Dated Material - Meeting Notice.
IEEE SCV EMC Society
C/O Tom Winegar
11741 Regnart Canyon Dr.
Cupertino, CA 95014

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IEEE/EMC/SCV CHAPTER
Meeting Tuesday January 13, 2004
LOCATION: Applied Materials Bowers Café
3090 Bowers, Santa Clara, CA 95051-0804
5:30 p.m. Social
7:00 p.m. Discussions

Spectral Lines

www.scvemc.org Santa Clara Valley Chapter of IEEE Electromagnetic Compatibility Society

January 2004 Issue

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$\nabla \times \vec{H} = \frac{\partial \vec{D}}{\partial t} + \vec{J}$$

$$\nabla \cdot \vec{D} = \rho$$

$$\nabla \cdot \vec{B} = 0$$

SCV IEEE/EMC Society Meeting
Tuesday January 13, 2004

Time: 5:30 p.m. Social, 7:00 p.m. Presentation

Place: Applied Materials Bowers Cafe
3090 Bowers, Santa Clara, CA 95051-0804

Subject: Time Domain Reflectometry as an EMI Analysis and Troubleshooting Tool

Speaker: Orin Laney

Abstract:
Signal integrity problems are often the root of EMI problems. Time domain reflectometry is a powerful way to view transmission systems in order to spot and diagnose signal integrity issues. The talk will start with TDR theory, then use a live TDR demonstration to illustrate various principles. Examples will include coax, waveguide, microstrip, LAN cable, and perhaps an antenna or two. As time permits cables and adapters will be accepted from the audience and tested in real-time, preferably ones that you suspect have problems. Remarks concerning the care and handling of microwave rate bit streams and similar challenges will conclude the talk.

Biography:
Orin Laney is an EMC and Signal Integrity Specialist at Kaiser Electronics in San Jose. This division of Rockwell Collins manufactures video displays for aircraft cockpits. Orin's background includes designing really strange aerospace instrumentation, running his own manufacturing company, and providing a type of special effect for Hollywood production use. He enjoys writing and speaking, and is fluent in video circuitry and other high-speed analog and mixed signal areas. A senior member of the IEEE and a NARTE certified EMC engineer, Mr. Laney is a graduate of the University of Maryland (BSEE) and Brigham Young University (MBA). He is a member and former chair of the IEEE Intellectual Property Committee. His interest in electronics began as a teenager when he started building crystal radios. His introduction to EMC came when he realized that his long suffering reel-to-reel tape recorder did an excellent job of receiving the 11+ MHz Caribbean relay transmitter for Radio Netherlands after sundown. That opened up a line of inquiry that continues to this day.

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NEMA ICS-1 (2000) Showering Arc Testing

When mechanical switches open to interrupt the currents flowing into inductive loads, arcing across the switch contacts occurs. Repeated ignition and quenching of the arc's plasma is typical in this instance, and the "showering arc" test was developed in the US and Europe to simulate this environment's effects on Power and I/O (control) lines. These environments would include those found in Utility power-switching or industrial installations or in other high-reliability applications. (Transportation, military, aerospace)

Dolan Labs at **American Electric Power (AEP) in Columbus, OH** states on their WEB site:
"The showering arc test is essentially an electrical noise susceptibility test. A NEMA standard noise generator is used to perform the test. The test set generates broadband electrical noise via an arcing spark gap, and couples the noise onto individual conductors within a multiconductor cable. Conductors are then used as input/output paths for the device under test. The test is designed to test logic input and output circuits, excluding low-level logic such as TTL, and is appropriate for devices with solid-state control input and output circuits such as PLCs."

The Showering Arc Generators referenced in **NEMA ICS-1 (2000)** use 3kV luminous-sign transformers to generate high peak voltages with 10mA of current. The oscillating-polarity Showering Arc Generator applies the transformer's secondary 60Hz high-voltage sine wave across a spark gap, and the single-polarity Showering Arc Generator rectifies the transformer's secondary output and applies the resulting DC voltage across the gap. In either case, the physical dimension of the spark gap is controlled with a lever-reduced micrometer to allow adjustment of the ionization potential (arc-over voltage or distance) across the gap. This mechanical adjustment sets the amplitude of the test voltage delivered from the Generator to the Coupler.

A "loom" of 15-conductor is wound onto a form, and lines are connected from the generator to the coupling cable assembly to form a transformer used for coupling the Generator's transients onto the Product's Power or Control lines. The test is run for one minute each on the power, input and output lines of the Product-Under-Test, and the Product must not change state (drop out or chatter) in order for the product to pass the test.

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