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Minimum Aviation System Performance Standards (MASPS) for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems

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FOREWORD

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1 PURPOSE AND SCOPE

1.1 Introduction

DO-315 addressed Enhanced Vision Systems (EVS), Synthetic Vision Systems (SVS), and Combined Vision Systems (CVS) technologies. Currently, only EVS technology incorporating an approved Head-Up Display (HUD) is eligible for operational credit under Title 14 US Code of Federal Regulations (CFR) §91.175 with the Federal Aviation Administration (FAA). An approved combination of EVS and HUD is termed an Enhanced Flight Vision System (EFVS) by the FAA. The European Aviation Safety Agency (EASA) uses the term "EVS" as equivalent to the FAA description of EFVS. While further definitions are in Appendix A, it is important to understand this distinction before reading this document. This document adds performance standards for operational credit to touchdown in visibility as low as 1000ft RVR (or 300M if applicable), by use of an approved EFVS. Performance standards for this new operational capability are delineated throughout this document in order to maintain the unique characteristics of DO-315 and DO-315A. Performance standards for EFVS to landing (DO-315A) include performance standards for EFVS approaches to 100 ft height above threshold elevation (THRE), formerly height above touchdown zone elevation (TDZE) (DO-315). See notes below regarding change in terms of reference in DO-315A.

The operational scenarios and concepts discussed in this document are written to describe the intended use of the proposed systems and from this context, associated minimum performance standards are derived. They do not define current or future operational regulations or limitations of these technologies.

Section 1 provides information needed to understand the rationale for system characteristics and requirements. This section also contains typical applications and envisioned operational goals and assumptions necessary to establish a basis for the subsequent sections. It describes typical applications and operational goals, as envisioned by members of RTCA Special Committee 213 and EUROCAE Work Group 79, 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 describes minimum system performance requirements.

Section 3 contains the minimum performance standards and subsystem/function that is a required element of minimum system performance in Section 2.0. These standards specify the required performance under the standard environmental conditions described.

Section 4 discusses performance evaluations with applicable FAA and EASA regulations, describing the minimum system test procedures to verify system performance compliance (e.g., end-to-end performance verification).

Compliance with these standards is recommended as one means of assuring that the system and each subsystem will perform its intended function(s) satisfactorily under conditions normally encountered in routine aeronautical operations for the environments intended. The Minimum Aviation System Performance Standards (MASPS) may be implemented by one or more regulatory documents and/or advisory documents (e.g., certifications, authorizations, approvals, commissioning, orders, advisory circulars, and

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notice.) and may be implemented in part or in total. Any regulatory application of this document is the sole responsibility of appropriate governmental agencies.

In this document, the term "shall" is used to indicate requirements. An approved design should comply with every requirement, which can be assured by inspection, test, analysis, or demonstration. The term "should" is used to denote a recommendation that would improve equipment, but does not constitute a requirement.

Note 1: 14 CFR § 91.175(l) refers to decision height (DH); however, this document uses DA/DH. For the purposes of DO-315A, the terms DA and DH are interchangeable.

Note 2: 14 CFR § 91.175(l) refers to descent to 100 feet height above touchdown zone elevation (TDZE). The FAA has recently instituted changes in the determination of instrument procedure minima to stop using TDZE to determine minima. Future instrument approach minima (MDA or DA/DH) will be referenced to threshold elevation (THRE). The height value specified as MDA(H) or DA(H)/DH will be referenced to THRE for approaches with minima published after August 10, 2010. Existing published IFR approach minima and charting will gradually be changed to reference THRE and be displayed as a height above threshold (HATh). DO315A has adopted the use of THRE for all text whether 14 CFR § 91.175(l) "to 100 feet" or to touchdown. The former terms HAT or TDZE and new terms HATh or THRE are considered interchangeable relative to the requirements of this document and the intent of DO-315.

1.1.1 EVS/SVS/CVS Introduction

This MASPS provides the high level system requirements for Enhanced, Synthetic, and Combined Vision Systems when installed in aircraft with the expressed purpose of gaining no additional operational credit. The implication of the term "no additional operational credit" as used throughout this MASPS is that the applicant cannot take advantage of the existing regulations in the Federal Aviation Regulations/EASA regulations for the various phases of flight through the installation certification of these systems. Refer to the EFVS sections of this MASPS for EVS to gain operational credit. For the FAA, EVS for operational credit is called "EFVS", and the term "EFVS" is used in this document.

The EVS/SVS/CVS subsections of the MASPS focuses on the concept that no additional capability with existing minima will be granted via EVS/SVS/CVS display systems as described within this portion of the MASPS. For example, the IFR approach minima or reduced vision taxi capability are the same for the aircraft regardless if EVS, SVS or CVS is installed.

In order for the following "no additional operational credit" guidelines to apply, the applicant shall be able to qualify the proposed EVS/SVS/CVS installation's intended function in terms that do not change the airplane's existing operational capability or certification basis. This will be one of the key parameters to be scrutinized by FAA during EVS/SVS/CVS flight evaluations when presented with a "No additional operational credit" installation certification.

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In this document, the term Terrain Awareness and Warning System (TAWS) is used to indicate both TAWS for fixed-wing aircraft and Helicopter TAWS (HTAWS) for rotary-wing aircraft. TAWS is defined in TSO-C151b and HTAWS in DO-309. Installation of TAWS is defined in FAA/AC 23-18 and AC 25-23. Installation of HTAWS is defined in AC 29-2C.

1.1.2 EFVS Introduction

1.1.2.1 The EFVS subsections of this MASPS provide the high level system requirements for Enhanced Flight Vision Systems when installed in aircraft with the expressed purpose of gaining additional operational credit.

1.1.2.2 The requirements of this MASPS may be global in nature and have international implications; however, they are written to meet the definitions, intended functions, and operational application defined in 14 CFR §1.1, §91.175 (l) and (m), §121.651, §125.381, and §135.225 as of Amendment 91-281 (69 FR 1620, January 9, 2004). Similar references are found in EU Ops Subpart E, Appendix 1 to OPS 1.430 (h). It should be noted that the European Aviation Safety Agency's (EASA) terminology and operational credit may differ from that of the United States. EASA uses the term Enhanced Vision System (EVS) to describe a system that has the same elements, features and characteristics as an Enhanced Flight Vision System (EFVS) certified by the FAA for use in the United States. EASA's operational concept and corresponding requirements may also be slightly different from those of the FAA.

1.1.2.3 The EFVS subsections of this MASPS specifically focus on standards to meet existing and emerging FAA and EASA requirements for an Enhanced Flight Vision System. Other guidance material is available (see References). This MASPS is intended to be complementary to these other materials, and is not meant to replace or conflict with these other materials. Conflicts between this MASPS and other material should be resolved on a case-by-case basis.

1.1.3 SVS for Lower than Standard (LTS) Minima Operations: Introduction

An SVS for operations in Lower than Standard minima is based on an existing SVS system as defined in Section 1.2.1.2 below. When combined with display of the landing runway, and trajectory reference information, including flight path vector (FPV) and flight path angle reference cue (FPARC), the system will provide the pilot with information that indicates that the trajectory is projected to the runway touchdown zone. In systems designed to support operations in which additional credit is sought, such as reduced visibility or decision altitude, the system must be designed to meet integrity, accuracy and reliability requirements, appropriate to the target level of safety required.

The initial operational credit is envisioned to be authorization to operate to lower than standard approach minima during a Category I ILS approach. In the US, the initial authorization may be in accordance with the provisions of a future amendment of FAA Order 8400.13D. This order defines the operational requirements for a Special Authorization Category I ILS approach for which a DH as low as 150 ft height above THRE, and visibility as low as RVR 1400 may be authorized. A comparable operation is defined by EASA as a Lower than Standard Category I ILS. Such an approach may be conducted to decision heights no lower than 200 ft height above THRE, with visibility not less than 400m.

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