, navigation, and surveillance (CNS) systems and Air Traffic Management as they could apply in terminal areas and at airports. The report examines current US plans for the terminal area airspace and airports in light of the limitation of the existing air traffic management system, and addresses emerging technologies that could help meet future needs. A number of conclusions and recommendations are offered for meeting user requirements and assuring a smooth transition.

DO-210D, Minimum Operational Performance Standards (MOPS) for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) Avionics

Issued 4-19-00 ♦ Prepared by SC-165

This standard addresses Aeronautical Mobile Satellite Services operating in the frequency bands 1.5 and 1.6 GHz. DO-210D updates DO-210C and contains new material regarding Inmarsat Aero H+/I services, intermediate-gain antenna, channel descriptions, related physical layer and management characteristics, and the 4.8 kbps Advanced Multiband Excitation (AMBE) voice codec. New verification procedures related to priority, precedence, and preemption are also included. Revisions relate to the Aero H+/I services, clarifications of requirements, and a review of verification procedures with respect to the Inmarsat System Definition Manual as well as ICAO Standards and Recommended Practices. The document includes equipment performance requirements, recommended bench tests and other performance verification procedures, and installed equipment tests and operational performance characteristics. DO-210D supersedes DO-210C and should be useful to designers, manufacturers, installers, and users of the AMSS system and equipment.

Change 1 to DO-210D

Issued 12-14-00 ♦ Prepared by SC-165

Change 1 addresses Electromagnetic Compatibility (EMC) issues that required resolution to ease the process of issuing a FAA Technical Standard Order (TSO) implementing DO-210 D.

Change 2 to DO-210D

Issued 11-28-01 ♦ Prepared by SC-165

Change 2 updates receiver interference susceptibility characteristics to include wide-band, as well as narrow-band, interfering signals. The Change also provides a complete set of verification procedures for all requirements, whether contained within DO-210D itself or invoked by external references.

Change 3 to DO-210D

Issued 9-19-06 ♦ Prepared by SC-208

Change 3 is intended to harmonize DO-210D and ARINC 741. The scope of Change 3 is limited to a) changes involving output amplifier intermodulation effects and tests related to such effects, and, b) changes involving the performance characteristics such as harmonics, spurious, and noise emissions that depend on the shape of the diplexer filter. The goal of these changes is to achieve the maximum commonality possible with ARINC 741, as approved in October 2005.

DO-209, Minimum Operational Performance Standards for Devices that Prevent Blocked Channels Used in Two-Way Radio Communications Due to Simultaneous Transmissions

Issued 4-23-92 ♦ Prepared by SC-163 Errata Issued 7-1-92

Sets forth goals and applications and recommends standards and procedures for systems that provide a means for reducing simultaneous transmissions that adversely affect two-way voice radio communications. This specification is applicable to ground-based, ground-mobile, and airborne two-way UHF and VHF voice radio communications equipment used for intercommunication and control of air traffic.

DO-208, Minimum Operational Performance Standards for Airborne Supplemental Navigation Equipment Using Global Positioning System (GPS)

Issued 7-12-91 ♦ Prepared by SC-159 Change 1 Issued 9-21-93

Sets forth the operational goals and applications, and recommends standards and test procedures for airborne supplementary navigation equipment (2D and 3D) using Global Positioning System (GPS) inputs in the en route, terminal, and approach modes or any combination thereof. A supplemental navigation system may be used as a primary navigation reference in an aircraft when an approved and operational sole means

navigation system is available. The report defines performance, functions, and features for 2D airborne equipment, which performs only lateral guidance, and 3D equipment, which performs both lateral and vertical guidance.

FAA Technical Standard Order (TSO) – C129a references this document.

Change 1 to DO-208

Issued 9-21-93 ♦ Errata Issued 3-16-95

Change 1 provides editorial changes to subparagraphs on Marginal Geometry Tests, Good Geometry Tests, and Dynamic Tests. Appendix B has been rewritten to provide corrected computations to calculate geodesics on the WGS-84 ellipsoid. A new Appendix K provides simulation of a second-order Gauss-Markov process.

DO-207, Minimum Operational Performance Standards for Devices that Prevent Blocked Channels Used in Two-Way Radio Communications Due to Unintentional Transmissions

Issued 1-25-91 ♦ Prepared by SC-163

Recommends standards and procedures for systems that reduce unintentional transmissions and prevent blocked frequencies that adversely affect two-way voice radio communications. This specification is applicable to ground-based, ground-mobile, and airborne two-way VHF and UHF radio voice communications equipment used for control of air traffic.

FAA Technical Standard Order (TSO) – C128 references this document.

DO-206, Minimum Aviation System Performance Standards for Radiodetermination Satellite Service (RDSS)

Issued 2-12-90 ♦ Prepared by SC-161

Sets forth a system description for the Radiodetermination Satellite Service (RDSS). Provides a description of non-safety-related functional capabilities that may be provided by and RDSS system implemented for civil aviation users.

DO-204A, Minimum Operational Performance Standards for 406 MHz Emergency Locator Transmitters (ELT)

Issued 12-06-07 ♦ Prepared by SC-204

DO-204A incorporates numerous changes to clarify the meaning and intent of the requirements. Text revisions and explanatory notes have been added. COSPAS/SARSAT testing criteria and DO-183 tests have been incorporated into the specification. G-Switch characteristics have been replaced. The document is harmonized with EUROCAE ED-62. Includes test conditions and procedures for installed equipment performance for emergency locator transmitters (ELTs) utilizing the 406.0 to 406.1 MHz band and operating in the COSPAS-SARSAT system.

DO-202, Report of Special Committee 159 on Minimum Aviation System Performance Standards (MASPS) for Global Positioning System (GPS)

Issued 11-28-88 ♦ Prepared by SC-159

This document reports on the Global Positioning System (GPS) and related parameters, for operation and use of a GPS-based navigation system by civil users of the airspace. The report considers the use of GPS both as a supplemental and as a sole means system for en route, terminal area, and non-precision approach operations. Integrity monitoring requirements are presented with a discussion of suitable methods for determining GPS integrity and broadcasting this information to civil aeronautical users. Coordinated with EUROCAE.

DO-201A, Standards for Aeronautical Information

Issued 4-19-00 ♦ Prepared by SC-181

This document provides for the improved operational effectiveness of airborne navigation systems that use stored databases. It presents a collection of disciplines necessary to provide assurance that aeronautical information used by the aviation industry meets the high quality and integrity for safe flight. The information in the document has been compiled for the purpose of stating aeronautical information requirements of the aviation industry with emphasis on RNAV operations in RNP airspace. There is focus on the importance of quality aeronautical information and the fact that the evolution of computer navigation technology requires a greater dependency on the accuracy, reliability, integrity, and timely availability of navigation reference data than ever before. This is a joint RTCA/EUROCAE document.

DO-200A, Standards for Processing Aeronautical Data

Issued 9-28-98 ♦ Prepared by SC-181

This document provides the minimum standards for the processing of aeronautical data that are used for navigation, flight planning, terrain awareness, flight simulators and for other purposes. The standards cover data processing quality assurance and quality management requirements. They provide the user the necessary assurance that delivered aeronautical databases meet the appropriate quality requirements for the data. DO-200A supports new technology and the expanding scope of aeronautical data by providing a more structured approach to the extremely important issues of data quality and data integrity management.

DO-199, Potential Interference to Aircraft Electronic Equipment from Devices Carried Aboard

Issued 9-16-88 ♦ Prepared by SC-156 Supersedes DO-119

Reports on the investigation to determine potential interference effects to aircraft electronic systems due to emissions from self-powered portable electronic and electrical devices operated aboard aircraft. Recommends regulatory actions relating to operation and identification of passenger-operated devices to assure control of possible sources of interference and recommends standardized procedures for reporting suspected interference. Volume I is the basic report and includes background, data collection, data analysis, conclusions, and recommendations. Volume II provides amplification or background material for some of the summary data included in the basic report.

DO-197A, Minimum Operational Performance Standards for an Active Traffic Alert and Collision Avoidance System I (Active TCAS I)

Issued 9-12-94 ♦ Prepared by SC-147 Errata 11-22-94 Supersedes DO-197

Pertains to aircraft with up to 30 passenger seats as prescribed by the Federal Aviation Administration (FAA) TCAS rules. Active TCAS I is an air-to-air interrogation device that provides traffic advice to the flight crew by alerting them to the presence of a nearby transponder- equipped aircraft and advising the crew where to look for that aircraft so it can be visually acquired and avoided if necessary. Unlike TCAS II and TCAS III, Active TCAS I does not provide conflict resolution advisories.

FAA Technical Standard Order (TSO) – C118 references this document.

NOTE: The electronic DO-197A is a pdf file but it is not in searchable format.

Change 1, DO-197A, Minimum Operational Performance Standards for an Active Traffic Alert and Collision Avoidance System I (Active TCAS I)

Issued 7-29-97 ♦ Prepared by SC-147

Analysis of data recorded from TCAS I equipped aircraft indicated that the TCAS I interference limiting algorithms were causing acquisition of intruders at low ranges and that the tracks were often intermittent. This change enhances the minimum TCAS I surveillance performance by refining the assumptions used in development of the original interference limiting algorithms. These modifications provide a significant operational benefit to the operators of TCAS I equipment, without increasing the total amount of interrogation power transmitted by TCAS I equipped aircraft. Power is reallocated to more closely reflect the actual operating environment.

NOTE: The electronic DO-197A, Change 1 is a pdf file but it is not in searchable format.

DO-196, Minimum Operational Performance Standards for Airborne VOR Receiving Equipment Operating within the Radio Frequency Range of 108- 117.95 Megahertz

Issued 11-17-86 ♦ Prepared by SC-153 *Supersedes DO-149 and DO-153A*

Sets forth operational goals and applications, and recommends standards and test procedures for airborne VHF Omirange (VOR) receiving equipment. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C40c references this document.

DO-195, Minimum Operational Performance Standards for Airborne ILS Localizer Receiving Equipment Operating within the Radio Frequency Range of 108- 112 Megahertz

Issued 11-17-86 ♦ Prepared by SC-153 *Supersedes DO-131A*

Postulates operational goals and applications, and recommends standards and test procedures for airborne ILS localizer receiving equipment. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C36e references this document.

DO-194, Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Loran-C Inputs

Issued 11-17-86 ♦ Prepared by SC-137 *Supersedes DO-159*

Sets forth operational goals and applications, and recommends standards and test procedures for airborne area navigation equipment (2D and 3D) using Loran-C inputs. Includes test conditions and procedures for installed Loran-C receiving equipment performance and operational characteristics with test procedures. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C60b references this document.

DO-193, User Requirements for Future Communications, Navigation, and Surveillance Systems, Including Space Technology Applications

Issued 9-19-86 ♦ Prepared by SC-155

Reports on the operational requirements for communications, navigation, and surveillance services likely to be required in the 2010 time frame as foreseen by airspace users. Investigates new concepts and technology, including the use of satellites, which may have applications in a future airspace management system. Institutional, economic, and transitional issues are assessed from United States and worldwide perspectives.

DO-192, Minimum Operational Performance Standards for Airborne ILS Glide Slope Receiving Equipment Operating within the Radio Frequency Range of 328.6-335.4 Megahertz

Issued 7-18-86 ♦ Prepared by SC-153 *Supersedes DO-132A*

Postulates operational goals and applications, and recommends standards and test procedures for airborne ILS glide slope receiving equipment. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C34e references this document.

NOTE: The electronic DO-192 is a pdf file but it is not in searchable format.

DO-191, Minimum Operational Performance Standards for Airborne Thunderstorm Detection Equipment

Issued 5-16-86 ♦ Prepared by SC-154

Defines the capabilities and limitations of the various methods of airborne thunderstorm detection and determines the correlation between the detection of electrical activity, precipitation, and any other phenomena that is measured or detected and likely to be hazardous to flight operations.

FAA Technical Standard Order (TSO) – C110a references this document.

DO-190, Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Omega/ VLF Inputs

Issued 5-16-86 ♦ Prepared by SC-137 *Supersedes DO-140*

Postulates operational goals and applications, and recommends standards and test procedures for airborne area navigation equipment (2D and 3D) using Omega/VLF signals. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C120 references this document.

DO-189, Minimum Operational Performance Standards for Airborne Distance Measuring Equipment (DME) Operating within the Radio Frequency Range of 960-1215 MHz

Issued 9-20-85 ♦ Prepared by SC-149 *Supersedes DO-141 and DO-151A*

Postulates operational goals and applications, and recommends standards and test procedures for airborne distance measuring equipment (DME). It updates the former DME operational characteristics and performance standards for airborne equipment that operates with conventional DME (DME/N) ground facilities and establishes standards for airborne equipment which will operate with both DME/N and precision DME (DME/P) ground facilities. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C66c references this document.

NOTE: The electronic DO-189 is a pdf file but it is not in searchable format.

DO-188, Emergency Locator Transmitter (ELT) Batteries Guidance and Recommendations

Issued 11-13-84 ♦ Prepared by SC-136 Battery Subcommittee

Provides guidelines and recommendations concerning ELT battery construction, storage, and methodology for qualifying replacement batteries. An appendix concerning considerations for design and manufacture of batteries for ELTs is included.

FAA Technical Standard Order (TSO) – C91a references this document.

NOTE: The electronic DO-188 is a pdf file but it is not in searchable format.

DO-187, Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Multi-Sensor Inputs

Issued 11-13-84 ♦ Prepared by SC-137

Postulates operational goals and applications, and recommends standards and test procedures for airborne area navigation equipment (2D and 3D) using multi-sensor inputs. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C115b references this document.

NOTE: The electronic DO-187 is a pdf file but it is not in searchable format.

DO-186B, Minimum Operational Performance Standards for Airborne Radio Communications Equipment.

Issued 11-08-05 ♦ Prepared by SC-172

DO-186B recommends standards and test procedures for airborne VHF communication transmitters and includes test conditions and procedures for installed equipment. This update incorporates Changes 1 and 2 of DO-186A and establishes performance standards for equipment designed for offset carrier operations, i.e., equipment classes A and C. An exclusion band to enable a successful and appropriate Radio Frequency Susceptibility Test (DO-160 Section 20.0) is defined. The document also includes class E receivers which are able to be used in an 8.33 kHz channel separation environment.

This document supersedes DO-186A.

DO-185B, Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance System II (TCAS II)

Issued 06-19-08 ♦ Prepared by SC-147 Errata Issued 7-14-08

This document provides Version Downloadable 7.1 of the TCAS II logic and sets forth the minimum operational performance standards for TCAS II equipment. The main changes are the enhancement of the Resolution Advisory Sense reversal function, and the replacement of "Adjust Vertical Speed, Adjust" Resolution Advisories by "Level Off, Level Off" advisories.

Volume I contains the rationale for equipment characteristics, minimum performance standards, bench test procedures, and installed equipment performance. Volume II presents the required collision avoidance algorithms in a state chart formulation with informational commentary text. Attachment A provides both high and low level pseudocode representations of the collision avoidance algorithms. The standards and performance requirements in the document ensure that TCAS II is fully interoperable with other elements and equipment of the National Airspace System.

Document available only as an electronic download.

An Errata is provided with purchase of the document.

Change 1 to DO-185B

Issued 07-01-09

Change 1 to DO-185B specifies changes to the TCAS II requirements.

Section 1 provides the text changes to Volume I. The change affects the "middle" aircraft of a multi-threat situation, and removes the feature that would have required a green arc to accompany that aircraft's RA. Section 2 provides changes to the Pseudocode in Volume II, Attachment A. It clarifies the coding of certain bits reporting Hybrid Surveillance capability within the Data Link Capability Report, to be consistent with a change made to DO-300.

Section 3 provides changes to the state charts in Volume II.

Section 4 provides changes to the TSIM data set that is specified for the verification of the TCAS implementation. This material is not part of DO-185B, but is accompanying material distributed by FAA, not by RTCA.

DO-185A, Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance System II (TCAS II) Airborne Equipment

Issued 12-16-97 ♦ Prepared by SC-147

This document provides Version Downloadable 7.0 of the TCAS II logic and sets forth the minimum operational performance standards for TCAS II equipment. Among the changes, this Version Downloadable improves the system's surveillance performance and modifies the interference limiting algorithms to account for aircraft densities near airports as well as to permit longer range surveillance. Improvements have been made in tracking Mode S targets and in permitting TCAS to receive the extended Mode S squitter. To preclude repeatedly issuing Traffic Advisories (TA) against the same target, changes have been made to ensure that a target's TA status is maintained in slow closure situations by using more stringent drop criteria. Other changes include credibility checks to ensure integrity of the data being supplied to the collision avoidance logic and additional, more thorough tests for installed equipment.

Volume I contains the rationale for equipment characteristics, minimum performance standards, bench test procedures, and installed equipment performance. Volume II presents the required collision avoidance algorithms in a state chart formulation with informational commentary text. Attachment A provides both high and low level pseudocode representations of the collision avoidance algorithms. The standards and performance requirements in the document ensure that TCAS II is fully interoperable with other elements and equipment of the National Airspace System.

Note:

TSO-C119b -Requests for a Copy of the CD-ROM Titled "TSO C119B Changes to DO-185A, Approved by SC-147 RWG* dated December 4, 1998 should be directed to: Federal Aviation Administration, Headquarters, Technical Programs & Continued Airworthiness Branch (AIR-120), (P) 202-267-9578.

DO-184, Traffic Alert and Collision Avoidance System (TCAS) I Functional Guidelines

Issued 5-13-83 ♦ Prepared by SC-147

Sets forth minimum requirements, and describes the various elements of TCAS I. Discusses both passive and active TCAS I applications. Provides the minimum performance requirements for electromagnetic compatibility for an active TCAS I and test procedures for both active and passive systems. Appendix A addresses cross-link advisories.

NOTE: The electronic DO-184 is a pdf file but it is not in searchable format.

DO-183, Minimum Operational Performance Standards for Emergency Locator Transmitters-Automatic Fixed-ELT (AF), Automatic Portable-ELT (AP), Automatic Deployable-ELT (AD), Survival-ELT (S) Operating on 121.5 and 243.0 Megahertz

Issued 5-13-83 ♦ Prepared by SC-136 *Supersedes DO-145, DO-146 and DO-168* ♦ Change 1 issued 1-17-86

Postulates operational goals and applications, and recommends standards and test procedures for emergency locator transmitters. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures.

FAA Technical Standard Order (TSO) – C91a references this document.

NOTE: The electronic DO-183 is a pdf file but it is not in searchable format.

DO-182, Emergency Locator Transmitter (ELT) Equipment Installation and Performance

Issued 11-17-82 ♦ Prepared by SC-136

Provides analyses of ELT performance in regard to false alarms and activations in crash environments; provides criteria and guidelines for placement and installation of ELTs in aircraft; reports on ELT system performance in a variety of typical installations; and provides specific recommendations on all of the above standards.

NOTE: The electronic DO-182 is a pdf file but it is not in searchable format.

DO-181E, Minimum Operational Performance Standards for Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment

Issued 03-17-11 ♦ Prepared by SC-209 *Supersedes DO-181D*

This document supersedes DO-181D published in 2008. It provides standards for Mode S airborne equipment (Mode S implies a combined ATCRBS/Mode S capability). Incorporated within these standards are system characteristics that will be helpful to users of the system as well as designers, manufacturers and installers. The document considers an equipment configuration consisting of transponder, control panel, antenna and interconnecting cables. Level 1 through Level 5 transponders are addressed and test procedures are provided as well as information for optional features. It reflects issues identified and discussed by the ICAO Aeronautical Surveillance Panel Technical Subgroup and reported by Civil Aviation Authorities since the publication of DO-181D in October 2008. The document is a coordinated effort with EUROCAE WG-49 and includes changes resulting from DO-260B, ADS-B MOPS, published in December 2009. Appendix E details the Changes from DO-181D to DO-181E.

DO-180A, Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using a Single Collocated VOR/DME Sensor Input

Issued 5-24-90 ♦ Prepared by SC-137 *Supersedes DO-180*

Postulates operational goals and applications and recommends standards and test procedures for airborne area navigation equipment (2D and 3D) using sensor inputs from a single collocated VOR/DME station. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures. Coordinated with EUROCAE.

NOTE: The electronic DO-180A is a pdf file but it is not in searchable format.

DO-179, Minimum Operational Performance Standards for Automatic Direction Finding (ADF) Equipment

Issued 5-13-82 ♦ Prepared by SC-146 *Supersedes DO-137 and DO-142*

Postulates operational goals and applications and recommends standards and test procedures for airborne automatic direction finding equipment. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures. Coordinated with EUROCAE.

Coordinated with EUROCAE FAA Technical Standard Order (TSO) – C41d references this document.

NOTE: The electronic DO-179 is a pdf file but it is not in searchable format.

DO-178C, Software Considerations in Airborne Systems and Equipment Certification

Issued 12-13-11 ♦ Prepared by SC-205

This document provides recommendations for the production of software for airborne systems and equipment that performs its intended function with a level of confidence in safety that complies with airworthiness requirements. Compliance with the objectives of DO-178C is the primary means of obtaining approval of software used in civil aviation products.

DO-178B, Software Considerations in Airborne Systems and Equipment Certification

Issued 12-1-92 ♦ Prepared by SC-167 Advisory Circular ♦ *Supersedes DO-178A* ♦ Errata Issued 3-26-99

Provides guidance for determining, in a consistent manner and with an acceptable level of confidence, that the software aspects of airborne systems and equipment comply with airworthiness requirements.

DO-177, Minimum Operational Performance Standards for Microwave Landing System (MLS) Airborne Receiving Equipment

Issued 7-17-81 ♦ Change 1 ♦ Change 2 issued 9-19-86 ♦ Prepared by SC-139

Postulates operational goals and applications, and recommends standards and test procedures for use of Microwave Landing System (MLS) airborne receiving equipment. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C104 references this document.

DO-176, FM Broadcast Interference Related to Airborne ILS, VOR and VHF Communications

Issued 11-18-81 ♦ Prepared by SC-141

Reviews the various aspects of the problem of commercial FM broadcast stations contributing to the interference of airborne systems. Recommends improved intra-governmental coordination procedures and recommends steps to limit growth of the problem, to reduce the problem with installed receivers, and to minimize the problem with new receivers or installations.

DO-175, Minimum Operational Performance Standards for Ground-Based Automated Weather Observation Equipment

Issued 1-23-81 ♦ Prepared by SC-143

Postulates operational goals and applications, recommends standards and test procedures for ground-based automated weather observation equipment. Provides system characteristics for users, designers, manufacturers, and installers of such equipment of interest to various users, including airfield operations, meteorological services, aviation administrations, airplane and helicopter operators, etc. Includes test conditions and procedures for installed system performance and operational characteristics with test procedures.

DO-174, Minimum Operational Performance Standards for Optional Equipment which Displays Non-Radar-Derived Data on Weather and Ground Mapping Radar Indicators

Issued 3-20-81 ♦ Prepared by SC-133

Postulates operational goals and applications, and recommends standards and test procedures for use of weather and ground mapping radar indicators for display of non-radar graphic and/or alphanumeric data. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures.

FAA Technical Standard Order (TSO) – C105 references this document.

NOTE: The electronic DO-174 is a pdf file but it is not in searchable format.

DO-173, Minimum Operational Performance Standards for Airborne Weather and Ground Mapping Pulsed Radars

Issued 11-19-80 ♦ Corrigendum/Errata/Change 1 ♦ *Supersedes DO-134* ♦ Prepared by SC-133

Postulates operational goals and applications; recommends standards and test procedures for airborne weather and ground mapping pulsed radars. Takes into account new radar technology and is applicable to both large aircraft and general aviation aircraft systems. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures.

FAA Technical Standard Order (TSO) – C63c references this document.

NOTE: The electronic DO-173 is a pdf file but it is not in searchable format.

DO-172, Minimum Operational Performance Standards for Airborne Radar Approach and Beacon Systems for Helicopters

Issued 11-19-80 ♦ Change 1 ♦ Prepared by SC-133

Postulates operational goals and applications, and recommends standards and test procedures for Airborne Radar Approach (ARA) systems for helicopters, particularly when operating under IFR, IMC conditions, or at night, including standards for the ground-based radar beacon. Includes test conditions and procedures for installed equipment performance and operational characteristics with test procedures.

FAA Technical Standard Order (TSO) – C102 references this document.

NOTE: The electronic DO-172 is a pdf file but it is not in searchable format.

DO-171, Recommendations on Policies and Procedures for Off-the-Shelf Electronic Test Equipment Acquisition and Support

Issued 1-25-80 ♦ Prepared by SC-134

Provides rationale and recommendations for various conditions and procedures that could provide major benefits to those responsible for drafting legislation, policies, procedures, and guidelines for the acquisition and support of electronic test equipment.

DO-169, VHF Air-Ground Communication Technology and Spectrum Utilization

Issued 7-20-79 ♦ Prepared by SC-140

Reports on VHF (118-136 MHz) spectrum utilization including the investigation of modulation techniques and reduced channel separation. Identifies problem areas and recommends, among other things, use of reduced channel spacing on a selective basis.

DO-167, Airborne Electronics and Electrical Equipment Reliability

Issued 9-16-77 ♦ Prepared by SC-130

Provides a tutorial discussion on reliability related to aircraft accidents. Discusses airborne electronic equipment failures and means of reducing failures, and presents arguments against use of MTBF and MTBR as reliability measures for use in RTCA MPSs and FAA TSOs.

NOTE: The electronic DO-167 is a pdf file but it is not in searchable format.

DO-166, Microwave Landing System (MLS) Implementation

Issued 7-15-77 ♦ Prepared by SC-125

Reports on a study of develop user recommendations for a national implementation policy for MLS as the primary landing system in service by the year 2000. Volume I provides recommendations on how best to transition from ILS to MLS; recommends implementation strategy and a national implementation policy, which are summarized in a findings and recommendations chapter. Volume II includes six appendices, which are the reports of working groups in special categories such as Benefits, Airborne Systems Operational Capabilities, and Civil System Costs.

NOTE: The electronic DO-166 V1 and V2 are pdf files but they are not in searchable format.

DO-165, Initial Report on Civil Aviation Frequency Spectrum Requirements-1980-2000

Issued 5-27-76 ♦ Prepared by SC-129

Provides a comprehensive report on civil aviation's frequency requirements. Appendices recommend revisions to the ITU Table of Allocations and the footnotes thereto. Provides justification for stated operational requirements; provides an aviation forecast.

DO-164A, Minimum Performance Standards-Airborne Omega Receiving Equipment

Issued 9-21-79 ♦ Superseded DO-164 ♦ Prepared by SC-138

Recommends standards and test procedures for airborne Omega Navigation Receivers, Systems Sensors, and Navigation Systems. Also included are operational characteristics. Appendices include conditions for testing, detailed test procedures, and a description of Omega Error Mechanisms.

FAA Technical Standard Order (TSO) – C94a references this document.

DO-163, Minimum Performance Standards-Airborne HF Radio Communications Transmitting and Receiving Equipment Operating within the Radio-Frequency Range of 1.5 to 30 Megahertz

Issued 3-19-76 ♦ Errata ♦ *Supersedes DO-48A and DO-49A* ♦ Prepared by SC-131

Recommends standards and test procedures for HF/SSB receivers and transmitters designed to operate in a 3 kHz channel environment. Also includes standards for the provision of AM equivalent mode of operation. Appendices include conditions for testing and detailed test procedures.

FAA Technical Standard Order (TSO) – C31d and C32d reference this document.

NOTE: The electronic DO-163 is a pdf file but it is not in searchable format.

DO-162, Report on Air-Ground Communications-Operational Considerations for 1980 and Beyond

Issued 10-17-75 ♦ Prepared by SC-120

Provides an analysis of air-ground communications requirements anticipated for the post-1980 time frame. Includes definitions of US aviation system and future trends, requirements, systems concepts, and recommendations. This is a companion report to RTCA Paper No. 128-72/EC-671 issued 8-18-72, entitled Proposed US National Aviation Standard for the VHF A/G Communications System.

DO-161A, Minimum Performance Standards-Airborne Ground Proximity Warning Equipment

Issued 5-27-76 ♦ Prepared by SC-128 *Supersedes DO-161*

Recommends standards and test procedures for Ground Proximity Warning Equipment. This is a revision of DO-161 and includes changes (1 & 2) to that document and other improvements suggested by operating experience. Appendices include envelopes of conditions for warning, conditions for testing, and detailed test procedures.

FAA Technical Standard Order (TSO) – C92c references this document.

NOTE: The electronic DO-161A is a pdf file but it is not in searchable format.

DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment

Issued 12-08-10 ♦ Prepared by SC-135 *Supersedes DO-160F*

DO-160G provides standard procedures and environmental test criteria for testing airborne equipment for the entire spectrum of aircraft from light, general aviation aircraft and helicopters through the "jumbo jets" and SST categories of aircraft. The document includes 26 sections and three appendices. Examples of tests covered include vibration, power input, radio frequency susceptibility, lightning and electrostatic discharge. Coordinated with EUROCAE, RTCA/DO-160G and EUROCAE/ED-14G are identically worded.

DO-160G is recognized by the International Organization for Standardization (ISO) as de facto international standard ISO-7137.

DO-160F, Environmental Conditions and Test Procedures for Airborne Equipment

Issued 12-06-07 ♦ Prepared by SC-135 *Supersedes DO-160E*
♦ Errata 1 – 10-01-2009 ♦ Errata 2 – 06-02-2010

Standard procedures and environmental test criteria for testing airborne equipment for the entire spectrum of aircraft from light general aviation aircraft and helicopters through the "Jumbo Jets" and SST categories of aircraft. The document includes 26 Sections and three Appendices. Examples of tests covered include vibration, power input, radio frequency susceptibility, lightning and electrostatic discharge. Coordinated with EUROCAE, RTCA/DO-160F and EUROCAE/ED-14F are identically worded.

Revision F updates DO-160E issued in December 2004. Twenty-one of the twenty-six Sections have been revised. Major changes were made to Sections 8 – Vibration, 10 – Waterproofness, 16 – Power Input, 18 – Audio Frequency Conducted Susceptibility, 20 – RF Susceptibility and 21 – RF Emissions.

DO-160F is recognized by the International Organization for Standardization (ISO) as de facto international standard ISO-7137.

Two Errata are provided for this document.

DO-160E, Environmental Conditions and Test Procedures for Airborne Equipment

Issued 12-09-04 ♦ Errata Issued 6-20-06 ♦ Prepared by SC-135 *Supersedes DO-160D, Changes 1, 2 & 3*

Standard procedures and environmental test criteria for testing airborne equipment for the entire spectrum of aircraft from light general aviation aircraft and helicopters through the "Jumbo Jets" and SST categories of aircraft. The document includes 26 Sections and three Appendices. Examples of tests covered include vibration, power input, radio frequency susceptibility, lightning, and electrostatic discharge. Coordinated with EUROCAE, RTCA/DO-160E and EUROCAE/ED-14E are identically worded. This revision updates 22 Sections and adds one new Section – Fire, Flammability.

DO-160E is recognized by the International Organization for Standardization (ISO) as de facto international standard ISO-7137.

An Errata is provided for this document.

DO-160D, Environmental Conditions and Test Procedures for Airborne Equipment

Issued 7-29-97 ♦ Prepared by SC-135 *Supersedes DO-160C, Changes 1, 2 & 3*

Standard procedures and environmental test criteria for testing airborne equipment for the entire spectrum of aircraft from light general aviation aircraft and helicopters through the "Jumbo Jets" and SST categories of aircraft. The document includes 25 Sections and three Appendices. Examples of tests covered include vibration, power input, radio frequency susceptibility, lightning, and electrostatic discharge. Coordinated with EUROCAE, RTCA/DO-160D and EUROCAE/ED-14D are identically worded.

DO-160D is recognized by the International Organization for Standardization (ISO) as de facto international standard ISO-7137.

Change 1 to DO-160D

Issued 12-14-00

This change provides revised text for Section 8.0 – Vibration, Section 20.0 – Radio Frequency Susceptibility (Radiated and Conducted) and Appendix C – Change Coordinators.

Change 2 to DO-160D

Issued 6-12-01

This change provides revised text for Section 16.0 – Power Input, Section 18.0 – Audio Frequency Conducted Susceptibility – Power Inputs and Appendix A – Environment Test Identification.

Section 16 – Power Input

This section proposes test modifications to address the issues of harmonic distortion and variable frequency AC buses. The revised power test requirements include:

- Requirements for variable frequency systems similar to constant frequency systems.
- Added designation H for equipment that is tested for current harmonic emission.
- Deletion of Category E equipment.
- Introduction of requirements for normal frequency transients.
- Revision of existing tables and addition of new tables for current harmonic emissions.

Section 18 – Audio Frequency Conducted Susceptibility – Power Inputs

This section provides revisions to ensure harmony with the changes to Section 16 and consistency with the sweep speed testing procedures in Section 20.

Appendix A – Environment Test Identification

This Appendix provides revisions to ensure harmony with the changes to Sections 16 and 18

Change 3 to DO-160D

Issued 12-05-02

Change 3 revises Section 22 - *Lightning Induced Transient Susceptibility* and Appendix C – *Change Coordinators*. Section 22 provides two groups of tests for equipment qualification. The first is a damage tolerance test performed using pin injection and the second group evaluates the functional upset tolerance of equipment when transients are applied to interconnecting cable bundles. Change 3 revisions are provided in three areas: multiple stroke and multiple burst testing applications, clarification of the dielectric withstand voltage tests and clarification of the power line tests. The test requirement table has been revised and new

figures are provided for the multiple stroke application, multiple burst application and pin injection calibration setup. Appendix C updates the contact information for the Change Coordinators.

DO-160C, Environmental Conditions and Test Procedures for Airborne Equipment

Issued 12-04-89 ♦ Prepared by SC-135 *Supersedes DO-160B*

The document provides standard procedures and environment test criteria for testing airborne equipment. Numerous tests are covered including vibration, power input, and radio frequency susceptibility. This document was superseded by DO-160D, issued July 29, 1997.

The electronic version of DO-160C includes Changes 1, 2, and 3. The price for the hardcopy version of DO-160C also includes Changes 1, 2, and 3.

NOTE: The electronic DO-160C is a pdf file but it is not in a searchable format.

DO-160B, Environmental Conditions and Test Procedures for Airborne Equipment

Issued 7-20-84 ♦ Prepared by SC-135 *Supersedes DO-160A*

The document provides standard procedures and environment test criteria for testing airborne equipment. Numerous tests are covered including vibration, power input, and radio frequency susceptibility. This document was superseded by DO-160C, issued December 4, 1989.

The electronic version of DO-160B includes Change 1. The price for the hardcopy version of DO-160B also includes Change 1.

NOTE: The electronic DO-160B is a pdf file but it is not in a searchable format.

DO-160A, Environmental Conditions and Test Procedures for Airborne Equipment

Issued 01-25-80 ♦ Prepared by SC-135 *Supersedes DO-160*

The document provides standard procedures and environmental test criteria for testing airborne equipment. Numerous tests are covered including vibration, power input, and radio frequency susceptibility. This document was superseded by DO-160B, issued July 20, 1984.

The electronic version of DO-160A includes Change 1. The price for the hardcopy version of DO-160A also includes Change 1.

NOTE: The electronic DO-160A is a pdf file but it is not in searchable format.

DO-158, Minimum Performance Standards-Airborne Doppler Radar Navigation Equipment

Issued 10-17-75 ♦ Prepared by ICG-13 *Supersedes DO-98 & DO-104*

Recommends standards and test procedures for Airborne Doppler Radar Navigation Equipment. Appendices include conditions of testing and detailed test procedures. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C65a references this document.

NOTE: The electronic DO-158 is a pdf file but it is not in searchable format.

DO-155, Minimum Performance Standards-Airborne Low-Range Radar Altimeters

Issued 1-11-74 ♦ Prepared by SC-115 (ICG-2) *Supersedes DO-123*

Recommends standards and test procedures for those characteristics of an Airborne Low-Range Radar Altimeter that are essential for its operation in applications to provide measured height above terrain for obstruction clearance and landing. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C87 references this document.

NOTE: The electronic DO-155 is a pdf file but it is not in searchable format.

DO-154, Recommended Basic Characteristics for Airborne Radio Homing and Alerting Equipment for Use with Emergency Locator Transmitters (ELTs)

Issued 3-9-73 ♦ Prepared by SC-124

Recommends basic system characteristics and provides test and guidance material for Airborne Radio Homing and Alerting Equipment.

DO-152, Minimum Operational Characteristics-Vertical Guidance Equipment Used in Airborne Volumetric Navigational Systems

Issued 3-17-72 ♦ Appendix D 4-23-74 ♦ Prepared by SC-116E

Part I defines the concepts, philosophy, and development of MOCs for airborne systems, and Part II covers the MOCs for vertical guidance equipment used in airborne volumetric navigation systems, including system characteristics; provides information for demonstration of compliance and guidance accuracy analysis. Appendix D provides a VOR/ DME/Altimeter vertical guidance analysis.

DO-148, A New Guidance System for Approach and Landing

Issued 12-18-70 ♦ Prepared by SC-117

Defines a system concept and technical description (signal format) for a new precision instrument approach and landing guidance system (LGS) intended to satisfy the varied operational needs of different classes of aviation users, civil and military, in the United States and abroad. Volume I is an 80-page summary of findings and recommendations. Volume II is a 400-page compilation of the milestone Special Committee Reports, including the Tentative Operational Requirements, the Report of the Techniques Assessment Team, and the Report of the Signal Format Development Team.

DO-144A, Minimum Operational Characteristics-Airborne ATC Transponder Systems

Issued 10-02-08 ♦ Prepared by SC-209

This document presents a consolidation of performance requirements from two sources: RTCA /DO-144 dated March 12, 1970 and Change 1 to DO-144, posted as RTCA Paper No. 232-70/EC-643, dated November 5, 1970; and the performance standards referred to in paragraph (a)(1) of Federal Aviation Administration (FAA) Technical Standard Order (TSO)-C47c, dated February 20, 1973. The document includes the technical changes/advances necessary to ensure proper operation with Mode S and TCAS interrogators. The document is a coordinated effort with EUROCAE WG-49.

DO-143, Minimum Performance Standards-Airborne Radio Marker Receiving Equipment Operating on 75 MHz

Issued 3-12-70 ♦ Prepared by SC-115 (ICG-7) *Supersedes DO-57A*

Recommends standards and test procedures for Airborne Radio Marker Receiving Equipment. Coordinated with EUROCAE.

FAA Technical Standard Order (TSO) – C35d references this document.

NOTE: The electronic DO-143 is a pdf file but it is not in a searchable format.

DO-136, Universal Air-Ground Digital Communication System Standards

Issued 3-7-68 ♦ Prepared by SC-110 & SC-111 *Amended and supersedes portions of DO-122*

Recommends universal digital standards for linking aircraft into the ground communications and data processing environment of the air traffic control system, airlines, and military management information systems.

DO-127, Standard Procedure for the Measurement of the Radio-Frequency Radiation from Aviation Radio Receivers Operating within the Radio-Frequency Range of 30-890 Megacycles

Issued 4-15-65 ♦ Prepared by SC-96

Recommends standards and test procedures for use by manufacturers of aviation receivers in making necessary radiation measurements using the Far-Field method. In addition, the report discusses two alternative methods of performing such measurements using the Near-Field method.

DO-117, Standard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers

Issued 3-14-63 ♦ Errata ♦ Prepared by SC-98

Recommends procedures for adjustment of Airborne Glide Slope and Localizer Receivers.

DO-93, Minimum Performance Standards – Airborne Selective Calling Equipment

Issued 02-10-59 ♦ Prepared by SC-83 ♦ Errata issued 09-13-62 included

This document sets forth the Minimum Performance Standards for Airborne Selective Calling Equipment for use with the ground-to-air selective calling system known as SELCAL. The SELCAL system is to permit selective calling of individual aircraft over normal radiotelephone channels linking the ground station with the aircraft.

DO-88, Altimetry

Issued 11-1-58 ♦ Issued Appendix I 5-15-59 ♦ Prepared by SC-70

Reports on studies of the problems associated with the measurement of aircraft altitude. States requirement that would permit all aircraft to maintain assigned heights within specific limits as related to terrain clearance and the safe vertical separation of aircraft in flight. Appendix I reports on Meteorological Aspects of Pressure Altimetry.

NOTE: The electronic DO-88 is a pdf file but it is not in a searchable format.

DO-62, Calibration Procedures-Test Standard Omni-Bearing Selectors and Omni-Bearing Selector Test Sets

Issued 12-2-54 ♦ Prepared by SC-61

Recommends procedures to aid operators of aircraft radio service stations in the Calibration of Test Standard Omni-Bearing Selectors and Omni-Bearing Selector Test Sets used in testing and adjusting VOR receivers and their associated Omni-Bearing Selectors.

DO-56, VOR Test Signals

Issued 4-15-54 ♦ Prepared by SC-60

Describes methods for determining, in an aircraft, the accuracy of VOR bearing indications. The causes of VOR bearing error due to VOR receiver malfunctioning are analyzed.

DO-52, Calibration Procedures for Signal Generators used in the Testing of VOR and ILS Receivers

Issued 12-8-53 ♦ Prepared by SC-61

Recommends procedures for testing and calibrating signal generators used in the servicing of airborne VOR and ILS receivers. The accuracy of the components of simulated VOR and ILS signals is stated for signal generators calibrated as described.

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TASK FORCE REPORTS

Task Force 5 – NextGen Mid-Term Implementation Task Force Report

Issued 9-09-09 ♦ Prepared by the RTCA NextGen Task Force

This report documents the community-wide consensus on the recommended NextGen operational capabilities to be implemented during the transition between now and 2018. Over 300 stakeholders participated in the development of this report. Each operational capability recommended defines the associated "What", "Where", "Who", and "When". The Report further recommends strategies for accelerating benefits, and strategies for encouraging equipage. Several overarching recommendations aimed at facilitating the transition to NextGen are also documented in this report, including streamlining the operations approval process, and establishing effective institutional mechanisms for post-Task Force government - industry collaboration. As a companion to this document, all the supporting analytic data and detailed descriptions of each operational capability are available on a CD for purchase on this website.

Task Force 5 – NextGen Mid-Term Implementation Task Force Report– Data Files

Issued 9-09-09 ♦ Prepared by the RTCA NextGen Task Force

Important Notes: You must have Excel 2007 to access the dashboard and Supporting Information
The data files are only available as an electronic download.

Instructions:

1. Download the .zip file by choosing "Save Target As" to the appropriate location on your computer (e.g., desktop).
2. "Right Click" on the .zip file and select "Extract All"
3. Select the file location where you want to save the unzipped files (Default is a folder under the location where the .zip file was downloaded.)
4. Enter the password (case sensitive)
5. These instructions are repeated in the INSTRUCTIONS FOR USING THIS ZIP FILE in the unzipped folder.
6. In the unzipped folder, open the Dashboard Excel file. The "instructions" tab in the Excel file (5th tab, just to left of "Top" tab) contains detailed instructions on the use of the Dashboard.

Task Force 4 – Final Report of the RTCA Task Force 4 Certification

Issued 2-26-99 ♦ Prepared by the RTCA Certification Task Force

Any improvements in safety, capacity, or efficiency will require some form of change. Prior to operationally implementing the improvement, equipment, procedures, and people will need to be "certified." Experience, both prior to and during the Task Force, indicate that significant benefits will accrue to the entire aviation community if the process is "systems oriented" and if refinements are made to reduce the time and cost of the process thereby expediting the availability of the operational enhancements. The Final Report of the RTCA Task Force 4 Certification underscores the critical role of certification in achieving FAA's safety and modernization goals and provides 15 consensus-based recommendations for improving the certification process.

Task Force 3 – Final Report of RTCA Task Force 3 Free Flight Implementation

Issued 10-26-95 ♦ Prepared by Task Force 3

The Free Flight Implementation Task Force Report underscores the need for changes in the air traffic system and emphasizes that changes should be both benefits driven and implemented in steps, such that incremental changes lead immediately to incremental benefits.

This report provides the definition of free flight, addresses “dynamic density” plus other operational initiatives, and recommends a transition strategy based on the time-phased implementation of new procedures and technology. The strategy provides benefits to the entire air transportation community. The strategy also simultaneously moves the community from an analog communication, ground-based navigation air traffic control system to a digital communication, ground- and space-based navigation air traffic management system that makes increasingly heavier use of decision support systems to help air traffic service providers meet their important responsibilities.

Task Force 3 – Interim Report on Free Flight Implementation

Issued 8-28-95 ♦ Prepared by Task Force 3

The RTCA Task Force 3 Free Flight Implementation Interim Report summarizes the 44 recommendations that had grown out of the group’s deliberations as of August 1995. The recommendations are initially grouped by time frame: near-term, present - 1997; mid-term, 1998-2000; and long-term, beyond 2000. Of the 44 Interim Report recommendations, 35 are included in the near-term, six in the mid-term and three in the long-term. Within each time frame, recommendations are aggregated by category: Procedural; Technology Application; New Concepts; and Studies and Investigations. All time frames do not include all categories of recommendations.

Task Force 2 – Report on the Transition to Digital Communications

Issued 12-20-93 ♦ Prepared by Task Force 2

The Transition to Digital Communications Task Force Report concludes that the aviation community urgently needs the economic benefits that can flow from the use of digital communications. Technology is available. Broad-based implementation of digital communications will hinge on international cooperation, a close and effective government partnership devoted to fielding new equipment plus prior assurances from government that aircraft operators will obtain a prompt and significant return on their investment in new technology.

Task Force 1 – Report on Global Navigation Satellite System (GNSS) Transition and Implementation Strategy

Issued 9-18-92 ♦ Prepared by Task Force 1

The RTCA Task Force Report on Global Navigation Satellite System (GNSS) Transition and Implementation Strategy concludes that: the entire user community is enthusiastic about the operational benefits to be derived from the use of GNSS, basic satellite navigation technology needed to achieve an early GNSS operational capability is available, there are no institutional issues that should preclude early implementation, the transition to operational use should begin almost immediately, should be user driven and should occur in an evolutionary manner, and additional action should begin now to expand on initial operational capabilities.

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FREE FLIGHT REPORTS

National Airspace System Concept of Operations and Vision for the Future of Aviation

Issued 11-15-02 ♦ Approved by the Free Flight Steering Committee

The new document updates the December 2000 *National Airspace System Concept of Operations*, identifies broad-gauged requirements of NAS users and service providers and is intended to serve as the basis for an incremental, benefits-driven approach for modernization of the Air Traffic Management System. This update adds a new Preface and Introductory section outlining a vision for the future of aviation. The immediate and primary focus is on making greater use of available information technology to help pilots and controllers meet their responsibilities. Operations are expected to become increasingly aircraft centric and human interactions with the system will evolve over time to a role of strategic planning supported by automation in managing real time operations.

Recommendations Regarding the Concept of Equipage and Mandated versus Voluntary Considerations

Issued 8-27-02 ♦ Approved by the Free Flight Steering Committee

This two-part document responds to the need for the aircraft equipage recommendations for realizing the benefit of capacity enhancement initiatives outlined in the Operational Evolution Plan. The objective of the Concept of Equipage work was to provide a recommended process and milestones to configure the fleet to achieve OEP capabilities. Four categories of capability were found to have avionics equipage implications: Domestic Reduced Vertical Separation Minima, Area Navigation, Controller Pilot Data link Communication, and Future air Navigation System 1A. In equipage related follow on work, additional detail will be obtained upon which avionic costing and installation time lines can be based. The second section of the document provides definitions of "mandated" and "voluntary" and offers recommended guidelines and criteria for FAA consideration when making mandated/voluntary equipage decisions.

National Airspace System Concept of Operations

Issued 12-13-00 ♦ Approved by the Free Flight Steering Committee

This publication is an update that supersedes the previously published *Government/Industry Operational Concept for the Evolution of Free Flight, Edition 2*. This document is intended as a guide for the FAA and user community to coordinate development and implementation activities for air traffic services and operational capabilities within the NAS. The evolution of capabilities for three timeframes is described:

Near Term, through 2005

Mid Term, 2005 – 2010

Far Term, 2010 – 2015

Concepts are discussed from environmental, airspace user, and service provider perspectives for all phases of flight. The concept will serve as a living document and will be the subject of regular review and updates to reflect changes in FAA and user strategy.

National Airspace System Concept of Operations, Addendum 4: Free Flight Phase 2

Issued 12-13-00 ♦ Approved by the Free Flight Steering Committee

Addendum 4 provides detail for the Free Flight Phase 2 recommendations made to the Free Flight Steering Committee in December 1999. Implementation strategies are recommended for TMA, URET, pFAST, and CPDLC and the recommendation for CDM is refined. Priority research and development initiatives are identified as well as the need for a high altitude airspace structure to accommodate more Free Flight activity. Operational scenarios are included. Appendix B of this publication documents the issues and problem-based analyses used to develop the FFP2 recommendations, and summarizes the capabilities recommended for the 2003-2005 period.

Government/Industry Operational Concept for the Evolution of Free Flight, Edition 2

Issued 8-16-00 ♦ Approved by the Free Flight Steering Committee

Edition 2 of the Government/Industry Operational Concept combines two previous documents:

- Free Flight Steering Committee, *Government/Industry Operational Concept for the Evolution of Free Flight*
- Federal Aviation Administration, *Concept of Operations for the National Airspace System in 2005*

This combined document provides the aviation community with a single, agreed to Operational Concept from the perspectives of National Airspace System (NAS) users and service providers. The concepts provided herein cover the transition of the current NAS from the near term through the far-term time when mature Free Flight occurs. It is intended to incorporate the needs and requirements of NAS users and service providers and to serve as the basis for an incremental and a benefits-driven approach towards Free Flight. It is also intended to form the basis for both the Federal Aviation Administration (FAA) and the user community to plan procedural, investment and architectural decisions that will provide the operational capabilities needed to achieve Free Flight.

NOTE: The electronic Government / Industry Operational Concept for the Evolution of Free Flight, Edition 2, is a pdf file but it is not in searchable format.

Government/Industry Operational Concept for the Evolution of Free Flight, Addendum 3.1: Roadmap for Surveillance Modernization

Issued 8-16-00 ♦ Approved by the Free Flight Steering Committee

This addendum presents a consensus for the evolutionary modernization of surveillance capabilities in the National Airspace System (NAS) and is based on the operational objectives identified in the RTCA document, Addendum 3: Surveillance. Both documents are driven by the need to improve aviation safety, capacity and efficiency. This roadmap provides a set of target architecture characteristics that include delivery of a common surveillance "picture" to ATC service providers, flight crews, and airport/airline operational personnel; the utilization of "enriched" surveillance data for decision support tools, and reliance on ADS-B as the "cornerstone" of the future surveillance architecture. This document also identifies key business case considerations and activities that will appropriately justify both FAA and industry investment commitments.

Government/Industry Operational Concept for the Evolution of Free Flight, Addendum 3: Surveillance

Issued 8-16-00 ♦ Approved by the Free Flight Steering Committee

The Surveillance Addendum documents one of the essential elements of Free Flight and describes future capabilities that cover a period of approximately the next two decades. The document focuses on the operational use of surveillance, not the technical or architectural aspects of providing the information to those needing it. The approach described transitions from the current radar/interrogator baseline of surveillance information to a digital information environment that encompasses air and ground operations.

This approaches envisions providing shared real-time surveillance information to service providers (using automation to manage aircraft separation in all operation) and to pilots (utilizing new technology to aid in those aircraft management and separation services).

Government/Industry Operational Concept for the Evolution of Free Flight Addendum 2: Candidate Recommendations on Near Term Procedural Enhancements, 1998 – 2002

Issued 8-19-98♦ Approved by the Free Flight Steering Committee

This document offers 25 procedural changes that can be made in the near term, 1998-2002. These proposals will provide benefits to NAS users and service providers with minimal dependence on new systems. The focus is on changes to today's operations, making better use of what is currently available. Addendum 2 also outlines a process for keeping stakeholders involved.

Government/Industry Operational Concept for the Evolution of Free Flight, Addendum 1: Free Flight Phase 1 Limited Deployment of Select Capabilities (URET, TMA (SC), pFAST, CPDLC, CDM, SMA)

Issued 8-19-98 ♦ Approved by the Free Flight Steering Committee

This document details the concept of operations for FFP1 Core Capability Limited Deployment (CCLD). The focus is on near-term implementations, 1998 - 2002, with an emphasis on scenarios that illustrate the functions and enhancements of FFP1 capabilities. This document is the basis for both the FAA and the user community plans for procedural, investment, and architectural decisions that will make FFP1 a reality.

Free Flight Action Plan Update 2

Issued 12-10-98

Provides updated status on Free Flight Recommendations listed in the original RTCA Free Flight Action Plan.

Free Flight Action Plan Update 1

Issued 4-2-98

Provides updated status on Free Flight Recommendations listed in the original RTCA Free Flight Action Plan.

Free Flight Action Plan

Issued 8-15-96

The Free Flight Action Plan outlines current and planned activities leading to the implementation of Task Force 3 recommendations, provides the points of contact and phone numbers for each initiative, and establishes intermediate milestones approved by the Free Flight Steering Committee on August 15, 1996.

Report of the RTCA Board of Directors' Select Committee on Free Flight

Issued 1-18-95 ♦ Prepared by the RTCA Board of Directors' Select Committee on Free Flight

This report summarizes requirements, flight operations, and expected user benefits attendant with Free Flight and will be used as the basis for follow-on work leading to concept implementation.

OTHER PUBLICATIONS

Future Flight Data Collection Committee Final Report

Issued 12-04-01 ♦ Prepared by the Future Flight Data Collection Committee

This report was prepared at the request of the FAA Administrator and the Chairman of the National Transportation Safety Board. The committee's objective was to define operational concepts for acquiring, storing, and managing data concerning the state of the aircraft, operation of the aircraft, and air/ground and air/air communications. The document is intended to help identify recorded data requirements to industry in advance so the technology can be incorporated early in new designs, minimizing event-driven rulemaking. The final report contains seven recommendations that summarize the important issues and changes that need to be considered in the area of flight data collection over the next 15 years. Appendices detailing the work of the three working groups are included:

- WG-1, Data Needs
- WG-2, Technology
- WG-2, Data Use and Protection

Additionally, the report includes an appendix on deployable cockpit voice and flight data recorders.

Certification Steering Committee Final Report

Issued 08-31-01 ♦ Prepared by Certification Steering Committee

The Final Report of the Certification Steering Committee addresses the status of the 15 recommendations of the Certification Task Force, formed in 1998 at the request of the FAA Administrator. Over 200 members of the international aviation community participated in the Task Force to produce broad gauged recommendations for issues that were seen to introduce inefficiencies into the certification process.

The 15 Task Force recommendations address the following topical areas:

- Organizational Focal Point in FAA
- Systems Engineering Capability
- Multi-tiered Airworthiness Requirements
- Human Performance Considerations
- Agreement or Regulator/Applicant Roles
- Standardize Designee Programs
- Early Deployment of Advanced Systems
- Instrument Approach Procedures to Exploit Current Capabilities
- Commonly Agreed Concept of Ops
- Eliminate Duplicate Committees
- Correct Misapplication of Rules
- Certification Process Improvements
- New Rule Harmonization
- Publicize how Rules have been applied
- A "No Fear" Feedback Process

RTCA formed the Certification Steering and Select Committees in response to the FAA's request for a follow-on effort. The Steering Committee and its supporting Select Committee reviewed the 15 Task Force recommendations and documented FAA initiatives already underway for implementing certain Task Force

recommendations and provided proposals for implementing those recommendations not yet addressed. Each Task Force recommendation is cited and the action taken to respond to the recommendation is discussed.

Portable Hand-Held GPS Receivers-What You Should Know

Issued 9-21-93 ♦ Prepared by SC-179

Presented in an encapsulated form, information on usage, antenna mounting, and other considerations including signal interference, power, and answers to commonly asked questions. The information is applicable to the models of portable hand-held GPS receivers that do not meet TSO C129 standards.

The Authority of Agreement—A History of RTCA

William G. Osmun, a professional writer of note and longtime observer of RTCA activity, researched and wrote this volume under contract with RTCA. In this history, Osmun traces the effort of engineers, pilots, technicians, and other aeronautical experts to forge agreement out of conflicting desires and in the face of changing technology, government reorganization, and the tremendous growth of worldwide air service. For reference, appendices include a brief chronology of RTCA and tabulate the work of RTCA Special Committees and their chairmen, membership of the Executive Committee, Technical Advisors, and International Associates.

NOTE: The electronic Authority of Agreement is a pdf file but it is not in searchable format.

PROCEEDINGS OF RTCA ANNUAL SYMPOSIA

- 2004 – Implementing a “Performance Based” National Airspace System
- 2003 – Modernizing Air Traffic Management in Today’s Environment
- 2002 – The New Aviation Environment - Safety, Security and Efficiency
- 2001 – None Held...
- 2000 – ATC Modernization – Achieving New Operational Capabilities
- 1999 – Modernization: Aviation’s Challenge and Opportunity for the New Millennium
- 1998 – Operations, Certification, & Standards: Cornerstones for the Future
- 1997 – Not Available
- 1996 – Working Together to Deliver Free Flight
- 1995 – International Cooperation and Standards – Keys to Enhancing the Capacity, Efficiency, and Safety of Air Transportation
- 1994 – Implementing Air Traffic Management through Government/Industry Partnerships – Accomplishments, Challenges, and Opportunities
- 1993 – Implementing Air Traffic Management – Systems Approach for the 21st Century

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TOPICAL INDEX

AERONAUTICAL DATA

- DO-296 **Safety Requirements for Aeronautical Operational Control (AOC) Datalink Messages**
Issued 10-19-04 ♦ Prepared by SC-201
- DO-291B **Minimum Interchange Standards for Terrain, Obstacle and Aerodrome Mapping Data**
Issued 09-28-11 ♦ Prepared by SC-217/EUROCAE WG-44
- DO-291A **Interchange Standards for Terrain, Obstacle and Aerodrome Mapping Data**
Issued 04-14-09 ♦ Prepared by SC-217/EUROCAE WG-44
- DO-276A **User Requirements for Terrain & Obstacle Data**
Issued 8-3-05 ♦ Prepared by SC-193/EUROCAE WG-44
- DO-272C **User Requirements for Aerodrome Mapping Information**
Issued 09-28-11 ♦ Prepared by SC-217/EUROCAE WG-44
- DO-272B **User Requirements for Aerodrome Mapping Information**
Issued 04-14-09 ♦ Prepared by SC-217/EUROCAE WG-44
- DO-201A **Standards for Aeronautical Information**
Issued 4-19-00 ♦ Prepared by SC-181
- DO-200A **Standards for Processing Aeronautical Data**
Issued 9-28-98 ♦ Prepared by SC-181

AERONAUTICAL TELECOMMUNICATION NETWORK

- DO-305 **Future Air Navigation System 1/A (FANS 1/A) - Aeronautical Telecommunications Network (ATN) Interoperability Standard**
Issued 06-26-07 ♦ Prepared by SC-189
- DO-287 **Plans and Principles for the Implementation of Aeronautical Data Link System (ADLS) Edition 1. Aeronautical Telecommunications Network (ATN)**
Issued 6-25-03 ♦ Prepared by SC-194
- DO-280B **Interoperability Requirements Standard for ATN Baseline 1**
Issued 06-26-07 ♦ Prepared by SC-189
- DO-250 **Guiding Principles for Air Traffic Services Provided via Data Communications Utilizing, the ATN, Builds 1 and 1A**
Issued 1-11-00 ♦ Prepared by SC-194

DO-240 **Minimum Operational Performance Standards for Aeronautical Telecommunications Network (ATN)**
Issued 7-29-97 ♦ Prepared by SC-162

AIRBORNE GROUND PROXIMITY WARNING EQUIPMENT

DO-161A **Minimum Performance Standards-Airborne Ground Proximity Warning Equipment**
Issues 5-27-76 ♦ Superseded DO-161 ♦ Prepared by SC-128

AIRPORT APPLICABLE DOCUMENTS

DO-234 **Minimum Performance and Installation Standards for Runway Guard Lights (RGLs)**
Issued 11-15-96 ♦ Prepared by SC-184

DO-221 **Guidance and Recommended Requirements for Airport Surface Movement Sensors**
Issued 4-29-94 ♦ Prepared by SC-178

AIR TRAFFIC SERVICES

DO-306 **Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard)**
Issued 10-11-07 ♦ Prepared by SC-189

Change 1 to DO-306
Issued 03-17-11 ♦ Prepared by SC-214

DO-290 **Safety and Performance Requirements Standard for Air Traffic Data Link Services in Continental Airspace (Continental SPR Standard)**
Issued 4-29-04 ♦ Prepared by SC-189

Change 1 to DO-290
Issued 12-13-06 ♦ Prepared by SC-189

Change 2 to DO-290
Issued 06-26-07 ♦ Prepared by SC-189

DO-285 **Next Generation Air/Ground Communication (NEXCOM) VDL Mode 3 Interoperability**
Issued 4-10-03 ♦ Prepared by SC-198

DO-269 **Concepts For Services Integrating Flight Operations and Air Traffic Management Using Addressed Data Link**
Issued 6-12-01 ♦ Prepared by SC-194

DO-264 **Guidelines for Approval of the Provision and Use of Air Traffic Services Supported by Data Communications**
Issued 12-14-00 ♦ Prepared by SC-189

DO-258A **Interoperability Requirements for ATS Applications Using ARINC 622 Data Communications**
Issued 4-07-05 ♦ Prepared by SC-189 ♦ Supersedes DO-258

ALTIMETERS / ALTIMETRY

DO-155 **Minimum Performance Standards- Airborne Low-Range Radar Altimeters**
Issued 1-11-74 ♦ Prepared by SC-115 (ICG-2) ♦ Supersedes DO-123

DO-88 **Altimetry**
Issued 11-1-58 ♦ Prepared by SC-70 ♦ Appendix I Issued 5-15-59

AREA NAVIGATION EQUIPMENT (AIRBORNE)

DO-190 **Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Omega/VLF Inputs**
Issued 5-16-86 ♦ Superseded DO-140 ♦ Prepared by SC-137

DO-187 **Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Multi-Sensor Inputs**
Issued 11-13-84 ♦ Prepared by SC-137

DO-180A **Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using a Single Collated VOR/DME Sensor Input**
Issued 5-24-90 ♦ Prepared by SC-137 ♦ Supersedes DO-180

DO-164A **Minimum Performance Standards-Airborne Omega Receiving Equipment**
Issued 9-21-79 ♦ Supersedes DO-164 ♦ Prepared by SC-138

AUDIO SYSTEMS

DO-214 **Audio Systems Characteristics and Minimum Operational Performance Standards for Aircraft Audio Systems and Equipment**
Issued 3-2-93 ♦ Prepared by SC-164 ♦ Supersedes DO-170

DO-209 **Minimum Operational Performance Standards for Devices that Prevent Blocked Channels Used in Two-Way Radio Communications Due to Simultaneous Transmissions**
Issued 4-23-92 ♦ Prepared by SC-163 ♦ Errata Issued 7-1-92

DO-207 **Minimum Operational Performance Standards for Devices that Prevent Blocked Channels Used in Two-Way Radio Communications Due to Unintentional Transmissions**
Issued 1-25-91 ♦ Prepared by SC-163

AUTOMATIC DEPENDENT SURVEILLANCE

DO-212 Minimum Operational Performance Standards for Airborne Automatic Dependent Surveillance (ADS) Equipment
Issued 10-26-92 ♦ Prepared by SC-170

AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST

**Airborne Spacing – Flight Deck Interval Management (ASPA-FIM)
Supplement to DO-323**

Safety, Performance and Interoperability Requirements Document for Enhanced Traffic Situational Awareness on the Airport Surface with Indications and Alerts (SURF IA)
Issued 12-08-10 ♦ Prepared by SC-186

DO-323 Safety, Performance and Interoperability Requirements Document for Enhanced Traffic Situational Awareness on the Airport Surface with Indications and Alerts (SURF IA)
Issued 12-08-10 ♦ Prepared by SC-186

DO-322 Safety, Performance and Interoperability Requirements Document for ATSA-SURF Application
Issued 12-08-10 ♦ Prepared by SC-186

DO-321 Safety, Performance and Interoperability Requirements Document for ADS-B Airport Surface Surveillance Application (ADS-B-APT)
Issued 12-08-10 ♦ Prepared by SC-186

DO-319 Safety, Performance and Interoperability Requirements Document for Enhanced Traffic Situational Awareness During Flight Operations (ATSA-AIRB)
Issued 03-17-10 ♦ Prepared by SC-186

DO-318 Safety, Performance and Interoperability Requirements Document for Enhanced Air traffic services in Radar-Controlled Areas Using ADS-B Surveillance (ADS-B-RAD)
Issued 09-09-09 ♦ Prepared by SC-186

DO-317A Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications (ASA) System
Issued 12-13-11 ♦ Prepared by SC-186

DO-317 Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications System (ASAS)
Issued 04-14-09 ♦ Prepared by SC-186

DO-314 Safety, Performance and Interoperability Requirements Document for Enhanced Visual Separation on Approach (ATSA-VSA)
Issued 12-16-08 ♦ Prepared by SC-186

DO-312	Safety, Performance and Interoperability Requirements Document for the In-Trail Procedure in Oceanic Airspace (ATSA-ITP) Application Issued 6-19-08 ♦ Prepared by SC-186
DO-303	Safety, Performance and Interoperability Requirements Document for the ADS-B Non-Radar-Airspace (NRA) Application Issued 12-13-06 ♦ Prepared by SC-186
DO-302	Minimum Operational Performance Standards (MOPS) for Surveillance Transmit Processing (STP) Issued 12-13-06 ♦ Prepared by SC-186
DO-289	Minimum Aviation System Performance Standards (MASPS) for Aircraft Surveillance Applications (ASA) Issued 12-09-03 ♦ Prepared by SC-186
Change 1 to DO-289	Issued 12-13-06 ♦ Prepared by SC-186
DO-286B	Minimum Aviation System Performance Standards (MASPS) for Traffic Information Service – Broadcast (TIS-B) Issued 10-11-07 ♦ Prepared by SC-186 ♦ Supersedes DO-286A
DO-282B, Corr. 1	Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance – Broadcast (ADS-B) Issued 12-13-11 ♦ Prepared by SC-186
DO-282B	Minimum Operational Performance Standards for Universal Access Transceiver (UAT) Automatic Dependent Surveillance - Broadcast Issued 12-13-11 ♦ Supersedes DO-282A ♦ Prepared by SC-186
DO-263	Application of Airborne Conflict Management: Detection, Prevention, & Resolution Issued 12-14-00 ♦ Prepared by SC-186
DO-260B, Corr. 1	Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services (TIS-B) Issued 12-13-11 ♦ Prepared by SC-186
DO-260B	Minimum Operational Performance Standards for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services (TIS-B) Issued 12-13-11 ♦ Supersedes DO-260A ♦ Prepared by SC-186
DO-260	Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B) Issued 9-13-00 ♦ Prepared by SC-186

Change 1 to DO-260

Issued 6-27-06 ♦ Prepared by SC-186

DO-249 Development and Implementation Planning Guide for Automatic Dependent Surveillance Broadcast (ADS-B) Applications

Issued 10-6-99 ♦ Prepared by SC-186

DO-242A Minimum Aviation System Performance Standards for Automatic Dependent Surveillance Broadcast (ADS-B)

Issued 6-25-02 ♦ Prepared by SC-186

Change 1 to DO-242A

Issued 12-13-06 ♦ Prepared by SC-186

AUTOMATIC DIRECTION FINDING EQUIPMENT (AIRBORNE)

DO-179 Minimum Operational Performance Standards for Automatic Direction Finding (ADF) Equipment

Issued 5-13-82 ♦ Prepared by SC-146 ♦ Supersedes DO-137, DO-142

AUTOMATIC FLIGHT GUIDANCE, CONTROL SYSTEMS AND EQUIPMENT (AFGCS)

DO-325 Minimum Operational Performance Standards (MOPS) for Automatic Flight Guidance and Control Systems and Equipment

Issued 12-08-10 ♦ Prepared by SC-220

AVIONICS COMPUTER RESOURCES

DO-255 Requirements Specification for Avionics Computer Resource (ACR)

Issued 6-20-00 ♦ Prepared by SC-182

BATTERIES

DO-311 Minimum Operational Performance Standards for Rechargeable Lithium Battery Systems

Issued 3-13-08 ♦ Prepared by SC-211

DO-293A Minimum Operational Performance Standards for Nickel-Cadmium and Lead Acid Batteries

Issued 12-02-09 ♦ Prepared by SC-211

DO-227 Minimum Operational Performance Standards for Lithium Batteries

Issued 6-23-95 ♦ Prepared by SC-168

CABIN SYSTEMS AND EQUIPMENT

DO-313 Certification Guidance for Installation of Non-Essential, Non-Required Aircraft Cabin Systems and Equipment

Issued 10-02-08 ♦ Prepared by SC-210

CERTIFICATION

Final Report of the RTCA Task Force 4 Certification

Issued 2-26-99 ♦ Prepared by the RTCA Certification Task Force

COCKPIT DISPLAY

DO-259 Applications Descriptions for Initial Cockpit Display of Traffic Information (CDTI) Applications

Issued 9-13-00 ♦ Prepared by SC-186

COMMUNICATIONS

RTCA Task Force Report on the Transition to Digital Communications

Issued 3-5-02 ♦ Prepared by TF-2

DO-288 Next Generation Air/Ground Communication System (NEXCOM) Implementation Considerations: Factors and Issues to be Considered in Planning for the Transition to Air/Ground, ICAO, VDL Mode 3 Based Integrated Voice and Data Communications in the U.S. National Airspace System

Issued 10-28-03 ♦ Prepared by SC-198

DO-287 Plans and Principles for the Implementation of Aeronautical Data Link System (ADLS) Edition 1. Aeronautical Telecommunication Network (ATN) Baseline 1 Implementation and ADLS Build IIA & IIB

Issued 6-25-03 ♦ Prepared by SC-194

DO-284 Next Generation Air/Ground Communication System (NEXCOM) Safety and Performance Requirements (SPR)

Issued 1-23-03 ♦ Prepared by SC-198

Change 1 to DO-284

Issued 6-25-03 ♦ Prepared by SC-198

DO-281A Minimum Operational Performance Standards for Aircraft VDL Mode 2 Physical, Link and Network Layer

Issued 11-08-05 ♦ Prepared by SC-172 Supersedes DO-281

DO-279 Next Generation Air Ground Communications (NEXCOM) Principles of Operation VDL Mode, 3

Issued 10-12-01 ♦ Prepared by SC-198

DO-274 Next Generation Air/Ground Communications (NEXCOM) Principles of Operation

Issued 10-12-01 ♦ Prepared by SC-198

DO-273 Response to the Report of the RTCA Chairman's Committee on NEXCOM

Issued 10-12-01 ♦ Prepared by SC-198

DO-271C Minimum Operational Performance Standards for Aircraft VDL Mode 3 Transceiver Operating in the Frequency Range 117.975-137.000 MHz

Issued 11-8-05 ♦ Supersedes DO-271B ♦ Prepared by SC-172

- DO-270 **Minimum Aviation System Performance Standards (MASPS) for the Aeronautical Mobile-Satellite (R) Service (AMS(R)S as Used in Aeronautical Data Links**
 Issued 10-12-01 ♦ Prepared by SC-165
- Change 1 to DO-270
 Issued 04-14-09 ♦ Prepared by SC-215
- DO-262A **Minimum Operational Performance Standards for Avionics Supporting Next Generation Satellite Systems (NGSS)**
 Issued 12-16-08 ♦ Prepared by SC-215
- DO-231 **Design Guidelines and Recommended Standards for the Implementation and Use of AMS(R)S Voice Services in a Data Link Environment**
 Issued 3-13-96 ♦ Prepared by SC-165
- DO-225 **VHF Air-Ground Communications System Improvements Alternatives Study and Selection of Proposals for Future Action**
 Issued 11-17-94 ♦ Prepared by SC-172
- DO-224C **Signal-in-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications Including Compatibility with Digital Voice Techniques**
 Issued 12-13-11 ♦ Prepared by SC-214
- DO-224B **Signal-in-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications Including Compatibility with Digital Voice Techniques**
 Issued 8-3-05 ♦ Prepared by SC-172
- DO-223 **Minimum Operational Performance Standards for Context Management (CM) Equipment**
 Issued 7-13-94 ♦ Prepared by SC-169
- DO-222 **Guidelines on AMS(R)S Near-Term Voice Implementation and Utilization**
 Issued 4-29-94 ♦ Prepared by SC-165 ♦ Errata Issued 6-21-94
- DO-219 **Minimum Operational Performance Standards for ATC Two-Way Data Link Communications**
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- DO-186B **Minimum Operational Performance Standards for Airborne Radio Communications Equipment Operating within the Radio Frequency Range 117.975-137.000 MHz**
 Issued 11-08-05 ♦ Prepared by SC-172 ♦ Supersedes DO-186A
- DO-169 **VHF Air-Ground Communication Technology and Spectrum Utilization**
 Issued 7-20-79 ♦ Prepared by SC-140
- DO-165 **Initial Report on Civil Aviation Frequency Spectrum Requirements 1980- 2000**
 Issued 5-27-76 ♦ Prepared by SC-129

- DO-163 **Minimum Performance Standards-Airborne HF Radio Communications Transmitting and Receiving Equipment Operating within the Radio-Frequency Range of 1.5 to 30 Megahertz**
 Issued 3-19-76 ♦ Prepared by SC-131 ♦ Errata ♦ Supersedes DO-48A & DO-49A
- DO-136 **Universal Air-Ground Digital Communication System Standards**
 Issued 3-7-68 Amended and superseded portions of DO-122 Prepared by SC-110 & SC-111
- DO-93 **Minimum Performance Standards – Airborne Selective Calling Equipment**
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- DO-243 **Guidance for Initial Implementation of Cockpit Display of Traffic Information**
 Issued 2-19-98 ♦ Prepared by SC-186

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- DO-189 **Minimum Operational Performance Standards for Airborne Distance Measuring Equipment (DME) Operating within the Radio Frequency Range of 960-1215 MHz**
 Issued 9-20-85 ♦ Prepared by SC-149 ♦ Supersedes DO-14, DO-151A

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- DO-158 **Minimum Performance Standards – Airborne Doppler Radar Navigation Equipment**
 Issued 10-17-75 ♦ Prepared by ICG-13

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- DO-254 **Design Assurance Guidance for Airborne Electronic Hardware**
 Issued 4-19-00 ♦ Prepared by SC-180

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- DO-257A **Minimum Operational Performance Standards for the Depiction of Navigation Information on Electronic Maps**
 Issued 6-25-03 ♦ Prepared by SC-181 ♦ Supersedes DO-257

EMERGENCY LOCATOR TRANSMITTERS (ELTs)

- DO-204A **Minimum Operational Performance Standards for 406 MHz Emergency Locator Transmitters (ELTs)**
 Issued 12-06-07 ♦ Prepared by SC-204
- DO-188 **Emergency Locator Transmitter (ELT) Batteries Guidance and Recommendations**
 Issued 11-13-84 ♦ Prepared by SC-136 Battery Subcommittee

- DO-183 **Minimum Operational Performance Standards for Emergency Locator Transmitters-Automatic Fixed-ELT (AF), Automatic Portable-ELT (AP), Automatic Deployable-ELT (AD), Survival-ELT (S) Operating on 121.5 and 243.0 Megahertz**
 Issued 5-13-83 ♦ Prepared by SC-136 ♦ Supersedes DO-145, DO-146, DO-168 and Change 1
- DO-182 **Emergency Locator Transmitter (ELT) Equipment Installation and Performance**
 Issued 11-17-82 ♦ Prepared by SC-136
- DO-154 **Recommended Basic Characteristics for Airborne Radio Homing and Alerting Equipment for Use with Emergency Locator Transmitters (ELTs)**
 Issued 3-9-73 ♦ Prepared by SC-124

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- DO-315B **Minimum Aviation System Performance Standards (MASPS) for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems**
 Issued 06-21-11 ♦ Prepared by SC-213
- DO-315A **Minimum Aviation System Performance Standards (MASPS) for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems**
 Issued 09-15-10 ♦ Prepared by SC-213

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- DO-160G **Environmental Conditions and Test Procedures for Airborne Equipment**
 Issued 12-08-10 ♦ Supersedes DO-160F ♦ Prepared by SC-135
- DO-160F **Environmental Conditions and Test Procedures for Airborne Equipment**
 Issued 12-06-07 ♦ Supersedes DO-160E ♦ Prepared by SC-135
- DO-160E **Environmental Conditions and Test Procedures for Airborne Equipment**
 Issued 12-09-04 ♦ Supersedes DO-160D, Changes 1, 2 & 3 ♦ Prepared by SC-135
- DO-160D **Environmental Conditions and Test Procedures for Airborne Equipment**
 Issued 7-29-97 ♦ Supersedes DO-160C, Change 1-3 ♦ Prepared by SC-135
- Change 1 to DO-160D
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- DO-160C **Environmental Conditions and Test Procedures for Airborne Equipment**
 Issued 12-04-89 ♦ Supersedes DO-160B ♦ Prepared by SC-135

- DO-160B** **Environmental Conditions and Test Procedures for Airborne Equipment**
Issued 7-20-84 ♦ Supersedes DO-160A ♦ Prepared by SC-135
- DO-160A** **Environmental Conditions and Test Procedures for Airborne Equipment**
Issued 1-25-80 ♦ Supersedes DO-160 ♦ Prepared by SC-135

FLIGHT DATA COLLECTION

Future Flight Data Collection Committee Final Report
Issued 12-04-01

FLIGHT INFORMATION SERVICES

- DO-324** **Safety and Performance Requirements (SPR) for Aeronautical Information Services (AIS) and Meteorological (MET) Data Link Services**
Issued 12-08-10 ♦ Prepared by SC-206
- DO-308** **Operational Services and Environment Definition (OSED) for Aeronautical Information Services (AIS) and Meteorological (MET) Data Link Services**
Issued 12-06-07 ♦ Prepared by SC-206
- DO-267A** **Minimum Aviation System Performance Standards (MASPS) for Flight Information Services Broadcast (FIS-B) Data Link**
Issued 4-29-04 ♦ Supersedes DO-267 ♦ Prepared by SC-195
- DO-241** **Operational Concepts and Information Elements Required to Improve Air Traffic Management (ATM) – Aeronautical Operational Control (AOC) Ground-Ground Information Exchange to Facilitate Collaborative Decision Making**
Issued 10-6-97 ♦ Prepared by SC-169
- DO-239** **Minimum Operational Performance Standards for Traffic Information Service (TIS) Data Link Communications**
Issued 4-2-97 ♦ Prepared by SC-169 ♦ Errata Issued 10-17-97
- DO-232** **Operations Concepts for Data Link Applications of Flight Information Services**
Issued 3-13-96 ♦ Prepared by SC-169

FREE FLIGHT

National Airspace System Concept of Operations and Vision for the Future of Aviation
Issued 11-15-02 ♦ Approved by the Free Flight Steering Committee

Recommendations Regarding the Concept of Equipage and Mandated versus Voluntary Considerations
Issued 8-27-02 ♦ Approved by the Free Flight Steering Committee

Final Report of RTCA Task Force 3 Free Flight Implementation
Issued 10-26-95 ♦ Prepared by TF3

RTCA Task Force 3 Interim Report on Free Flight Implementation
Issued 8-28-95 ♦ Prepared by TF3

Government / Industry Operational Concept for the Evolution of Free Flight
Issued 12-1-97 ♦ Approved by the Free Flight Steering Committee

**Government / Industry Operational Concept for the Evolution of Free Flight,
Addendum 1: Free Flight Phase 1 Limited Deployment of Select Capabilities (URET, TMA (SC)
pFAST, CPDLC, CDM,SMA)**

Issued 8-19-98 ♦ Approved by the Free Flight Steering Committee

Government/Industry Operational Concept for the Evolution of Free Flight

Addendum 2: Candidate Recommendations on Near Term Procedural Enhancements, 1998 – 2002

Issued 8-1998 ♦ Approved by the Free Flight Steering Committee

Free Flight Action Plan

Issued 8-15-96 ♦ Approved by the Free Flight Steering Committee

Free Flight Action Plan Update

Issued 4-2-98 ♦ Approved by the Free Flight Steering Committee

Free Flight Action Plan Update II

Issued 12-10-98 ♦ Approved by the Free Flight Steering Committee

Report of the RTCA Board of Directors' Select Committee on Free Flight

Issued 1-18-95 ♦ Prepared by the RTCA Board of Directors' Select Committee on Free Flight

GLOBAL POSITIONING SYSTEM (GPS)

**RTCA Task Force Report on Global Navigation Satellite System (GNSS) Transition and
Implementation Strategy**

Issued 9-18-92 ♦ Prepared by Task Force 1

**DO-327 Assessment of the LightSquared Ancillary Terrestrial Component Radio
Frequency Interference Impact on GNSS L1 Band Airborne Receiver Operations**
Issued 06-03-11 ♦ Prepared by SC-159

**DO-316 Minimum Operational Performance Standards for Global Positioning System /
Aircraft Based Augmentation System Airborne Equipment**
Issued 04-14-09 ♦ Prepared by SC-159

**DO-310 Minimum Operational Performance Standards for GPS Ground-based Regional
Augmentation System Airborne Equipment**
Issued 03-13-08 ♦ Prepared by SC-159

**DO-301 Minimum Operational Performance Standards for Global Navigation Satellite
System (GNSS) Airborne Active Antenna Equipment for the L1 Frequency Band**
Issued 12-13-06 ♦ Prepared by SC-159

**DO-292 Assessment of Radio Frequency Interference Relevant to the GNSS L5/E5A
Frequency Band**
Issued 7-29-04 ♦ Prepared by SC-159

DO-261 NAVSTAR GPS L5 Signal Specification
Issued 12-14-00 ♦ Prepared by SC-159

**DO-253C Minimum Operational Performance Standards for GPS Local Area
Augmentation System Airborne Equipment**
Issued 12-16-08♦ Prepared by SC-159

- DO-247** **The Role of the Global Navigation Satellite System (GNSS) in Supporting Airport Surface Operations**
 Issued 1-7-99 ♦ Prepared by SC-159
- DO-246D** **GNSS Based Precision Approach Local Area Augmentation System (LAAS) Signal-in-Space Interface Control Document (ICD)**
 Issued 12-16-08 ♦ Prepared by SC-159 ♦ Supersedes DO-246C
- DO-245A** **Minimum Aviation System Performance Standards for Local Area Augmentation System (LAAS)**
 Issued 12-09-04 ♦ Prepared by SC-159 ♦ Supersedes DO-245
- DO-235B** **Assessment of Radio Frequency Interference Relevant to the GNSS**
 Issued 03-13-08 ♦ Prepared by SC-159 ♦ Supersedes DO-235A
- DO-229D** **Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment**
 Issued 12-13-06 ♦ Prepared by SC-159
- GEO Bias Modeling Tool for DO-229D**
 Issued 12-13-06 ♦ Prepared by SC-159
- DO-229C** **Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment**
 Issued 11-28-01 ♦ Prepared by SC-159 ♦ Supersedes DO-229B
 Errata issued 8-16-02
- DO-228** **Minimum Operational Performance Standards for Global Navigation Satellite Systems (GNSS) Airborne Antenna Equipment**
 Issued 10-6-99 ♦ Prepared by SC-159
- DO-217** **Minimum Aviation System Performance Standards DGNSS Instrument Approach System: Special Category 1 (SCAT-1) Revised to Include Change 1**
 Issued 8-27-93 ♦ Prepared by SC-159
- Change 1 to DO-217**
 Issued 8-13-94
- Change 2 to DO-217**
 Issued 11-15-96
- DO-208** **Minimum Operational Performance Standards for Airborne Supplemental Navigation Equipment Using Global Positioning System (GPS)**
 Issued 7-12-91 ♦ Prepared by SC-159
- Change 1 to DO-208**
 Issued 9-21-93 ♦ Errata Issued 3-16-95
- DO-202** **Report of Special Committee 159 on Minimum Aviation System Performance Standards (MASPS) for Global Positioning System (GPS)**
 Issued 11-28-88 ♦ Prepared by SC-159
- Portable Hand-Held GPS Receivers-What You Should Know**
 Issued 9-21-93 ♦ Prepared by SC-179

GUIDANCE / REPORTS

- DO-254 **Design Assurance Guidance for Airborne Electronic Hardware**
Issued 4-19-00 ♦ Prepared by SC-180
- DO-237 **Aeronautical Spectrum Planning for 1997-2010**
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- DO-216 **Minimum General Specification for Ground-Based Electronic Equipment**
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- DO-211 **User Requirements for Future Airport and Terminal Area Communications,
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- DO-193 **User Requirements for Future Communications, Navigation and Surveillance
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- DO-171 **Recommendations on Policies and Procedures for Off-the-Shelf Electronic Test
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- DO-167 **Airborne Electronics and Electrical Equipment Reliability**
Issued 9-16-77 ♦ Prepared by SC-130
- DO-162 **Report on Air-Ground Communications- Operational Considerations for 1980
and Beyond**
Issued 10-17-75 ♦ Prepared by SC-120
- DO-148 **A New Guidance System for Approach and Landing**
Issued 12-18-70 ♦ Prepared by SC-117 ♦ Volume II Change
- Portable Hand-Held GPS Receivers-What You Should Know
Issued 9-21-93 ♦ Prepared by SC-179

HIGH FREQUENCY DATA LINK (HFDL)

- DO-277 **Minimum Aviation System Performance Standards (MASPS) for the High
Frequency Data Link Operating in the Aeronautical Mobile (Route) Service
(AM(R)S)**
Issued 3-05-02 ♦ Prepared by SC-188
- DO-265 **Minimum Operational Performance Standards for Aeronautical Mobile High
Frequency Data Link (HFDL)**
Issued 12-14-00 ♦ Prepared by SC-188

HISTORY

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HUMAN FACTORS

- DO-256 **Minimum Human Factors Standards for Air Traffic Services Provided Via Data Communications Utilizing the ATN, Builds I and IA**
Issued 6-20-00 ♦ Prepared by SC-194
- DO-238 **Human Engineering Guidance for Data Link Systems**
Issued 4-2-97 ♦ Prepared by SC-169

INSTRUMENT LANDING SYSTEM (ILS)

- DO-195 **Minimum Operational Performance Standards for Airborne ILS Localizer Receiving Equipment Operating within the radio Frequency Range of 108-112 Megahertz**
Issued 11-17-86 ♦ Prepared by SC-153 ♦ Supersedes DO-131A
- DO-192 **Minimum Operational Performance Standards for Airborne ILS Glide Slope Receiving Equipment Operating within the Radio Frequency Range of 328.6 - 335.4 Megahertz**
Issued 7-18-86 ♦ Prepared by SC-153 ♦ Supersedes DO-132A
- DO-117 **Standard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers**
Issued 3-14-63 ♦ Prepared by SC-98 ♦ Errata

INTERFERENCE

- DO-292 **Assessment of Radio Frequency Interference Relevant to the GNSS L5/E5A Frequency Band**
Issued 7-29-04 ♦ Prepared by SC-159
- DO-235A **Assessment of Radio Frequency Interference Relevant to the GNSS**
Issued 12-05-02 ♦ Prepared by SC-159 ♦ Supersedes DO-235
- DO-176 **FM Broadcast Interference related to Airborne ILS, VOR and VHF Communications**
Issued 11-18-81 ♦ Prepared by SC-141

LORAN

- DO-194 **Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Loran-C Inputs**
Issued 11-17-86 ♦ Prepared by SC-137 ♦ Supersedes DO-159

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- DO-143 **Minimum Performance Standards-Airborne Radio Marker Receiving Equipment Operating on 75 MHz**
Issued 3-12-70 ♦ Prepared by SC-115 (ICG-7) ♦ Supersedes DO-57A

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- DO-226 **Guidance Material for Evolving Precision Area Navigation Equipment with Emphasis on MLS**
Issued 5-25-95 ♦ Prepared by SC-171 ♦ Supersedes DO-198
- DO-177 **Minimum Operational Performance Standards for Microwave Landing System (MLS) Airborne Receiving Equipment**
Issued 7-17-81 ♦ Prepared by SC-139
- Change 1, Change 2 to DO-177
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- DO-166 **Microwave Landing System (MLS) Implementation**
Issued 7-15-77 ♦ Prepared by SC-125

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- RTCA Task Force 5 NextGen Mid-Term Implementation Task Force Report
Issued 09-09-09 ♦ Prepared by the RTCA NextGen Task Force
- RTCA Task Force 5 NextGen Mid-Term Implementation Task Force Report – Data Files
Issued 09-09-09 ♦ Prepared by the RTCA NextGen Task Force

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- DO-295 **Civil Operators' Training Guidelines for Integrated Night Vision Imaging System Equipment**
Issued 10-19-04 ♦ Prepared by SC-196
- DO-275 **Minimum Operational Performance Standards for Integrated Night Vision Imaging System Equipment**
Issued 10-12-01 ♦ Prepared by SC-196
- DO-268 **Concept of Operations, Night Vision Imaging System for Civil Operators**
Issued 3-27-01 ♦ Prepared by SC-196

PORTABLE ELECTRONIC DEVICES (PEDs)

DO-307 Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance
Issued 10-11-07 ♦ Prepared by SC-202

Change 1 to DO-307

Issued 12-16-08

DO-294C Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft
Issued 12-16-08 ♦ Prepared by SC-202

DO-233 Portable Electronic Devices Carried on Board Aircraft
Issued 8-20-96 ♦ Prepared by SC-177 ♦ Errata Issued 8-18-99

DO-199 Potential Interference to Aircraft Electronic Equipment from Devices Carried Aboard
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PROCEEDINGS OF ANNUAL SYMPOSIA

2004 Implementing a "Performance Based" National Airspace System
2003 Modernizing Air Traffic Management in Today's Environment...Why, How and When
2002 The New Aviation Environment-Safety, Security and Efficiency
2000 ATC Modernization – Achieving New Operational Capabilities (and it's more than equipment)
1999 Modernization: Aviation's Challenge and Opportunity for the New Millennium
1998 Operations, Certification, & Standards: Cornerstones for the Future
1996 Working Together to Deliver Free Flight
1995 International Cooperation and Standards—Keys to Enhancing the Capacity, Efficiency, and Safety of Air Transportation
1994 Implementing Air Traffic Management through Government/Industry Partnerships— Accomplishments, Challenges, and Opportunities
1993 Implementing Air Traffic Management—A Systems Approach for the 21st Century

RADAR

DO-220 Minimum Operational Performance Standards (MOPS) for Airborne Weather Radar with Forward-Looking Windshear Detection Capability
Issued 9-21-93 ♦ Prepared by SC-173 ♦ Change 1 issued 6-23-95

DO-213 Minimum Operational Performance Standards for Nose-Mounted Radomes
Issued 1-14-93 ♦ Prepared by SC-173

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DO-173 Minimum Operational Performance Standards for Airborne Weather and Ground Mapping Pulsed Radars
Issued 11-19-80 ♦ Prepared by SC-133 ♦ Supersedes DO-134
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DO-172 **Minimum Operational Performance Standards for Airborne Radar Approach and Beacon Systems for Helicopters**
Issued 11-19-80 ♦ Prepared by SC-133 ♦ Change 1

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Issued 10-28-03 ♦ Prepared by SC-181

DO-236B **Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation**
Issued 10-28-03 ♦ Supersedes DO-236A ♦ Prepared by SC-181

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DO-215A **Guidance on Aeronautical Mobile Satellite Service (AMSS) End-to-End System Performance**
Issued 2-21-95 ♦ Prepared by SC-165 ♦ Supersedes DO-215

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Issued 9-28-98

DO-210D **Minimum Operational Performance Standards (MOPS) for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) Avionics**
Issued 4-19-00 ♦ Prepared by SC-165

Change 1 to DO-210D
Issued 12-14-00♦ Prepared by SC-165

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Issued 9-19-06 ♦ Prepared by SC-208

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Issued 2-12-90 ♦ Prepared by SC-161

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Issued 09-28-11 ♦Prepared by SC-221

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Issued 12-08-10 ♦Prepared by SC-216

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Issued 6-21-11 ♦ Prepared by SC-224 ♦Supersedes DO-230B

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Issued 6-19-08 ♦ Prepared by SC-207 ♦ Supersedes DO-230A

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Issued 4-10-03 ♦ Prepared by SC-199 ♦ Supersedes DO-230

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Issued 12-13-11 ♦ Prepared by SC-205

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Issued 12-13-11 ♦ Prepared by SC-205

DO-331 **Model-Based Development and Verification Supplement to DO-178C and DO-278A**
Issued 12-13-11 ♦ Prepared by SC-205

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Issued 12-13-11 ♦ Prepared by SC-205

DO-297 **Integrated Modular Avionics (IMA) Development Guidance and Certification Considerations**
Issued 11-08-05 ♦ Prepared by SC-200

DO-278A **Software Integrity Assurance Considerations for Communication, Navigation, Surveillance and Air Traffic Management (CNS/ATM) Systems**
Issued 12-13-11 ♦ Prepared by SC-205

DO-278 **Guidelines for Communication, Navigation, Surveillance and Air Traffic Management (CNA/ATM) Systems Software Integrity Assurance**
Issued 3-5-02 ♦ Prepared by SC-190/EUROCAE WG-52

DO-248C **Supporting Information for DO-178C and DO-278A**
Issued 12-13-11 ♦ Prepared by SC-205

DO-248B **Final Annual Report for Clarification of DO-178B "Software Considerations in Airborne Systems and Equipment Certification"**
Issued 10-12-01 ♦ Prepared by SC-190/EUROCAE WG-52

DO-178C **Software Considerations in Airborne Systems and Equipment Certification**
Issued 12-13-11 ♦ Prepared by SC-205

DO-178B **Software Considerations in Airborne Systems and Equipment Certification**
Issued 12-1-92 ♦ Prepared by SC-167 ♦ Supersedes DO-178A ♦ Advisory Circular ♦ Errata Issued 3-26-99

TERRAIN AWARENESS and WARNING SYSTEM (TAWS)

DO-309 **Minimum Operational Performance Standards (MOPS) for Helicopter Terrain Awareness and warning System (HTAWS) Airborne Equipment**
Issued 03-13-08 ♦ Prepared by SC-212

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS)

DO-300 Minimum Operational Performance Standards (MOPS) for Traffic Alert and Collision Avoidance System II (TCAS II) Hybrid Surveillance
Issued 12-13-06 ♦ Prepared by SC-147

Change 1 to DO-300

Issued 07-01-09 ♦ Prepared by SC-147

DO-299 Report - Assessment and Recommendations on Visual Alerts and Aural Annunciations for TCAS II
Issued 03-14-06 ♦ Prepared by SC-147

DO-298 Safety Analysis of Proposed Change to TCAS RA Reversal Logic.
Issued 11-08-05 ♦ Prepared by SC-147

DO-197A Minimum Operational Performance Standards for an Active Traffic Alert and Collision Avoidance System I (Active TCAS I)
Issued 9-12-94 ♦ Prepared by SC-147 ♦ Supersedes DO-197 ♦ Errata 11-22-94

Change 1 to DO-197A

Issued 7-29-97 ♦ Prepared by SC-147

DO-185B Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance System II (TCAS II)
Issued 6-19-08 ♦ Prepared by SC-147

Change 1 to DO-185B

Issued 07-01-09 ♦ Prepared by SC-147

DO-185A Minimum Operational Performance Standards for Traffic Alert and Collision Avoidance System II (TCAS II) Airborne Equipment
Issued 12-16-97 ♦ Prepared by SC-147

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Issued 5-13-83 ♦ Prepared by SC-147

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DO-127 Standard Procedure for the Measurement of the Radio-Frequency Radiation from Aviation Radio Receivers Operating within the Radio-Frequency Range of 30-890 Megacycles
Issued 4-15-65 ♦ Prepared by SC-96

DO-62 Calibration Procedures- test Standard Omni-Bearing Selectors and Omni-Bearing Selector Test Sets
Issued 12-2-54 ♦ Prepared by SC-61

DO-56 VOR Test Signals
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DO-52 Calibration Procedures for Signal Generators used in the Testing of VOR & ILS Receivers
Issued 12-8-53 ♦ Prepared by SC-61

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- DO-181E **Minimum Operational Performance Standards for Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment**
Issued 03-17-11 ♦ Prepared by SC-209 ♦ Supersedes DO-181D
- DO-144A **Minimum Operational Characteristics-Airborne ATC Transponder Systems**
Issued 10-02-08 ♦ Prepared by SC-209 ♦ Supersedes DO-144

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- DO-320 **Operational Services and Environmental Definition (OSED) for Unmanned Aircraft Systems**
Issued 06-10-10 ♦ Prepared by SC-203
- DO-304 **Guidance Material and Considerations for Unmanned Aircraft Systems**
Issued 03-22-07 ♦ Prepared by SC-203

VERTICAL GUIDANCE EQUIPMENT

- DO-152 **Minimum Operational Characteristics-Vertical Guidance Equipment Used in Airborne Volumetric Navigational Systems**
Issued 3-17-72 ♦ Prepared by SC-116E ♦ Appendix D 4-23-74

VOR

- DO-196 **Minimum Operational Performance Standards for Airborne VOR Receiving Equipment Operating within the Radio Frequency Range of 108-117.95 Megahertz**
Issued 11-17-86 ♦ Prepared by SC-153 ♦ Supersedes DO-149, DO-153A

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- DO-252 **Minimum Interoperability Standards (MIS) for Automated Meteorological Transmission (AUTOMET)**
Issued 1-11-2000 ♦ Prepared by SC-195
- DO-191 **Minimum Operational Performance Standards for Airborne Thunderstorm Detection Equipment**
Issued 5-16-86 ♦ Prepared by SC-154
- DO-175 **Minimum Operational Performance Standards for Ground-Based Automated Weather Observation Equipment**
Issued 1-23-81 ♦ Prepared by SC-143
- DO-174 **Minimum Operational Performance Standards for Optional Equipment which Displays Non-Radar-Derived Data on Weather and Ground Mapping Radar Indicators**
Issued 3-20-81 ♦ Prepared by SC-133

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