

**SPECIAL EARLY  
REGISTRATION OFFER**

# **ELECTROMAGNETIC COMPATIBILITY ENGINEERING**

**Presented by: Henry Ott Consultants**

**APRIL 28-30, 2010**

**HILTON SAN FRANCISCO AIRPORT, CA**

*Includes Henry Ott's New Book: ELECTROMAGNETIC COMPATIBILITY ENGINEERING*

This course covers the practical aspects of noise and interference control in electronic systems. It will provide the participants with a working knowledge of electromagnetic compatibility principles. Emphasis is on cost effective EMC design for digital & analog systems. The commercial and industrial aspects of EMC are emphasized. The amount and complexity of mathematics will be kept to a minimum, and ideas will be 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.

**HOC**  
ELECTROMAGNETIC  
COMPATIBILITY

## REGISTRATION AND FEES

- COURSE DATES/TIME** April 28-30, 2010. 8:30 a.m. to 4:30 p.m.
- COURSE LOCATION:** Hilton San Francisco Airport, 600 Airport Blvd., Burlingame, CA
- COURSE FEE:** \$1,395 (\$1,245 until 2/26/2010). Includes course notes, textbook\*, lunch & breaks.  
**Payment required prior to course.** Hotel accommodations are NOT included.
- CANCELLATION POLICY:** 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.  
**Registration is limited . . . Sign up early.**
- HOTEL RESERVATIONS:** Call the Hilton at 650-340-8500. Room rates: \$139 per night. You must mention the Henry Ott Consultants Course when making reservations to get this special rate. The hotel is holding a limited block of rooms until April 5, 2010.
- \*Electromagnetic Compatibility Engineering** by Henry W. Ott.

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## 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.

**HENRY OTT CONSULTANTS, 48 BAKER ROAD, LIVINGSTON, NJ 07039**

PHONE (973) 992-1793

[www.hottconsultants.com](http://www.hottconsultants.com)

FAX (973) 533-1442

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### REGISTRATION FORM:

#### Electromagnetic Compatibility Engineering

April 28-30, 2010 - Hilton San Francisco Airport, Burlingame, CA

Fee  \$1,395;  \$1,245 until 2/26/2010

Payment required prior to start of course.

		PAYMENT METHOD		
NAME _____		<input type="checkbox"/> Check	<input type="checkbox"/> P.O.	<input type="checkbox"/> AMEX
TITLE _____		<input type="checkbox"/> Discover	<input type="checkbox"/> VISA	<input type="checkbox"/> MC
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CITY _____ STATE _____ ZIP _____		SIGNATURE _____		
OFFICE PHONE _____ FAX _____ E-Mail _____				

Call 973-992-1793, Fax 973-533-1442 or mail registration form.

Make checks payable to: **Henry Ott Consultants** and mail to: 48 Baker Road, Livingston, NJ 07039