RTCA, Inc.
1150 18th Street, NW, Suite 910
Washington, DC 20036

Model-Based Development and Verification Supplement to DO-178C and DO-278A

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Prepared by: SC-205

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RTCA, Inc.

Telephone: 202-833-9339
Facsimile: 202-833-9434
Internet: www.rtca.org

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FOREWORD

This document was prepared by RTCA Special Committee 205 (SC-205) and EUROCAE Working Group 71 (WG-71) and approved by the RTCA Program Management Committee (PMC) on December 13, 2011.

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.

Since the 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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MB.1.0 INTRODUCTION

A model is an abstract representation of a set of software aspects of a system that is used to support the software development process or the software verification process. This supplement addresses model(s) that have the following characteristics:

a. The model is completely described using an explicitly identified modeling notation. The modeling notation may be graphical and/or textual.

b. The model contains software requirements and/or software architecture definition.

c. The model is of a form and type that is used for direct analysis or behavioral evaluation as supported by the software development process or the software verification process.

The following are not considered as models within this supplement:

- Figures without syntax/semantics (these may be illustrative).
- Equations related to natural language sentences.

The use of models may bring the benefits and capabilities of:

- Providing unambiguous expression of requirements and architecture.
- Supporting the use of automated code generation.
- Supporting the use of automated test generation.
- Supporting the use of analysis tools for verification of requirements and architecture.
- Supporting the use of simulation for partial verification of requirements, architecture, and/or Executable Object Code.

Since the publication of DO-178B, advances and experience have been gained in model-based development and verification, their application, and supporting tools. As the use of this technology for critical software applications in avionics has increased, there are a number of issues that need to be considered to ensure the safety and integrity goals are met. Clarifying each of these issues will ease the application of model-based development and verification; therefore, this supplement provides guidance for applicants and certification or approval authorities to facilitate the use of this technology.

MB.1.1 Purpose

This supplement contains modifications and additions to DO-178C objectives, activities, explanatory text, and software life cycle data that should be addressed when model-based development and verification are used as part of the software life cycle. This includes the artifacts that would be expressed using models and the verification evidence that could be derived from them. Therefore, this supplement also applies to the models developed in the system process that define software requirements or software architecture.

MB.1.2 Scope

This supplement discusses the use of model-based development and verification in the software life cycle for software that is produced in accordance with DO-178C. If the applicant is planning to use model-based development and verification, then the applicant