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Minimum Operational Performance Standards for 1090 MHz Automatic Dependent Surveillance - Broadcast (ADS-B)

Change 1

Change 1 to RTCA DO-260
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Foreword

This report was prepared by Special Committee 186 (SC-186) and approved by the RTCA Program Management Committee (PMC) on June 27, 2006.

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 Telecommunications 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

The update to the *Minimum Operational Performance Standards (MOPS) for the 1090 MHz Automatic Dependent Surveillance – Broadcast (ADS-B)* systems, published by RTCA on September 13, 2000 as RTCA/DO-260, contained herein as RTCA/DO-260 Change 1, has been produced to reflect changes that have resulted in requirements for ADS-B transmitting systems. RTCA/DO-260 was developed in accordance with the *Minimum Aviation System Performance Standards (MASPS) for Automatic Dependent Surveillance – Broadcast (ADS-B)*, which was published by RTCA on February 19, 1998 as RTCA/DO-242. Even during the development of DO-260, it was always the intention of RTCA and the International community to update the initial 1090ES MOPS with the addition of enhanced reception techniques, as well as improved definitions of navigational accuracy and integrity measurements, and system integrity levels, among other things. However, prior to the updating of such information, it was necessary to update the ADS-B MASPS on which those standards were to be based. On June 25, 2002, RTCA published the updated ADS-B MASPS as RTCA/DO-242A, and the revision of the 1090ES MOPS was also begun. On April 10, 2003, RTCA published RTCA/DO-260A as the update to the 1090ES MOPS which was intended to replace RTCA/DO-260 and all of its requirements.

When RTCA/DO-260 was published in September 2000, the international community began to refine and adapt the requirements contained therein into ICAO Standards and Recommended Practices (SARPs) for all International States to use. The initial 1090ES SARPs were adapted and published by ICAO into Annex 10 with Amendment 77, which became effective on November 28, 2002.

With the publication of the 1090ES SARPs, a trial program was started by Australia for transmit-only 1090ES equipment for the purpose of evaluating ADS-B for supplying surveillance in areas of their country where no radar exists. As this program progressed, operational experience was gained and data was collected on the implementations of 1090ES equipment, which in turn shed light on some issues within the ADS-B MOPS and SARPs documents that outlined the requirements. This initial Australian program relied solely on aircraft avionics that were based on the initial 1090ES MOPS, RTCA/DO-260.

One of the initial issues uncovered by the Australian trials were errors reported in the airborne/on-the-ground status of ADS-B equipped aircraft. It was found that there were errors in the determination of the "on-the-ground" condition of the aircraft. After an extensive analysis of the collected data and of the algorithms defined in RTCA/DO-260 (and by that time also in DO-260A), it was determined that there had been errors introduced in both documents which could lead an ADS-B system to indicate that an aircraft was on-the-ground, when in fact, it was still airborne. **This problem had to be corrected**.

Another issue that was a concern for ground stations and other users of position data from RTCA/DO-260 transmitters, was that the Navigational Uncertainty Category (NUC) in DO-260-based systems could be based either on accuracy or integrity measurements. It was deemed necessary for the benefit of receivers of RTCA/DO-260 transmitted position information that the NUC be based on integrity, and not on accuracy. To correct this problem, a statement in DO-260,