RTCA, Inc.
1828 L Street, NW, Suite 805
Washington, DC 20036-5133 USA

Minimum Aviation System Performance Standards: Required Navigation Performance for Area Navigation

RTCA DO-236B
Supersedes DO-236A
October 28, 2003

Prepared by: SC-181

Copies of this document may be obtained from

RTCA, Inc.

Telephone: 202-833-9339
Facsimile: 202-833-9434
Internet: www.rtca.org

Please visit the RTCA Online Store for document pricing and ordering information.

FOREWORD

This report was prepared by RTCA Special 181 and approved by the RTCA Program Management Committee (PMC) on October 28, 2003.

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 the 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.

This page intentionally left blank.

TABLE OF CONTENTS

Appendices

Table of Figures

Table of Tables

1.0 PURPOSE AND SCOPE

1.1 Introduction

The International Civil Aviation Organization (ICAO) has recognized a need for dramatic improvements to the existing air navigation system. An ICAO Special Committee of Future Air Navigation Systems (FANS) developed a new concept expressed in terms of communication, navigation, surveillance and air traffic management (CNS/ATM). It is intended to be an evolutionary means of achieving improvements in the global air navigation system. To obtain the benefits of the CNS/ATM concept, aircraft will need to achieve accurate, repeatable and predictable navigation performance. This is referred to as Required Navigation Performance (RNP).

This document contains Minimum Aviation System Performance Standards (MASPS) for area navigation systems operating in an RNP environment. These standards are intended for designers, manufacturers, and installers of avionics equipment, service providers and users of these systems for world-wide operations. The MASPS provides guidance for the development of airspace and operational procedures needed to obtain the benefits of improved navigation capability.

The requirements of this MASPS are intended to meet the definitions of RNP developed by the ICAO Review of the General Concept of Separation Panel (RGCSP) while providing increased integrity with repeatable and predictable navigation. In addition, barometric vertical navigation (VNAV) requirements are defined for aircraft that provide the capability to ensure accurate and predictable vertical paths. The VNAV requirements in this document are consistent with but may not be sufficient for instrument approach procedures with vertical guidance (IPV). Due to the wide disparity of climb performance of different aircraft types, this MASPS only addresses vertical path definition requirements for level flight and descent. Finally, optional requirements for estimated time of arrival (ETA) and time of arrival control (TOAC) functions are defined for systems that provide these functions.

Compliance with these standards is one means of ensuring that the system and each subsystem will perform its intended function(s) satisfactorily under conditions normally encountered in aeronautical operations. The MASPS, when applied by regulatory authorities, are expected to provide the benefits of the listed applications in section 1.3.

Section 1.0 of this document describes minimum navigation performance functions, operational goals, and applications needed to operate in RNP RNAV airspace. It also includes the assumptions made within the MASPS for defining the airborne requirements.

RNP RNAV airspace may be considered to apply to an area, route, procedure or operation using a particular RNP RNAV type. The functions are described for position estimation, path definition and steering, and user interface.

Section 2.0 describes the minimum system performance requirements.
Section 3.0 describes minimum performance standards for each subsystem/function that is a required element of minimum system performance.

Section 4.0 describes an acceptable method for demonstrating system performance compliance and subsystem performance to meet the minimum standards in Section 2.0.
The appendices in the MASPS include a glossary of terms and acronyms (A), an example of system compliance analysis (B), navigation system requirements and infrastructure characteristics