

# AEROSPACE

## SHORT COURSES

### 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: \$2,595 if you register and pay by the early registration deadline (45 days out).

Regular registration course fee: \$2,795 if you register and pay after the early registration deadline.

### **Course Materials**

Course materials, including outlines, presentation copies, and supplementary materials, will be accessible through Canvas, KU's online learning system. Instructions to access Canvas will be provided upon completed registration. Students are required to bring a computer or other electronic device with PDF-viewing capabilities with them to class each day. If you require accommodation contact us at [professionalprograms@ku.edu](mailto:professionalprograms@ku.edu) and we will work with you on an accessible solution.

**Students enrolled in this class should acquire a copy of the textbook(s) listed below.**

- Textbook Name: DO-160G – Environmental Conditions and Test Procedures for Airborne Equipment

**Textbooks may be purchased online at [https://my.rtca.org/nc\\_store](https://my.rtca.org/nc_store)**

### **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.

## Instructor Bios

**C. Bruce Stephens** is an FAA DER/EUM in the areas of EME, HIRF, Lightning, Fuel Systems, Structures and EWIS. His aircraft certification experience includes Beechcraft Starship, King Air, Bonanza, Baron, Hawker 4000, Hawker 800XP, Premier 1, JPATS, Learjet Model 45/75, Cessna Citation Latitude, and military projects related to Boeing 707, 737, 747, 767 KC-46A Tanker, and 777. Stephens continues to work on Part 27 and 29 rotorcrafts (MH139 Grey Wolf), and space vehicle certification projects. He has assisted several smaller companies with FAA EME certification projects and is interested in the certification requirements related to new EVTOL Aircraft. Stephens enjoys mentoring new FAA delegates and instructing several courses he has developed for The University of Kansas Aerospace Short Course program. These courses include HIRF, Lightning, EWIS, EZAP, DO-160, Fuel Systems, Introduction to EME, and EME Aircraft Testing/Certification. Stephens has been a Six-Sigma/Lean Master Black Belt consultant with experience in both aircraft and copper mining process improvement. He has instructed over 25 college courses, most being MBA level, including MBA Statistics, MBA Business Management, MBA Operations Management, MBA Six Sigma/Lean Production Management, Supply Chain Management, Six Sigma/Lean Black Belt and Green Belt. Universities Stephens has instructed at include Webster University, Friends University, Embry Riddle University, Southwestern College, Newman University and The University of Phoenix. 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.

### **This class is available for delivery at your company.**

Your company can realize substantial savings by bringing an aerospace short course to your workplace. On-site delivery is ideal for organizations that need to train 10 or more employees on a specific topic. For more information on on-site course delivery, or to request a cost proposal, please contact us at [ProfessionalPrograms@ku.edu](mailto:ProfessionalPrograms@ku.edu).

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