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Software Considerations in Airborne Systems and Equipment Certification

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F O R E W O R D

This document was prepared by Special Committee 152 of the Radio Technical Commission for Aeronautics. It was approved by RTCA on March 22, 1985.

RTCA is an association of aeronautical organizations of the United States from both government and industry. Dedicated to the advancement of aeronautics, RTCA seeks sound technical solutions to problems involving the application of electronics and telecommunications to aeronautical operations. Its objective is the resolution of such problems by mutual agreement of its member and participating organizations.

The findings of RTCA are in the nature of recommendations to all organizations concerned. As 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 federal government organization or agency having statutory jurisdiction over any matters to which the recommendations relate.

Coordination of these guidelines was accomplished by RTCA SC-152 with the European Organisation for Civil Aviation Electronics (EUROCAE) WG-1.

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1.0 INTRODUCTION

The rapid increase in the application of digital computers to aircraft equipment and systems during the late 1970s demonstrated the need for documented guidance on how regulatory agencies' certification requirements for such equipment and systems might be met. An ad hoc committee established by the RTCA Executive Committee found that while existing RTCA minimum performance standards (MPSs) and FAA technical standard orders (TSOs) were adequate to cover functional performance requirements for certification, additional guidance was needed on software requirements. It recommended that the RTCA Executive Committee establish a Special Committee to develop and document software practices that would support the certification of software-based equipment and systems. This recommendation was accepted by the Executive Committee and Special Committee 145, "Digital Avionics Software," was formed in May 1980. SC-145 produced RTCA Document DO-178, "Software Considerations in Airborne Systems and Equipment Certification," which was approved by the RTCA Executive Committee and published by RTCA in January 1982.

Early in 1983 the RTCA Executive Committee determined that DO-178 should be updated to reflect the experience gained in the certification of the digital equipment and systems on recently certificated aircraft. It established Special Committee 152 for this purpose with the following terms of reference:

> Special Committee 152 shall review and revise, as necessary, RTCA Document No. DO-178, "Software Considerations in Airborne Systems and Equipment Certification."
>
> GUIDANCE:
>
> 1. The committee should take into account experience gained through field application of the guidelines contained in RTCA/DO-178 and consider including additional guidance material for other applications as may be appropriate.
>
> 2. The committee should coordinate its work with the European Organisation for Civil Aviation Electronics (EUROCAE).

1.1 Background

The aviation community developed, over a period of many years, techniques and procedures to demonstrate to the satisfaction of regulatory authorities that failures in analog equipment and systems do not affect the safety of the aircraft in which they are installed. This includes systems performing flight critical functions.

These techniques were also applied in the certification of first generation digital technology equipment and systems. This was possible because their system architectures duplicated analog

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