

ELECTROMAGNETIC COMPATIBILITY ENGINEERING

Presented by: Henry Ott Consultants & IN Compliance Magazine

May 16-18, 2017

Double Tree by Hilton Cocoa Beach Oceanfront, Cocoa Beach, FL

INCLUDES One-Day of concurrent EMC EXHIBITS on Wednesday, May 17, 2017

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. 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

Day 1

CABLING

Electric and magnetic field coupling, crosstalk. Cable types: coax, twisted pair. Cable shielding and termination.

GROUNDING PRINCIPLES

Why do we ground? Ground loops. Return current paths, split reference planes. EMC grounding philosophy. Safety, 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. Effective decoupling strategies. Use of distributed decoupling capacitance, power supply isolation, effect of paralleling capacitors. Embedded PCB capacitance.

Day 2

DIFFERENTIAL-MODE EMISSION

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

PRE-COMPLIANCE EMC MEASUREMENTS

Advantages. Test Environment. Probes vs. Antennas. Common-Mode Current. Magnetic Field Measurements. Conducted Emissions. Spectrum Analyzers. EMC Crash Cart.

COMMON-MODE FILTERS

Basic C-M filter theory. Filter source and load impedances. Single and multi-stage filters. Ferrite chokes versus shunt capacitors. Various filter topologies Filter parasitics.

DIGITAL TRANSMISSION LINES

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

Day 3

RF & TRANSIENT IMMUNITY

RF immunity: circuits affected, PCB layout, audio rectification, RFI filters. Transient immunity: circuits affected, the three-prong approach.

CONDUCTED EMISSION

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

SHIELDING

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

MIXED SIGNAL PCBs

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

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 16-18, 2017 8:30 a.m. to 4:30 p.m.
COURSE LOCATION: DoubleTree by Hilton Cocoa Beach Oceanfront, 2080 North Atlantic Ave., Cocoa Beach FL 32931
COURSE FEE: **\$1,695 (\$1,495 until 4/7/17)**. Fee includes notes, textbook,* EMC pocket guide,** luncheon and beverage breaks. **Payment required prior to course.** Hotel accommodations are **NOT** included.
CANCELLATION POLICY: You can 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 \$200 cancellation fee, or you can send a substitute, or use the registration for a future course. **Cancellations within 24-hours of the class start date, or 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, email JaniceWoodruff@verizon.net, or mail the registration form to 48 Baker Rd., Livingston, NJ 07039. **Registration is limited...Sign up early.**
HOTEL RESERVATIONS: The Double Tree is holding a limited number of rooms at \$150 plus tax per night until 4/25/17. Call 321-783-9222 and mention **HOC EMC Seminar** in order to receive this special rate.

**Electromagnetic Compatibility Engineering*, by Henry W. Ott, published by John Wiley & Sons, 2009.
** *EMC Pocket Guide*, by Kenneth Wyatt & Randy J. Jost, published by Scitech Publishing, 2013.

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. In addition to knowing his subject, Mr. Ott has the rare ability to communicate that knowledge to others.

Mr. Ott's recent 872-page book, *Electromagnetic Compatibility Engineering* is the most comprehensive book available on EMC. While still retaining the core information that made his previous book *Noise Reduction Techniques in Electronic Systems* an international success, this book contains over 600 pages of new and revised material. *Electromagnetic Compatibility Engineering* has been translated into Chinese, Korean and Japanese.

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 a past Distinguished Lecturer of the EMC Society, and lectures extensively on the subject of EMC. He is also a member of the ESD Association and holds an amateur radio operator's license with the call sign WA2IRQ.

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REGISTRATION FORM:

Electromagnetic Compatibility Engineering

May 16-18, 2017

Double Tree by Hilton Cocoa Beach Oceanfront, Cocoa Beach, FL

Fee: ___ \$1,695; ___ \$1,495 until April 7, 2017

Payment required prior to start of course.

Name: _____ **Work Title:** _____

Company: _____ **Office Phone:** _____

Address: _____ **E-Mail:** _____

City: _____

State: _____ **Zip:** _____ **Country:** _____

Credit Card #: _____

Exp. Date: _____ **Name on card:** _____

Security Code: _____ **Billing Address:** _____

PAYMENT METHOD:

Check P.O.
 AMEX Discover VISA MC

Call, fax, email, or mail registration

Make checks payable to: *Henry Ott Consultants*