

ELECTROMAGNETIC COMPATIBILITY ENGINEERING

Presented by: Henry Ott Consultants & IN Compliance Magazine

MAY 24 - 26, 2011

WESTFORD, MASSACHUSETTS

INCLUDES EMC EXHIBITS ON WEDNESDAY MAY 25, 2011

This course covers the practical aspects of noise and interference control in electronic systems and provides a working knowledge of EMC principles. Emphasis is on cost effective design for analog & digital systems. Commercial and industrial aspects of EMC are emphasized. The amount and complexity of mathematics are kept to a minimum, and ideas are illustrated with examples of actual case histories. The participants should obtain the knowledge necessary to design electronic equipment that is compatible with the electromagnetic environment and is in compliance with national and international EMC regulations.

COURSE CONTENT

CABLING

Electric and magnetic field coupling, crosstalk. Cable types: coax, twisted pair and ribbon cables. Cable shielding and terminations.

GROUNDING PRINCIPLES

Why do we ground? Ground systems: single point, multipoint, hybrid. Ground loops. Return current paths, split reference planes. EMC grounding philosophy. AC power grounds.

DIGITAL LAYOUT & GROUNDING

Noise sources, PCB layout, power distribution, ground grids, characteristics of ground planes. Decoupling capacitors: value, placement, resonance and limitations.

HIGH SPEED DIGITAL DECOUPLING

Alternative decoupling methods, use of distributed decoupling capacitance, power supply isolation, effect of paralleling capacitors. Embedded PCB capacitance.

DIFFERENTIAL-MODE EMISSION

Radiated emission mechanisms. Fourier spectrum. Methods of controlling differential-mode emission. Clock dithering. Cancellation techniques.

COMMON-MODE FILTERING

Basic C-M filter theory. Filter source and load impedances. Single and multi-stage filters. Ferrite chokes versus shunt capacitors. Effectiveness of various filter configurations. Filter mounting and layout.

TRANSMISSION LINES

What is a transmission line? Transmission-line effects, transmission-line radiation, and matching. How currents flow on transmission lines. Series, shunt and AC terminations. Simulation.

MIXED SIGNAL PCBs

Defining the problem, A/D converter requirements, return current paths, split ground planes, PCB partitioning, bridges & moats, routing discipline.

RF & TRANSIENT IMMUNITY

RF immunity: circuits affected, PCB layout, audio rectification, RFI filters. Transient immunity: circuits affected, the three-prong approach, keeping transient energy out, protecting the sensitive devices, designing software/firmware for transient immunity.

CONDUCTED EMISSION

AC power line conducted emission models, switching power supplies, parasitic capacitance, layout. Common-mode and differential-mode conducted emission, common-mode chokes, saturation. Power line filters.

SHIELDING

Absorption and reflection loss. Seams, joints, gaskets, slot antennas, and multiple apertures. Waveguides below cutoff, conductive coatings. Cabinet and enclosure design.

WHO SHOULD ATTEND

This course is directed towards electrical engineers. However, mechanical engineers, reliability and standards engineers, technical managers, systems engineers, regulatory compliance engineers, technicians, and others who need a working knowledge of electromagnetic compatibility engineering principles will also benefit from the course.

REGISTRATION AND FEES--see early registration discount below!!

COURSE DATES/TIME: May 24-26, 2011 8:30 a.m. to 4:30 p.m.
COURSE LOCATION: Westford Regency Inn and Conference Center, 219 Littleton Road, Westford, MA.
COURSE FEE: \$1,395 (\$1,245 until 4/15/11). Fee includes notes, textbook,* luncheon and beverage breaks.
CANCELLATION POLICY: **Payment required prior to course.** Hotel accommodations are **NOT** included. You may cancel your registration up to two weeks prior to the course and receive a full refund. For cancellations received after this time there will be a \$100 cancellation fee, or you can send a substitute, or use the registration for a future course. No-shows will not receive a refund; however, the seminar fee may be applied to a future course.
REGISTRATION: Call 973-992-1793, fax 973-533-1442 or mail the registration form.
HOTEL RESERVATIONS: **Registration is limited...Sign up early.** Call the Westford Regency Inn at 978-692-8200 or 800-543-7801. Room rates are \$115 per night. You must mention IN Compliance Magazine when making reservations to get this special rate. The hotel is holding a limited block of rooms for course attendees.
EXHIBITORS: Contact Sharon Smith at sharon.smith@incompliancemag.com or (978) 873-7722

*Electromagnetic Compatibility Engineering, By Henry W. Ott

ABOUT THE INSTRUCTOR

Henry W. Ott is President and Principal Consultant of Henry Ott Consultants, an EMC training and consulting organization. He has literally "written the book" on the subject of EMC, and is considered by many to be the nation's leading EMC educator. He is the author of the popular EMC book, Noise Reduction Techniques in Electronic Systems, (1976, 1988). The book has sold over 65,000 copies and has been translated into six other languages. In addition to knowing his subject, Mr. Ott has the rare ability to communicate that knowledge to others.

Mr. Ott's newly published (Aug. 2009) 872-page book, Electromagnetic Compatibility Engineering is the most comprehensive book available on EMC. While still retaining the core information that made Noise Reduction Techniques an international success, this new book contains over 600 pages of new and revised material.

Prior to starting his own consulting company, Mr. Ott was with AT&T Bell Laboratories, Whippany, NJ, for 30 years, where he was a Distinguished Member of the Technical Staff and a consultant on EMC.

Mr. Ott is a Life Fellow of the IEEE. For over 20 years, Mr. Ott has served the EMC Society in various capacities including: membership on the Board of Directors, Education Committee Chairman, Symposium Committee Chairman and Vice President of Conferences. He is also a member of the ESD Association and a NARTE certified ESD engineer. He is a past Distinguished Lecturer of the EMC Society, and lectures extensively on the subject of EMC.

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REGISTRATION FORM:

Electromagnetic Compatibility Engineering

May 24-26, 2011, Westford Regency Inn, Westford, MA

Fee: ___ \$1,395; ___ \$1,245 until April 15, 2011

Payment Required prior to start of course.

PAYMENT METHOD:

Name: _____ Check P.O. AMEX
Title: _____ Discover VISA MC
Company: _____ **Card #:** _____ **Exp date:** _____
Address: _____ **Signature:** _____
City: _____ **State:** _____ **Zip:** _____
Office Phone: _____ **Fax:** _____ **E-Mail:** _____

Call, fax, or mail registration form.

Make checks payable to: Henry Ott Consultants.