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Test Procedures for Quantified Visual Advantage

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FOREWORD

This document was originally prepared by the RTCA Special Committee 213 Standards for Enhanced Flight Vision Systems and Synthetic Vision Systems (EFVS/SVS) jointly with EUROCAE WG-79. It was approved by the RTCA Program Management Committee on May 14, 2021 and the EUROCAE Council on May 14, 2021. This document is technically equivalent to ED-291.

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 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 (MOPS) 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 (ICAO) and the International Telecommunication Union (ITU) and other appropriate international organizations can be based.

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EXECUTIVE SUMMARY

This document provides a consensus standard for a method to measure and quantify the visual advantage performance of an installed Enhanced Flight Vision System (EFVS).

In 2016 the FAA published revised EFVS-related regulations that expanded the types of approved EFVS operations and the number of operators that could use the new EFVS regulations. While, demonstrating a quantified visual advantage is not required for an installed EFVS to be certified, any operator that uses the installed EFVS to dispatch the aircraft in accordance with 14 CFR §121.613, §125.361, or §135.219 or commence an instrument approach under §121.561, §125,325, §125.381, or §135.225 requires an operational approval from FAA flight standards.

In the European Union (EU), the requirement to demonstrate a visual advantage using an EFVS is introduced through the NPA 2018-06 subpart B which includes the proposed amendments to CS-AWO (airworthiness requirements). For the EFVS operator to be granted certain operational approvals, the applicant must demonstrate and document a quantifiable measure of the EFVS visual advantage performance.

This document provides a consensus standard for a method via flight test to measure and quantify the visual advantage performance of an installed Enhanced Flight Vision System (EFVS).

This document has been developed with EUROCAE Working Group 79 (WG-79) and is technically equivalent to ED-291.

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1.1 Introduction and Purpose of Document

1.2 Scope of the Document

This document is limited to providing a method to determine and document the quantified visual advantage (QVA) of an installed Enhanced Flight Vision System (EFVS). This document does not provide any guidance on the design of the EFVS.

QVA determination in this document is based on extensive experience with EFVS systems using infrared (IR) sensors. Future EFVS sensor technologies may require alternate methods to evaluate QVA.

In this document, the term "shall" is used to indicate an agreed to means of measurement of QVA. 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 recommended method in the collection or analysis of data, but does not constitute a requirement.

1.3 Background

In 2016 the FAA published revised EFVS related regulations that expanded the type of EFVS operations and the types of operators that could make use of the new EFVS regulations. Demonstrating a quantified visual advantage is not required for an installed EFVS to be certified. However, any operator that uses the installed EFVS to dispatch the aircraft in accordance with 14 CFR §121.613, §125.361, or §135.219 or commence an instrument approach under §121.561, §125,325, §125.381, or §135.225 require an operational approval from FAA flight standards. For the operator to receive the required operational approval, the applicant must demonstrate and document a quantifiable measure of the EFVS visual advantage performance.

Additionally, in the European Union through the NPA 2018-06, published on 17 July 2018, the principles of the EFVS have been proposed for introduction into the European regulatory system. The EFVS's main function is to electronically provide the pilot the required visual references supporting the proposed operationally procedure before the required references can be seen using natural vision.

EFVS visual advantage should be demonstrated during certification flight testing before descending below the DA/H or the MDA because this is the point in an instrument approach procedure where the operating rules permit an EFVS to be used in lieu of natural vision for operational benefit/credit. The EFVS performance will be documented as a quantifiable measure of the EFVS visual advantage performance allowing the operator to receive the required operational approval from the competent national aviation authority.

While previous RTCA/EUROCAE standards provide a means to design and demonstrate the intended function of the EFVS they did not provide any standardized means of quantifying the visual advantage. This document provides a consensus method of demonstrating and documenting the QVA in order to support the granting of operational approval by the competent national aviation authority.

