



THE VIEW FROM WASHINGTON

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Breaking Down the Alphabet Soup of Performance and Quality Standards

During the AEA West Regional Meeting last year, we had a discussion regarding the quality and reliability of non-certified, non-TSO'd equipment, primarily for amateur-built experimental aircraft and the new light-sport aircraft.

These aircraft, as well as many applications in certified aircraft, do not require FAA-approved equipment, which is TSO'd equipment; yet, the shops want some way to gauge the quality and reliability of this equipment.

In the process of describing the performance and quality standards shops should use in selling non-certified equipment, we began to discuss many of the standards currently used in avionics maintenance. I thought a review of some of the more common organizations and their standards might be helpful.

The recent discussion of the new "Standard Wiring Practices Manual" for general aviation aircraft, as well as the new design, certification and maintenance standards for light-sport aircraft, highlight the standards of ASTM International.

ASTM International

ASTM International is one of the largest voluntary standards development organizations in the world, and it is a trusted source for technical standards for materials, products, systems and services.

If you have followed any of the dis-

cussions regarding consumer products and toy recalls recently, you would have noticed these consumer products were recalled because many of the products did not meet the applicable ASTM standards.

While known for its high technical quality and market relevancy, ASTM International standards also have an important role in aviation.

For the old-timers, ASTM International originally was known as the American Society for Testing and Materials. It was established more than a century ago to address frequent rail breaks in the burgeoning railroad industry. Its work led to standardization of the steel used in rail construction, ultimately improving railroad safety for the public.

As the century progressed and new industrial, governmental and environmental developments created new standardization requirements, ASTM answered the call with consensus standards, which have made products and services safer, better and more cost-effective.

In addition to the new wiring standards and the light-sport aircraft standards, ASTM also manages the aviation standards for unmanned aircraft systems, aviation fuels, aviation plastics, insulating blankets, aluminum and other metal alloys.

For a complete listing of ASTM standards, visit www.astm.org.

The original discussion at the AEA

West Regional Meeting focused on non-certified aircraft instruments. The question raised was: "How can a shop know the quality of the product it is selling to the amateur-built aircraft market?"

The answer turned out to be quite simple. While the requirement for FAA-approved (TSO'd) instruments does not exist for amateur-built aircraft, the underlying standards still should be met to provide the customer with some assurance of quality and performance.

In the FAA technical standard order for a given instrument, the TSO usually will have some unique FAA requirements, but then incorporate the applicable standards from two separate organizations into the TSO: RTCA and SAE.

For example, let's look at TSO-C2d for airspeed instruments. The minimum performance standards prescribe the minimum performance standard airspeed instruments must meet to be identified with the applicable TSO marking.

The TSO requires any new model of airspeed instrument, which is to be so identified by the TSO and is manufactured on or after June 14, 1989, must meet the standards set forth in the Society of Automotive Engineers (SAE) Aerospace Standard 8019, "Airspeed Instruments," dated March 30, 1981, as amended and supplemented by TSO-C2d.

The TSO mandates the instrument

meets the conditions and procedures prescribed in Radio Technical Commission for Aeronautics (RTCA) Document No. DO-160B, "Environmental Conditions and Test Procedures for Airborne Equipment," dated July 1984.

In addition, if the equipment design implementation includes a digital computer, the computer software must be verified and validated in an acceptable manner. One acceptable means of compliance for the verification and validation of the computer software is outlined in RTCA Document No. DO-178A, "Software Considerations in Airborne Systems and Equipment Certification," dated March 1985.

RTCA

RTCA Inc. was organized in 1935 as the Radio Technical Commission for Aeronautics and is a private, non-profit corporation developing consensus-based recommendations regarding communications, navigation, surveillance and air traffic management system issues.

RTCA functions as a federal advisory committee. Its recommendations are used by the FAA as the basis for policy, program and regulatory decisions, as well as by the private sector as the basis for development, investment and other business decisions.

While RTCA holds the recommended standards for most modern communications, navigation and surveillance equipment, some of the more common standards our industry uses include:

- DO-160, "Environmental Conditions and Test Procedures for Airborne Equipment." This document provides standard procedures and environmental test criteria for testing airborne equipment. Numerous tests are covered, including vibration, power input and radio frequency susceptibility.

- DO-178, "Software Considerations in Airborne Systems and Equipment

Certification." This document provides guidance for determining, in a consistent manner and with an acceptable level of confidence, the software aspects of airborne systems and equipment comply with airworthiness requirements.

- DO-200, "Standards for Processing Aeronautical Data." This document provides the minimum standards for the processing of aeronautical data used for navigation, flight planning, terrain awareness, flight simulators and other purposes. The standards cover data-processing quality assurance and quality management requirements. They provide the end-user the necessary assurance that delivered aeronautical databases meet the appropriate quality requirements for the data.

- DO-201, "Standards for Aeronautical Information." This document provides for the improved operational effectiveness of airborne navigation systems that use stored databases.

For more information about RTCA standards, visit www.rtca.org.

SAE

The Society of Automotive Engineers International is a group of engineers, business executives, educators and students from more than 97 countries, forming a network of members who share information and exchange ideas for advancing the engineering of mobility systems.

The SAE holds hundreds of Aerospace Recommended Practices, Aerospace Standards, Metric Aerospace Recommended Practices, and Aerospace Information Reports to include the standards for most aviation instruments and the Aerospace Quality Standards: AS9000 and AS9100.

In February 1996, the National Technology Transfer and Advancement Act of 1995 (Public Law 104-113) was passed by Congress to direct "federal agencies to focus upon increasing their

use of voluntary consensus standards whenever possible," thus reducing federal procurement and operating costs.

The law also authorized the National Institute of Standards and Technology as the "federal coordinator for government entities responsible for the development of technical standards and conformity assessment activities," thus eliminating "unnecessary duplication of conformity assessment activities."

Following the enactment of the National Technology Transfer and Advancement Act, many of the familiar standards of aviation changed from a government or military specification to an industry specification.

Most of the common-use wiring and hardware was listed (and still is listed in many cases) as a MIL-W-xxxxx. However, most of this wire and hardware today is listed as an SAE — AS-xxxxx specification — often retaining the same numbering system as the original military specification.

For more information about SAE standards, visit www.sae.org.

ARINC

Incorporated on Dec. 2, 1929, Aeronautical Radio Inc. was chartered by the Federal Radio Commission (later to become the Federal Communications Commission) to serve as the airline industry's "single licensee and coordinator of radio communication outside of the government." The corporation's stock was held by the four major airlines of the day.

The company, known in the industry as ARINC, soon took on responsibility for all ground-based, aeronautical radio stations and for ensuring station compliance with FRC rules and regulations. Today, ARINC is a portfolio company of The Carlyle Group.

ARINC specifications and reports provide a design foundation for equip-

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ment, including guidelines for installation, wiring, data buses, databases and general guidance.

For more information about ARINC standards, visit www.arinc.com.

ISO

The International Organization for Standardization is a non-governmental organization comprised of the national standards institutes of 157 countries, on the basis of one member per country, with a central secretariat in Geneva, Switzerland, who coordinates the system.

The ISO has developed more than 16,500 international standards on a variety of subjects, and 1,250 new ISO standards are published every year. ISO standards include aerospace fastener systems; aerospace fluid systems and components; airframe bearings;

air cargo and ground equipment; and aerospace electrical requirements, to name a few.

Although The ISO is heavily involved in aerospace standards, the standards most recognized are its ISO 9000 series standards on quality management systems and its ISO 14000 series standards on environmental management systems.

For more information about the ISO, visit www.iso.org.

NIST

Any review of supporting standards would not be complete without a brief addition of the National Institute of Standards and Technology. From automated teller machines and atomic clocks to mammograms and semiconductors, innumerable products and services rely in some way on the technology, measurement and standards provided by the NIST.

Founded in 1901, the NIST is a non-regulatory federal agency within the U.S. Department of Commerce. Its mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards and technology in ways that enhance economic security and improve quality of life.

In the U.S. aviation industry, we rely on the measurement and equipment calibrations standards of the NIST to ensure our precision measuring equipment meets the standards necessary for airworthiness.

For more information about NIST, visit www.nist.gov.

While we regularly look to the standards of our regulatory body for the performance of maintenance and aircraft operations, we often rely on industry consensus standards for the design, performance and quality of our products, tools and equipment. □