

# AEROSPACE

## SHORT COURSES

### Electromagnetic Effects Aircraft Level Testing and FAA Requirements (AERO0250)

Instructor: C. Bruce Stephens

#### Course Description

This course discusses the concepts of aircraft ground and flight testing that may be required to ensure that aircraft level systems are safe for operation when exposed to the effects of electromagnetic effects (EME), high intensity radiated fields (HIRF), lightning, precipitation static (P-static), and transmitting personal electronic devices (TPEDs). Please note that this course requires background knowledge of electromagnetic effects and a basic understanding of P-Static, TPED's, HIRF, and lightning.

Students will work in teams to gain hands-on experience building a new STC Electrical/Avionics System Installation for EME Aircraft Testing. They will create a report showing how the installation meets Direct Effects of Lightning certification requirements and prepare sample compliance statements. This project will provide students a unique opportunity to incorporate the information they learn as they progress through the course.

Prerequisite: If you do not have prior knowledge of or experience working with electromagnetic effects, it is required you take the following course: **Introduction to Electromagnetic Effects (EME) and Aircraft Engineering Requirements.**

#### Course Highlights

- Aircraft testing fundamentals
- Coordination of aircraft testing activities
- Documentation of test procedures and results
- FAA aircraft-level certification requirements
- Problem and solution discussions
- EME testing team workshops

#### Who Should Attend?

The course is designed for all aircraft design and testing areas including electrical, avionics, communications, engineers and technicians. Aircraft managers and project engineers who coordinate airplane testing and/or certification related areas are also recommended to attend.

#### Learning Objectives

- Understanding of the fundamentals of aircraft testing for EME, HIRF, lightning, p-static, and TPEDs
- Understanding how to coordinate aircraft testing
- Data that is beneficial before, during, and after performing aircraft testing
- Understanding how to identify problems during certain aircraft testing
- Ground testing versus flight testing
- Documentation of test results to show compliance
- Showing and finding compliance for EME, HIRF, lightning, p-static, and TPEDs

## **Course Outline**

### **Day One**

- Introduction to the electromagnetic environment of aircraft—metallic and composite aircraft requirements
- 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)
- Ground and Flight Test Procedure Examples
- Developing an Aircraft Test Procedure for P-Static and TPED's

### **Day Two**

- DER/UM Requirements
- Introduction to Electrical Wiring Interconnection System (EWIS)
- Introduction to Electromagnetic Compatibility EMC/EMI
- Ground and Flight Test Procedure Examples
- Developing an Aircraft Test Procedure for EMC

### **Day Three**

- HIRF Safety and Security
- High Intensity Radiated Fields (HIRF)
- HIRF Aircraft Level Tests
- HIRF Test Levels Comparison – bench test data and aircraft data
- FAA AC 20-158A and SAE ARP5583A
- HIRF Test Lessons Learned
- Developing an aircraft test procedure for HIRF and TPEDs

### **Day Four**

- Lightning Effects on Aircraft
- Introduction to Indirect Effects
- Lightning Aircraft Level Testing
- Aircraft Electrical and Electronic System Lightning Protection

- Aircraft Lightning Test Methods
- FAA AC 20-136B and SAE ARP5416A
- Developing an aircraft test procedure for lightning and P-Static

#### **Day Five**

- EME team aircraft testing summary
- Final discussion and questions
- Final EME aircraft testing exam

#### **Classroom hours / CEUs**

31.5 classroom hours

3.15 CEUs

#### **Certificate Tracks**

Aerospace Compliance

Aircraft Maintenance and Safety

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.

#### **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.

#### **Canada Department of National Defence Discount**

This course is available to Canada DND employees at 10% off the registration fee. Please contact the DND Procurement Authority (DAP 2-3) for details. Please note that you cannot

register using our online system when requesting this discount. This discount is available for both the early registration and regular registration fees.

### **Instructor Bio**

**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.

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