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Minimum Operational Performance Standards (MOPS) for Ground Based Surveillance Systems (GBSS) for Traffic Surveillance

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FOREWORD

This document was prepared by Special Committee 228 (SC-228) and approved by the RTCA Program Management Committee (PMC) on March 26, 2020.

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 Standards Development Organization 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.

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EXECUTIVE SUMMARY

This document contains Minimum Operational Performance Standards (MOPS) for Ground Based Surveillance Systems (GBSS) used for air traffic surveillance in support of Detect and Avoid (DAA) operations for unmanned aircraft. The primary applications will be used in terminal, transit, or extended operational areas in the National Airspace System (NAS) as defined in RTCA Document 365A (DO-365A), Minimum Operational Performance Standards for Detect and Avoid Systems. These standards specify the GBSS characteristics that should be useful for designers, manufacturers, installers and users of the equipment. Note that in this context, surveillance "systems" includes one or more networked non-cooperative sensors (e.g., radar and lidar), Electro-Optical/Infrared (EO/IR), etc.) needed to meet these MOPS. Also note that these MOPS do not address cooperative ground-based sensors (e.g., radar beacon, Mode Select (Mode S), Automatic Dependent Surveillance-Broadcast (ADS-B), multilateration, etc.).

The intended function of the GBSS is to detect and generate tracks for airborne traffic within the GBSS Declaration Volume (DV). The GBSS complements other surveillance sensors by providing detection of non-cooperative traffic (i.e., those without operating transponders or ADS-B Out). Aircraft tracks are established at sufficient range and accuracy to enable an Unmanned Aircraft (UA) flying within the GBSS Operational Volume (OV) to remain well clear of other aircraft. The GBSS defined in these MOPS differs from typical primary radars used by Air Traffic Control in that these radars are intended to detect aircraft with smaller radar cross-sections and aircraft flying at low altitudes; in addition, a GBSS reports three-dimensional position and velocity for generated tracks.

This document has the detailed performance and environmental requirements of the radar along with their verification methods. Verification includes bench tests, flight tests and environmental tests. Recommendations and flight tests for installed performance are also provided.

Note: At the time of the publication of this document, the known technology available to satisfy this standard is radar-based. Future revisions of this document may be necessary to capture differences when using technology not heretofore available.

Note: Section 2.2.3 Frequency Deconfliction and the associated test Section 2.4.3 Frequency Deconfliction Test Procedure are intended to be revised to address performance criteria in a future revision of this document. Manufacturers using this document as a basis for their designs should coordinate with the regulator to agree upon an acceptable performance criteria early in the design process to mitigate certification approval risk

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1 PURPOSE AND SCOPE

1.1 Introduction

This document contains Minimum Operational Performance Standards (MOPS) for the Ground Based Surveillance System (GBSS) for Traffic Surveillance systems implemented with Unmanned Aircraft Systems (UAS) transiting and performing extended operations in Class D, E[1] and G airspace, along with transiting Class B and C airspace. It includes equipment to enable UAS operations near terminal areas during approach and departure in Class C, D, E and G airspace and off-airport locations. It does not apply to small UAS (sUAS) as defined in Title 14 of the Code of Federal Regulations (CFR) Chapter 107. Likewise, it does not apply to operations in the Visual Flight Rules (VFR) traffic pattern of an airport, nor to surface operations. These standards specify the surveillance system characteristics that should be useful for designers, manufacturers, installers and users of the equipment.

Compliance with these standards is recommended as one means of assuring that the equipment will perform its intended function(s) satisfactorily under the conditions specified herein. Any regulatory application of this document is the sole responsibility of appropriate governmental agencies.

1.2 Document Hierarchy

Section 1 of this document provides information needed to understand the rationale for the equipment characteristics and requirements in Sections 2 through 4. It describes typical equipment operations and operational goals as envisioned by the members of RTCA Inc. Special Committee (SC) 228 and establishes the basis for the standards stated herein. Definitions and assumptions essential to proper understanding of this document are also provided in this section.

Section 2 contains the characteristics and requirements for the equipment, including the link to the Control Station (CS). These standards specify the required performance under standard environmental conditions. Also included are recommended bench test procedures necessary to demonstrate equipment compliance with the stated minimum requirements.

Section 3 describes the performance required of installed equipment and link to the Control Station. Tests for the installed equipment are included when performance cannot be adequately determined through bench testing.

Section 4 describes the operational performance characteristics for equipment installations, and defines conditions that will assure the user that operations can be conducted safely and reliably in the expected operational environment.

Section 5 provides a roster of Special Committee 228 members who contributed to the development of these MOPS and the companies/organizations they represent.

Appendix A contains the methods for calculating the Surveillance Volume (SV), Declaration Volume (DV) and Operational Volume (OV).

[1] Up to Flight Level 180 (FL180)

