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User Requirements for Aerodrome Mapping Information

RTCA DO-272C
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Foreword

This report was prepared by RTCA Special Committee 217 (SC-217) and EUROCAE Working Group 44 (WG-44) and approved by the RTCA Program Management Committee (PMC) on September 28, 2011.

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

Operations at large aerodromes have become a complex combination of many activities being performed by many individuals. This group of individuals includes pilots, air traffic controllers, apron controllers, surface vehicle operators, construction/maintenance crews, emergency/security personnel, commercial and cargo airline operations personnel, and general and business aviation operations personnel. All of these individuals must work collaboratively to ensure safe efficient flight operations at the aerodrome. Furthermore, all of these individuals, or *users*, require some knowledge of the aerodrome layout.

Traditionally, pilots navigate on the surface based on visual aids such as airfield markings, signs, and lighting, in conjunction with a paper chart of the aerodrome layout. Radio communications between air traffic control (ATC) and pilots are used to obtain the route to follow while on the surface. ATC issues route instructions, using explicit phraseology along with unique names of legs along the route. ATC must remember the routes given to all aircraft, as well as all aircraft locations, so that no one is directed into a potential collision. If there is a potential for collision, hold short instructions can be issued over the radio frequency to constrain aircraft movements. To maintain safe separation, surveillance on the aerodrome surface is performed by the flight crews based primarily on the "see-and-avoid" principle. Similarly, ATC performs the surveillance task based primarily on visual cues. Occasionally, both pilots and controllers will use radio communications to confirm positions of relevant traffic. From this brief description of aircraft movements, it is apparent that both ATC and pilots require geospatial information about the aerodrome layout (e.g. the relative location and orientation of runways, taxiways, and stands).

In order to support flight operations at aerodromes, several other activities are required, each performed by separate organizations and/or facilities. The aerodrome authority is responsible for construction and maintenance of aerodrome resources such as buildings, pavement, markings, and landing systems (e.g., ILS). They are also responsible for providing emergency response teams such as fire/rescue and aerodrome security in some cases. Commercial and cargo airline operators perform activities such as apron control, aircraft maintenance and fueling, baggage and cargo handling, catering services, crew and aircraft scheduling, flight planning, and ticketing. They also manage training activities such as flight simulations to assure pilot currency. Finally, General Aviation (GA) and Business Aviation operations are typically supported by Fixed Base Operators (FBOs). FBOs support GA and Business Aviation operations by providing maintenance, fueling, flight planning, and local ground transportation services. As with pilots and controllers, all of these users also require geospatial information.

The information contained in this document has been compiled by industry for the purpose of stating surface mapping information requirements for users such as those described above. The requirements presented are not all-inclusive, but represent those of more immediate concern. Airworthiness authorities, civil aviation authorities, and the aviation industry urge aerodrome mapping database (AMDB) originators and integrators to use this document when providing those data to system designers and users. In addition, this document provides guidance material on structure of AMDBs. Based on the availability of standardized current AMDBs, a variety of applications can be envisioned. Several are described in this document. This document has been written under the assumption that if all users are using consistent aerodrome mapping data, operations can be improved, and new capabilities can be realized.

This document is organized as follows:

- Section 1 provides background information with respect to the purpose of developing AMDB requirements
- Section 2 describes aerodrome mapping data considerations that are important when attempting to comply with this document
- Section 3 provides general requirements and recommendations for AMDB development

- Section 4 provides more detailed content requirements and specific numerical requirements
- Appendix A provides an overview of the types of applications that may make use of AMDBs
- Appendix B is a glossary of relevant terms
- Appendix C lists important abbreviations and acronyms
- Appendix D may be used as guidance material when creating AMDBs to meet the quality requirements specified in this document
- Appendix E lists the membership of the committee that developed this document

REVISIONS TO RTCA DO-272B/EUROCAE ED-99B

The following list is a summary of the major changes made to RTCA DO-272B/EUROCAE ED-99B for the DO-272C and ED-99C versions.

Editorial errors, mainly reported by the users of the previous version of the document, or found during the update of the document were corrected.

The reference list was updated.

For temporality new sections were added, Sections 2.1.2, 2.3.4, 3.12, 4.1.3, 4.1.4.

The completeness text was re-written, Section 2.3.2.

Changes were made to the data elements text, Section 4.3.

New text was added to cover the requirements related to the Aerodrome Surface Routing Network (ASRN), Sections 2.2.4, 4.3.10. The data elements related to the ASRN were grouped in the dedicated Section 4.3.10.

The General and Specific Requirements text was updated and new rules were added, Section 3, 4. Geometrical/functional relations and constraints requirements were added to reflect new features.

Numerical requirements tables were updated following harmonization with ICAO Annex 4, 14 and 15, Section 4.4.4.

The Appendix-A was re-written with new state-of-art and latest realization examples of AMDB applications.

Definitions, features, attributes, and data content were revised. A brief summary of these changes follows:

- New features were added: ArrestingSystemLocation; RunwayCenterlinePoint; AsrnEdge; AsrnNode;
- The new temporal attributes sfeat, endfeat, stvalid, endvalid, interp were added to all features;
- A new attribute rwyahtxt was added to TaxiwayHoldingPosition;
- A new attribute rwymkwy was added to RunwayMarking;
- A new attribute terrref was added to StandGuidanceLine, ParkingStandArea, and ParkingStandLocation;
- Attribute restac was renamed to restacft and definition was modified;
- Attribute acn was renamed to acft and definition was modified;
- Attribute elev was added to RunwayThreshold and Helipad Threshold;
- The definition of elev was updated;
- Attribute status was added to RunwayElement, RunwayIntersection, FinalApproachandTakeoff Area, TouchDownLiftOff Area, TaxiwayElement, and ParkingStandArea;
- A new attribute aprontyp was added to ApronElement;
- Feature attribute definitions were enhanced (example: pcn, width, length);
- New attributes required by new features were added (example: setback for the ArrestingSystemLocation feature).

The membership list was updated and this summary of revisions was included.

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1 PURPOSE AND SCOPE

1.1 Introduction

The information contained in this document has been compiled for the purpose of stating aerodrome surface mapping information requirements for aeronautical uses. The term aerodrome is used in this document to include: Aerodromes, Heliports, and Sea-Plane aerodromes. The requirements are not all-inclusive, but represent those of more immediate concern. As future applications are developed, more stringent numerical requirements may be needed. Airworthiness authorities, civil aviation authorities, and the aviation industry urge the aerodrome mapping data originators and integrators to use this information when providing those data to system designers and users.

Based on the availability of standardized aerodrome mapping databases (AMDBs), a wide variety of applications can be envisioned (Appendix A). It is important to note that multiple user classes can benefit from using these databases, for example: pilots, controllers, aerodrome managers, and aerodrome emergency/security personnel. Each of the applications listed below are described in detail in Appendix A.

Applications of AMDBs:
Digital charts
Traffic awareness, runway incursion prevention
Position and route awareness, runway excursion prevention
Display of notices to airmen
Synthetic/enhanced vision
Resource management
Training and simulation
Facility management
Emergency and security service management
Asset management

1.2 Scope

This document provides minimum requirements and reference material applicable to the content, origination, publication, and updating of aerodrome mapping information. The document also provides guidance to assess compliance and determination of the levels of confidence that need to be reached to support the types of applications listed in Appendix A. This document should be used to support the development and application of AMDBs. AMDBs represent a collection of aerodrome information that is organized and arranged for ease of electronic storage and retrieval in systems that support aerodrome surface movements, training, charting, and planning.

Appendix A is intended to provide an overview of the types of applications that may make use of AMDBs. These application categories were used as guidance to ensure the defined AMDB user requirements could support the selected current and future capabilities.

The content generated/surveyed within the scope of this document will be interchangeable according to the rules defined in RTCA DO-291B/EUROCAE ED-119B.