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RTCA Task Force 4 – Certification
Implementation Plans and Responsibilities
Final Report of the RTCA Certification Steering Committee

Certification Steering Committee
August 31, 2001

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FOREWORD

This document was prepared by the Certification Select Committee. Papers reviewed and approved by the Certification Steering Committee at its final meeting on August 31, 2001 form the basis for the report.

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 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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1 EXECUTIVE SUMMARY

On February 26, 1999 the RTCA Task Force 4 - Certification issued its Final Report, which concluded a one-year study of aviation certification issues. The Final Report contained fifteen recommendations to the Federal Aviation Administration and the aviation industry. These recommendations were not prescriptive in nature but identified opportunities for improving the overall efficiency and effectiveness of the aviation certification processes.

At the request of the FAA Administrator, two committees consisting of government and aviation industry personnel were formed to assist with the implementation of the fifteen recommendations. The Certification Steering Committee was the guiding body to charter and promote the work of the Certification Select Committee, which developed responses to the fifteen recommendations. The Certification Steering Committee held its final meeting on August 31, 2001, during which it accepted the Certification Select Committee's papers that address implementation of the fifteen Task Force 4 (TF4) recommendations. This body of work describes FAA initiatives already underway for implementing certain TF4 recommendations and provides proposals for implementing those recommendations not yet addressed. These papers, accepted on August 31, 2001, as well as material briefed to the Steering Committee on March 23, 2001(Appendices C and D), form the basis for this final report.

To accomplish its objectives the Certification Select Committee reviewed the overarching issues identified by Task Force 4 and formed three Working Groups each co-chaired by a government and industry representative, to address the specific recommendations in context of:

- Working Group 1 – Operational Concepts and Procedures
- Working Group 2 – End-to-End Operation and System Requirements
- Working Group 3 – Organizational Certification and Oversight

The Select Committee's work plans aimed to provide a two part approach, facilitating a progressive change in FAA and industry certification processes (people, equipment, systems, procedures), while implementing near-term recommendations to reduce cycle time, cost and complexity, thereby making the process more consistent and responsive to today's operational environment.

Following the text of each recommendation contained in the RTCA Task Force 4 Final Report, below, there is a brief summary of the Certification Select Committee's corresponding action to:

- Transition the recommendation to the FAA or elsewhere for further development and implementation or;
- Respond to the recommendation directly with near-term implementation or acknowledgement of FAA action already underway.

Six recommendations and elements of two further recommendations were transitioned to the Federal Aviation Administration for further action and completion. Transition papers were prepared, and included in this report, outlining:

- What the recommended end state solution should look like;
- A high level roadmap of how to reach the end state;
- What products are required to reach the end state and who should be responsible;
- Metrics to measure efficiency and effectiveness improvements.

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The Certification Select Committee responded to seven recommendations and elements of two further recommendations with proposed implementations or by acknowledging FAA implementation efforts. Response papers for those recommendations are also included in this report. The Response Papers provide the same topic areas as noted above for the Transition Papers.

Recommendation 1: An organizational focal point should be established by the authorities to provide *one stop service* to users, industry, and other governments in all matters related to advanced ground electronics and airborne avionics systems and related procedures. This function should have appropriate operational and technical expertise, and the authority and responsibility to develop and issue appropriate policy, certification, and related regulations and guidance materials.

Status: Transitioned to the FAA Office of Cost & Performance Management (APF-1) for establishment of an organizational structure within the FAA that will provide a more efficient working relationship between the authorities and their aviation constituents, particularly in the advanced ground electronics and avionics sectors, including the creation of a "Customer Service Advocate" corps. Expected benefits include improved consistency and timeliness of certification service, as well as ease of access to information needed by any user.

Recommendation 2: The authorities should establish and maintain a systems engineering capability. This function should be used to establish overall performance requirements for all advanced systems and their subsystems, in conjunction with the user community. As part of this effort, the authorities should consider developing clear approval standards and processes for ground system elements that are integrated, to the degree necessary, with airborne system element certification.

Status: Transitioned to the FAA executive management to identify a senior FAA advocate and cross-services transition team to oversee the implementation of a coordinated (cross-services) air-ground system operational approval process. The Coordinated Operational Approval Process introduces a systems engineering approach to the end-to-end system requirements allocation, development, approval and deployment processes for interacting ground-based and airborne CNS/ATM elements. Expected benefits include consistent and appropriately balanced system requirements with potential for earlier deployment of new operational capabilities.

Recommendation 3: Multi-tiered airworthiness requirements should be vigorously pursued by the authorities.

Status: Responded by acknowledging the efforts of the FAA, subsequent to Task Force 4, to address the intent of this recommendation in multiple Aircraft Certification initiatives through the issuance of Policy Memoranda, Advisory Circulars, Notices of Proposed Rulemaking, and proposed Federal Aviation Regulations. The FAA is encouraged to maintain a continuing awareness of multi-tier requirements, appropriate to all categories of air commerce. Expected benefits include cost and complexity reductions for many categories of air commerce, while continuing to promote safe flight by prescribing minimum standards required in the interest of safety for each category.

Recommendation 4: The importance of human performance considerations should be recognized by both the authorities and industry in reducing certification costs and improving the safety of the INAS. They should do so by introducing processes and written guidance that institutionalizes *earlier* and *better* consideration of human performance. This should be accomplished by providing certification credit for human performance where possible and by requiring consideration of human performance in accordance with

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specific standards for the certification of equipment, people, and procedures in advanced airborne and ground-based systems.

Status: Transitioned to the FAA executive management as part of the Coordinated Operational Approval Process (Recommendation 2) for implementation of a process to incorporate human factors considerations from creation of the operational concept to system implementation. Human factors considerations were also addressed under Recommendations 5 and 7. Expected benefits are consistent and appropriately balanced system requirements with the potential for corresponding cost reductions and earlier deployment of new operational capabilities.

Recommendation 5: The authorities should broadly implement a process where the regulators and applicants come to an early and clear agreement on their respective roles, responsibilities, expectations, schedules, and standards to be used in certification projects. The process should apply broadly across airborne and ground systems, allow non-applicant equipment suppliers to engage in certification programs, and provide greater opportunity to approve components or processes independent of the airplane.

Status: Acknowledged the efforts of the FAA to create avionics-specific Certification Process Improvement principles in a document titled, “The FAA and Industry Guide to Avionics Approvals.” The FAA also drafted and placed in circulation for comment a “General” Technical Standard Order, based on process standards such as RTCA DO-160 and DO-178, to facilitate rapid approval of non-required equipment, parts and appliances. The FAA drafted an additional Notice to provide flexibility in avionics system evaluation processes and encourage early review and documentation of human factors issues. Expected benefits include simplified, consistent and more responsive approval processes, which are more efficient in terms of time and cost for both the regulators and applicants.

Recommendation 6: The authorities should enhance, expand upon, and standardize designee programs to improve timeliness of approvals. Promptly expand the concept of approving organizations, in addition to individuals, as is done in some cases in the Joint Aviation Authorities (JAA) and FAA. In addition to the traditional uses of delegated authority in the FAA and JAA, it is particularly important to also apply delegated approval authority to instrument flight procedures as soon as practical.

Status: Responded by proposing a new prototype process to allow the FAA to select, appoint, and provide oversight of Designee Managed Organizations. The FAA drafted a policy Notice to implement Designee Managed Organizations, following the successful conclusion of the prototype phase. The FAA created a Policy Memorandum to standardize the use of Designated Engineering Representatives in the TSO Authorization process. Expected benefits include reduced demand on scarce FAA resources and a reduction in the time required for approvals.

Recommendation 7: The early deployment of advanced systems should be encouraged by the authorities. This initiative would assure that prompt in-service experience can be obtained more quickly and incorporated into production systems. Improved feedback mechanisms would also assure that positive and negative experiences (especially human performance considerations) with operational systems and procedures are documented and analyzed for future system *credit*, or for corrections to be applied based on lessons learned.

Status: Transitioned to the FAA executive management as part of the Coordinated Operational Approval Process (Recommendation 2), to review the National Airspace System architecture to identify airborne and ground-based equipment and procedures required to implement timely and consistent operational capabilities. Also to require integrated schedules and plans as part of the coordinated air-ground system operational

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approval process, and to assess the adequacy of current metrics being collected and define additional system performance metrics, if necessary. Expected benefits include consistent and appropriately balanced system requirements with potential for earlier deployment of new operational capabilities.

Recommendation 8: The authorities should work with industry to accelerate the development of instrument flight procedures based on proven operational concepts, such as Required Navigation Performance/Area Navigation (RNP/RNAV), to exploit existing and anticipated aircraft system capabilities (e.g., Flight Management System(s) [FMSs]).

Status: Responded by acknowledging and supporting the efforts of the SOIT RNP/RNAV Working Group to collect public input necessary to validate the RNP vision and develop harmonized standards for Required Navigation Performance/Area Navigation. Additionally transitioned to the FAA Flight Standards (AFS-420) the need to complete an Advisory Circular (AC 90-FPP), supporting the development of instrument procedures by non-governmental entities. Expected benefits include effective use of existing aircraft system capabilities and reductions in the time and cost for service providers and aircraft operators to promulgate new procedures and access new airspace, routes, airports, runways and alternates.

Recommendation 9: The authorities should work with the rest of the aviation community to develop, coordinate, and apply a commonly agreed-upon concept of operations, including the development and application of certification policies.

Status: Transitioned to the FAA executive management as part of the Coordinated Operational Approval Process (Recommendation 2), to create the framework for gathering public input to the operational concept definition process and implementation into the Acquisition Management System, and also to modify the investment analysis phase of the Acquisition Management System to account for public input. Expected benefits include consensus driven end-to-end system requirements with potential for lower costs and earlier deployment of new operational capabilities.

Recommendation 10: The number of committees should be reviewed and reduced by both the authorities and industry. Leverage successful activities (such as C/AFT, the JAA CNS/ATM Steering Committee) as means for users, industry, service providers, and regulators to discuss and reach general consensus before scarce resources are applied to additional forums. A specific effort to review and eliminate duplicate or ineffective implementation teams, committees, panels, etc., should be undertaken.

Status: Responded by developing and publishing a centralized Aviation Committees database on an independent Internet web site, together with a voluntary process for each of the aviation committee sponsoring organizations to maintain current committee information. Expected benefits are for the web site to become a single point reference resource for committee sponsoring organizations when considering the formation of new committees and for industry participants to evaluate their participation in committee activity.

Recommendation 11: The authorities should correct the improper application of rules, guidance, and policy by educating agency specialists about the conceptual basis for regulatory material. It is especially important to clarify the proper application of and relationship between airworthiness regulations and operating rules. An important aspect of this is to address or correct inappropriate use of certificate limitations, particularly when inappropriate limitations are proposed to address or correct perceived operational issues unrelated to basic airworthiness.

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Status: Acknowledged the joint effort of FAA Flight Standards and Aircraft Certification in tasking a Field Approval Process Improvement Team to review of the quality of current field approvals and evaluate/improve avionics repair and alteration and avionics certification training courses for FAA airworthiness inspectors. The FAA established an Intranet site for the dissemination and tracking of Flight Standards policy information. Expected benefits include appropriate classification of Field Approvals versus Supplemental Type Certificates and timely availability/consistent application of standardized policy.

Recommendation 12: The authorities should work with industry to review the use of the TSO, STC (Amended TC in case of TC holders), or field approval processes when seeking airworthiness approval for an aircraft modification. Special focus should be placed on (1) providing the kind of self-certification of the manufacturing process for STC holders that is obtained by TSO holders, and (2) ensuring that human factors issues are appropriately addressed, regardless of which of these processes are followed.

Status: Responded by acknowledging the FAA's long-term efforts to revise TSO Order 8150.1A to reflect current avionics technology and practice, including the expanded use of Standard Parts and Parts Manufacturing Approval (PMA) Parts. The use of Field Approval processes was addressed as part of Recommendation 11. Expected benefits are reduced complexity and cost saving to avionics manufacturers, repair stations and end-users.

Recommendation 13: To stop the ever-increasing number of rules that need harmonization, the authorities should ensure that no new regulations are proposed or promulgated unless they have been harmonized at least between the JAA and the FAA. This activity should begin at a specific date in the near future (say, one year), except in cases of overriding safety or statutory urgency. In the longer term, the ongoing efforts to harmonize existing rules should be completed.

Status: Responded by acknowledging the FAA/JAA initiative, subsequent to Task Force 4, in establishing the Harmonization Management Team to ensure rule harmonization. The FAA is encouraged to maintain their harmonization focus and extend this effort towards the longer-term creation of a single worldwide code, or certification process, among all ICAO member states. Expected benefits are improved consistency of requirements and means of compliance, leading to reduced certification process complexity, costs and cycle-time.

Recommendation 14: The authorities should publicize how rules have been applied, thereby facilitating the standardization of regulatory interpretations. Making this information generally available, perhaps by Internet access, will ensure that those who are concerned with standardization are provided accurate information on the regulatory applications that may be in need of better standardization. This is especially critical for timely granting of approvals by field offices.

Status: Responded by recognizing the progress already made by FAA, subsequent to Task Force 4, in making several certification-related guidance documents available to the public, in most cases via the FAA and other Internet web sites. The FAA's regulatory interpretive files have become more readily available to the public. Additionally transitioned to the FAA Associate Administrators the need to establish a team across the lines of business to develop an agency-wide re-designed web site. Expected benefits will be more timely and user-friendly access to all of the information provided on the FAA web site.

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Recommendation 15: The authorities should establish specific processes that will provide for feedback on actions that are perceived by users to be inappropriate for any reason. This must be conducted in a manner that users will have no fear of retribution.

Status: Transitioned to the FAA Associate Administrators for establishment of a “no-fear feedback” process and survey program. This recommendation is coupled with Recommendations 1 and 14, in that the Organizational Focal Point and agency-wide web site re-design provides the vehicle for responding to this recommendation. Expected benefits include better FAA visibility of field concerns, leading to improved consistency of certification services and more timely resolution of inappropriate actions.

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2 BACKGROUND

On February 26, 1999, the RTCA Task Force 4 - Certification issued its Final Report, which concluded a one-year study of aviation certification issues. The Final Report contained fifteen recommendations to the Federal Aviation Administration and the aviation industry. These recommendations were not prescriptive in nature but identified opportunities for improving the overall efficiency and effectiveness of the aviation certification processes.

At the request of the FAA Administrator, two committees consisting of government and aviation industry personnel were formed to assist with the implementation of the fifteen recommendations. The Certification Steering Committee was the guiding body to charter and promote the work of the Certification Select Committee, which developed responses to the fifteen recommendations. To accomplish its objectives the Certification Select Committee reviewed the overarching issues identified by Task Force 4 and formed three Working Groups each co-chaired by a government and industry representative, to address the specific recommendations in context of:

- Working Group 1 – Operational Concepts and Procedures
- Working Group 2 – End-to-End Operation and System Requirements
- Working Group 3 – Organizational Certification and Oversight

The Certification Steering Committee charged the Certification Select Committee with deliberating and formulating actions to implement the 15 recommendations contained in the RTCA Task Force 4, Certification Final Report dated February 26, 1999. From October 1999 to August 2001, the Certification Select Committee met on a regular basis to formulate implementation plans for the 15 recommendations.

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3 REPORT STRUCTURE

This report documents the activities and deliberations of the Certification Select Committee over a 22-month period. This report addresses the actions taken by the Certification Select Committee to address or account for actions taken by other organizations to address the 15 recommendations contained in the RTCA Task Force 4, Certification Final Report dated February 26, 1999.

Each recommendation is cited and the action taken to respond to the recommendation or transition the recommendation to the FAA is discussed. Details of actions taken to address each recommendation are provided by way of either a Response Paper or a Transition Paper, contained in the appendices to this report.

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4 INTRODUCTION

Four overarching issues were identified in the RTCA Task Force 4 Report and reflected in the Certification Steering Committee charter. The issues are:

1. Technology development and associated product cycle times have outpaced the applicable FAA regulations, policy, guidance, and oversight capacity.
2. Under current practice, the time and cost to market for new technology CNS/ATM products is prohibitive to the FAA's National Airspace System (NAS) modernization plans and priorities.
3. The lack of international agreements concerning the interoperability of CNS/ATM products and the harmonization of applicable regulations is a barrier to definition of International Airspace System (INAS) operations and to any significant development or certification cost efficiencies for the associated products and systems.
4. Current methods, policies and practices do not support the types of operations necessary for efficient use of the INAS by the aviation community. The situation will get worse unless changes are made.

Responses to the Task Force 4 report, from both FAA and industry leadership affirmed these issues, together with the need to match an implementation program with INAS modernization priorities.

The objective of the Task Force 4 recommendations are to realize operational benefits with improvements in the cost and schedule of the certification process, particularly for CNS/ATM products, while maintaining or improving today's level of operational safety. The implementation processes should incorporate human factors design considerations and enhance international interoperability.

It is recognized that institutionalizing changes is necessarily a long-term endeavor. However, this report identifies specific near term actions that have been or can be taken, and which provide a roadmap to facilitate a transition to improved methods of FAA oversight, certification service and operational authorization and use.

Three Working Groups were formed to address the various aspects of the recommendations.

4.1 WG-1 Operational Concepts and Procedures

Context — The INAS is a complex environment that must accommodate the needs of a wide range of users from scheduled air carriers to personal and sport aviation. Growth in air traffic and public safety perspectives exerts forces on the operations conducted in the INAS. The Air Traffic Services (ATS) that support the INAS are continuously being assessed to determine if the level of service can support the future need of the aviation community. Technical and functional obsolescence in some areas is dictating either a change in technology or change in methodology. The aircraft manufacturing and equipage industry is attempting to match required operational functionality with evolving technology. Collectively, these forces produce a very dynamic environment.

The user community expects flight operations that allow safe and efficient air commerce and public use. Product manufacturers expect clear definition of the functions necessary to conduct those operations. The management of the use of airspace by the FAA, and other oversight agencies, should focus on the procedures necessary for orderly access to, and operation within the INAS. Because of the dynamics of the air space, the creation and modification of operational procedures must be a continuous process.

The FAA, and other national or regional Civil Aviation Authorities (CAAs), should implement changes necessary to focus on the development and maintenance of a means to

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address the following goals and their resultant operational benefits, as described in the Task Force 4 report:

- Establish an organizational framework to provide a functional focus for users, industry and other government agencies.
- Allow and encourage communications to support the development of operational and technical rationale necessary to formulate suitable policy and guidance consistent with regulatory and industry needs.
- Expedite development of procedures and 3D and 4D operational concepts such as RNAV, RNP, available in current avionics, but underutilized.
- Respond promptly to operational requirements with appropriate operational concepts when the concepts can be supported by technical capability.
- Coordinate concepts of operations with operational, airworthiness and procedural certification policy.
- Coordinate with industry to reduce the number of committees and forums devoted to operational concepts, certification basis and technical standardization.

Work Group 1 addressed Task Force 4 Recommendations 1, 8, 9 and 10.

4.2 WG-2 End-to-End Operation and System Requirements

Context — As the present air traffic system has evolved, various ground and airborne systems have been implemented to conduct operations and to increase safety margins. Efficient use of the air space suggests the need for more flexible operation of aircraft to accomplish capacity, efficiency and workload objectives. Technology enhancements help promote higher levels of operational capability and greater integration of functions to reduce cost and improve reliability. An end to end perspective is necessary to appreciate the relationships between the various ground, air and space components and the interface between the human participants and the supporting systems. Only such an inclusive view can properly assess the levels of performance and integrity that are appropriate for each individual component. Without such a perspective, functional specifications may become disproportionately stringent such that resulting equipment costs are driven up with no corresponding increase in capability or safety margin. Unnecessarily stringent requirements can also preclude the promulgation of positive safety features due to cost considerations.

Incorporating an end to end perspective in the charter of the proposed organizational structure for operational capabilities should institutionalize closer coordination between the functional branches of the agencies. The following are associated goals and their resultant benefits, as described in the Task Force 4 report:

- Establish a system engineering discipline to consider the overall performance requirements in the context of the operational requirements and to allocate safety budgets appropriate to the various elements that contribute to the operation.
- The agencies and industry should coordinate to produce standards and processes for both ground system and airborne system elements appropriate to their contribution to the operational function.
- Implement multi-tiered airworthiness requirements to achieve safety objectives at reasonable cost.
- Incorporate human performance considerations in standards for system operation, design and airworthiness approval.

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- The agencies and industry should utilize advanced system deployment "trials" as a technique to gain in-service experience quickly and provide feedback regarding operational concepts.

Work Group 2 addressed Task Force 4 Recommendations 2, 3, 4 and 7.

4.3 WG-3 Organizational Certification and Oversight

Context — The projected growth of aviation operations and the products to enable that growth forecast an enormous need for operational authorization and certification service. The current practice of direct agency involvement in each operational and product approval has become an impediment to this growth. The current practice should be replaced with organizational certification of operators and product manufacturers, modeled after current practice in European states.

Providing oversight through organizational certification, as considered under the Certified Design Organization (CDO) and Certified Design and Production Organization (CDPO) initiatives, should focus on the following goals and their resultant benefits, as described in the Task Force 4 report:

- Establish a process where authorities and applicants come to an early and clear agreement on their respective roles, responsibilities, expectations, schedules, and standards to be used in certification projects.
- Construct and apply this process to airborne and ground equipment suppliers, to facilitate approval of their components and processes independent of any specific aircraft Type Certificate or Supplemental Type Certificate (TC/STC) project.
- Enhance the designee program to improve timeliness of approvals.
- Ensure the proper application of rules and policy and distinguish between airworthiness objectives and operational procedures.
- Provide for self-certification of the manufacturing process for STC holders (similar to that of TSO).

Work Group 3 addressed Task Force 4 Recommendations 5, 6, 11, 12, 14 and 15.

During the work program, the Working Groups identified opportunities to:

- Minimize the number of rules and advisory material
- Harmonize current rules, policies and criteria
- Assure compatibility on any new rules, policies and criteria for new functionality

All Work Groups were asked to consider the concepts of Task Force 4 Recommendation 13 – Rule Harmonization, in their work programs.

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