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Guidance for Installation of Automatic Flight Guidance and Control Systems (AFGCS) for Part 23 Airplanes

RTCA DO-335
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FOREWORD

This report was prepared by Special Committee 220 (SC-220) and approved by the RTCA Program Management Committee (PMC) on March 21, 2012.

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 and several advisory circulars.

Since 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.

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EXECUTIVE SUMMARY

RTCA, Inc. formed SC-220 to create installation guidance document for Automatic Flight Guidance and Control Systems (AFGCS) for Part 23 airplanes. This guidance will standardize and streamline the installation and compliance demonstration process. SC-220 included representatives from avionics manufacturers, airplane manufacturers, airlines, airplane operators, regulatory agencies, and related industry associations.

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CHAPTER 1 BACKGROUND

11. General

a. Scope. The automatic control and guidance systems in current airplanes have evolved to a level that dictates a revision to current published industry practices. Information herein is based on RTCA DO-325 "Minimum Operational Performance Standards for AFGCS". This document provides information for Part 23 automatic and flight guidance and control systems (AFGCS), which encompass AFGCS functions, flight director (FD) functions, automatic thrust control functions, yaw damper functions, and automatic trim functions, as well as any interactions with stability augmentation functions. This material also applies to products that perform any part of the AFGCS installed function.

b. Reference Versions. Wherever other documents are referenced herein, the intent is to use the referenced or later version, as accepted by the regulatory authority.

Note: This White Paper uses the terminology "should" and "should not" when discussing compliance to the provisions within this document, but not the only method.

Note: This White paper uses the terminology "must" and "may not" when discussing compliance to Reference CFRs and other specific rules, as compliance to a rule is not optional. In these cases, this document supplies a reference to the specific rule being discussed.

12. Evolution of Automatic Flight Guidance and Control Systems (AFGCS)

a. Complexity. The Part 23 AFGCS market includes products varying from simple analog wing levelers to complex multi-axis digital AFGCSs coupled to advanced GPS Navigation and moving map display systems. This dramatic range of products, technology, and system design complexity makes previous Part 23 AFGCS-related guidance obsolete. Recent Part 23 integrated avionics suites have much higher levels of integration, automation, and complexity than legacy Part 23 products. Some newer Part 23 systems have more modes, automatic changes in modes, and functional failure modes. The introduction of digital sensors, digital data communication, and the potential for fly–by–wire flight control systems have created a need for updated industry practices concerning Part 23 AFGCS and flight guidance systems.

b. Guidance Considerations. These new systems are capable of providing better performance, increased safety, and decreased workload. But, if designed without consideration for the criteria in this document, these systems could also be confusing and not immediately intuitive for the flight crew. Significant operational experience has been gained on new generation systems, and this material is provided based on that experience.

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