

SCANFAX

March 2000

Volume 52, Issue 3



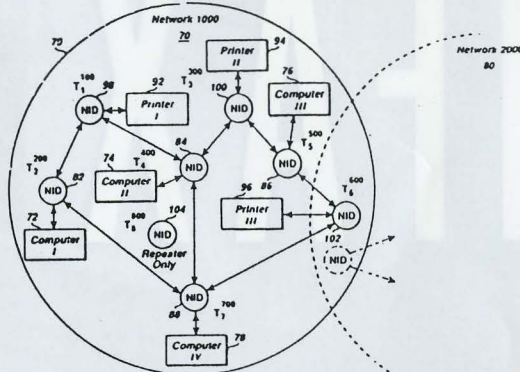
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A publication of the
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— Chicago Section —

Testing Insulation of Electrical Equipment

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March 2000

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SCANFAX

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SPOT NETWORK SYSTEMS
Wednesday, March 15, 2000*
- 11 *IEEE / Joint Chapter on Engineering Management and
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CHICAGO SECTION EXECUTIVE COMMITTEE MEETING

Tuesday, March 14, 7:15 pm

Northrop Grumman, 600 Hicks Rd., Rolling Meadows, IL
Call or e-mail E.G. Bogus to register. Provide name, employer, phone & citizenship.

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Chairman's Message

This month the Chicago Section, Fox Valley Subsection, the Engineering Management/Professional Communications Chapter and the Computer Chapter are co-sponsoring a special presentation by Dr. Eric Munro, Director of the Center for Corporate Education at

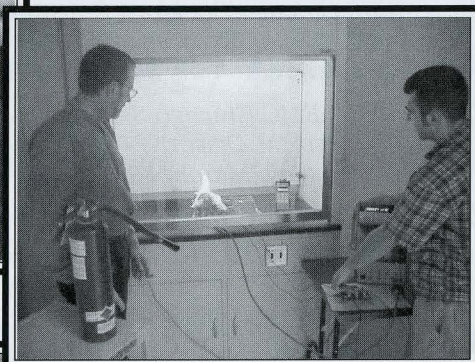
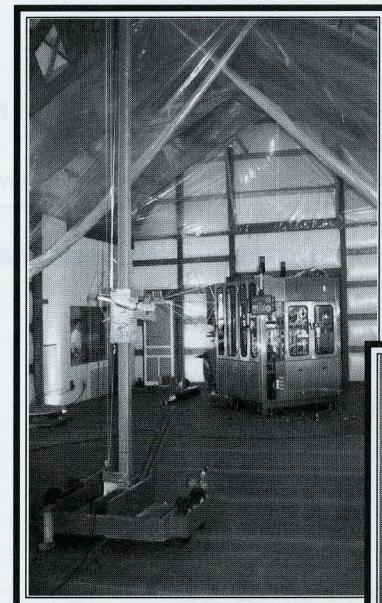
Keller Graduate School of Management. The topic of his presentation is Project Management. This topic crosses all engineering disciplines and should be of interest to all members of the Chicago Section. Everyone is encouraged to attend. See the meeting announcement on page 11

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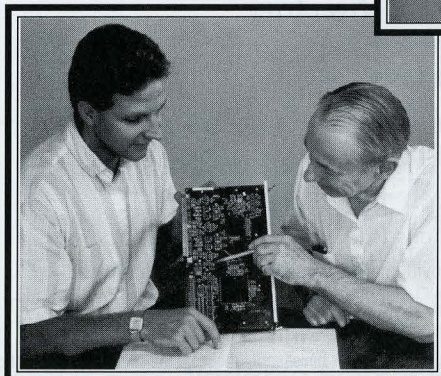
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Edward G. Bogus, PhD.

IEEE Chicago Section, Chairman

for all of the details.

IEEE credit card holders, did you recently receive a new credit card from Travelers Bank with the name "Electrical & Electronics Engineers," printed on it and wonder what happened to the IEEE logo and Franklin's kite with right-hand rule emblem? Here is what happened. IEEE has joined with First USA Bank to provide a new and improved IEEE Platinum Visa Card. The IEEE is no longer affiliated with the Travelers Bank credit card. Any replacement card issued by Travelers is not an authorized IEEE card, and therefore, cannot display the IEEE logo. You should be receiving information about the new IEEE Platinum Visa card offered through First USA Bank. The new program provides higher-quality benefits that were not available from Travelers'.

Recent research and membership surveys in 1998 have shown that the IEEE should do more to strengthen its image and help ensure its growth by leveraging its brand. As a result, the Board of Directors authorized the formation of the Branding Ad Hoc Committee with the mandate to examine IEEE brand issues and develop a set of recommendations. During most of 1999, the committee conducted additional research to ensure Society and Section leadership views were incorporated in the recommendations that were submitted to the Board.

After 18 months of effort, the Branding Committee had produced findings that concerned the IEEE's leadership. For example, 65 percent of IEEE members said they belong to stay technically current, but 33 percent also said the IEEE takes too long to publish and they were using the Internet more frequently to obtain technical information. Only 43 percent of the younger professionals felt the logo represents today's IEEE and 24 percent felt it does not. While 75 percent of IEEE members personally value their membership, only 25 percent think their

Continued on page 8

TESTING INSULATION of Electrical Equipment

By Terri Biloff

The insulation value upon
generators, cables, and
motors requires a great
deal of knowledge and
quality equipment. This
article aims to identify
some of the most common
reasons for deterioration
of insulation and uncover
the most common
methods of testing
insulation values.

Deterioration Factors

Mechanical stress often causes the insulation to become brittle and develop cracks under the mechanical stress to which it is subjected.

Usually the cause of brittleness is from operation at high temperatures over a long period of time. Cracking results from mechanical stress imposed upon conductors having brittle insulation. These mechanical stresses are often caused by short-circuit currents, thermal expansion and contraction of the conductors or vibration.

Electrical breakdown usually follows quickly once a crack develops. For this reason, frequent inspection of insulation should be made. Operating experience is one of the most basic ways of testing insulation. The age and history provide a good indication of the insulation's probable condition. Even if inspections are not done at regular intervals, it should be noted that a piece of electrical equipment running at a rate of twenty four hours a day for seven days a week, with temperatures over 100° C for more than ten years, is a likely candidate for brittleness and cracking.

Vibration due to loose levels or slots are another cause of deterioration. Hard mechanical components leveraged against insulation material produce wearing and breakdown.

Moisture is probably the number one reason for failure of insulation. Organic insulation materials absorb natural moisture from the atmosphere or oil.

Frequent checking for loose joints,

poorly sealed gaskets or leaky coils will help reduce the potential of mechanical failure.

Insulation Resistance/ Dielectric Absorption Tests

Insulation resistance is defined as the resistance (in megohms) by the insulation to an impressed direct voltage. The resulting current is called an insulation current.

There are two main components of the insulation current. The current flows within the volume of the insulation, and the current flows in leakage paths over the surface of the insulation.

This leakage is known as the leakage current and does not change with voltage application and is the primary factor by which the quality of insulation is judged. Insulation resistance results vary directly as the thickness of the insulation being tested.

Fluctuation Of Testing

Unless measurements are made with a high degree of skill, insulation resistance and dielectric absorption measurements will fluctuate due to variances and will consequently be of little use. Some of the most common reasons for fluctuations include:

- 1) *Presence of previous charge on the insulation.* The charge may be from normal operation of generator or other electrical equipment, or from a previous measurement test of the insulation resistance.

Continued on page 6.

TESTING INSULATION

Continued from page 5

2) *Insulation resistance varies dramatically with temperature.* To properly compare measurement results to previous test results, one should be sure to take measurements at the same temperature.

Temperature conversions can be made if "hot" dielectric and "cold" dielectric absorption test results use the 40° C as the baseline temperature.

3) *Moisture*, which can enter insulation from the air or oils, makes a huge difference with insulation resistance testing. Poor results from insulation resistance testing from exposure to moisture does not mean that the insulation is unsuitable for use, especially if the results compare to other recent tests.

4) *Age and Curing.* Insulation with semi-solid binder such as asphalt-mica undergoes a curing process over time. This curing process increases the

dielectric absorption current taken by the insulation, thus megger or dc (direct current) tests show a decrease in the resistance.

We've talked about insulation resistance and dielectric absorption (tests by direct current), but the megger test is also a widely accepted method of measurement, and is considered to be a non-destructive method.

Megger Testing

The limitations of the megger test is that its operating voltage of 500 to 1,000 volts will not always detect insulation punctures, whereas high voltage, dc testing will usually detect these punctures. The megger test will show the major elements:

- 1) The relative amount of moisture in the insulation
- 2) The leakage current over dirty or moist surfaces of insulation
- 3) Winding deterioration or faults by means of insulation resistance versus time curves

The megger test uses a dc voltage which is applied to the insulation, with readings of the insulation resistance being taken at various time intervals. One to ten minute intervals is recommended.

Megger Test Equipment

The hand cranked "megger" has long been the standard instrument for checking insulation resistance. It is generally good for spot checks, but is not recommended for routine dielectric absorption tests because few can continue cranking the hand crank for ten minutes while maintaining consistent cranking speed.

Motor driven meggers or electronic insulation resistance testers of 115 volts should be used for this purpose.

More On The Dielectric Absorption Curve In Megger Testing

Insulation resistance is not a definite measure of the voltage an insulation can withstand. Difference in readings of the resistance and time are often plotted as a curve called "the dielectric absorption curve". Any curve which reaches a consistent and lower than normal value indicates high leakage current.

Other Tests

1) *Transformer megger testing* for insulation is not well known, and moreover does not have standards by which to measure. What we do know is that if the transformer windings are not immersed in oil, the insulation resistance will behave much the same way as dc testing for generators.

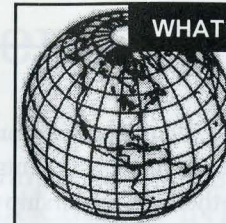
2) *Cable insulation megger testing* differs from other megger testing in that the cable is long, which takes longer to charge and is difficult to maintain an accurate temperature measurement since many cables are exposed to outdoor environments, or are indoors with some outdoor exposure. It may be necessary to average out the temperature readings at various points and compute it using the "dielectric absorption curve" or weighted averages.

Other types of tests for measuring insulation include"

- *Dc (direct current) high voltage, ramped test.* This is used for high voltage cables, motors or generators
- *Power factor*—used for power transformers, high voltage cables and high voltage bushings
- *AC (alternating current)*—used for power transformers

Excerpts were obtained from the Facilities Instructions, Standards and Techniques Volume 3-1

Next month:
Y2K—ARE WE SURVIVING?



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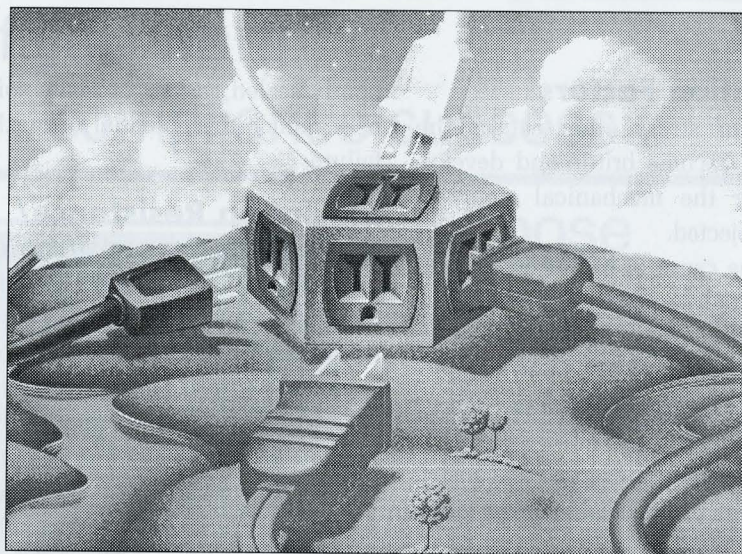
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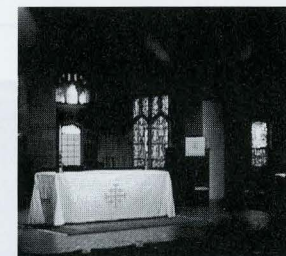


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DEADLINES: Feb. 25 for APRIL ISSUE
March 25 for MAY ISSUE

Continued from page 4

employer believes it is worthwhile.

The main conclusions of the IEEE Branding research are: 1) The IEEE lacks a cohesive and consistent image. Most current and prospective members are not clear about what the IEEE is, who it represents and what it stands for. 2) Current and evolving member needs are not being met well enough - a danger signal for the organization's continued value and relevance. 3) The IEEE has unparalleled potential to build on. Virtually all constituents who are somewhat aware of the IEEE and its activities regard it without equal in: the organization's technical breadth, worldwide reach, integrity and scope of published literature, quality of conferences, and extraordinary commitment of volunteers. Ken Laker, IEEE president, summarized the results of the research by stating, "The IEEE projects

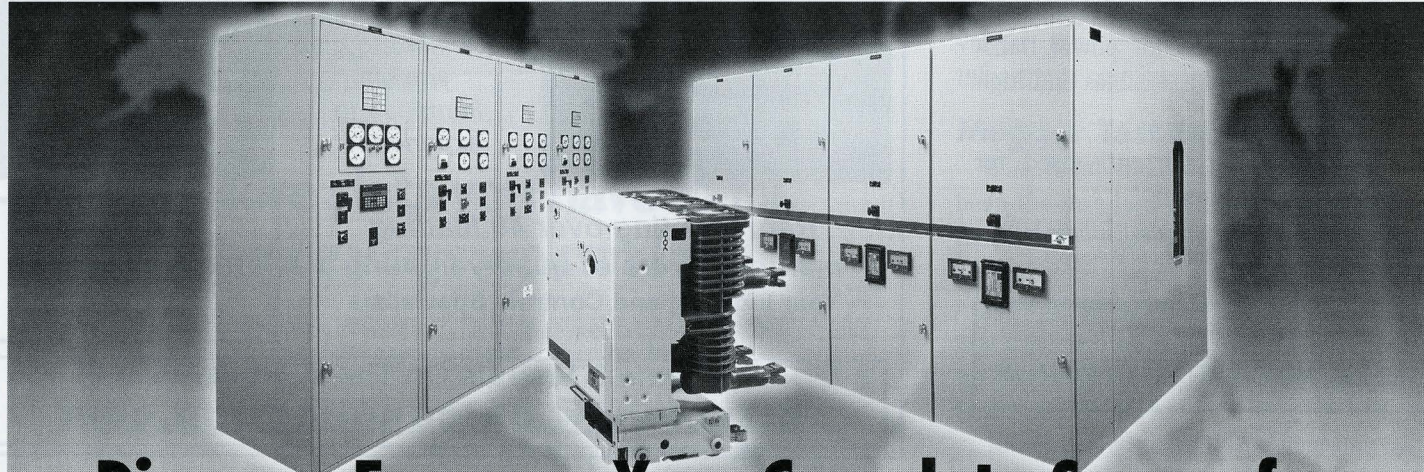
many inconsistent identities and provides one interface to all constituents." He says it calls for the IEEE leadership to invert that image and project one consistent identity and provide many interfaces.

Drawing on the findings of the research, the Branding Ad Hoc Committee generated recommendations to refresh and revitalize the IEEE, and to provide a consistent, unified image that will enhance the institute's perceived value.

The recommendations that were submitted to the Board are in four areas. 1) A Positioning Statement to set the spirit and tone for all that the Institute does, including how it conveys its visual identity, reflects the volunteer leadership's overall desire for the organization, and makes positive statements that are desir-

able and achievable in three to five years. 2) Organizational Renewal to outline how the IEEE might achieve the goals of the Positioning Statement. 3) A new, coordinated and consistent brand identity system to represent the unity of IEEE. 4) A rollout and implementation plan that includes a cost and benefits analysis, a timetable, and external publicity recommendations and specifications for an approval process for acceptable designs.

Updated information on the progress of the IEEE branding activities is available at www.ieee.org/organizations/committee/branding. ■



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Calendar of Events

Date	Event
March 8	Chicago Chapter of the IEEE Power Engineering Society ARC FAULT CIRCUIT INTERRUPTION
March 14	Chicago Section EXECUTIVE COMMITTEE MEETING
March 15	IAS/IES Joint Meeting with Northwest Subsection SPOT NETWORK SYSTEMS
March 15	IEEE Joint Chapter on Engineering Management and Professional Communication, Chicago Section, Fox Valley Subsection, Computer Society Chapter HOW ORGANIZATIONS ADOPT PROJECT MANAGEMENT
March 27	IEEE Chicago/Rockford Consultants' Network MEETING AND NETWORKING
March 29	IEEE / EMC Chicago Section THE MEDICAL DIRECTIVE—AN UPDATE
April 15, 2000	IEEE Chicago Section ANNUAL AWARDS BANQUET
May 22 & 23, 2000	IEEE / EMC Chicago Section MINISYMPOSIUM 2000

Anyone can show you an EMC test chamber.
It's what you can't see that's much more important.

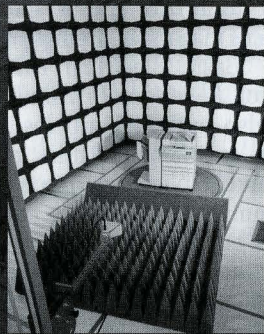
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CHICAGO CHAPTER
OF THE IEEE
POWER
ENGINEERING
SOCIETY

Arc Fault
Circuit
Interruption

Wednesday,
March 8, 2000

IAS/IES
JOINT MEETING
WITH NORTHWEST
SUBSECTION

Spot
Network
Systems

Wednesday,
March 15, 2000

LUNCH MEETING

Steve Wilmes, Square D Company

About the Topic:

Steve Wilmes will give a presentation on arc fault circuit interruption. Arc fault circuit interruption will be required for bedroom circuits in January 2002 per the National Electrical Code and the Chicago Code.

About the Speaker:

Steve Wilmes has been with Square D Company for 19 years. He has spent the last 10 years working primarily with consulting engineers, with a short period doing product development. Steve has a BSME from University of Illinois and he is a registered engineer in Illinois.

Location:

Chicago Bar Association, 321 South Plymouth Court (Near Jackson & Dearborn), Chicago, IL 60604.

Time:

Social: 11:30 am
Lunch: 12:00 pm (optional)
Presentation: 12:15 pm
Adjourn: 1:00 pm

Reservations:

Lunch tickets can be purchased in the lobby bookstore (\$10.50). Please call the IEEE Business Office at (800) 898-IEEE to make your reservation.

For more information, please visit the Chicago Chapter IEEE PES web site: www.ece.iit.edu/~flueck/chicago_pes/

EVENING MEETING

Charles J. Nochumson, PE—Application Engineer

About the Speaker:

Charles J. Nochumson is an Application Engineer for Cutler-Hammer and was previously an Application Engineer with Westinghouse Electric Corporation in their Distribution and Control Business Unit for 29 years. Mr. Nochumson is a co-author of an IEEE paper on "Transfer Considerations in Standby Generator Application," author of an TAPPI and IEEE paper on "Application of New Technologies in Power Circuit Breakers with Higher Interrupting Capacity and Short Time Ratings." He has also been a previous guest speaker at the Chicago Chapter of IEEE/IAS and a speaker for *Plant Services* magazine. He has written an article on "Basic Electrical Distribution Systems" for *Electrical Distributor* magazine and also authored articles in *Plant Engineering* magazine. Besides providing technical and application information on Cutler-Hammer products for consulting and design engineers, he is head of the committee that publishes Cutler-Hammer Consulting Application Guide Catalog 55-000 and its Product Specification Guide. Mr. Nochumson is a Professional Engineer and Senior Member of IEEE.

About the Topic:

Mr. Nochumson will be discussing the application of customer owned Spot Network Systems as a reliable power source for Commercial and Industrial facilities.

The criteria for choosing spot network systems and their advantages over other alternate distributions systems, such as automatic throw-over schemes or UPS, will be discussed. The talk will include selection and operation of the spot network system components. Information on typical design, equipment layout arrangements, selection criteria for transformer KVA, and system protection will be presented.

Location: Como Inn, 564 North Milwaukee Ave., Chicago, IL. The Como Inn is located on Milwaukee Ave. just off the Kennedy Expressway (I-90/94) near Grand Ave. and Halsted St.

Time:

Social: 5:30 pm
Dinner: 6:00 pm
Presentation: 7:00 pm

Cost: Your cost includes the presentation and your choice of chicken (\$25) or pasta (\$20) 4 course dinner.

Reservations: Please call the IEEE Business Office at (800) 898-IEEE or (630) 724-0200 with your entree preference.

Note: For P.E. licenses that require continuing education for renewal, attendance at IEEE Technical Meetings is acceptable as one Professional Development Hour (PDH) per meeting. The upcoming 1999-2000 IEEE-IAS meeting dates are: April 12th and May 17th.

IEEE

JOINT CHAPTER ON
ENGINEERING
MANAGEMENT AND
PROFESSIONAL
COMMUNICATION,
CHICAGO SECTION,
FOX VALLEY
SUBSECTION,
COMPUTER SOCIETY
CHAPTER

How
Organizations
Adopt Project
Management

Wednesday,
March 15, 2000

EVENING MEETING

Dr. Eric Munro, Keller Graduate School of Management

About the Topic:

This presentation is a collection of thoughts and observations on how Project Management fits into today's organizations. We take a look at how organizations adopt it, as well as why they adopt it. The key areas of focus are the benefits of the Project Management approach, the maturity models that are currently receiving attention in Project Management, and the (lack of) management support to the meaningful implementation of realistic Project Management practices. The program will begin with an introductory discussion, followed by a facilitated discussion among the attendees.

About the Speakers:

Dr. Eric Munro is the Director of the Center for Corporate Education (CCE) at Keller Graduate School of Management. CCE provides training and education in Project Management to corporations - both as graduate credit and non-credit courses. CCE's clients include Commonwealth Edison, Compuware, GTE, Honeywell, Motorola, R.R. Donnelly, and Wang Global.

Dr. Munro joined CCE five years ago after over 20 years of management experience within the telecommunications industry while working for firms such as Andrew Corporation, Telesciences, and Motorola. His work included engineering

project management, new product development, marketing, and sales, both in the United States and in most international markets. He has a PhD and a Bachelor's Degree in Electronic and Electrical Engineering from the University of Sheffield in Great Britain. Currently, he teaches Project Management at Keller Graduate School.

Location:

Lucent Technologies Indian Hill South (Rear Door)—Conference Dining Room. On Warrenville Road, 2 lights west of Naperville Road (or Naper Boulevard).

Time: Presentation: 7:30 pm

Reservations:

Please call our IEEE Office at (800) 898-4333 to ensure your admission to Lucent's facilities, but no later than 5 PM on Monday, March 13th.

For other information or travel directions, please send e-mail to Joe Feitler at j.feitler@ieee.org or call him at (708) 383-8773.

IEEE Chicago Section / ANNUAL AWARDS BANQUET

SATURDAY APRIL 15, 2000

Fountain Blue Banquets • 2300 S. Mannheim Road • Des Plaines, IL (Corner of Mannheim & Touhy Avenue)

— AWARDS —

IEEE Fellow Awards
IEEE College/University
Student Chapter Awards
Millennium Awards

Cocktails at 6 pm / Dinner at 7 pm

Entertainment: *The Magic Wizardry of Will Tremont*

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You may want to form a
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FOR TICKET INFORMATION CONTACT:

Joe Feitler, Ticket Chairperson, PO Box 5072, River Forest, IL 60305, 708-383-8773, e-mail: j.feitler@ieee.org or IEEE office (800) 898-4333.

Please request any special meals by April 8, 2000.

We Need Your Help!

Our Banquet Committee membership has been shrinking due to retirement of several of our members. We need you to join us in our endeavor to make the 2000 Awards Banquet a great success. Recent graduates are particularly welcome to our monthly dinner meetings where our plans are developed.

IEEE
CHICAGO/ROCKFORD
CONSULTANTS'
NETWORK

Meeting
and
Networking

Monday,
March 27, 2000

IEEE / EMC
CHICAGO SECTION

The Medical
Directive -
An Update

Wednesday,
March 29, 2000

Mini
Symposium
2000
May 22 & 23, 2000

EVENING MEETING

The Chicago/Rockford IEEE Consultants' Network will be meeting on Monday, March 27, 2000, 7:30-9:00 pm at the Palatine Public Library, 700 North Court, Palatine, Illinois, 847-358-1216.

Preceding the meeting, we will be getting together for our group dinner. We will meet at Bakers Square at 6:15 pm. It is located at 270 E. Northwest Highway and North Court, just south of the library.

You are invited to join us for the optional dinner. We order individually from the menu. We plan to finish dinner by 7:20 pm. The meeting is two blocks from Bakers Square. Reservations are not required.

In addition to networking and sharing leads and referrals, there is usually a guest speaker.

Members and non-members are invited to both the meeting and the optional dinner.

The Network can be reached at: g.l.blank@ieee.org.

EVENING MEETING

Tom Moyer, Marketing Specialist, Amplifier Research/EM Test BSEE, Drexel University

About the Topic:

This presentation will focus on an update to the Medical Directive, with a focus on Conducted Immunity portion, and how it will affect the EMC Community.

About the Speaker:

Tom Moyer is Marketing Specialist with Amplifier Research. Amplifier Research manufactures power amplifiers from D.C. to 40Ghz, EMC Immunity antennas, ArCellTM, and a variety of accessories. In addition, Amplifier Research has a strategic alignment with EM Test for Conducted Immunity equipment.

Mr. Moyer's previous experience includes Ford Motor Company, designing automotive electronics systems, as a sales engineer, and as a regional sales manager.

Location:

Lucent Technologies Indian Hill South (Rear Door)—Conference Dining Room. On Warrenville Road, 2 lights west of Naperville Road (or Naper Boulevard).

Time: Social: 6:30 pm
Presentation: 7:30 pm

Reservations:

To make reservations or for more information, contact Carla Robinson at 847-262-2494.

May is the month of our MiniSymposium:

The MiniSymposium will feature exhibits from all major EMC manufacturers—software and hardware. This year we have added a section for demonstrations, in addition to the popular poster papers. The website for this event will be listed soon.

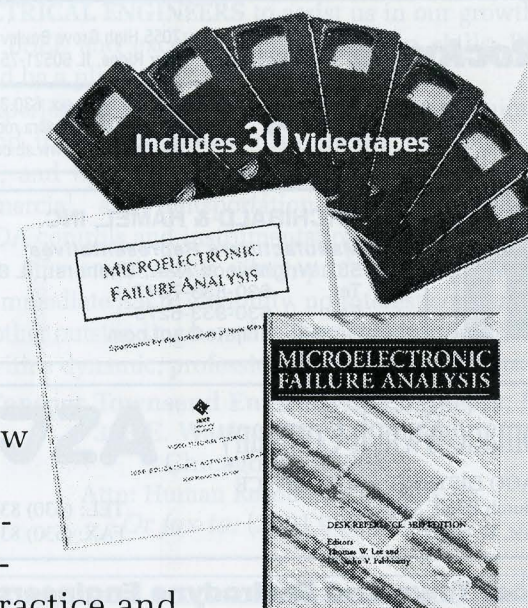
Location:

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