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**Minimum Operational Performance Standards
(MOPS) for Helicopter Terrain Awareness and
Warning System (HTAWS) Airborne Equipment**

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FOREWORD

This report was prepared by Special Committee 212 (SC-212) and approved by the RTCA Program Management Committee (PMC) on March 13, 2008.

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.

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EXECUTIVE SUMMARY

A review of a ten-year period (1994 thru 2004) of data has indicated that controlled flight into terrain (CFIT) has been a major contributor of helicopter accidents, especially those resulting in fatalities. The data suggests that CFIT accidents can happen during day and night under both visual meteorological conditions (VMC) and instrument meteorological conditions (IMC).

The application of a Terrain Avoidance and Warning System (TAWS) (originally developed for fixed-wing aircraft) in helicopter operations offers great promise in reducing the number of CFIT accidents. However, helicopters operate in widely diverse environments, including under visual and instrument flight rules (VFR and IFR) and in both on- and off-airport operations, often with significant low altitude exposure. Existing TAWS performance standards are insufficient to support these diverse operations.

Subsequently, the United States Federal Aviation Administration (FAA) requested that RTCA Inc. form a committee to develop a Minimum Operational Performance Standard (MOPS) for a Helicopter Terrain Awareness and Warning System (HTAWS) in an effort to reduce the helicopter accident rate. RTCA created the Special Committee SC- 212 to meet this goal.

In order to develop a MOPS with the most beneficial alert/warning functions that support the unique helicopter VFR/IFR operational conditions, a ten-year period of existing helicopter CFIT accident data was analyzed to provide a basis for testing and to aid in the development of the MOPS. Emphasis was placed on helicopter VFR operations into and out of remote and/or unimproved locations without runways, lighting, or navigational aids. Nine representative test scenarios were extracted from the CFIT accident cases as representative examples. Appendix C of this document contains summaries of these accident cases. Emphasis was also placed on minimizing nuisance alerts during normal helicopter operations.

With collective experience from across the helicopter industry, RTCA SC-212 developed this Minimum Operational Performance Standard (MOPS) for Helicopter Terrain Awareness and Warning System (HTAWS). The CFIT accident cases were used as a basis to develop the test scenarios. This MOPS defines the most beneficial alert/warning functions that support the unique flight characteristics of helicopters while at the same time attempting to minimize nuisance alerting.

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1 PURPOSE AND SCOPE

1.1 Introduction

This document defines the Minimum Operational Performance Standards (MOPS) for a Helicopter Terrain Awareness and Warning System (HTAWS). These standards specify system characteristics that should be useful to designers, manufactures, installers and users of the equipment.

The word “equipment”, as used within this document, includes all components and units necessary (as determined by the manufacturer or installer) for the system to properly perform its intended function(s). For example, the “equipment” may include: sensor(s), a computer unit, an input/output unit that interfaces with other aircraft displays and/or systems, a control unit, and a display unit. In the case of this example, all of the foregoing components and units comprise the “equipment.” It should not be inferred from this example that each HTAWS equipment design will necessarily include all of the foregoing components or units. This will depend on the specific design chosen by the manufacturer.

1.1.1 Compliance

In this document, the term “shall” is used to indicate a requirement of the HTAWS equipment. The term “should” is used to denote a recommendation that would improve the HTAWS equipment, but does not constitute a requirement. The term “may” is used to denote a permissive situation. An approved design should comply with every requirement which shall be verifiable by inspection, test, analysis, or demonstration.

Compliance with these standards is recommended as one means of assuring that the equipment will perform its intended functions(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.

Operation performance standards for functions or components that refer to equipment capabilities that exceed the stated minimum requirements shall be identified as optional features. Performance requirements and associated test procedures should be developed for these optional features.

1.1.2 Document Contents

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 applications and operation goals, as envisioned by the members of Special Committee 212, and establishes the basis for the standards stated in Sections 2 through 4. Definitions and assumptions essential to proper understanding of this document are also provided in this section.

Section 2 contains the minimum performance standards for the equipment. These standards specify the required performance under standard and environmental conditions.