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Minimum Operational Performance Standards (MOPS) For Airborne Weather Radar Systems

RTCA DO-220B
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FOREWORD

This document was prepared by Special Committee 230 (SC-230) and approved by the RTCA Program Management Committee (PMC) on June 22, 2023. It supersedes DO-220A with Change 1, dated August 17, 2018.

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 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 and several advisory circulars.

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

Since the introduction of DO-220, there have been many technological advances in the field of airborne weather radar. DO-220A incorporated updates and corrections to the previous version. In addition to modernizing the requirements and test procedures for the weather, ground mapping, and forward-looking windshear functions set out in its predecessors, SC-230 added specifications for radar detection of turbulence and atmospheric threat awareness. DO-220B adds requirements and test procedures for a high-altitude ice crystal detection function. Any of these functions may be implemented individually or in combination with any others. This document has been designed such that the requirements and test procedures for each function are grouped into distinct sections to facilitate testing and showing of compliance.

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1 PURPOSE AND SCOPE

1.1 Introduction

This document contains Minimum Operational Performance Standards for Airborne Radar Systems that may include any combination of the following functions: weather detection, ground mapping, forward-looking windshear detection, forward-looking turbulence detection, atmospheric threat awareness capability, or high-altitude ice crystal detection.

These standards specify system characteristics that should be useful to designers, manufacturers, installers, and users of the equipment. The requirements defined in Subsection 2.1 and Paragraphs 2.2.1, 0, 2.2.5, and 0 of this MOPS are applicable to both rotorcraft and fixed-wing aircraft. Paragraph 2.2.5 can be used to address the indication of turbulent conditions or microburst events ahead of the aircraft for rotorcraft. This document does not directly define the MOPS for forward-looking windshear or turbulence detection capability for rotorcraft.

Compliance with these standards is one means of assuring that the equipment will perform its intended function(s) satisfactorily under all conditions normally encountered in routine aeronautical operation. Any regulatory application of this document is the sole responsibility of appropriate governmental agencies.

Section 1 of this document provides information needed to understand the rationale for equipment characteristics and requirements stated in the remaining sections. It describes typical equipment operations and operational goals, as envisioned by the members of Special Committee 230, and establishes the basis for the standards stated in Sections 2 and 3. This section also contains definitions and assumptions essential to proper understanding of this document.

Section 2 contains the Minimum Performance Standards for the equipment. These standards specify the required performance under standard environmental conditions. Also included are recommended test procedures necessary to demonstrate equipment compliance with the stated minimum requirements.

Section 3 describes the performance required of installed equipment. Tests for the installed equipment are included when performance cannot be adequately determined otherwise.

Section 4 describes the operational performance characteristics for equipment installations and defines conditions that will assure the equipment user that the expected operational environment will allow safe and reliable operation of the equipment.

Appendix A, a normative appendix, describes the windshear database developed for the certification testing of airborne forward-looking windshear detection systems, and defines the test scenarios used for this testing. It also includes considerations associated with the use of the windshear test set-up

Appendix B, an informative appendix, includes plots associated with the windshear data sets.

Appendix C, a normative appendix, describes the analytical technique for evaluation of windshear missed events and nuisance alerts.

Appendix D, a normative appendix, describes the atmospheric database developed for the certification testing of airborne forward-looking ice crystal detection systems, and defines the test scenarios used for this testing.

Appendix E, an informative appendix, contains historical information and derivations that may be useful to the radar designer.

