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Standards for Processing Aeronautical Data

RTCA DO-200C
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FOREWORD

This document was prepared by RTCA Special Committee 217 (SC-217) and EUROCAE Working Group 44 (WG-44). It was approved for publication by the RTCA Program Management Committee (PMC) and the EUROCAE Council on June 27, 2024.

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EXECUTIVE SUMMARY

Insufficient, corrupt, or erroneous aeronautical information has the potential to adversely affect the safety of aircraft operations. Therefore, processing of aeronautical data using Quality Management (QM) principles contributes to safety. In addition, Air Traffic Management (ATM) modernization programs are implementing services that are dependent on the robust management of data and information supporting air operations. This standard supports the safety of operations and ATM modernization initiatives, for example the capabilities and flexibilities provided by Performance Based Navigation (PBN) and collaborative capabilities between both ground and aircraft operations enabled by System Wide Information Management (SWIM).

It was deemed necessary to revise the RTCA/EUROCAE standard for processing aeronautical databases (RTCA DO-200B/EUROCAE ED-76A) to address interpretation issues encountered in applying DO-200B/ED-76A across the industry, and to enable opportunities for all market segments and entrants to utilize this standard in a consistent manner. RTCA SC-217 and EUROCAE WG-44 Terms of Reference were revised accordingly.

The revision to DO-200B/ED-76A takes into account suggested changes from industry and authorities' experience and feedback, as well as the related regulation and technical standards. Several requirements that were reported as confusing or open to conflicting interpretations were clarified. A new Data Process Assurance Level (DPAL), 2B (Basic), was added between DPALs 2 and 3. A requirements identifier scheme was applied to the requirements in Section 2 of the document, along with rules for how identifiers will be managed in future revisions, and harmonized how requirements are defined in the body of the document with how they are used in the Appendix F objective tables. Additional adaptations to DO-330/ED-215 Tool Qualification objectives were defined in Appendix D, including a new set of adaptations related to external components. Terminology was clarified and harmonized across the document. A summary of changes to DO-200B/ED-76A is provided in section "Revisions to RTCA DO-200B/EUROCAE ED-76A."

This standard provides recommended minimum requirements for the processing of aeronautical data. It aims to assist aeronautical data chain participants and regulatory authorities in meeting their responsibilities. It is intended to be used by organizations seeking approval of the method(s) they use to process or manipulate data. As a result, the document is structured in a manner that assists an organization to:

1. Relate material obtained from the relevant regulatory authority to the requirements set forth herein; and,
2. Determine if its processing method(s) meets the requirements.

This standard is divided as follows:

Section 1 - An introductory section which provides:

1. Information on the purpose and scope of the document;
2. An explanation of how to use and apply the document;
3. A list of baseline documents used in the development of the document;
4. An explanation of the concept that ultimate responsibility for ensuring data meets the quality for its intended use rests with the end-user; and,

5. An explanation of the concepts of data quality characteristics, required data quality, assuring quality through quality management, aeronautical data chains and the functional links in those chains.

Section 2 - Defines the requirements. Organizations intending to demonstrate compliance with this standard need to review this section to ensure they meet all requirements relevant to their data processing activities. This section:

1. Establishes the users' responsibility for defining their Data Quality Requirements (DQRs), and
2. Provides requirements for aeronautical data processing and quality management.

Section 3 - Describes a method, but not the only method, that can be used to demonstrate compliance with the requirements. States or approval authorities may determine that an application for approval using alternative methods of demonstrating compliance may also be acceptable.

Section 4 - Describes the Membership of RTCA SC-217/EUROCAE WG-44.

Appendix A - Glossary of terms and abbreviations used in this standard.

Appendix B - Provides guidance on defining DQRs in support of those requirements expressed in Section 2.

Appendix C - Provides guidance and further details on the methods available to demonstrate compliance.

Appendix D - Provides guidance on the application of DO-330/ED-215 to qualify tools in the aeronautical data processing domain.

Appendix E - Provides an example of the organization of compliance documentation.

Appendix F - Provides a summary of requirements in this standard.

Appendix G - Provides a mapping from DO-200B/ED-76A objective numbers to DO-200C/ED-76B requirement identifiers.

REVISIONS TO RTCA DO-200B/EUROCAE ED-76A

The following list is a summary of the major changes made to DO-200B/ED-76A for the DO-200C/ ED-76B version.

1. Editorial errors found during the revision of the document were corrected.

2. Incorporated requirements identifier schema for all requirements in Section 2.

a. Added to Section 1.3, How to Use This Document, to describe how requirement identifiers are maintained.

b. Updated Appendix F, DO-200C/ED-76B Data Processing Requirements Compliance Matrix, to use requirement identifiers and reflect the revised set of requirements.

c. Added Appendix G to map DO-200B/ED-76A objective numbers to DO-200C/ED-76B requirement identifiers.

d. Reworded statements throughout document to avoid the use of pseudo-requirement words like “must”, “need”, “should”, “will”, "may", and “cannot” to the extent practical and replace with active voice. Eliminated all “shall” requirements outside of Section 2.

3. Terms reviewed and revised to ensure they were used consistently throughout the document. A brief summary of these changes follows:

a. The term “data processor” was replaced with “data supplier”.

b. Changed “assurance level” to “integrity”.

c. Replaced the term “objectives” with “purpose” when used generically.

d. Split Appendix A into two sections: A.1, Glossary, and A.2, Acronyms. Many additional acronyms used in the document were listed in A.2.

e. Added terms to Glossary: Accredited Supplier, Alteration, Data Integrity Level, Quality Management System, and Tool.

f. Revised definitions for: Data Process Assurance Level, Data Quality, Format (as a process), and Quality Assurance.

4. Added Data Process Assurance Level 2B (Basic), and updated the content of B.3, Integrity, and C.2, Data Process Assurance Level.

5. Revised the Executive Summary.

6. Updated Section 1.1, Context, to be more current and remove references to Single European Sky ATM Research (SESAR) and NextGen.

7. Revised Section 1.4, Scope.

8. Removed unnecessary statement from Section 1.4.1, Definition of Terms.

9. Updated Section 1.4.2, Reference Documents, to add references to SAE ARP4754B/EUROCAE ED-79B, SAE ARP4761A/EUROCAE ED-135, ICAO Doc 10666, RTCA DO-394/EUROCAE ED-302, and ISO 9001. Updated versions of other referenced documents where applicable. Added note before Figure 1-1 to acknowledge Data Transmission.

10. Removed redundant statement from Section 1.5.1, Data Quality.

11. Clarified wording in Sections 1.5.2, Determining Data Quality Requirements, 1.5.3.1, Quality Management, 1.5.3.2, Traceability, 1.5.4.1, Aeronautical Data Chain Overview, and 1.5.4.4, Aeronautical Data Preparation.

12. Moved statement related to scope of document from Section 1.5.5.1, General Aeronautical Data Processing Model, to Section 1.4, Scope.

13. Removed statement from Section 1.5.5.3, Aeronautical Data Preparation: Assemble Phase.

14. Added missing words to end of Section 1.5.5.6, Aeronautical Data Preparation: Format Phase.

15. Updated Figures 1-2, 1-3, 1-4, and 2-1. Added note after Figure 1-4.

16. Removed redundant requirement statement in Section 2.1, Requirements Introduction.

17. Retitled Section 2.2 from "Compliance Documentation" to "Compliance".

18. Simplified requirement R_001 in Section 2.2.1, Compliance Plan.

19. Retitled Section 2.3 from "Defining DQRs" to "Data Quality Requirements".

20. Split the content of Section 2.3.2, Data Quality Characteristics, into multiple requirements.

21. Split the content of Section 2.3.3, User, into multiple requirements. Added note to requirement R_014.

22. In Section 2.3.4, removed prior DO-200B/ED-76A objectives 2-1 and 2-9 as duplicates of requirement R_022 (prior objective 2-20).

23. Retitled Section 2.3.5 from "Documentation Requirements (User/Supplier)" to "Data Quality Requirements Documentation (User and Supplier)". Reworded the requirements in this section for clarity and to avoid redundancy. Removed configuration management portion of requirement prior objective 2-24 (now R_026) as a duplicate of R_106 (prior objective 12-1). Removed coordination of changes portion of requirement prior objective 2-25 (now R_027) as a duplicate of R_026 (prior objective 2-24).

24. Retitled Section 2.4 from "Defining Aeronautical Data Processing Requirements" to "Aeronautical Data Processing". Split the contents of Section 2.4.1, Data Processing Procedures, into multiple requirements, and reworded many of the requirements for clarity. Added note to requirement R_039. Removed prior objective 3-13 as a duplicate of R_028 (previously objective 3-1). Removed prior objective 3-15 as a duplicate of requirements R_013, R_016, and R_041 (previously objectives 2-11, 2-14, and 3-16, respectively). Formalized requirement to clarify situations where temporary, intentional deviations are necessary into requirement R_042.

25. Revised Section 2.4.2, Data Alteration, to harmonize requirements and description with RTCA DO-394/EUROCAE ED-302.

26. Moved Competency Management (previously Section 2.4.4) to Section 2.4.3. Moved Data Configuration Management (previously Section 2.4.3) to Section 2.5. Moved Aeronautical Data Tool Qualification (previously Section 2.4.5) to Section

2.6. Moved Defining Data Security Requirements (previously Section 2.4.6) to Section 2.7. Moved Quality Management for Aeronautical Data Processing (previously Section 2.7) to Section 2.8.

27. Revised Section 2.5, Data Configuration Management (renumbered from Section 2.4.3) and sub-sections. Retitled subsection headings to remove the word "Requirements". Split the content of Section 2.5.2, Data Placed Under Configuration Management, into multiple requirements.

28. Added more introductory content to Section 2.6, Aeronautical Data Tool Qualification (renumbered from Section 2.4.5). Added note to requirement R_069.

29. Rearranged content of Section 2.6.1, Determining Requirements for Tool Qualification, and removed statements that were redundant with the content of Figure 2-1.

30. In Section 2.6.2, Determining Tool Qualification Level, formalized a prior recommendation into requirement R_074.

31. Retitled Section 2.6.3 from "Tools Previously Qualified Under RTCA DO-200A/EUROCAE ED-76" to "Tools Previously Qualified", and updated the content of this section.

32. Added Section 2.6.4, "Tools Not Previously Qualified".

33. Retitled Section 2.8 from Section 2.5 Defining Quality Management Requirements" to "Quality Management for Aeronautical Data Processing", and updated content. Split Section 2.8.1, Quality Management Procedures, into multiple requirements.

34. Clarified requirements in Section 2.8.2, Quality Management Control. Formalized a prior recommendation into requirement R_084. Removed prior objective 9-8 as a duplicate of R_097 (prior objective 10-3). Moved prior objective 9-15 to Section 2.4.3 as requirements R_062, R_063, and R_064.

35. Retitled Section 2.8.3 from "Review" to "Reviews", and splits its content into multiple requirements.

36. Retitled Section 2.8.3.1 from "Event-Driven" to "Event-Driven Reviews", and clarified the wording of its requirements. Removed prior objective 10-6 as a duplicate of requirements R_071 and R_073 (prior objectives 7-3 and 7-5).

37. Retitled Section 2.8.3.2 from "Periodic" to "Periodic Reviews", and clarified the wording of its requirements. Removed prior objective 11-6 as a duplicate of requirement R_094 (prior objective 9-20).

38. Retitled Section 2.8.4 from "Document Control Requirements" to "Document Control", and split its content into multiple requirements.

39. Clarified the requirements in Sections 2.8.5, Quality Records, and 2.8.6, Management Reviews.

40. Minor revisions to content in Section 3, Compliance.

41. Section 4, Membership was revised to reflect the members who contributed to this version of the document.

42. Updated content throughout Appendix B, Guidance on Defining Data Quality Requirements. Renumbered subsections B.1.x to B.1 through B.7. Removed

previous B.2, Data Supplier Requirements, and incorporated its content into B.1 through B.7. Significantly revised B.3, Integrity.

43. Significantly updated Appendix C, especially C.2, Data Process Assurance Level. Retitled C.2.1 from "Validation" to "Validation Techniques". Revised Table C-2, Example of Validation Techniques Applied Per DPAL, and stressed that it is an example.

44. Updated Appendix D, DO-330/ED-215 TOOL QUALIFICATION ADAPTATION GUIDANCE, adding further clarification and information. Updated Appendix D.2, DO-330/ED-215 Objectives Aeronautical Data Processing Adaptations, including adding more and clarifying existing adaptations. Added new section D.3, Additional Adaptions for Tool External Components.

45. Revised Appendix E, Guidance on Compliance Documentation, to reflect revised structure of the document.

46. This summary of revisions was included.

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1 Purpose and Scope

1.1 Context

ATM modernization programs are implementing services that support aeronautical applications and depend on the robust management of aeronautical data and information. This standard supports these modernization efforts, for example the capabilities and flexibilities provided by Performance Based Navigation (PBN). Several other collaborative capabilities implement shared responsibilities between both ground and aircraft operations. System Wide Information Management (SWIM) enables the provision of data and information supporting these concepts.

This standard addresses aeronautical databases as well as the associated data processing. These databases may be utilized by airborne or ground-based aviation products. This standard includes guidance and requirements for data processing activities that may occur between data origination and end use.

1.2 Introduction

This standard provides the minimum requirements and guidance for the processing of aeronautical data that are used for navigation, flight planning, terrain/obstacle awareness, flight deck displays, flight simulators and for other applications. Such data would be passed on to the user as a data set. This standard provides requirements to support implementation of data quality management, inspired by the Quality Management System (QMS) concepts outlined in ISO 9001. When applied by each organization in the aeronautical data chain, the standard provides assurance that the level of data quality is established and maintained.

1.3 How to Use This Document

This standard represents a consensus reached within the aviation community and has been written so that it may be applied by the regulatory authorities as an acceptable means of ensuring that aeronautical data maintains the required data quality and supports its intended use. It does not, in itself, have any authority over organizations responsible for processing aeronautical data.

This standard is intended to address the specific issues of the aeronautical data process. While regulations require organizations to have a QMS in place, the requirements defined in this standard also need to be met when claiming compliance to the standard.

This standard uses the term “shall” to identify requirements within this standard, which can be traced to particular aspects of the aeronautical data process.

Each requirement has a unique identifier in the format R_XXX. This ID is specific to the version of the document in which it appears. However, an ID number associated with a requirement will not change from one version to another unless the requirement change could result in a process change or modifies the intent of the requirement changes. Requirement IDs will not change due to editorial or clarification modifications, or due to moving requirements to a different place in the document.

If the intent of a requirement changes, the ID used in the previous version will be eliminated and never reused. A new ID is assigned for the new document version. For example, if the requirement, “The user shall assure that the bicycle requirements are attained” were modified to state, “The user shall assure that the bicycle requirements are accomplished”,

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the requirement ID would not be changed, since the intent of the requirement is still to ensure that the bicycle requirements are satisfied.

However, if it were modified to state, “The user shall assure that the bicycle requirements are attained and recorded,” the requirement ID would change, since the scope of the requirement expanded to include recording the requirements, as opposed to just satisfying them.

Requirements that are deleted or deprecated never have their identifiers reused.

1.4 Scope

This standard provides minimum requirements for all phases of the data process applicable to the processing of aeronautical data, including their quality management. This standard provides guidance to assess compliance and determination of the levels of process assurance. This standard supports the development of aeronautical databases. Data origination is outside the scope of this standard except when origination is performed by non-authoritative sources. The end-use of aeronautical data is also outside the scope of this standard. This standard is a complementary standard to those reference documents listed in Section 1.4.2.

1.4.1 Definition of Terms

The definitions of terms used in this standard are provided in a glossary in APPENDIX A.

Several terms have been given specific and more restricted meanings than may be understood from general use. Terms like “accuracy”, “resolution”, “integrity”, “validation” and “verification” are defined in APPENDIX A and are further addressed in APPENDIX B, where their interrelationships are discussed.

1.4.2 Reference Documents

Figure 1-1 maps relevant reference documents to the functional links based on their typical use. Different participants throughout the data chain can perform multiple functions depending upon which environment they operate in. A number of the indicated reference documents are used repeatedly across the data chain. Those instances were not mapped across all functional links to avoid cluttering the image. For example, ARINC 424 is used widely in multiple functional links.

In this document, references to standards with “()” at the end refer to all acceptable published versions of that standard.

Note: The list of reference documents stated is not intended to be exhaustive.

1. AEEC ARINC Specification 424 version 23, Navigation System Data Base

2. ANSI/ASQ Z1.4-2003(R2018)4, Sampling Procedures and Table for Inspection by Variable for Percent Nonconforming

3. ARINC 842-1, Guidance for Usage of Digital Certificates

4. ATA Specification 42, Aviation Industry Standards for Digital Information Security, Revision 2020.1

5. SAE ARP4754B/EUROCAE ED-79B, Guidelines for Development of Civil Aircraft and Systems

6. SAE ARP4761A/EUROCAE ED-135, Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment

7. ICAO Annex 4, International Standards and Recommended Practices - Aeronautical Charts

8. ICAO Annex 11, International Standards and Recommended Practices -Air Traffic Services

9. ICAO Annex 14, International Standards and Recommended Practices - Aerodromes

10. ICAO Annex 15, International Standards and Recommended Practices - Aeronautical Information Services

11. ICAO Doc 8126 Seventh Edition, Aeronautical Information Services Manual AN/872 2022

12. ICAO Doc 9613 Fifth Edition, Performance Based Navigation (PBN) Manual AN/937 2023

13. ICAO Doc 9674 Second Edition, World Geodetic System 1984, (WGS-84) AN/946 2002

14. ICAO Doc 10666, PANS-AIM 2018

15. ISO 2859-1, Sampling Procedures for Inspection by Attributes

16. ISO 9001 Quality Management Systems — Requirements, 2015

17. ISO/IEC 27001 Annex A, Controls/ ISO 27002, Code of Practice for Information Security Management for Additional Information, 2022

18. ISO/IEC 27002, Information technology - Security Techniques - Code of Practice for Information Security Management, 2022

19. ISO/IEC 27005, Information Technology - Security Techniques - Information Security Risk Management, 2022

20. NIST FIPS 198-1, The Keyed-Hash Message Authentication Code (HMAC), July 2008

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27. RTCA DO-201B/EUROCAE ED-77A, User Requirements for Navigation Data

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28. RTCA DO-229F, Minimum Operational Performance Standards for Global Positioning System/Satellite-Based Augmentation System Airborne Equipment

29. RTCA DO-236D/ED-75E, Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation

30. RTCA DO-257B, Minimum Operational Performance Standards for the Depiction of Navigational Information on Electronic Maps

31. RTCA DO-272D/EUROCAE ED-99D, User Requirements for Aerodrome Mapping Information

32. RTCA DO-276C/EUROCAE ED-98C, User Requirements for Terrain and Obstacle Data

33. RTCA DO-291C/EUROCAE ED-119C, Minimum Interchange Standards for Terrain, Obstacle, and Aerodrome Mapping Data

34. RTCA DO-309, Minimum Operational Performances Standards (MOPS) for Helicopter Terrain Awareness and Warning Systems (HTAWS) Airborne Equipment

35. RTCA DO-315B/EUROCAE ED-179B, Minimum Aviation System Performance Standards (MASPS) for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems

36. RTCA DO-330/EUROCAE ED-215, Software Tool Qualification Considerations

37. RTCA DO-394/EUROCAE ED-302, Considerations for Aeronautical Data Alteration

Figure 1-1 provides an overview of the relationship of ICAO and other industry standards to the applicable functional links of the aeronautical data chain. The documents' revisions have been intentionally omitted.

Note: Although Data Transmission is not depicted, several of these standards also apply to Data Transmission.