



Joint Spectrum Center



**DEPARTMENT OF DEFENSE
JOINT SPECTRUM CENTER
ANNAPOLIS, MARYLAND 21402-5064**

Electromagnetic Environmental Effects (E3) Awareness and Training Course Guide

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GUIDELINES ON OBTAINING JSC E3/SC SEMINARS

Introduction

Electromagnetic Environmental Effects (E3) awareness training is fundamental to preventing electromagnetic interference (EMI) and to correcting weapon system EMI problems. In the past, many E3 problems could have been avoided and many millions of dollars saved if personnel involved in the acquisition process or operational usage of military systems and equipment were better trained in recognizing and resolving and/or knowing how to avoid the occurrence of EMI. The JSC sponsors E3 awareness training seminars, which are available to DOD activities. These seminars cover a wide range of E3 topics useful to E3 engineers and program managers. See the list of available courses below.

Course Availability

The courses listed in this guide are available to Government organizations to host, coordinate and provide the appropriate facilities to conduct the course(s). A Government point of contact (POC) is necessary for each course requested. This POC will provide the coordination of time, date and attendance for the course(s) and will be the liaison with the instructor for the successful accomplishment of the course(s). Courses provided by the Joint Spectrum Center (JSC) are available on a first-come, first-served basis.

Government contractors desiring to attend or host any of the subject courses can do so by coordinating with their Government sponsor. Contractor requests will be considered on a case-by-case basis. Contractors are welcome to attend Government-sponsored seminars pending available seating.

Location

Seminars are provided on-site at the sponsoring organization's location. The sponsoring organization is also required to provide training space and suitable training and audio-visual equipment (projector for laptop computer, screen, VCR/TV).

Attendance/Participation

It is recommended that a minimum of 10 people attend any given course. It is also recommended that if different groups in the same locale care to host a course(s) that they should coordinate with one another and hold it at a location so all can attend at the same time.

Categories

Historically, JSC sponsored seminars have been offered at no cost to the requesting activity and we will continue that policy within the limitations of available funding. Due to funding constraints, we are grouping our seminars by historical demand to maximize the availability of the most popular seminars.



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Beginning in FY03, JSC courses are grouped into three levels:

- Level 1 – available at no cost, on a first come, first served basis until available funds are exhausted
- Level 2 – cost dependent on available funding and demand for Level 1 courses. Effort will be to make available at no cost, but limited seminars likely to be available at no cost.
- Level 3 – available on a fee-for-service basis only. Contact the JSC E3 Awareness Training manager for details.

This fee will cover preparation costs, instructor labor, course material, shipping costs, and applicable travel and per diem costs. For more information, see “Contact Information” below.

Cost Information

All courses are available for a fee. The Level I and Level II courses are provided at no charge a limited number of times each fiscal year. They are provided based on available funding and based on the number and type of requests received (i.e., which services). For more information on specific course costs, see “Contact Information” below or call (410) 293-4957, x1523.

Course Development

New courses may be developed. The JSC will have to assess the relevance and appropriateness of the course and the expected time and cost involved. Please contact us to discuss the contents of the course and for the estimated cost.

Website

Additional information on the E3 Awareness program at JSC is available via the Internet at <http://www.jsc.mil/jsce3/E3Aware/awarindx.asp>.

Contact Information

For additional information, please contact Matthew Grenis, Joint Spectrum Center, E3 Engineering Division (J5) at (410) 293-4957 x1523 or Email grenis@jsc.mil.



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COURSES CATEGORIZED

Seminar	Course	Duration (days)
Level 1		
99	E3 and Spectrum Certification for Program Managers	½
1	Understanding and Applying MIL-STD-461E	½-1
20	Electromagnetic Radiation Hazards Awareness	2
32	Application & Use of MIL-STD-464	2
31	Application and Use of MIL-HDBK-237C	½
Level 2		
23	Grounding, Bonding & Shielding	2
27	Introduction to EMI Associated with EEDS, Firing Circuits and Ordnance	3
28	Electromagnetic Compatibility by Design	3
30	Understanding Commercial Standards	½
Level 3		
16	Spectrum Certification Process	½
22	Electromagnetic Pulse (EMP)	1
26	Transient Testing	1
29	Guidelines for the Use of Commercial Technologies for MIL E3 Applications	½

Course Type

Acquisition Awareness
Standards & Handbooks
E3/EMC Testing
RADHAZ
Design & Fabrication

COURSE DESCRIPTIONS

E3 and Spectrum Certification for Program Managers

This seminar introduces acquisition personnel to the proper ways to consider E3 and Spectrum Certification (SC) concerns in the DOD systems acquisition process. As electronic systems have evolved, they have become more complex, and electromagnetic environmental effects and spectrum certification requirements have become critical factors in the ability to employ military systems and



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platforms effectively. Reductions in the number of military platforms and personnel and increased reliance on technology means that controlling electromagnetic environmental effects on weapon systems is critical to future U. S. military success. Not accounting for E3/SC during systems design, production, and integration can result in degraded systems performance, program schedule delays, and funding issues. The objectives of this course are to give attendees an awareness of how electromagnetic environmental effects and spectrum certification concerns impact systems acquisition and to provide an understanding of the tasks that must be undertaken during the acquisition process to ensure compatibility.

The scheduled duration is one-half (1/2) day.

Understanding and Applying MIL-STD-461E

This course is designed for those responsible for specifying the emission and susceptibility requirements of MIL-STD-461E. Test techniques and instrumentation are addressed, as well as the tailoring of requirements for compliance. The seminar also addresses requirements for commercial off-the-shelf (COTS) items, and provides a practical discussion of the differences between MIL-STD-461D and MIL-STD-461E.

The scheduled duration is one-half (1/2) day to one (1) day.

Spectrum Certification Process

This course is tailored for personnel involved in program planning, management, and acquisition. It provides guidance and detail to ensure accurate and timely submission of frequency allocation requests. The course identifies and describes DOD and Navy directives governing the frequency allocation process. It also includes the step-by-step process for filling out the lengthy and sometimes complicated frequency allocation form (DOD Form 1494).

The scheduled duration is one half (1/2) day.

Electromagnetic Radiation Hazards Awareness

This course provides information on the potential hazards to humans from electromagnetic radiation, sometimes called "microwave" radiation." This knowledge should enable the seminar participant to intelligently deal with any RADHAZ problems that he encounters. The material covered includes background information, requirements, definitions, permissible exposure limits, electromagnetic fields, calculation of electromagnetic fields, measurements, protective measures, reporting of overexposure, and RADHAZ related organizations.

The scheduled duration is two (2) days.



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Electromagnetic Pulse (EMP)

This course provides an introduction to EMP terms and definitions along with the objectives for EMP testing and hardening requirements. A brief overview of the physics of EMP generation is also presented. The requirements for CS114, CS115, and RS105 in MIL-STD-461E, including equipment requirements, conducted susceptibility, and radiated susceptibility testing methods, are reviewed and discussed.

The scheduled duration is one (1) day.

Grounding, Bonding, & Shielding

This course helps the participant understand the basic principles of grounding for safety, signal referencing, and EMI suppression and protection. Discussion includes design of structures, systems and various equipment, review of parts and materials necessary for achieving adequate grounding systems and shields, and proper designs for enclosures and cable shielding applicable to both commercial and military systems and/or equipment.

The scheduled duration is two (2) days.

Transient Testing

This course introduces laboratory and testing personnel to the phenomena of lightning and Electrostatic Discharge (ESD) and discusses safety precautions and test methods. Particular attention is paid to EMC/EMI testing in accordance with MIL-STD-461E, RTCA-DO-160, MIL-STD-1757, and related specifications and standards.

The scheduled duration is one (1) day.

Introduction to EMI Associated with EEDS, Firing Circuits, and Ordnance

This course covers the basic uses and functions of electro-explosive devices, firing circuits, and ordnance. It explains how EM threats (ESD, LEMP, NEMP, HERO) evolve, the types of hazards encountered, and the mitigation techniques used to neutralize these hazards (deflagration, detonation, and explosive). The course defines safety reliability criteria. This course also covers EED lot acceptance testing, qualification testing, accelerated aging testing, surveillance testing, and Bruceton analysis. Case studies are highlighted.

The schedule duration is three (3) days.



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Electromagnetic Compatibility by Design

This is a comprehensive course in EMI/EMC principles, design, and test methods. The course covers most facets of EMI control, including design retrofits and specific problem-solving from PC boards to system and platform level. The course includes practical problem-solving exercises to ensure the students' ability to apply concepts.

The scheduled duration is three (3) days.

Guidelines for the Use of Commercial Technologies for MIL E3 Applications

This course is the evaluation and selection of already developed equipment capable of fulfilling DOD operational requirements with little or no modification. These non-development items (NDI) allow DOD services to take advantage of technological advances resulting from the competitive pressures of the commercial marketplace, as well as developments in other DOD or Government agencies. The use of these items will minimize or eliminate the need for costly, time-consuming government-sponsored research and development programs.

The scheduled duration is four (4) hours.

Understanding Commercial Standards

This course presents a comprehensive overview of major commercial EMC requirements in the United States and the European Community (EC). It provides an explanation of the different test requirements and procedures, as well as a comparison of commercial standards to each other and to the current MIL-STD requirements.

The scheduled duration is four (4) hours.

Application and Use of MIL-HDBK-237C

This course provides E3 guidance to Program Managers responsible for acquisitions and explains the new DOD acquisition procedures now reflected in Revision C to MIL-HDBK-237. Special emphasis is given to the acquisition of NDI and commercial items (CI) for use in unique military operational environments.

The scheduled duration is four (4) hours.



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Application and Use of MIL-STD-464

This course explains the evolution of MIL-STD-464 and the new system level E3 requirements it mandates. The course describes the baseline requirements of the new specification and covers the E3 interface and performance requirements and verification criteria for airborne, sea, space, and ground systems, including ordnance. The effects of the increasing use of CI and NDI in military operational environments are discussed.

The scheduled duration of this seminar is two (2) days.