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Integrated Modular Avionics (IMA) Development Guidance and Certification Considerations

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Foreword

This document was prepared jointly by RTCA Special Committee (SC-200) and EUROCAE Working Group 60 and approved by the RTCA Program Management Committee (PMC) on November 8, 2005.

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 use of Integrated Modular Avionics (IMA) is rapidly expanding and is found in all classes of aircraft. In recognition of this rapid growth RTCA established Special Committee 200 (SC-200) and EUROCAE established Working Group 60 (WG-60) to jointly develop a document that could be used as guidance in the design, development, and application of IMA. Participants in the development of the document included government, industry, and academic personnel.

IMA is a shared set of flexible, reusable, and interoperable hardware and software resources that, when integrated, form a platform that provides services, designed and verified to a defined set of safety and performance requirements, to host applications performing aircraft functions.

This document provides guidance for IMA developers, integrators, applicants, and those involved in the approval and continued airworthiness of IMA systems. It provides specific guidance for the assurance of IMA systems as differentiated from traditional federated avionics.

The development of this document is based on earlier RTCA/EUROCAE documents, for example RTCA DO-178/EUROCAE ED-12, Software Considerations in Airborne Systems and Equipment Certification and RTCA DO-254/EUROCAE ED-80, Design Assurance Guidance for Airborne Electronic Hardware. Concepts from other RTCA and EUROCAE documents, as well as SAE and ARINC documents, also guided the document preparation.

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CHAPTER 1 INTRODUCTION

1.1 PURPOSE

This document contains guidance for Integrated Modular Avionics (IMA) developers, application developers, integrators, certification applicants, and those involved in the approval and continued airworthiness of IMA systems in civil certification projects. The guidance describes the objectives, processes, and activities for those involved in the development and integration of IMA modules, applications, and systems to incrementally accumulate design assurance toward the installation and approval of an IMA system on an approved aviation product as differentiated from traditional federated aviation system architectures.

IMA system concepts are presented, including the platform and modules, and their relationships to the hosted applications and avionics functions used in an aircraft installation. This includes the description of how the developers and integrators can accumulate incremental acceptance of the modules, platform, and application integration which will provide a means for applicants to achieve design assurance of an IMA system on an approved aviation product.

During the IMA system development the certification applicant for a Type Certificate (TC) or Supplemental Type Certificate (STC) program should develop an effective system of communication among the module and platform developers and system integrators. This is especially important when these suppliers are from different companies. Otherwise, there may be a misunderstanding of the implementation during final integration and approval of the IMA system installation.

Six tasks define the incremental acceptance of IMA systems in the certification process:

- Task 1: Module acceptance.
- Task 2: Application software or hardware acceptance.
- Task 3: IMA system acceptance.
- Task 4: Aircraft integration of IMA system - including Validation and Verification (V&V).
- Task 5: Change of modules or applications.
- Task 6: Reuse of modules or applications.

Approval of an IMA system installation may be based on the accumulation of incremental acceptance, culminating in the complete design assurance needed to demonstrate that the installed system and functions comply with the applicable regulations and guidance.

The incremental acceptance, if appropriate, may be granted in the form of an acceptance letter, stamped type design data, or other means for the specific project.

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