RTCA DO-160 Qualification: Purpose, Testing and Design Considerations (AERO0450)

Instructors: C. Bruce Stephens, Darren Stout *(This course may be taught by either instructor.)*

**Course Description**
This is an introductory class, designed to educate system engineers, hardware design engineers and test engineers in the aspects of DO-160 as it pertains to equipment qualification in support of aircraft certification. For system and hardware engineers, the intent is to educate and empower them to develop equipment designs that are compliant with DO-160 by design and avoid expensive redesigns to correct issues found late in the development cycle during test. For test engineers, it is intended to assist them to properly develop test plans for their products. For each test section of DO-160, we provide purpose, adverse effects, categories, a high-level, step-by-step guide through the test procedure and design considerations for passing the test. Also included is an overview of a top-down requirements management approach (systems engineering), review of related FAA advisory material, an overview of grounding and bonding, wire shielding practices and lightning protection for composites.

Students will work in teams to gain hands-on experience building a new STC Electrical/Avionics System Widget to meet Direct Effects of Lightning DO-160 Section 23 certification requirements and the other DO-160 certification requirements. They will also prepare a report detailing the test levels for all DO-160 sections and defining where the equipment is located on the aircraft, the criticality of the equipment, and the required testing categories incorporating the information they learn as they progress through the course.

**Course Highlights**
- The aircraft environment
- Overview of RTCA and DO-160
- Advisory circular AC 21-16G
- Requirements, development and management
- FAA test requirements
- Pass/fail requirements

**Who Should Attend?**
This class is designed for system engineers responsible for developing requirements for airborne electronic equipment; hardware design engineers responsible for building such equipment and test engineers responsible for writing test plans.
Learning Objectives

- The purpose of each test, and the adverse effects that the test is intended to prevent
- The ability to properly assign test categories and test levels
- A basic understanding of each test procedure
- Design considerations to meet the test requirements
- Test requirements for both metal and composite aircraft designs

Course Outline

Day One
- Aircraft environment
- Overview of RTCA and DO-160
- Advisory Circular AC 21-16G
- Requirements development and management
- Conditions of tests
- Temperature and altitude
- Temperature variation
- Humidity
- Shock and crash safety
- Vibration
- Explosion proof

Day Two
- Waterproofness
- Fluids susceptibility
- Sand and dust
- Fungus resist
- Salt fog
- Icing
- Flammability

Day Three
- Magnetic effect
- Power input
- Voltage spike
- Audio frequency conducted susceptibility
- Induced signal susceptibility

Day Four
- RF susceptibility
- RF emission
- Lightning indirect susceptibility
- Lightning direct effects
- ESD
Day Five
- DO-160 Final Exam
- Final Team Test Reports
- What's next in component testing?
- Final Evaluation

Classroom hours / CEUs
31.5 classroom hours
3.150 CEUs

Certificate Tracks
Aerospace Compliance
Avionics and Avionic Components
Electromagnetic Effects

Course Fees
Early registration course fee: $2,495 if you register and pay by the early registration deadline (45 days out).

Regular registration course fee: $2,695 if you register and pay after the early registration deadline.

U.S. Federal Employee Discount
This course is available to U.S. federal employees at 10% off the registration fee. To receive the federal employee discount, you must enter the code FGVT116 during the checkout process. Please note that you must validate your eligibility to receive this discount by entering your U.S. government email address (ending in .gov or .mil) when creating your online registration profile. This discount is available for both the early registration and regular registration fees.

Netherlands Defence Academy Discount
This course is available to Netherlands Defence Academy employees at a discounted registration fee. Please contact the NDA Procurement and Contracting department for details. Please note that you cannot register using our online system when requesting this discount.

Instructor Bios

C. Bruce Stephens is an HIRF/Lightning/EWIS ODA UM/AR at the Boeing Company and a consultant DER at his company, Stephens Aviation, with a wealth of experience in High Intensity Radiated Fields (HIRF) and Lightning protection of Aircraft. Stephens retired from Hawker Beechcraft after 28 years of service. He has HIRF/Lightning experience on both Part 23 and Part 25 including composite aircraft. Stephens is working with the Boeing Team to develop EWIS
requirements and means of compliance on several aircraft projects. Stephens is a Six-
Sigma/Lean Master Black Belt consultant, developing implementation and training materials,
and teaches at a number of universities, including Webster University and Southwestern
College. He has an executive M.B.A. and M.S. in Management from Friends University and a B.S.
in Industrial Technology from Wichita State University.

**Darren Stout** is an EME/HIRF/Lightning ODA UM/AR at the Boeing Company. Darren has a
wealth of experience in Electromagnetic Effects (EME), High Intensity Radiated Fields (HIRF),
lightning effects, p-static effects, and transmitting personal electronic devices, RTCA/DO-160,
MIL-STD-461, along with extensive experience in laboratory and aircraft testing. His experience
is a result of over 22 combined years as an Electrical and EME engineer with Boeing, Lucent
Technologies (Bell Labs), FAA, and BancTec. He also served six years in the United States Air
Force as a B-52 navigator, instructor navigator, and radar navigator (bombardier), directing and
performing higher headquarters missions including aircraft, systems, and munitions testing, and
is a Desert Storm veteran. He has a BSEE degree in electrical engineering (lasers, fiber optics,
and antenna arrays) from the University of Michigan - Ann Arbor, is an iNARTE certified EMC
Engineer, and is a Level 2 Certified TEMPEST Professional.

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workplace. On-site delivery is ideal for organizations that need to train 10 or more employees
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