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Minimum Operational Performance Standards for Airborne Collision Avoidance System X (ACAS X) (ACAS Xa and ACAS Xo)

Volume I and II

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FOREWORD

This document was prepared jointly by Special Committee 147 (SC-147) and EUROCAE Working Group 75(WG-75). It was approved by the RTCA Program Management Committee (PMC) on September 20, 2018 and by the EUROCAE Council on October 2, 2018.

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- 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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1 PURPOSE AND SCOPE

1.1 Introduction

This document sets forth minimum operational performance standards for the Airborne Collision Avoidance System X (ACAS X) equipment, including both Active surveillance (Xa) and special Operations (Xo) functions. Unless otherwise noted, ACAS X references in this document refer to ACAS Xa/Xo.

ACAS X is intended to improve air safety by acting as a last-resort method of preventing mid-air collisions or near mid-air collisions (NMAC) between aircraft. By utilizing surveillance information from Secondary Surveillance Radar (SSR) and ADS-B technology, ACAS X equipment operates independently of ground-based aids and air traffic control (ATC). Aircraft equipped with ACAS X have the ability to interrogate airborne transponders and receive ADS-B Messages to determine the location of other aircraft in the vicinity and assess the risk of collision. ACAS Xa/Xo equipment is not required to detect non-cooperative aircraft.

ACAS X provides Traffic Advisories (TAs) and Resolution Advisories (RAs) in the vertical plane. RAs are indications given to the flight crew recommending maneuvers intended to avoid collisions with all threats, or restrict maneuvers to maintain existing separation. (In this document the term *separation* means physical separation, i.e., absence of NMAC, and should not be confused with the provision of ATC minimum separation.) ICAO standards give ACAS RAs priority over ATC clearances and instructions, i.e., flight crews are instructed to follow RAs even when it conflicts with ATC guidance (Ref. ICAO Doc. 8168 – PANS-OPS, §3.2.c.2). Controllers typically have no knowledge of RAs unless notified by the flight crew via the radio. RA information is provided by ACAS X to Mode S SSRs and ADS-B ground radios, but typically is not presented to controllers. Some alerts (e.g. wind shear warnings, stall warnings, and Ground Proximity Warning System warnings) have higher priority than ACAS RAs. Results of United States and European safety studies show that there is a significant safety benefit to be gained from the widespread carriage and operation of ACAS, specifically, the risk of mid-air collision is reduced by at least a factor of three (Ref. ACASA/WP1.8/210D/V1.1 27-12-01). Globally, operational experience has shown that ACAS systems have significantly improved the safety of flight.

Incorporated within these standards are system characteristics that should be of value to users, designers, manufacturers, and installers. These characteristics are intended to accommodate the requirements of various users.

1.1.1 Document Structure

This document is published in two volumes.

Section 1 of Volume I is intended to provide information needed to understand the rationale for equipment characteristics and requirements stated in the remaining sections. It describes typical equipment applications and operational goals and is the basis for the standards stated in the document. Definitions essential to proper understanding of this document are also provided in Section 1.

Section 2 of Volume I contains the minimum performance standards for the equipment. These standards define the required performance under standard operating conditions and stressed physical environmental conditions. It also details bench test procedures that demonstrate compliance, including specific bench tests for the collision avoidance logic performance.

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