STANDARDS FOR AERONAUTICAL INFORMATION

RTCA DO-201A
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Prepared by:
SC-181

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Foreword

This report was prepared by Special Committee 181 (SC-181) and approved by the RTCA Program Management Committee (PMC) on April 19, 2000.

RTCA, Incorporated 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 in a manner that helps government and industry meet their mutual objectives and responsibilities;

- analyzing and recommending solutions to the 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; and

- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and 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.

Since RTCA is not an official agency of the United States 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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EXECUTIVE SUMMARY

1. The RTCA Technical Management Committee established Special Committee 181 (SC-181) to:

   a. Develop Minimum Aviation System Performance Standards (MASPS) for area navigation systems operating in Required Navigation Performance (RNP) airspace.

   b. Investigate the processes related to the loading of aeronautical databases and produce guidance to ensure that:

      1) The integrity of the civil aviation authority created source data and the processing of this data is not degraded for RNP and non-RNP, area navigation (RNAV) operations; and

      2) The databases are compatible with the type of equipment in which they will be used.

   c. Review current practices used in defining aeronautical data and recommend any changes needed to provide improved operational effectiveness for airborne navigation systems that use stored databases.

   d. Coordinate its work with the European Organization for Civil Aviation Equipment, Working Group 13 (EUROCAE WG 13). The results will be the combined effort of these two organizations, RTCA SC-181/EUROCAE WG 13.

2. The work of SC-181/EUROCAE WG 13 has resulted in three new documents, two of which were published to satisfy the terms of reference in paragraphs 1a. and 1b. above. These two documents are:

   a. RTCA DO-236/EUROCAE ED-75, "Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation"; and

   b. RTCA DO-200A/EUROCAE ED-76, "Standards for Processing Aeronautical Data".

3. RTCA DO-201A/EUROCAE ED-77, this Document, is the third document and supports the terms of reference in paragraph 1c. above. It is submitted to the aviation community as 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 aviation industry requires that organizations who develop and publish aeronautical information consider the type, accuracy, resolution, and procedure design concepts presented.

4. Several standards presented in this document are already available in International Civil Aviation Organization (ICAO) Standards and Recommended Practices (SARPS). These are appropriately referenced to ICAO. Their inclusion in this document is to emphasize the importance of ICAO compliance. Others are currently being developed by the ICAO Panels such as the Obstacle Clearance Panel (OCP) as well as various industry groups. The words "standards" and "requirements" are used in context with the following Oxford Dictionary definitions.

Standards – Object or quality or measure to which others should conform or against which others are judged; a required degree of excellence, etc.

Requirements – Things needed or depended on for success.

5. Graphic illustrations appearing in different Sections and Appendices of this document are conceptual and were developed strictly to support textual discussions. They are not intended to be used for developing cartographic charting criteria or standards. Illustrations contain graphic symbols copyrighted by Jeppesen which have been reproduced with permission. The equivalent graphic symbols to be used by States are specified in ICAO Annex 4.

6. RTCA DO-201A/EUROCAE ED-77 is organized as follows.

Section 1.0 Purpose and Scope explains the purpose of the document and summarizes the introduction of new concepts and terminology.

Section 2.0 General Requirements and Standards discusses the needs for standards that will accommodate the requirements for aeronautical data elements including accuracy, resolution,, calculation conventions, naming convention, and the timely dissemination of the finished data.

Section 2.1 specifies aeronautical data elements required by the aviation industry and a standard for the accuracy, resolution, and integrity of the associated values.

Section 2.2 discusses the requirements for a calculation convention and presents specific conventions that should be used as a standard for calculating fixes. Examples are provided in Appendix D.

Section 2.3 presents the requirements for naming conventions and prescribes standard conventions for: the naming of fixes; assigning identifiers to aerodromes and airways; and assigning designators to domestic airways.

Section 2.4 explains the importance of timely dissemination of accurate and complete aeronautical information and stresses the use of the standard ICAO Aeronautical Information Regulation and Control (AIRAC) schedule. An AIRAC schedule through the year 2008 is included.

Section 3.0 Specific Requirements and Standards describes operational requirements that civil aviation authorities, procedure designers, and airspace planners should consider when developing procedures in the en route, arrival, departure, approach, and aerodrome environments. Standards are proposed where appropriate.

Section 3.1 specifies the types of route segments to be used in the design of arrivals, departures, and approaches with emphasis on those types required for RNAV operations in RNP airspace.

Section 3.2 presents aeronautical information requirements to support navigation systems conducting arrivals and departures. The standards will enhance non-computer as well as computer-based navigation.

Section 3.3 includes several specific instrument approach procedure requirements of importance to the industry and proposes standards where appropriate.

Section 3.4 discusses the requirement for a quality graphic representation of the aerodrome environment.

Appendix A is a glossary of terms, abbreviations and acronyms used in the document. ICAO definitions were used when ever available. Where acronyms/abbreviations differ from those prescribed by ICAO, the ICAO acronym/abbreviation is shown in brackets.

Appendix B discusses Cyclic Redundancy Check (CRC) methodology to support the integrity classifications in Section 2.1 and the GNSS Precision Approach Path Point Concept of Sections 3.3.6.

Appendix C provides background information on the determination of geographic coordinates including a brief summary of WGS 84.

Appendix D presents examples of fix calculations using the calculation convention standards prescribed in Section 2.2. Formulas for direct and indirect geodesic calculations are included.

Appendix E presents the FAA philosophy behind the development of the basic "T" RNAV instrument approach procedure design concept.

Appendix F includes several examples of how the "T" and "TAA" procedure design concepts of Section 3.3.2 and 3.3.3 might be applied in various situations.

Appendix G presents a naming convention for waypoints in the terminal area. The concept is used in Europe and proposed by the European aviation community for use internationally.

Appendix H contains an algorithm that can be used to calculate the forward and reverse bearing/distance between two points.

Appendix I provides a list of reference material for reader convenience.

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1.0 PURPOSE AND SCOPE

1.1 Introduction

The information in this document has been compiled for the purpose of stating aeronautical information requirements of the aviation industry with emphasis on RNAV operations in RNP airspace. Three types of standards are presented in support of these requirements: existing ICAO standards; standards proposed for adoption by ICAO; and developing standards to support evolving requirements. The rotorcraft community may also be able to use the standards defined within this document, however, their applicability has not been evaluated.

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The requirements and associated standards presented are not all inclusive but represent those of immediate concern to RNAV and RNP RNAV operations. RNP RNAV is a term and concept developed by RTCA SC-181/EUROCAE WG 13, refer to Section 1.2.3. Sections containing standards and concepts of specific importance to RNP RNAV operations are labeled ***(RNP RNAV Significant)***. Information in these Sections may also be of importance to RNAV and non-RNAV operations as well. Worldwide aeronautical information providers are urged to use information in this document while planning, organizing, developing, coordinating, and implementing RNP concepts. It is also important that this information be considered during the transition to RNP.

Sections focus on the importance of quality aeronautical information and the fact that:

- The evolution of computer navigation technology including the development of Global Navigation Satellite System (GNSS) technology and the RNP concept have a greater dependency on the accuracy, reliability, integrity, and timely availability of navigation reference data than ever before;

- There is a greater need for standardization in aeronautical information management practices than ever before; and

- There is a greater need for clear and effective guidance in the development of the aeronautical information than ever before.

Aeronautical information issues of importance to the aviation industry were addressed in RTCA DO-201, "User Recommendations for Aeronautical Information" dated November 1988. Several of these issues were never resolved and are repeated in this document. In addition and because of the increasing importance of quality and timely aeronautical information, the actions to resolve the issues were changed from recommendations in RTCA DO-201 to industry stated requirements in RTCA DO-201A/EUROCAE ED-77. Also, the title was changed to "Standards for Aeronautical Information" so that standards for supporting the requirements could be presented and emphasized. In terms of safety, navigation