Introduction to Electromagnetic Effects (EME) and Aircraft Engineering Requirements – ONLINE (AERO0375)

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

Course Description
This course will provide participants with an understanding of electromagnetic effects related to aircraft engineering requirements, FAA certification requirements, testing requirements for both DO-160 bench testing and aircraft level testing related to EMC, P-Static, ESD, TPED's, HIRF, EWIS and lightning.

Students will work in teams to gain hands-on experience building a new STC Electrical/Avionics System Installation to meet Direct Effects of Lightning certification requirements and the internal EME certification requirements. They will also prepare Electromagnetic Effects CFR compliance statements incorporating the information they learn as they progress through the course.

Course Highlights
• EME best practices
• Team EME compliance project
• DER/UM EME requirements
• EME examples and practical applications
• Review of the Advisory Circulars related to EME
• Daily real examples of problems and solutions related to EME certification

Who Should Attend?
The course is designed for all aircraft design areas including certification engineers and managers, electrical, avionics, HIRF & lightning engineers, DO-160 laboratory and aircraft technicians. Aircraft managers, project engineers, and all other system engineers working in electrical/avionics/HIRF/lightning/EWIS-related areas should also attend.

Learning Objectives
• Overview of FAA EME CFR related to aircraft protection
• How EME requirements relate to the different areas of the aircraft
• EME bench testing and aircraft level testing requirements
- Safety aspects of EME
- Design requirements related to EME
- How EME relates to other engineering requirements
- How to find and demonstrate/document compliance for EME requirements

**Course Outline**

- Electrical Bonding Electromagnetic Effects Overview
- Electrical Bonding and Protection Against Static Electricity
  - Advisory Circulars 25.899-1 and 25.1715
- Electrostatic Discharge Sensitive (ESDS) Device
- Electrostatic Discharge
  - RTCA/DO-160G Section 25
- Precipitation Static (P-Static)
- Transmitting Portable Electronic Devices (T-PEDs)
- Introduction to Electrical Wiring Interconnection System (EWIS)
- Introduction to EMC/EMI
- Emission of Radio Frequency Energy
  - RTCA/DO-160G Section 21
- HIRF Safety and Security
- High Intensity Radiated Fields (HIRF)
- HIRF Requirements
- Radio Frequency Susceptibility
  - RTCA/DO-160G Section 20
- The Lightning Environment
- Directs Effects Protection and Paint & Direct Effects of Lightning
- Levels for Direct Effects Testing
  - RTCA/DO-160G Section 23
- Introduction to Indirect Effects
- Lighting Indirect Effects
  - RTCA/DO-160G Section 22
- Aircraft Electrical and Electronic System Lightning Protection
  - Advisory Circular 20-136B
- Protection of Aircraft Fuel Systems Against Fuel Vapor Ignition Caused by Lightning
  - Advisory Circular 20-53C
- EME final exam
- EME team report-out
- EME course evaluation

**Classroom hours / CEUs**

31.50 classroom hours
3.15 CEUs
**Certificate Track**
Aircraft Maintenance and Safety
Avionics and Avionic Components
Electromagnetic Effects

**Course Fees**
*Early Online Registration fee: $2,195*  
Regular Online Registration fee: $2,395  
*Early registration fee is available if you register and pay at least 7 days prior to the course start*

Registration is open until the first day of the course; however, early registration is encouraged. The online course fee includes individual access to the Zoom course meetings and to course materials, readings, videos, and resources in Blackboard, the University of Kansas Learning Management System. No additional textbook purchases are required outside the course fee.

**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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