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# EMC

IEEE EMC Society Newsletter

INSIDE:




All photos and collage by Dick Ford

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*IEEE EMC Society Newsletter Publication Schedule*

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|---|---|
| August | July 1 |
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Photo by Janet O'Neil

# President's Message

*Joe Butler – President, EMC Society*

*Joe Butler brought along his adorable daughter Christie to Montréal. Christie enjoyed spending some time with her father at one of his business events.*

The 2001 IEEE International Symposium on EMC in Montréal was a great event. Benoît Nadeau and his symposium steering committee did a great job for which we are very thankful. The spacious convention center, well-planned and executed technical program, and excellent social functions made this event one to be remembered. The extra touches such as the restaurant and activity directory and the emphasis on families will no doubt be duplicated by future symposia. And, we made a lot of money for the Society: details to be announced. We are now setting our sights on next year's symposium in Minneapolis, Minnesota.

Speaking of money, although now in this case a negative situation, the IEEE continues its troubled saga of budgeting with this year instituting assigned mandatory dollar surpluses by Society. The amount mandated is by size and the EMC Society was able to reach its target of $149K. Note that it's the Society surpluses plus unfortunately some of the reserves that have been and are being used to pay for IEEE initiatives and operating expenses. The IEEE's continued overspending has resulted in increased dissent among the Societies versus the IEEE Board of Directors. More information will be provided at the upcoming IEEE Technical Activities Board (TAB) meeting in November in Mexico City. In the face of all this discussion, expect an IEEE dues increase.

This is my final column as President of the IEEE EMC Society as my two-year term of office ends on December 30th. In practical terms, it ends at our November 13, 2001 meeting in La Jolla, California when I turn over the gavel to President-Elect Todd Hubing. I've thoroughly enjoyed my term of office, most especially the opportunity afforded me to meet and associate with many different people in our extended EMC family. I've especially enjoyed the experiences I have had with people and activities in IEEE Regions outside of the United States. My associates on the Board of Directors have been most supportive and I look forward to my continuing involvement with them during my two-year term as immediate Past-President. I owe specific and deep heartfelt thanks to two people on our Board of Directors, for without them, neither the EMC Society nor I would function properly. Secretary (and Editor of this Newsletter) Janet O'Neil and Treasurer/Society Administrator Warren Kesselman are responsible for the meeting planning and documentation of all Society financial matters, respectively. Their attention to detail and commitment to going the extra mile has been much appreciated.

I look forward to hearing from you if you have any questions or comments – call me at 781-939-4267 or e-mail me at j.e.butler@ieee.org. **EMC**

# Letter from the Editor

*Janet O'Neil – Editor, EMC Society Newsletter*

*Newsletter Editor Janet O'Neil is pictured with Benoît Nadeau, Chairman of the 2001 IEEE International Symposium on EMC in Montréal, Canada.*

Photo by Mary Ann Pavlik

*The team that made it all happen! The Montréal Symposium Steering Committee is shown following one of their several planning meetings. Standing (left to right) are: Dr. Bernard Segal, Workshops; Hans Baumans, Secretary; Richard Duhamel, Exhibits; Amy Pinchuk, Publicity; Christian Forget, Registration; and Clermond Marquis, Local Arrangements and Social Program. Seated (left to right) are Dr. Jean-Jacques Laurin, Technical Papers and International Liaison; Christian Dubé, Vice-Chairman and Publications; Benoît Nadeau, Chairman; and Stanley Kubina, Advisor. Committee members not present at the time of the photograph included (bottom, left to right) Constance Brown, Communications; Shantnu Mishra, Technical Program; and Mary Ann Pavlik, JPdL Management Services. Not shown: Howard Mende, Demonstrations.*

"It reminds me of the day when Kennedy was assassinated. It's somewhat the same feeling; you know, that feeling of a loss of innocence." So said my friend following dinner one night in Denver, over a month after the September 11 tragedy. I had struggled since that day with my feelings. I wondered what it was I felt. Somehow, I thought by putting a label on my feelings, I could better handle them. I was too young to remember the day when Kennedy died, but I certainly understood the feeling of a loss of innocence. I have never taken it for granted to live in a country like the United States, but I had taken it for granted that people, like me, would respect this country and all that it stood for. Sadly, September 11 proved that this is not the case. And so I am sure that many others, like me, suffered from a loss of innocence.

However, immediately following this tragedy heroes were born as we mourned the lives of all those lost due to this heinous terrorist act. The actions of these heroes are memorable and admirable. And there were several heroes: some obvious such as the firefighters and some less so such as those that quietly served meals to those suddenly displaced. They all serve as an example that life goes on and does so honorably. We owe these heroes an immeasurable debt of gratitude.

In putting together this issue of the Newsletter, I was struck by all the wonderful things that happened at the EMC Symposium in Montréal the week of August 13, 2001. Little did we know then that life would change for many of us just one month later. There were so many things that made this symposium unique. As a Society, we need to do justice to the Montréal symposium steering committee by acknowledging their tremendous efforts in putting on this one-week event. We owe them our thanks for their dedication to our Society and the study of electromagnetic compatibility. I trust within this issue that you will learn more about the symposium in Montréal if you did not attend. You might just see what you've been missing and want to attend next year's symposium in Minneapolis. If you did attend, I trust you will agree by "reliving" the symposium through the articles and photos in this issue that it was a wonderful symposium.

You will also find an article on page 19 by Maqsood Mohd, Chair of the Education Committee. In his article,

*continued on page 54*

Photo by Janet O'Neil

*(Left) EMCS Photographer Dick Ford was especially busy during the Montreal symposium taking photos of the social events, the city, the awards programs, etc. etc.!! He managed to enjoy some quiet time, or at least sit down for a moment, with his wife Terry, during the dB Society annual party. The fruits of his labors are evident throughout this Newsletter. Thank you Dick!*

# Chapter Chatter

*Todd Robinson, Associate Editor*

## "A Message . . . Loud and Clear"

*Thank you to Steve Jensen of SJ Consulting (Senior IEEE EMC Member) for this humorous EMC tale. As with all good reporting, I have added a few entertaining adjectives that may or may not embellish the truth of what really happened.*

A Long Beach police officer had taken a liking to a young lady who lived in the same apartment complex as Steve Jensen during his college days. The officer's assigned vehicle was a motorcycle, which he rode to liaison with his interest. While at the young lady's apartment, the officer would leave the speaker volume turned up quite high on his motorcycle's radio, so as not to miss any important calls.

Meanwhile, only four doors down, Steve was trying to study diligently, constantly interrupted by "Adam 12, this is Central Station. Do you copy, over?" This was certainly a fateful triangle: a police officer developing his love life, a police radio whose volume probably violated city noise ordinances and a budding engineer trying desperately to pass his next exam.

His concentration being so overwhelmingly derailed, Steve was forced to take action. As any good EMC engineer would, he faced the challenge rationally and with the latest technology at his disposal. Using an RF signal generator and carbon microphone telephone handset, he was soon tuned in and capable of transmitting to the frequency playing on the offending police motorcycle radio. Meanwhile, the police officer returned to his motorcycle, ready to resume the duties that Long Beach was actually paying him for. As he mounted the saddle of the big two wheeler, a message came over the radio that (evidently) changed his life, "This is God speaking, I know what you are doing. Stop it." Steve's studies were never again interrupted by the squawking of a police radio.

## France

The French chapter welcomes two new members to its board. Joe Wiart of France Telecom R&D and Gilles Cottard of ANTEM joined Dr. Berthon, Dr. Béniguel and the former Chairman, Dr. Mayer. The chapter held its first meeting on June 11 with two topics related to the numerical treatment of EMC antenna problems. Dr. Berthon, new Chairman of the chapter, talked about exact and approximate methods for computing the input impedance of antennas, with comparisons based on results of the literature for wire antennas. The main conclusion is that the accuracy of the usual procedure associated with the Method of Moments may be improved by more exact but not heavier calculations, and should be when the diameter of the wire increases. Dr. Béniguel, Vice-Chair, gave a complete review of numerical methods used to calculate the coupling between antennas in the near field of each other, and presented a variety of examples in different frequency ranges.

*Professor Garbe, German Chapter Chairman, (far left) and Dr. Schänzler, head of the Physics Department, (far right) welcome the speakers to the workshop.*

## Germany

The German Chapter held its second workshop on electromagnetic effects (EME) on July 16 and 17 at the Armed Forces Scientific Institute for Protection Technologies (WIS) in Munster. Professor H. Garbe (Chapter Chairman) and Professor B. Staginnus (Head of the WIS) had the pleasure to welcome more than 25 participants – chapter members and guests. The annual Chapter-Forum on EME included discussions of technical and scientific problems. This year the main topics of the program were "Susceptibility of

*Tomas Weber of the Technical University of Hamburg-Harburg explains the protection against fast transient (UWB) signals at the German EMC Chapter meeting.*


*Dr. Sabath, organizer of the German EMC Chapter workshop, was pleased by the large number of participants. Please note the invitation to the 2002 workshop on EME.*

Modern Electronics" and "Hardness of Modern Aircraft Systems." The seven presentations during the Forum covered the aspects susceptibility investigations, protection concepts and numerical computation of electromagnetic behavior. All presentations were on a high scientific level and provided an enjoyable atmosphere for intensive discussions. At the end of the second day, all participants confirmed the high benefit of the workshop. Based on feedback, Dr. Sabath (organizer of the workshop) invited all participants to the third workshop on EME, to be held in the autumn of 2002.

The first meeting of a new task group followed the workshop on High Power Electromagnetic Effects (AG HPEM) in Munster. The scope of the AG HPEM covers both the generation and effects of high power electromagnetic fields on civil and military systems. The items are ranging from effects on electronics (like passenger carried equipment on planes) to protection concepts and hardening tests. The task group leader, Dr. Robert Kebel of EADS, invited all interested members to join the AG HPEM.

## Israel

On September 24, 2001, the Israel EMC Chapter held a meeting hosted by the Israel Standard Institute (ISI) headquarters in Tel Aviv. The meeting consisted of a full day session on "EMC in General", i.e., various EMC topics which were selected on the basis of novelty and interesting issues proposed by the Chapter members and guests. The meeting was co-sponsored by the AEAI, the Association of Engineers and Architects in Israel. Over 80 participants attended this meeting, from the high tech industry, through the military and standardization research and development institutes. Moshe Netzer, Israel EMC Chapter Chairman, gave an opening address. Next, Mr. Emil Koifman, Chairman of the Society of Electrical and Electronics Engineers in the National AEAI, addressed the attendees and invited the chapter members to take an active part in the AEAI's third symposium scheduled for April 2002. The ten lectures which were delivered in the morning and afternoon sessions were all prepared by chapter members and guest experts and dealt with various EMC issues, including radiated susceptibility in low frequency sensors, FCC compliance of assembled components, filtering and grounding in shielded test chambers and many other topics.


Photo by Shmuel Auster

*Members of the Israel EMC Chapter attended the Montréal Symposium and promoted the Tel-Aviv 2003 EMC Symposium, including (L-R) Elya Joffe, Oded Einat, Moshe Netzer, Vidi Bar-Natan, Shmuel Auster, Yossi Ben David, Armon Rabia, and Dr. Alex Axelrod.*

## Nanjing

Professor Wen Xun Zhang was the presiding officer at the Nanjing Chapter's August 27 meeting. The speaker for the meeting was Dr. Robert Marks of the National Institute of Standards and Technology in Boulder, Colorado. Dr. Marks reported on and discussed the recent activities of the IEEE 802.16 Working Group on Broadband Wireless Access Standard. A total of 145 persons were in attendance, including 23 IEEE members.

## Central New England

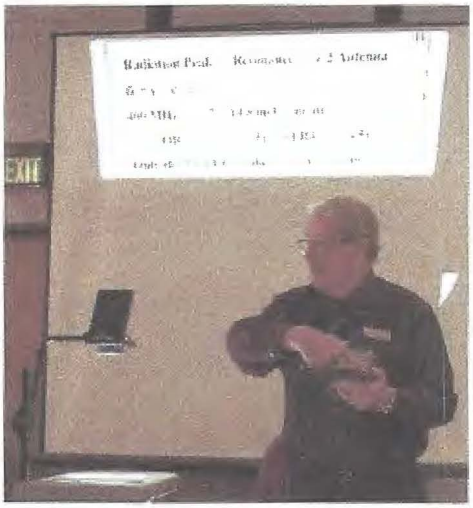
The first meeting for 2001/2002 was a joint meeting of the IEEE Central New England Chapter with the Northeast Product Safety Society (NPSS). This was held on Wednesday September 26th, 2001. The speaker was David Baron, PE, Vice President, Customer Services at Holaday Industries in Eden Prairie, Minnesota. The Speaker addressed aspects of electromagnetic field (EMF) environments relating to workplace safety. Topics included the biological basis for controlling human exposure, typical measurement units and conversions used in safety measurements, applicable standards, basic measurement procedures, and application examples of EMF's and human perception. The presentation included frequencies from ELF (60 Hz) to RF/Microwave. 35 members and guests attended, and the speaker responded to specific questions from the audience.

## Phoenix

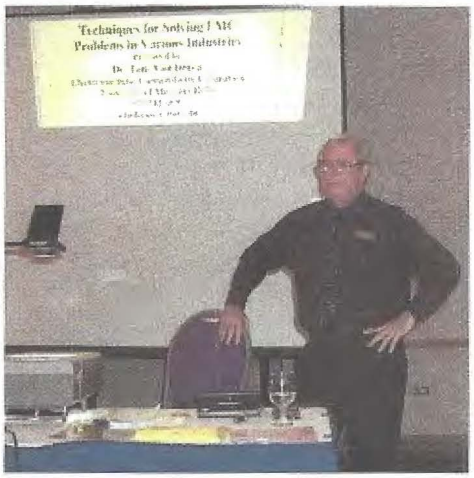
Harry Gaul reports that the Phoenix Chapter did not have any meetings over the summer because they were hiding from the sun and no speakers were willing to brave the 110 degree F (43 degree C)

temperatures. But the chapter has some exciting meetings planned for the future including a talk by the newly elected EMCS President, Dr. Todd Hubing, on February 13th. This talk will be held in conjunction with the EMCS Board of Directors Meeting at the Wyndham Buttes Resort in Tempe, Arizona. Then on Monday, March 11th, Dr. Clayton Paul of Mercer University in Georgia will provide a one-day tutorial on the "Fundamentals of EMC." This tutorial will include a Table Top show with representation by many of the vendors of EMC test equipment and design components. Check out the Phoenix web site at http://www.ewh.ieee.org/r6/phoenix/phoenixemc/ for the latest schedule on upcoming meetings.

*Dr. Tom Van Doren (right) is greeted by Charles Grasso, Vice Chairman of the Rocky Mountain EMC Chapter.*



*Dr. Van Doren explains a case study during his EMC problem solving presentation.*



*Dr. Van Doren begins his presentation on EMC problem solving techniques.*

## Rocky Mountain

The Rocky Mountain Chapter met on September 19 at the Radisson Hotel in Northglenn, Colorado. They enjoyed a presentation by Dr. Tom Van Doren, Professor of Electrical and Computer Engineering, University of Missouri-Rolla, entitled: "Techniques for Solving EMC Problems in Various Industries." Dr Van Doren drew upon his extensive experience and discussed five EMC problems from four different industries. Before getting into the specifics of the problems, Dr. Van Doren first reviewed the four noise coupling mechanisms that plague EMC engineers: Conducted, Magnetic Field, Electric Field and Electromagnetic Wave - and presented simple equivalent circuits to describe them. Dr. Van Doren then reviewed some of the causes of electromagnetic interference problems, including unintended current paths, poor field containment, resonance, and impedance imbalance. Dr. Van Doren then held up a small hand-held PC as an example of a radiated emissions problem at 400 MHz. He described the problem and the solution. Some spirited discussions about alternative fixes then ensued to the benefit of all. Dr. Van Doren's next example was a temperature controller that had a susceptibility problem at the 'blazing' frequency of 60Hz. Using simple math, Dr. Van Doren led us on a step-by-step approach on the solution of the noise issue. He then changed gears once again and we went from solving problems with fairly unsophisticated equipment to avionics gear. We examined the RF susceptibility of a flight controller. Interestingly enough, the controller actually had EMC protection added but Dr. Van Doren showed the weakness in the implementation that allowed the RF to penetrate the electronics. From flying high to wheels, Dr. Van Doren then displayed an automotive pressure sensor. This problem featured a "hidden" circuit element that allowed the rectified RF to shift a DC level, with unpleasant results. Also from the automotive worlds, Tom showed us a timing sensor that had self-induced noise. In summary, Dr. Van Doren demonstrated that even though the industry might be different, the physics of EMC coupling could be understood. This presentation is available for download at the RMC Chapter web site: http://www.ieee.org/rmcemc/

## Singapore

The newly formed Singapore chapter held its very first meeting on September 7, 2001. Since Mark Montrose and Elya Joffe were in Singapore for business, the chapter took this rare opportunity to invite both of them to present two short talks for the chapter meeting. Although the talks were arranged with very short notice, the committee was pleasantly surprised with a crowd of about 50 members and guests. The meeting started with Mr. Joffe's talk entitled "Electrophobia, or Why Are People So Scared of Electromagnetic Fields?" His humorous style and numerous colorful slides made the serious topic both thought-provoking and interesting. After that, Mr. Montrose captured the audience's attention with his talk on "Decoupling, Bypassing and Buried Capacitance for Enhancing PCB Performance." The mechanism of EMI radiation from high-speed digital devices was discussed as well as the future direction of PCB designs, including special dielectric materials. The members and guests enjoyed a wonderful evening with the two distinguished speakers. The chapter would like to thank Mr. Montrose and Mr. Joffe for accepting the invitation to give the talks despite their busy schedules in Singapore. The chapter would also like to acknowledge CET Technologies for sponsoring the meeting venue and providing the refreshments.

*Mark Montrose and Elya Joffe answering the questions raised by the audience during the Q & A session.*

*Elya delivered his talk on "Electrophobia" to a crowd of fifty members and guests in a seminar room at CET Technologies. This marked the first meeting of the newly formed Singapore EMC Chapter.*

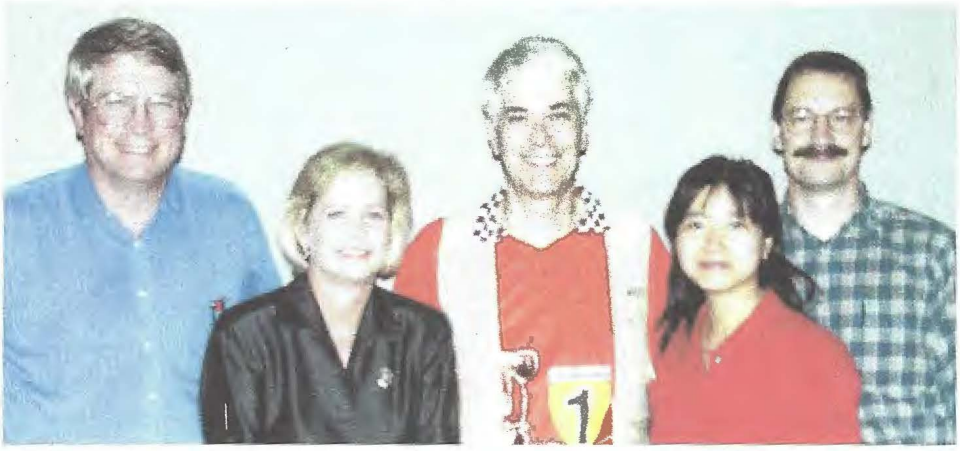
*Singapore EMC Chapter committee members and the September meeting speakers including (L-R) Kye-Yak See (Chair), Elya Joffe and Mark Montrose (speakers) Wee-Sing Chow (Treasurer), Er-Ping Lee (Deputy Chair), Roger Tay (committee member) and Timothy Foo (Secretary).*

## Seattle

The Seattle EMC Chapter held its first chapter meeting of the 2001/2002 technical program year on September 25 at AT&T Wireless in Redmond. The "boys of summer", that is, speakers Joel Lachance of Microsoft and Ed Blankenship of Hewlett-Packard in Vancouver, did a great job with a "double-header" presentation. Joel spoke about "Strategies to Improve Confidence in Immunity Testing Under CISPR 24" while Ed spoke about "Field Perturbations Due to Accessories Used in Radiated Emission Tests." These papers were each previously presented at the IEEE EMC Symposium in Montréal this past August. Ed's paper was a candidate for the Best Paper Award. It's interesting to note that Joel was born in Montréal. He started his career in medical electronic product development where he was introduced to the world of EMC. He then joined Matrox Electronics Systems in Montréal as a Compliance Engineer. Thus, he knew the Chairman of the Montréal Symposium, Benoît Nadeau, from their days together at Matrox. Joel later moved to the USA and worked for Gateway Computer and then Microsoft where he currently leads the EMC and Safety Compliance activities for the hardware peripheral development. Joel advised that CISPR 24 documents procedures to assess the performance of Information Technology Equipment (ITE) while subjected to various continuous and transient, conducted and radiated disturbances such as Electrostatic Discharges (ESD) and Electrical Fast Transient and burst (EFT/B). Basic EMC standards listed in CISPR 24 have not proven to be highly repeatable and reproducible. Therefore, this has made practical design decisions to improve ITE products performance to the standards difficult. His presentation proposed strategies that could be used to increase the confidence in the EMC basic standards called out in CISPR 24. These strategies included proper test planning, calibration and verification, repeatability and reproducibility studies, precise diagnostics and the application of a statistical process. Speaker Ed Blankenship has been employed by Hewlett Packard for 23 years in a variety of positions at three different sites. Currently, he is a senior EMC Technician in Bob Dockey's EMC Laboratory at HP, Vancouver. He is also an Assistant Adjunct Professor of Physics at the University of Portland, Oregon's premier Catholic University. And, he is currently Chairman of the Oregon and SW Washington EMC Chapter! Ed's presentation included

Photo by Stephen Slimac

*A great turn out for the "double-header" presentation at the September Seattle EMC Chapter meeting at AT&T Wireless.*



*It's a line up of Seattle EMC Chapter Officers, including (from left) immediate past Chairman, Ghery Pettit of Intel, Janet O'Neil of ETS-Lindgren, the current Chair, Stephen Stimac of Cascade Engineering Services, Secretary, Kitty Tam of Microsoft, Treasurer, and Pat Andre of CKC Labs, Vice-Chairman.*

great graphics and photos, including one of a polystyrene workbench that his lab created to study the effects of field perturbations in radiated emission tests due to such accessories. It was a treat to have these excellent speakers share their papers with those of us who did not get a chance to sit in on their presentations in Montréal. Many chapter members were eager and alert that night too judging by the frequent and excellent questions posed to the speakers. It was a great way to start the year with a chapter meeting attended by over 30 people. In October, the chapter will hold a four-hour "Design and Test for Immunity Workshop" presented by Chris Kendall, Principal EMC Consultant, CKC Laboratories, Inc. In November, Franz Gisin, of Sanmina in San Jose, California returns to the chapter to present "How to Div, Grad, Kink and Curl Electrons Into Generating Unwanted Radiated Emissions."

Photo by Stephen Stimac

*Speakers at the September Seattle EMC Chapter meeting included Joel Lachance of Microsoft (left) and Ed Blankenship of Hewlett Packard.*

## Southeastern Michigan Chapter

William M. Ashe of Eaton Corporation reports that the SE Michigan Chapter held a meeting on September 4, 2001 at the Defiance Corporation, who hosted the meeting and provided a pizza dinner. Val Liepa, PhD, of the University of Michigan Radiation Laboratory, presented "Modern Automobiles and FCC." The meeting was well attended by 27 chapter members and guests. Dr. Liepa discussed the FCC requirements for transmitters and their impact on automotive systems. He discussed a number of different requirements in FCC Part 15. He also discussed their implications on data communication and RADAR imaging. The requirements that FCC lays out for transmitter bandwidths especially in the higher frequencies creates challenges to the system designer to get enough bandwidth to accurately image objects. Some examples of current technology that used clever schemes to achieve image integrity were discussed. The talk was of general interest to the EMC design community, but presented interesting challenges to the EMC testing community. Accurate testing of the very high frequencies being used in some vehicle radar designs (77 GHz) will present many challenges to the testing community. A general discussion after the formal presentation highlighted these issues. **EMC**


# FREE TRANSACTIONS ON EMC 1982 to 2000

**EMC Society Past President, Bob Hofmann, is offering a virtually complete set of the Transactions on EMC from 1982 to 2000, to anyone who is willing to pay for shipping costs — that's it! If you are interested in the complimentary set, please e-mail Mr. Hofmann at hrhofmann@att.net**

# Practical Papers, Articles and Application Notes

*Bob Olsen, Associate Editor*

In this issue you will find one practical paper that should be of interest to the EMC community. It is by Matthew Wills of the Cessna Aircraft Co. and is entitled, "A Different Antenna for the Mode-Stirred Chamber." The author shows that using a discone antenna can reduce return loss and reduce the probability of excessive SWR on the transmission line feeding the chamber. This paper was originally presented at the 2001 Reverberation Chamber, Anechoic Chamber and OATS Users Meeting held in Bellevue, Washington, June 4–6. I have received one response to last issue's paper, "EMI Measurements and Modeling – More Similar Than You'd Think" and plan to publish it in the next issue along with other comments that other readers might have on this subject. I hope that this will be the beginning of a long conversation between those who primarily make measurements and those who primarily do numerical modeling.

While all material for this column will be reviewed prior to acceptance, the criteria are different from those of Transactions papers. Specifically, while it is not necessary that the paper be original or archival, it is necessary that the paper be correct, useful and of interest to readers of the Newsletter.

Comments from readers concerning these papers are welcome, either as a letter (or e-mail) to the Associate Editor or directly to the authors.

## A Different Antenna for the Mode-Stirred Chamber

*Matthew R. Wills*
*Cessna Aircraft Co.*

### ABSTRACT

Directional antennas are a necessary part of RF susceptibility testing because of a need to direct the RF energy toward a specific EUT using a spot illumination methodology. In the case of the mode stir chamber (MSC) the antenna serves as a transducer to transfer the energy into the chamber. Directional characteristics are not needed. In this case the antenna chosen was the discone antenna. The discone will be compared to a double ridge horn from the standpoint of return loss. These simple antennas improved the return loss from –5dB to better than –10dB and eliminated transmit antenna changes during a test. The discone antenna efficiency is within 1dB of the double ridge horn based on test field strength measurements. The reflected energy from the double ridge horn antenna was sufficient to activate SWR (Standing Wave Ratio) shutdown circuitry in the TWT (Traveling Wave Tube) amplifiers thereby limiting the forward power available from the amp.

At some test frequencies, the amp would shut down completely from a high SWR condition. Other labs attribute the TWT shutdown to energy return from the chamber, in our mode stir chamber the return at 1 GHz is over 10dB down. The discone antenna has better SWR characteristics across the frequency range of interest and may be constructed easily by the user. This article will have some technical detail and will provide construction details in a "this is how I done it" fashion.

### INTRODUCTION

During the first year of operation of the Cessna mode stir chamber, we had a power limitation on the receive antenna. The dipole used from 100 – 250 MHz was rated 10 watts max. This required that chamber calibrations be done at the 10W level and cal levels scaled up to the test levels.

In the mode stir chamber the insertion loss may be quite small at low frequencies. A discone receiving antenna was purchased at a nationally known electronics store and tested for use as a receiving antenna (100 -1000 Mhz). The antenna has been in continuous service since. During the initial testing of the discone, the 50W attenuator connected to the antenna was overheated and destroyed due to low insertion losses. 100W attenuators are now the minimum used. This is from an antenna with a cost of less than $75, and the reality is, it fills the job very well. Test calibrations are now performed at the full test levels.

This prompted us to look at discone transmit antennas for the higher frequencies.

### Test Setup and Testing

The horn and the discone antennas were compared using an HP-85025C Directional Bridge, HP-83620A RF Sweeper and an HP-8757D Scalar Analyzer.

The bridge was operated into an open circuit and a calibration level stored, this represented a 0 dB return loss. Next the antenna to be tested was placed on the bridge and a sweep taken over the band of interest. The charts produced indicate return loss in dB.

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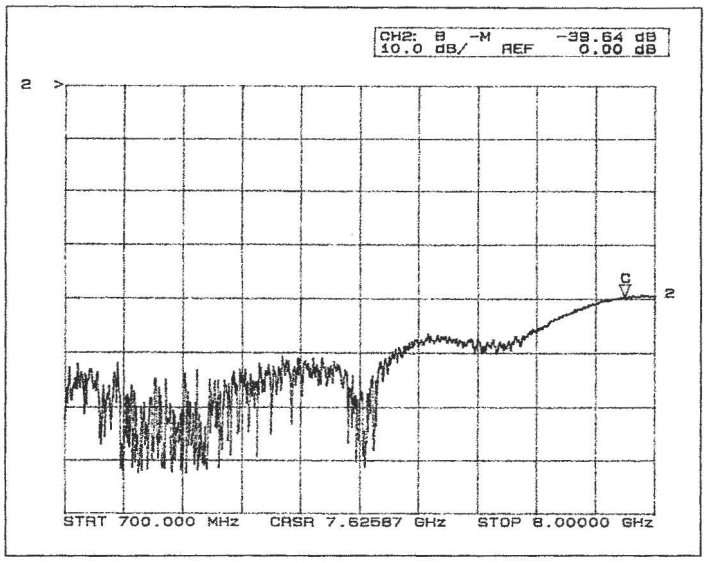


*Figure 1. Directional Bridge Terminated with 50 Ohm Pad*

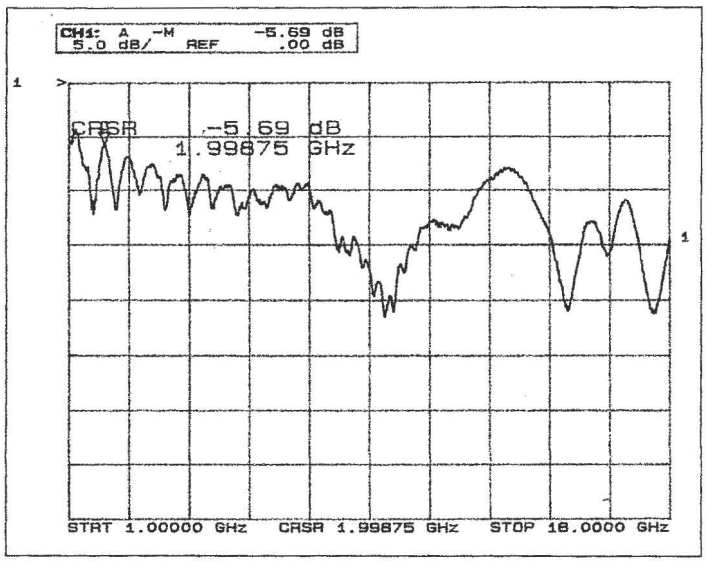


*Figure 2. Return Loss of Double Ridge Horn #1*

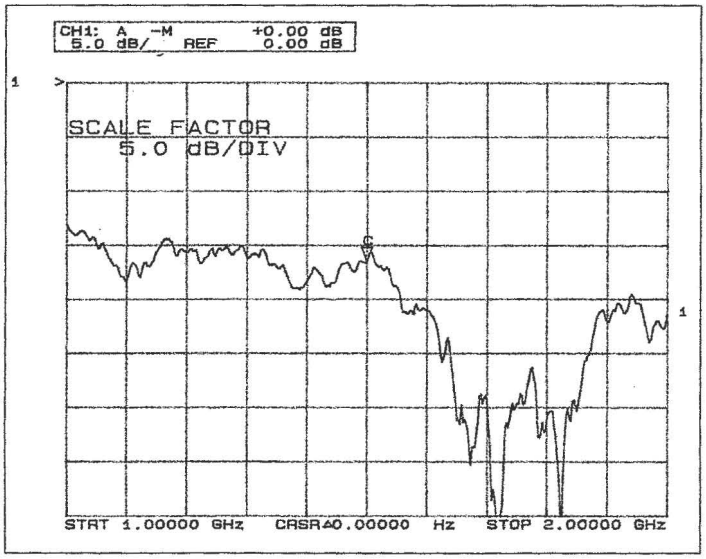


*Figure 3. 1 - 2 GHz discone*

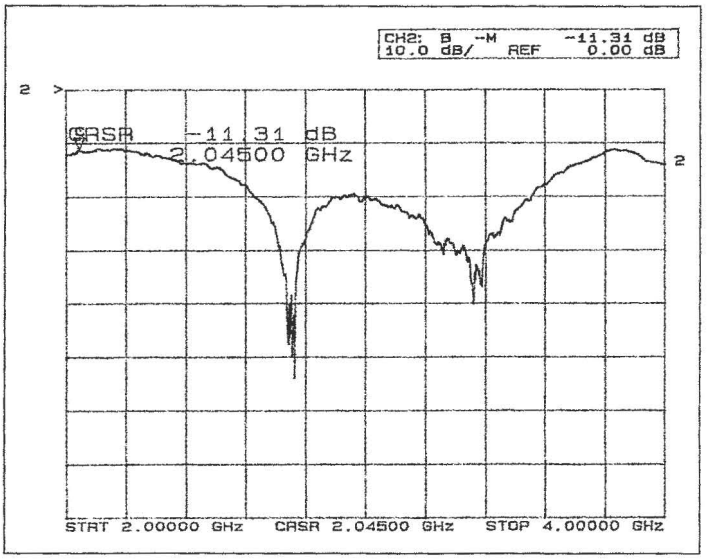


*Figure 4. 2 - 4 GHz Discone*

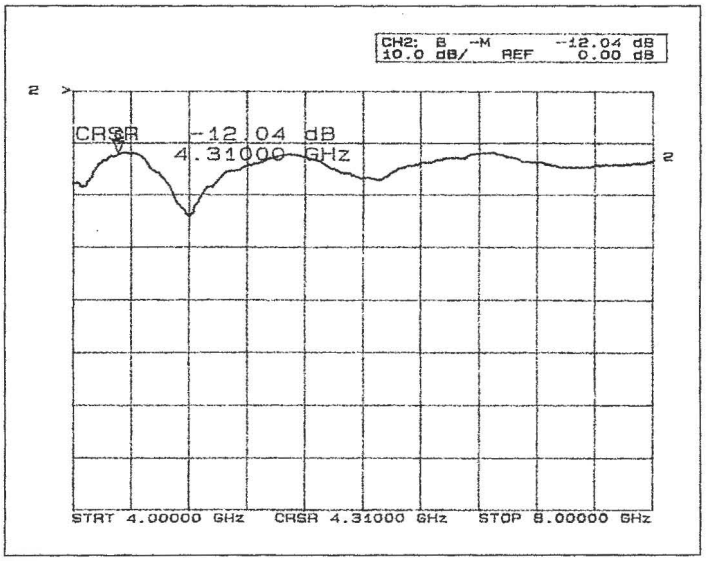


*Figure 5. 4 - 8 GHz Discone*

The goal for the discone antenna was to obtain < -10 dB return loss. The antennas were not tested in any special environment, simply in an open lab area. Reflections did not seem to influence the return loss measurements to an intolerable level. These tests could be repeated in more controlled conditions to improve uncertainties from range reflections.

## Test Results

Test results show that the discone return losses were always equal to or better than the double ridge horn over equivalent frequency ranges as shown in Fig 1-5. In some frequency bands, the discone is much better. A high-pot test was tried at 1000 Volts with no apparent problems.

We have been pleased with the performance of the discone antennas. We are currently using 4 separate discones from 1 to 8 GHz. Examples of the discone and horn antennas are shown in Fig 6. Fewer antennas could have been used, but it

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*Figure 6. 1 to 18 GHz transmit antennas (1 - 8 GHz discones, 8 - 18 GHz Horn)*

*Figure 7. Construction Photo #1*

is more convenient to have a separate antenna connected to each TWT amplifier.

## Construction Details

Construction time is about 8 hours.

The antennas were constructed using a crimp on connector, brass tubing from a hobby store and copper sheet. Silver solder would be nice for some of the joints but is probably not a requirement.

The outer conductor for the feed line is made from brass tubing with a .282 inch inside diameter. The inside conductor is made from 1/8 inch brass tubing. Using the air dielectric transmission line formula,

$$Zo = 138 \log \frac{d1}{d2}$$

$$Zo = 138 \log \frac{.282}{.125}$$

d1 = inside diameter of the outer conductor
d2 = outside diameter of the inner conductor

Zo = 48.76 ohms, fairly close to the required 50 Ohm impedance.

The cone of the discone is made by cutting a half circle of copper to the required radius plus 1/4" overlap on the edges for soldering. The edges are brought together and soldered. The top of the cone is then cut away to allow a slip fit onto the outside diameter of the transmission line section and soldered in place. See Fig 7 and 8.

The first discone was built using 5/8 inch copper tubing as the XMSN line. There seemed to be a lot of ripple in the return loss response. Changing over to the smaller tubing reduced the ripple. The transmission line is soldered into a coaxial crimp connector that has had a hole bored into it the same size as the outside of the transmission line. The hole must fit fairly tightly. This joint would be best if it were silver soldered for the extra strength. Soft solder will work though.

The center pin of the coax connector is soldered to the center conductor of the transmission line using a short piece of wire that fits the center pin and is in turn soldered inside the 1/8 inch tubing.

The following formulas were used to determine sizes for discone. A search for discone antennas on the Internet will yield several resources. Don't forget your local ham radio operators, this is right up their alley!

When designing for a specific frequency band, use a frequency about 20% below your desired start frequency. This will improve the low-end characteristics. The discone theoretically has a 10:1 frequency range, but for lower SWR, 3:1 is a better number based on our results. This fits well with the octave range of the TWTs.

$$L = \frac{2953}{FMHz}$$

FMHz = Frequency in megahertz
Dimensions are in inches.

$$D = \frac{2008}{FMHz}$$

L = length of the cone in inches

*Figure 8. The finished antenna, ready for installation.*

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$S \bullet \frac{d1}{5}$ D = diameter of the top disc in inches

S = distance from the top of the cone to the disc in inches

In practice, it is easier to leave the center conductor a little long and trim it to adjust the spacing between the disc and the top of the cone, by measuring the return loss.

## Biographical Notes

*Matthew Wills has been employed as an Engineering Technologist by the Cessna Aircraft Company in Wichita, Kansas for the last seven years. For the last five of these, he has been with the Electromagnetic Effects Lab. Prior to working for Cessna, he was employed for two years in television broadcasting, five years as an avionics bench technician and five years as an electronics instructor. He graduated from the Wichita Technical Institute, Wichita, Kansas in 1982. He is married with one daughter. He may be reached at phone 316-831-2631 or via e-mail at mwills@cessna.textron.com.*

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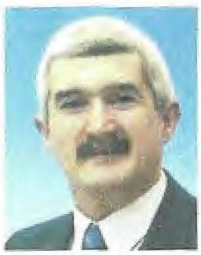


# Inter-Society Activities

## RAC/SACCom Annual Joint Luncheon

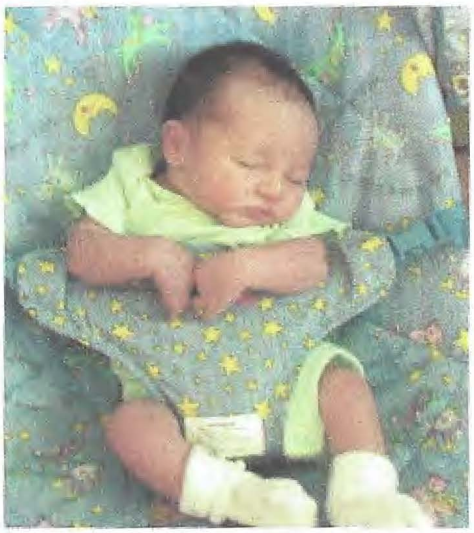
*By Elya Joffe, SACCom Chairman*

As tradition carries on, the IEEE EMC Society RAC (Representative Advisory Committee) and SACCom (Standards Advisory and Coordination Committee) held their joint luncheon on August 13th, during the 2001 IEEE International Symposium on EMC in Montréal.

This meeting and luncheon is hosted in alternate years by RAC and SACCom, and this year it was SACCom's turn to host the meeting.

This meeting serves as a great opportunity for members of the two committees, all representatives of various organizations, to sit together, hear and discuss activities of mutual interest in both organizations, and, in some cases, even find common interests and activities.

RAC, chaired by Dave Case, is a committee of representatives of Non-Standardization organizations and societies that deal with various aspects of electromagnetic compatibility and associated fields. Such organizations include COMAR (Committee on Man and Radiation) and ACES (Applied Computational Electromagnetics Society).



*Tyler David Case made his debut on August 11, 2001, just days before the start of the Montréal EMC Symposium. Congratulations to proud parents Teresa and David Case!*

SACCom, chaired by Elya B. Joffe, on the other hand, is a committee of representatives of Standardization-related organizations, both IEEE and non-IEEE related (including EMC-related committees, of course). Such organizations include IEC/TC-77, CISPR, SAE (Society of Automotive Engineers), RTCA, and others.

27 members of both the RAC/SACCom committees, as well as members of the EMC Society Board of Directors, enjoyed the luncheon and the lively discussion and exchange of information between the attendees.

Regretfully, Dave Case, Chairman of RAC could not attend this Symposium (and luncheon), for the first time in many years – however – for a good reason: Dave and his wife were awaiting the arrival of the stork in August. Congratulations to Dave and Teresa upon the birth of Tyler David Case.

So, Dave, congratulations, and all the best! Remember, in 2002, it is RAC's turn to host the luncheon. **EMC**

# EMC Standards Activities

*Don Heirman, Associate Editor*

## Exciting Work Started in Your Standards Development Committee

The IEEE Standards Association Board recently approved a new project (P1597.1 and P1597.2) for our standards development committee that will take us into a totally new standards arena—that of computational electromagnetic computer modeling! Not only will our committee devote its effort only on practical measurement techniques and the necessary instrumentation, but it will now bring in the modeling aspects which is the forte of our Society's Technical Committee TC-9. TC-9 by the way is the co-sponsor of this standards work. I want to particularly thank Andy Drozd who is the project leader and an enthusiastic missionary for this project. That is why he has graciously agreed to write this article for my column. Please read this from start to finish and if interested in participating, contact Andy without delay so you can be at the start of this exciting work! Now is the time!

## STANDARDS AND RECOMMENDED PRACTICES FOR COMPUTATIONAL ELECTROMAGNETICS COMPUTER MODELING AND SIMULATION

*By Andy Drozd*
*IEEE EMC Society Standards Development Committee*

The IEEE EMC Society's Standards Development Committee (SDCom), Chaired by Stephen Berger, is sponsoring the development of a formal standard and recommended practice applied to computational electromagnetics (CEM) computer modeling and simulation (M&S). Although this is new territory for the SDCom, there is a great deal of interest and support behind the idea of a *CEM standard.* However, the idea is not a new one. In fact, the need for such was realized over 30 years ago at a time when the development and use of computer tools for electromagnetics applications was emerging and just beginning to gain momentum. This was influenced by several factors: (a) the growing complexity and sophistication of military and commercial systems designs; (b) achieving requirements for a balanced, cost-effective $E^3$ program in which computer analysis could effectively complement measurements; and (c) providing a means of developing consistent models and benchmarks to support life cycle EMC code and measurement validations of actual systems. Important technological advancements in computer hardware and use of structured code only accelerated the arrival of CEM technologies and applications, as we know them today. The fast track CEM M&S trend continues today and will continue to grow as we further enter the age of high performance computing. This encompasses a broad range of applications such as analyzing printed circuit board radiated and conducted emissions/immunity, assessing system-level EMC, predicting the radar cross section (RCS) of complex structures, and automated target recognition (ATR) and imaging simulations.

The central issue is that there is a lack of well-defined methodologies to achieve code-to-code or even simulation-to-measurement validations within a consistent level of accuracy. The standard and recommended practice are expected to address these concerns and provide a method for validating CEM codes and models.

### Fundamental Validation Issues

There are both overt and subtle differences among CEM codes due to their underlying physics, mathematical basis functions, numerical solution methods, associated precision, and the building blocks (primitives) that are used to create models and analyze them. Although all CEM codes have their basis in Maxwell's equations of one form or another, their rate of convergence and "accuracy" compared to known results depend upon how the physics equations are cast (e.g., method of moments, finite differences, etc.), what numerical solver approach is used (full or partial wave, non-matrix, etc.), inherent modeling limitations, built-in approximations, and so forth. The physics formalism, available modeling primitives (canonical surface objects, wires, patches, facets, etc.), analysis frequency, and time or mesh discretization further conspire to affect accuracy, solution convergence, and overall validity of the computer model. Here, we have just scratched the surface for there are even subtler, innocuous issues that affect the way the codes operate and how or even if they can be validly compared.

What have not been fully appreciated are the issues of model accuracy, convergence, and code validity. Concerns immediately arise when the results of predictions using one type of CEM code do not favorably or consistently agree with the results of other codes of comparable type or against measurement benchmarks. Oftentimes, one observes clear differences among analytically based results over certain frequency regions and for certain simulation states. Significant deviations between analytical and empirical methods have been recorded. Differences are not unexpected, but the degree of disparity in certain cases cannot be readily explained nor easily discounted which leads one to ask the question, "...*Which result is correct?*"

While analysts may argue in favor of a given modeling approach, simulation technique, or use of a particular CEM code, there is no consistent methodology for comparing results among codes or

against empirically-based methods in a truly valid, objective way. If a methodology exists, it does not appear to be universally practiced.

Furthermore, it is often difficult if not impractical to compare the results of certain codes even though they are based on Maxwell's equations. Of course, some exceptions to this can be cited, in particular, when one considers grouping and comparing the results of "similar" codes determined by their physics, solution methods, and modeling element domains. However, significant disparities can even occur between "similar" codes, so oftentimes we are forced to go back to square one regarding the fundamental question.

## Art Versus Science

Is CEM an art or a science? One can make the case that it is nearly an even mix of both. The objective should be to emphasize the scientific aspects of modeling and simulation to ensure objectivity as a function of the overarching approach (modeling primitives, physics, problem to be solved) and the underlying scheme (physics, solver method, computation of observables). Obviously, the types of physics and solution method we use for a given problem and the desired observables are central to the issue.

No one will dispute the scientific basis and technical merit of CEM for solving complex problems. However, CEM is also something of an art from the perspective of the (expert) analyst. In practice, the expert is familiar with the code and the physics (i.e., the "canvas") and is proficient in applying the modeling tools and simulation/processing techniques (i.e., the brushes and colors). Unfortunately, this is also the root of the problem in that the process can naturally introduce a certain degree of subjectivism and uncertainty. What seems appropriate to one expert analyst may be inconsistent or inappropriate to another, yet both may claim to be "correct" based on their preferred tools and applied techniques. Even though both approaches may be generally correct for a given problem, results may differ. This again begs the question, "...*Which result is correct?*"

In effect, we need to eliminate (or at least significantly reduce) potential uncertainty in the modeling and simulation process. The electromagnetic community clearly needs a benchmark methodology i.e., a CEM standard that can be used to assure consistency for objective modeling and simulation validations.

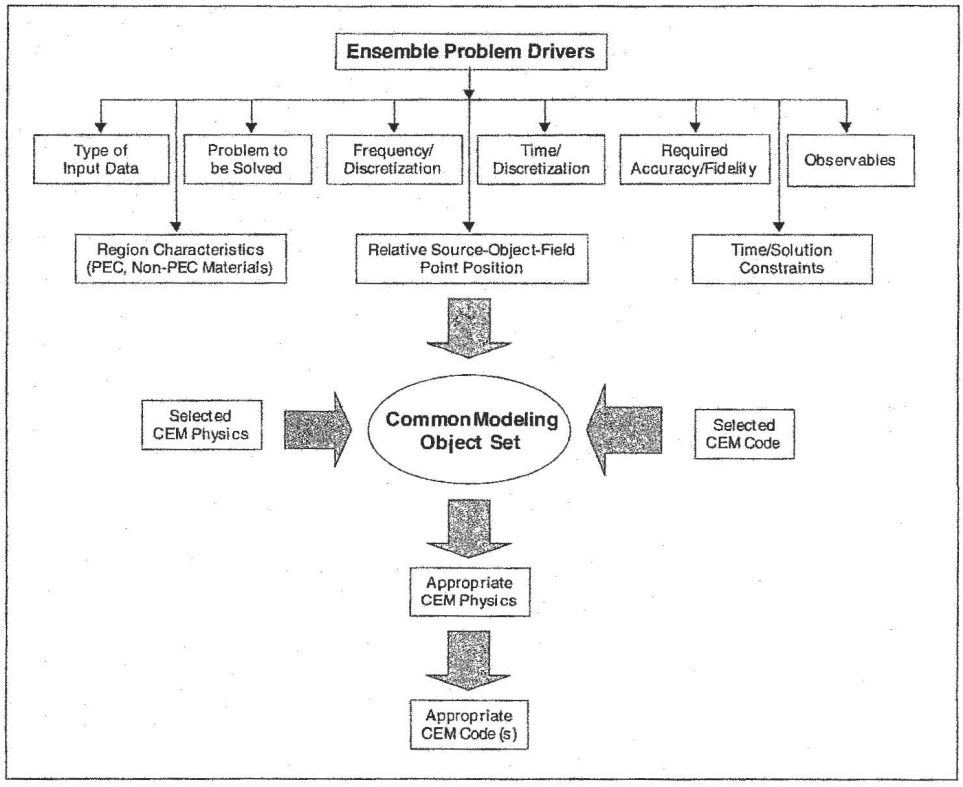



*Figure 1. Ensemble Problem Drivers and Their Influence on the Selection of Appropriate CEM Physics and Codes for Validation Purposes*

To achieve this we must rely on CEM experts as well as today's software savvy engineers and computer scientists familiar with the latest computerized simulation and hardware technologies. One of the goals should be to determine how generalized computer models are represented or generated, and how they can be effectively converted into efficient CEM models. One application that the DoD's High Performance Computing Modernization Program has investigated involves deriving high-fidelity CEM models from CAD databases. This implies an understanding of the typical ways to represent models possibly using a common language or via a universal set of descriptors, and then specifying methods to assure model and code validation utilizing these data.

## Standards and Recommended Practices

To properly develop the standard and recommended practices, a balanced cross section of the CEM community must be tapped. This includes the Applied Computational Electromagnetics Society (ACES) community, the IEEE EMC Society's TC-9 Committee on CEM (co-sponsors of the proposed standard), the IEEE's Antennas and Propagation, Microwave Theory and Technique, and Magnetics Societies Electromagnetic Code Consortium, and other international groups concerned with advancing and applying CEM technologies. Thinking somewhat "outside the box", we can also learn a great deal about relevant modeling and simulation technologies and techniques from the world of consumer video games.

There are two separate projects established to address the above concerns, issues, and goals as follows.

## Project 1597.1: IEEE Standard for Validation of CEM Computer Modeling and Simulation

The scope of this four-year project is to develop a standard for the validation of CEM computer modeling and simulation codes in differing applications. The standard will provide a basis for analytical and empirical validation of CEM

codes and configurations. Several key areas will be addressed, including:

- Validation by use of canonical models – This refers to the specification of canonical modeling elements (primitives) as a function of ensemble parameters (frequency, desired accuracy or fidelity, physics and numerical solution method, etc.). This is illustrated in Figure 1.
- Validation by simulation versus measurement - Included in the validations will be associated model-based parameter estimation (model- versus measurement-driven uncertainty estimates).

The purpose of this project is to guide the validation of CEM application models. The standard is intended to address concerns over the lack of well-defined methodologies to achieve code-to-code or simulation-to-measurement validations within a consistent level of accuracy, and provide a method for validating CEM codes and models. An additional aspect of computer modeling and simulation for CEM considered here is aimed at perhaps studying radiation hazards and related safety issues.

Comparable work has been accomplished and continues to mature on behalf of other collaborative engineering disciplines such as computational fluid dynamics, thermal and structural/mechanical engineering. These will also be looked at for guidance and the development of a draft standard for CEM.

## Project 1597.2: IEEE Recommended Practice for CEM Computer M&S Applications

The scope of this four-year project is to develop a recommended practice for use in CEM computer M&S applications to guide the EMC design of printed circuit boards to large, complex systems. Areas to be addressed include:

- General guidelines for creating CEM models.
- Development of modeling methodologies for small-to-large scale "canonical" systems, platforms or composite models.
- Methodologies for developing and applying collaborative, multi-disciplinary engineering modeling schemes.
- Computation of uncertainty for modeling applications.

This recommended practice will aid modelers and analysts in the selection and application of appropriate modeling and simulation methodologies, physics, and solution techniques to achieve accurate results and to complement measurements and EMC design tasks for a wide range of problems. As with its counterpart standard, a significant aspect of CEM computer modeling and simulation for electromagentic effects analyses could be used to target the study of radiation hazards and related safety issues.

## Relevant Research

This work will build upon prior analytical studies and research conducted by academic, government, commercial and professional institutions and consortia [1, 2]. These include studies on the modeling and simulation of multi-disciplinary engineering problems pertaining to fluid dynamics, laminar flow, structural and thermal engineering applications [3]. Another key area of study is the development and use of analytical and measurement benchmarks.

## Project Status

The first ad hoc Working Group meeting was held in conjunction with the 2001 IEEE International Symposium on EMC in Montréal. There were 17 attendees representing government (≈25%), industry (≈50%), and academia (≈25%). From these, the estimated user/producer/general interest profile was: 100% (code users), 50% (code producers/developers), and 100% (general and materielly interested organizations). This represents a reasonably balanced balloting group.

The Working Group plans to meet two to three times per year in conjunction with current EMC symposia, conferences, or review meetings. The Working Group officers are Andy Drozd of ANDRO Computational Solutions, Rome, New York (Chair), Dr. Bruce Archambeault of IBM, Research Triangle Park, North Carolina (Vice Chair), and Dr. Maqsood Mohd of Sverdrup Technology, Eglin AFB, Florida (Secretary).

The progress on the development of these standards and guidelines will be reported upon periodically. For more information or to provide comments, please contact Andy Drozd at (315) 334-1163 or via email at andro1@aol.com.

## References


[1] B. Archambeault and J. Drewniak, *"EMI Model Validation and Standard Challenge Problems"*, http://aces.ee.olemiss.edu/.

[2] Electromagnetic Code Consortium Web Site *http://www.asc.hpc.mil/PET/CEA/emcc/benchmark/benchmark.html*

[3] *CGNS, The CFD General Notation System Overview and Entry-Level Document*, CGNS Project Group, 15 May 1998.



***Andrew Drozd** is President and Chief Scientist of ANDRO Computational Solutions, Beeches Technical Campus in Rome, NY. ANDRO is a company dedicated to the research, development, application and training of computational electromagnetics (CEM) tools for EMC and electromagnetic environmental effects (E3) analyses. He has over 26 years of experience in electromagnetics technologies primarily for the modeling and analysis of E3 effects, environments, and responses for government and commercial systems. His responsibilities include: systems engineering; EMC computer modeling, simulation and analysis; exploitation of innovative, expert system technologies for CEM and EMC analytical applications; and EMC laboratory testing support including the design and conduct of experiments. He may be contacted at andro1@aol.com.* **EMC**

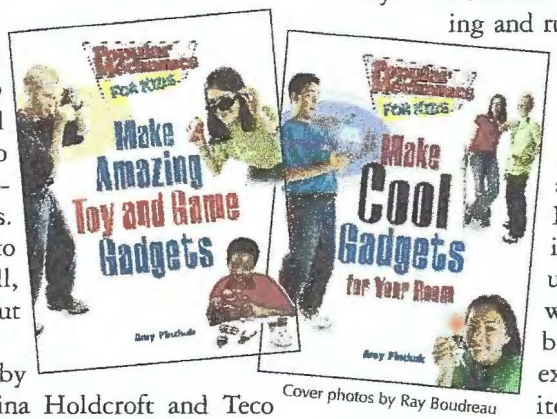


# Book Review

*By Mark I. Montrose*

***Popular Mechanics for Kids Series (Two books by Amy Pinchuk)***
*Make Amazing Toy and Game Gadgets*
*Make Cool Gadgets for Your Room*
Published by Greey de Pencier Books Inc. (Owl Books) in Canada and by Harper Collins in the United States

Having spent years involved with books that deal exclusively with technology, filled with math and targeted for graduate students or practicing engineers, it is refreshing to pick up a book that is targeted toward kids. Amy Pinchuk, the mother of four children, has written two books that will excite not only kids ages 9-13, but also adults who will probably want to build these projects themselves. Adults do like to have fun, after all, with and without their kids.



Cover photos by Ray Boudreau

Illustrated by Allan Moon, Tina Holdcroft and Teco Rodrigues, the diagrams and instructions show that someone has developed a learning tool that presents engineering principles to kids in a fun manner. With step-by-step directions, "test-as-you-go" troubleshooting, lively fact sidebars and hot web link, these amazing project books join the hugely successful kid's television series and website (www.pm4kids.com). There is also a section that deals with EMC.

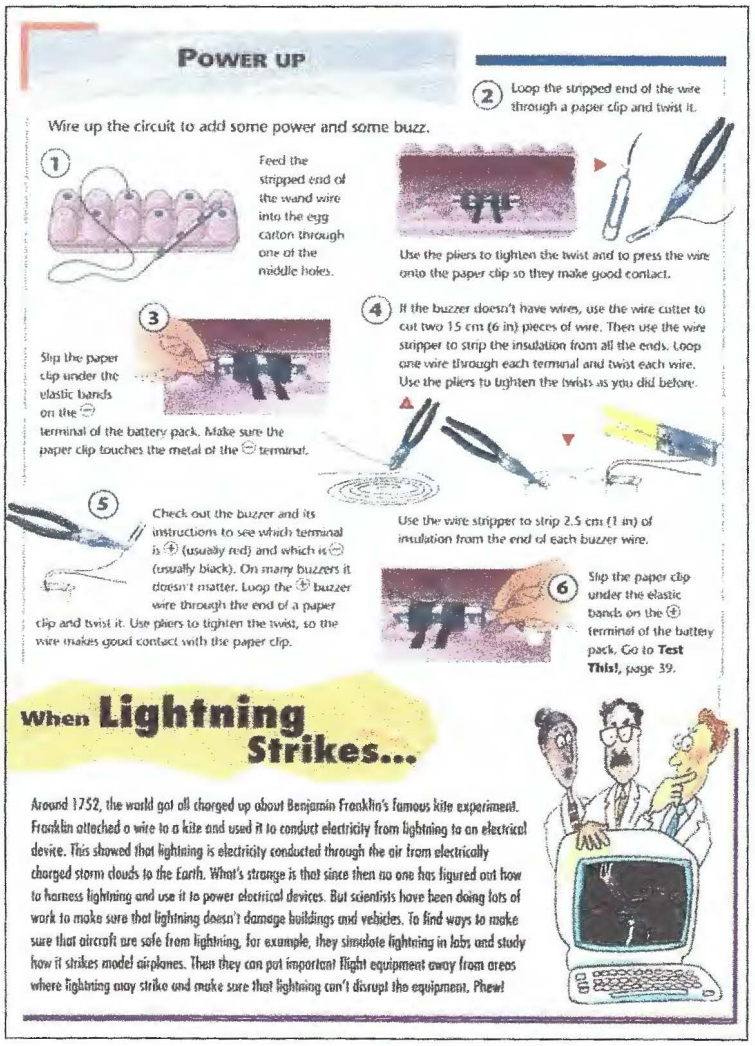
Amy Pinchuk has a PhD in engineering and runs an electromagnetics and EMC consulting firm in Montréal, Canada. For those who attended the IEEE EMC Symposium in Montréal (August 2001), kids were welcomed to build gadgets and experiment with items detailed in these books in the Hospitality Suite for spouses and guests. This kids program at the Symposium was a huge success, and will be continued at future symposia, with the program based on this book series.

### Biography for Amy Pinchuk

Amy Pinchuk received her B. Eng, M. Eng and Ph.D. from the Department of Electrical Engineering at McGill University in Montréal. She also completed a year as Visiting Scholar with the Department of Electrical Engineering at Cambridge University in England. She received the Montréal Prix d'Excellence for her PhD Thesis on the subject of Computational Electromagnetic Analysis using the Finite Element Method. After many years of industrial experience in the areas of Computational Electromagnetics and Electromagnetic Interference, in 1994 Amy founded InField Scientific Inc. InField specializes in Electromagnetic Analysis, EMI/EMC, Radiation Hazards and Control of Electromagnetic Environments for complex systems such as Ships and Aircraft. Amy has also taught Software Engineering at McGill University, was a member of the steering committees for the Montréal 2001 IEEE EMC Symposium and the Montréal 1997 IEEE APS/URSI Symposium. She was also the Canadian URSI Section E (Electromagnetic Noise & Interference) Chairman from 1996 to 1999.

Amy Pinchuk has written two critically acclaimed children's books, *Make Amazing Toy and Game Gadgets*, and, *Make Cool Gadgets for Your Room*. These two Popular Mechanics for Kids books are published by Greey de Pencier Books Inc. in Canada, and Harper Collins in the United States. Amy is in the process of writing a third book in the series.

Amy enjoys raising and riding horses, stone sculpting and skiing. She lives with her husband and four children just outside Montréal, Quebec.



Page 38 of *Make Amazing Toy and Game Gadgets*, illustrated by Allan Moon and Tina Holdcroft.

These 64 page full-size books are not about making cute papier-mâché crafts. The focus is to build electro-mechanical gadgets that work with lights, batteries, motors and buzzers. There are five projects in *Make Amazing Toy and Game Gadgets*, while six projects are in *Make Cool Gadgets for Your Room*. All projects are definitely very, very cool for kids.

Projects in the *Make Amazing Toy and Game Gadgets* book include: Outta Site Light Box, Flashy Jewelry, Spy Camera, Buzz Off Game, and Cool Shades. In *Make Cool Gadgets for Your Room*, we have: Flashy Key Chain, See It-Hear it Doorbell, Bouncy Animal, Secret Code Machine, Quiz Game and Alarm in a Box.

All photos by Dick Ford

*Everyone had a great time during the children's session in Montréal, including (clockwise from left) Tami Lee Joffe, a couple of clowns, author and Montréal Symposium Committee member Amy Pinchuk, and EMC Society Board member Henry Benitez. Tami Lee enjoyed the session so much that she was inspired to write an article for this Newsletter (see insert this page).*

These are not a do-it-fast project. Every item has between four and twelve sections, each with four or five steps. Each step is illustrated clearly. Most require some purchased material, a power tool, and adult assistance. The end result of creating an electromechanical device is that kids will be proud of their work, such as building a doorbell for their room that buzzes and lights up. After each subsection, the "Test-This" aspect is given. This helps uncover problems that developed, such as glue that is not sticking or a battery that is weak. Not only is this a step-by-step project, reasons how and why this item works is detailed in the sidebars. In certain boxes, interesting related facts are provided that gives insight and history on how the device came about. A glossary defines unfamiliar terms, and explains how to read circuit diagrams. In addition, there are tips on the safe use of X-Acto knives, how to glue, and splitting, stripping and connecting wires.

A sample from *Make Amazing Toy and Game Gadgets*, page 38 is included with this book review to illustrate the format of the book. Both are available in the United States, Canada and worldwide, in bookstores as well as the web. **EMC**

## The IEEE EMC 2001 Symposium from a Child's Perspective

*By Tami-Lee Joffe (aged 13), Daughter of Elya B. Joffe*

When we got home to Israel, my Dad asked me if I liked the Symposium in Montréal. I liked the Symposium because there were activities for kids that were a lot of fun. There were three days of science. We built cool stuff of slime, electricity and magnetism, and I finally understood a little of my Dad's work. The sessions lasted for an hour each day.

I liked it very much because finally somebody did something for children at the Symposium. I have been with my Dad at several IEEE EMC symposia; he tells me that I went even as a baby, and this was the first time that someone thought of the kids.

I saw things that I never saw before and although at first I though that it was stuff for little children, it WAS for all ages. This activity kept me busy while my Dad was attending the EMC Society Board (bored?) of Directors meetings and activities. I think that symposia organizers should stick to this idea of a children's program and plan activities for kids at every symposium!

I also liked to walk around the exhibition area, receiving great stuff (and winning a big Teddy Bear) and especially helping in our booth for the Symposium that will be in Tel-Aviv, Israel, in 2003 at the David Intercontinental. Be there (with your children) – I will help my Dad to have activities for children there, too.

# Personality Profile

*Bill Duff, Associate Editor*

## Introducing Donald R. Bush

Don Bush was born in Louisville, Kentucky in 1942. He graduated from the Speed Scientific School of the University of Louisville with a Bachelor of Electrical Engineering Degree in 1965, and received the Master of Electrical Engineering Degree in 1974. He attended his first IEEE EMC Symposium in Washington DC in 1967, and has been an AIEE/IRE/IEEE member since a student in college.

Don was recently honored at the 2001 IEEE International Symposium on EMC in Montréal. He received an Honorary Life Membership in the EMC Society and a Certificate of Technical Achievement for "Contributions to the Development of Spread Spectrum Computer Clock Technology." Don says, "The Honorary Life Membership in the EMC Society is my most cherished award."

Upon graduation from college, Don started his career in the IBM Office Products Division (OPD) in Lexington, Kentucky. His new boss introduced him to the then-under-construction EMC Laboratory and demonstrated the brand-new Empire/Singer NF-105 EMI receiver. Having been an amateur radio operator, and by chance listing this on his resume, his fate was sealed.

TEMPEST was the buzzword in 1965, and the lab was being formed to develop products for the government that complied with these taxing requirements. Don worked on two commercial TEMPEST products, one the inertia-motor Selectric® Typewriter, which was sold for more than 25 years. The other product, because of political and antitrust issues, was transferred to the Federal Systems Division of IBM. In the late '60's the IBM OPD product line was becoming more electronic, and development personnel were starting to recognize the occurrence of strange phenomena. Don's work thus shifted from TEMPEST measurements to commercial EMC.

At this time, he met Clayton Paul, who had joined the faculty at the University of Kentucky. They were the only two members of the IEEE EMC Society in Kentucky, and they soon became fishing buddies as well as colleagues.

Don became involved in ESD simulation and commercial product support in 1968. Early customer problems with new electronic products caused this EMC mission change. In 1969, the Justice department under the Johnson administration decided to sue IBM. This caused the TEMPEST work to slow down, but the commercial EMC problems were immune to politics.

*Donald R. Bush*

IBM had developed a new line of magnetic-belt dictation equipment, which used silicon transistors instead of the antiquated, leaky, germanium predecessors. During one of the early field tests, a development engineer was checking a unit in his hotel room in Chicago before taking it to the customer. When listening, the unit appeared to have music recorded on the media. After removing the media, music was still playing! Don then packed an EMC-25, antennas, and various suppression components and headed for Chicago to inspect IBM OPD's first radiated immunity problem. The radiated field from the FM radio station was measured, (this was a great deal different from measuring TEMPEST microvolts) and the location of the station relative to the hotel was noted. Many other broadcast stations were measured so that experience with this new problem could be studied.

Many other obstacles had to be overcome. The biggest challenge in hardening these products was the hardening of an audio circuit rather than a digital circuit. No large amplifiers were available and antenna calibrations for generating fields had not yet been thought of, so these new challenges had to be addressed.

The Federal Communications Commission (FCC) started looking at the interference potential of computers in the mid-'70's, and the entire IBM EMC community was involved in studying this very critical issue. The OPD division developed and manufactured the smallest and lowest priced of IBM's products, and Don was involved in their EMI measurement and suppression. These were essentially the "consumer products" of IBM. Virtually all of these products connected to 120 VAC outlets or were battery powered. Don led and originated several of the 120 V power-line conducted EMI studies and participated in many of the EMI studies directed by IBM corporate headquarters, such as antenna proximity to Data Processing Systems.

Over the years, IBM developed many internal EMC standards and design criteria, as did most other large companies. All were first developed empirically in order to generate a very quick response to a customer's problem, then a great deal of analysis was used to generate a permanent measurement criteria and standard. Don was named EMC coordinator to deal with the unique product line of the OPD division and represented the low-end EMC issues in all corporate standards meetings.

When the FCC first published the Part 15 Computing Device Rules in 1979, the second IBM product to receive FCC Certification was developed and produced by IBM OPD Lexington. Don generated this and many more certification reports.

Don was named Corporate Standards Project Authority for Electromagnetic Susceptibility in 1985, and held this post until 1991, when IBM decided to spin off what had become the PC printer and typewriter division. Lexmark was born. Don was a Senior Engineer and technical team leader of the Lexmark EMC laboratory. Lexmark joined the Information Technology Industries Council (ITIC) and Don was appointed EMC/ESC-5 representative.

He has written eleven papers that have been presented at EMC symposia around the world, has presented EMC experi-

*continued on page 52*

# IEEE EMC Society Education and Student Activities Committee

*Maqsood Mohd, Chairman*
*IEEE EMC-S Education and Student Activities Committee (ESAC)*

Since the EMC community was together in Montréal during August 2001, our lives have changed. We have witnessed the worst terrorist act in US history. However, this is not the first time that religion was abused, and if history is any witness, it may not be the last time either. Innocent people continue to be terrorized around the world in the name of religion. Misguided practitioners of Islam are not alone in these types of acts. Misguided adherents of world religions such as, Hinduism, Buddhism, Judaism and Christianity all are equally tainted. One needs to just look in the daily news headlines around the globe. Islam, however, is a favorite target of the mass media. The mass media constantly manufactures a connection of terrorism to Islam; notwithstanding that true Islam has nothing to do with such acts. President Bush, scores of law enforcement and public officials in the US have emphasized this fact.

Proper education is the key to understand the human civilization and societal dynamics. During the last few weeks, I have been providing the much-needed education to my fellow Americans in and around my area. I must also express my utmost appreciation for the generous outpouring of concern and help from those whom I know and those whom I don't know, in this heightened time of misguided hatred towards fellow Muslims and Arab Americans. I hope, like President Bush and other public officials in the US, the common people have a clear distinction between the true adherents of Islam and a fringe group.

As life goes on, what will help us understand and march forward with confidence is what we would do in our EMC profession. Our profession can provide the guidance very much needed today. That is, if there is a catastrophic failure due to EMI, then we look for its causes and resolve it in such a manner that the EMI will not occur again. In our terrorized world of today, we need to search for reason(s) why these types of events occur and take appropriate steps to inhibit them from occurring again. We might also study the history of the world to guide us, just like we would study the history of EMI in a system to get a better understanding of the nature of the problem. On behalf of the Education and Student Activities Committee (ESAC) I wish you peace and a normal life in the coming weeks, months, and years. Now let me provide you with the details of the ESAC activities for your reading pleasure and enjoyment.

Our big education events at the symposium included the Experiments Demonstration and the Fundamental Tutorial Workshop. Nine years ago, we started the Experiments Demonstration session, and the Fundamental Tutorial and NARTE Exam Preparation workshops eight years ago. On Mondays, eight years ago, there was hardly any other workshop offered. Over the years, the choice for the attendees has grown to almost eight workshops on Mondays. Thanks to our excellent speakers and presenters, our Tutorial sessions have never lost their appeal and utility. The real down to earth and fundamentals education is really in demand. One of the reasons for this demand is that the environment in which we live is becoming richer with man-made electromagnetic energy and at the same time the susceptibility of electronic technology is decreasing. So, many are in desperate need of how to deal with EMI and EMC today. The increasing participation of novices in this field at seminars and symposia and even the desire of seasoned professionals to brush-up and soak up every tidbit of EMC knowledge are noteworthy. After all, knowledge is power. This makes our Committee's responsibility very important, and we don't take that lightly. We of the ESAC will continue to strive to bring the best in EMC Education to you as we have in the past. But, we need fresh ideas and feedback on what we provide. If you are interested in making the education task easier, efficient, and innovative, and you enjoy doing this type of activity, please contact any one of us.

Knowledge is power. It's worth repeating! And indeed education is the means to get the knowledge. To seek knowledge is a birth right of every human being. EMC professionals are included in this. It is never too late to learn and seek education. Education is a verb. Our goal is to become the premier education committee of the IEEE. This is *your* Committee. We are here to help you and support your education needs. We are striving to undertake unconventional and innovative means to achieve our goals. Help us help you better. Let me update you on the activities of our various subcommittees. We welcome your help and support that you may be able to provide to any of our subcommittees. Please feel free to contact any of these subcommittee Chairs.

## Montréal, Canada, EMC Symposium 2001

The Montréal, Canada Symposium is now behind us; and it was the best yet for educating and enriching the EMC professionals. The Montréal Symposium Committee deserves thanks and appreciation for the job well done. At this symposium, the Education and Student Activities Committee achieved great success in several areas. In the following paragraphs I have highlighted some of the events that took place that you may find of interest.

## Tutorials

It was another landmark year for the Fundamentals Tutorials. Although the tutorials are primarily targeted for the entry-level engineers in the EMC field, quite a few seasoned engineers also enjoy

brushing-up on concepts that they might not have used in a while. This year several noted experts from several organizations provided the tutorial material to help better understand EMC concepts and to better design systems from EMC point of view. The highlight of the Tutorials was that not only theoretical concepts from PC board design to system engineering were discussed, but also practical examples of how to analyze communication systems of wireless technology were presented. A notable addition to this Tutorial was the presentation about the passive intermodulation (PIM) concepts useful in spaceborne systems. If attendance is any measure of success and popularity, the Fundamental Tutorials were very successful. Throughout the day on an average there was an impressive attendance of about 400 participants. We had standing room only during parts of the day. We needed extra chairs a few times in the day. With the help of understanding from our audience, we had successful sessions. Like previous years, this year too, the first-time attendees were relatively larger in percentage than the seasoned ones. Maybe the seasoned ones didn't want to sit in standing room only sessions. But the newcomers didn't know any better. With everybody's understanding and patience we managed to cater to the audience. Thanks to all the speakers and the attendees who made the Fundamentals Tutorials a great success. The tutorial subcommittee is busy planning for another exciting and informative session during the Minneapolis 2002 Symposium. If you would like to propose a topic or a speaker for the Minneapolis Symposium, email your comments and ideas to maqsood@ieee.org.

Photo by Dick Ford

*EMCS President Joe Butler (left) is pleased to present the award for the Best Student Paper presented at the 2001 IEEE International Symposium on EMC to Jose Luis Bermudez (center) of the Swiss Federal Institute of Technology, Power Systems Laboratory, in Lausanne, Switzerland. Maqsood Mohd (right), Chair of the Education and Student Activities Committee, congratulates this star student!*

## Demonstrations

This is another popular and "educational" activity we do as a committee. A variety of EMC concepts are demonstrated experimentally during the symposium to educate the symposium attendees. This year also marked the beginning of demonstration of EM modeling and simulation (M&S) concepts. For three main days of the symposium more than 20 experts demonstrated 24 EMC concepts that sometimes might be classified as abstract or black magic. Many happy souls were pleased to learn these concepts during these demonstrations. Their doubts changed into convincing beliefs. The same numbers of demonstrations were also presented in the M&S area. There were at least two noteworthy highlights during this year. We had presenters from around the world and also demonstrations were located in the best location at the symposium. Our thanks go to the Montréal Symposium committee for providing us with the excellent location for the demonstrations. Thanks are due to Andy Drozd and Larry Cohen for putting together a fine demonstration program. Our thanks are also due to very supportive vendors. If you would like to demonstrate an experiment at the Minneapolis symposium, respond to the Call for Experiments or contact Andy Drozd. If you would like to demonstrate an EMC modeling and simulation concept at the next symposium in Minneapolis please contact Andy at andro1@aol.com. (Please see Andy's article on the Experiments Demonstrations on page 34 of this Newsletter for more information.)

## NARTE Activities

As during the past several years, Dr. James Whalen conducted the workshop for engineers and technicians who are preparing to take the National Association of Radio and Telecommunications Engineers (NARTE) examination to certify as EMC engineers and technicians. Dr. James Whalen is also a part of the overseeing committee of the EMCS that would review the question pool along with several folks from the technical committees (TCs). At the NARTE examination on Friday during the symposium, 13 engineers and technicians sat for the exams. The word from NARTE is that 62% of the participants passed the exams. Our congratulations to all the successful applicants, and welcome to the ranks of certified NARTE professionals. Our thanks to Dr. James Whalen for championing the cause of "preparing for the NARTE exams."

## University Grant

John Howard heads the university grant committee. This year we had responses from around the world requesting the grant money and the committee was successful in selecting a winner. The grant is provided to an institution that is on the verge of offering an EMC course. The grant money is used as seed money to start an EMC course as an established part of the curriculum in an Electrical Engineering department. The grant is open to all universities in the world. For more details contact John Howard at jhoward@emcguru.com. This year's winning school is the Utah State University. Congratulations to Dr. Randy Jost of USU.

## University Survey

Professor Antonio Orlandi is the Chair of this subcommittee. The mission of the university survey committee is to survey the universities and collect data about the EMC course offering, student population, modeling and simulation usage, etc. The data collected will help EMCS and its members in various ways. Information will be useful for prospective students, industry, employers etc. If you have not already done so, please, complete an

online survey by going to the website http://dau.ing.univaq.it/art. If you know of a school or a college that has not participated in the survey, please encourage them to complete an online survey. For more information on this activity, please contact Professor Orlandi at orlandi@ing.univaq.it.

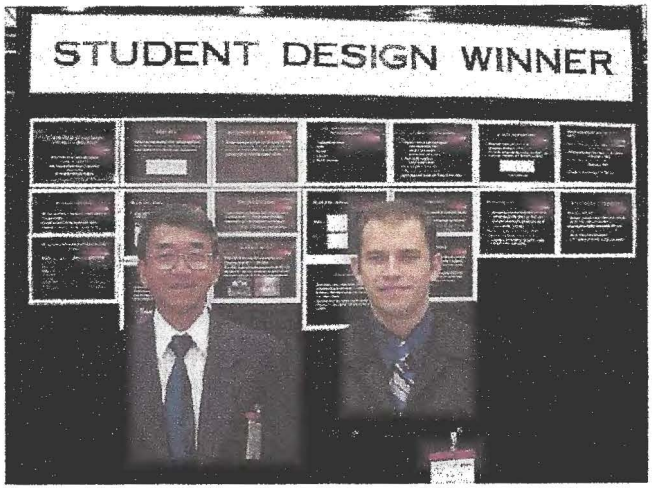



Photo by ESAC

*Best Student Design Award Winner Presentation at the 2001 Symposium. Vichate Ungvichian (left), professor, and Christos Kinezos, Student, of Florida Atlantic University, Boca Raton, Florida.*

## Student Design Contest

This is the most exciting area of growth this year for our Committee. This effort epitomizes the proverbial synergistic cooperative effort between industry and the Society. Ahmad Fallah of Ciena CSD in Cupertino, California, is the Chair of this effort. This was our second year and we have learnt a few more things this year. We will still learn and fine-tune the process as we go. If you would like to join this bandwagon and help advance and fine tune this contest, then contact Ahmad Fallah. In this competition, parts of a circuit (designed by Fallah) in the form of a kit are sent to the students at the universities. The kit is yours for the asking. This year more than 30 kits were sent to seven countries in addition to the US. We received only three entries. The entries were evaluated against a set of criteria provided in the information packet sent with the kit. The evaluators are EMC engineers from the industry and academia without any conflict of interest. In spite of our creative evaluation, this year two teams "tied" for the first place. This is very unusual. The 2001 EMC Student Design Competition was a major success! The two winning entries were teams from California State University at Chico and Florida Atlantic University at Boca Raton. Each team's primary member presented an impressive poster paper presentation in the demonstration area. Each team qualified to receive $900 in cash and one student from each winning team received an expense-paid trip to attend the 2001 IEEE International Symposium on EMC in Montréal, Canada. The most important reward for the participants, however, was the experience of applying their EMC design knowledge to a real-life problem and explaining the EMI-reduction techniques to scores of professionals at the symposium. If you are a student and want to participate in the 2002 EMC Design Contest, then all you need to do is contact Ahmad M. Fallah at (408) 342-5516, or (408)-366-4866 (fax), or via email at ahmadfallah@ieee.org, and request a design kit and a copy of the competition rules by December 31, 2001. Follow the rules and submit a winning entry. Get started early and remember: the early bird gets the worm. The price is right. The winner gets a free trip to the Minneapolis EMC symposium in 2002 and $900 US dollars! Not bad! Please see the article by Ahmad Fallah on page 23 of this Newsletter for more information on this contest.

## Experiments Manual On-line:

Dr. Jim Drewniak is heading up this effort. Dr. Dick DuBroff is helping Jim in expanding this activity to additional manuals. The first Experiment Manual published by the Education and Student Activities Committee is on the web site at: http://www.ewh.ieee.org/soc/emcs/pdf/EMCman.pdf. If you have an Adobe Acrobat Reader, you can download the entire manual from this site. If you don't have the Adobe Acrobat Reader, it can easily be downloaded from the site: http://www.adobe.com. Jim and Dick can still use some help from a volunteer who can do the follow-up work of soliciting and arranging the new experiments. If you are interested in broadening your career horizons, contact Jim or Dick or any other officer of the Education and Student Activities Committee.

## Education Committee Web Site

Andy Drozd was the Chairperson of this subcommittee. He has done a wonderful job of creating the website for your ESAC. As the duties fall under the secretary of the Committee, Dr. Bob Nelson has taken over and is very ably maintaining it. Take a look at our web site at http://www.ewh.ieee.org/soc/emcs/emcsedu.html. If you have any ideas how to improve our web site, please contact Andy, Bob, or me.

## Student Activities

Ahmad Fallah is the new Chair of this subcommittee. The mission of this committee is to reach out and touch some students (in fact, all students). Primarily, the focus is on working with student chapters in four areas: The Awareness of EMC, Student Paper Contest, The President's Award, and the Student Design Contest. The first order of business is to introduce the studenr chapters to EMC educational materials. If you have any ideas or wish to volunteer please contact Ahmad Fallah (ahmadfallah@ieee.org) or me (maqsood@ieee.org).

## Student Award Winners at the 2001 EMC Symposium

In addition to the Best Student Design Award, each year the Education and Student Activities Committee also awards the Best Student Paper Award at the annual symposium. The winning entries for this year are as follows:

**Best Student Paper Contest:** "On the Enhancement of Radiated Electric and Magnetic Fields Associated with Lightning Return Strokes to Tall Structures," by **J.L. Bermudez**, et. al, of Swiss Federal Institute of Technology, Lausanne, Switzerland. His award included $900 US dollars and an expense paid trip to the Montréal Symposium.

**Best Student Design Contest:** The

IEEE members get more choices, more information, and more discounts!

IEEE INFORMATION ADVANTAGE PROGRAM™

**IEEE Fatbrain**
Top technology books from best publishers in the world!

**IEEE Xplore™**
a dynamic new delivery system

IEEE PERSONAL
**e-mail @lias**
with FREE virus scanning software!

What's New@IEEE
be the first to know!

HBS PRESS **Harvard Business School Publishing**
discounted professional resources!

**Ask*IEEE**
a document delivery service with an IEEE advantage!

Get the most from your membership!

www.ieee.org/infoadvantage

IEEE

winning entries were from California State University at Chico and Florida Atlantic University at Boca Raton. The team members from CSU, Chico were: Richard Chairez, Cynthia Abundabar, and Gaurav Khalsa, and the solo team member from FAU, Boca Raton was Christos Kinezos. The three members of the CSU Chico team shared a cash award of $900 US dollars. The primary team member, Richard Chairez, got an expense paid trip to the symposium in addition to the cash award. The FAU team had only one member and Christos Kinezos was awarded the $900 US dollars cash award and the expense paid trip to attend the symposium in Montréal. Congratulations to these students, their team members, their professors, sponsors, and universities.

## Video/CD-ROM based Educational Material Production

The task of this committee is to produce educational material in appropriate and useful medium to the EMCS membership. Dick Ford is the Chair of this committee. He will welcome any help you can provide him in this task. What we do in this committee will have a far-reaching impact in the 21st century. At the present time we are in process of producing some video products of experiments that will be valuable to EMC students and professionals alike.

## EMC Outreach

The task of this committee is to produce educational material in appropriate and useful medium to the EMCS membership. The outreach consists of the segments: The k-12 population, the college student population, and the professional members who are not fulltime students. We are beginning to devote our efforts and resources to the k-12 population segment during the coming months. If you have any ideas how to go about doing this job more effectively, please contact me at maqsood@ieee.org.

## Education and Student Activities Committee Officers

Some changes have occurred during the symposium. Contact any one of th following to become a part of the ongc ing innovation in EMC engineerin through education.

**Student Activities**
Ahmad Fallah, ahmadfallah@ieee.org

**NARTE BOD Liaison**
David Case, davecase@cisco.com

**Experiments Manual II**
Jim Drewniak,
drewniak@ece.umr.edu

**Vice Chair**
Andy Drozd, andro1@aol.com

**Demonstrations**
Andy Drozd & Larry Cohen,
cohen@radar.nrl.navy.mil

**Student Design Contest**
Ahmad Fallah, ahmadfallah@ieee.org

**Video Productions**
Dick Ford, dford@radar.nrl.navy.mil

**University Grant**
John Howard, jhoward@emcguru.com

**Tutorials**
Maqsood Mohd, maqsood@ieee.org

**University Survey**
Antonio Orlandi,
orlandi@electtrica.ing.uniroma1.it

**NARTE**
Jim Whalen & David Case,
jjw4@ece.umr.edu

**EMC Outreach**
Maqsood Mohd, maqsood@ieee.org

I would like to express my personal thanks and appreciation to each of these officers who tirelessly work throughout the year to bring the very best in EMC education materials, workshops, demonstrations, tutorials, and student contests at every symposium and to all the members of the EMC profession throughout the year. When you email them, contact them, or see them during a symposium, please express your appreciation for their volunteering valuable time for the EMCS and the Education and Student Activities Committee. **EMC**

# 2002 STUDENT EMC DESIGN COMPETITION

## Apply Your EMC Design Knowledge to a Real-Life Problem. Win a Trip to the EMC Symposium in Minneapolis, Minnesota and $900 Cash!

You are invited to take part in the 2002 Student EMC Design Competition. The winner will be announced at the 2002 IEEE International Symposium on EMC in Minneapolis, Minnesota.

The 2000 and 2001 EMC Student Design Competitions were a major success! In the 2001 competition, we had two 1st place wining entries. The two winning entries were teams from California State University, Chico and Florida Atlantic University. For their efforts, each team received $900 in cash and one student from each winning entry received an expense-paid trip to attend the 2001 IEEE International Symposium on EMC in Montréal, Canada. This included a free pass to all technical sessions and exhibits and a special recognition during the Awards Luncheon! The most important reward for the participants was the experience of applying their EMC design knowledge to a real-life problem.

All you need to do to enter the 2002 Student EMC Design Competition is contact Ahmad M. Fallah at (408) 342-5516, or via email at ahmadfallah@ieee.org, and request a design kit and a copy of the competition rules by December 31, 2001.

Then, apply your knowledge of EMC design principles and submit your design entry and a detailed report on how you arrived at your solution by April 15, 2002. You will be notified well in advance so you can attend the 2002 IEEE International Symposium on EMC in Minneapolis, Minnesota and present the results of your efforts in a poster session. And, of course, you can then collect the $900 cash award!

Photo by Ahmad Fallah

*(From Left to Right) Joe Butler, President, EMC Society, Richard Chairez representing the team (members included Gaurav Khalsa and Cynthia Abundabar) from California State University at Chico, Christos Kinezos, student winner from Florida Atlantic University, and Dr. Maqsood Mohd, Chair, Education and Student Activities Committee (ESAC).*


Photo by Ahmad Fallah

*(From left to right) Ahmad Fallah, Chair, Student Design Subcommittee, Richard Chairez, Dr. Heda Ma, Student Advisor from California State University at Chico, and Dr. Maqsood Mohd, Chair, ESAC.*

# Reporting from... "St. Petersburg 2001" Russia

*By Elya Joffe, EMC Society Global Symposia Coordinator*

During June 19-22, 2001, over 100 EMC specialists convened at the LETI Electro-technical University in St. Petersburg, Russia for the IV International Symposium on EMC and Electromagnetic Ecology: EMC 2001. This Symposium was the continuation of a tradition, renewed by this event. The Symposium had not taken place for several years.

The interesting technical program featured 135 published papers, of which 94 were presented in 16 sessions and one poster session. The papers featured such topics on EMC as:

- EMC and Power Systems
- Natural Noise Sources
- Biological Effects of EM Fields
- Measurements and Standards
- Theoretical EMC Questions

as well as other interesting topics.

The EMC Society was pleased to be a Technical Co-Sponsor of the Symposium. A special workshop organized and sponsored by the IEEE EMC Society also took place during the Symposium. The workshop, split into two half-day sessions, actually spanned over two days. Session I, presented on June 19th, entitled "EMC Aspects in the Analysis and Design of Printed Circuit Boards (PCBs)" covered the following topics:

- "EMC Aspects of PCB Grounding Design," by Dr. Alex Axelrod, Israel
- "Decoupling, Bypassing and Embedded Capacitance for Enhanced PCB Performance," by Mark Montrose, USA
- "Signal Traces as Transmission Lines on PCBs – Why, and What Does that Imply?," by Elya B. Joffe, Israel
- "Methods of the Analysis of PCB of High-Speed Devices," by Professor Leonid N. Kechiev, Russia

*Speakers at the workshop included (from left) Mark Montrose, Jose Perini and Elya Joffe.*

*Following the workshop, the organizers and speakers took a moment to relax and visit, including (from left) Professor Leonid N. Kechiev, Mark Montrose, Professor Jose Perini, Elya Joffe, Interpreter Nina C. Higauri, and Dr. Alex Axelrod.*

Session II, held on June 20th, entitled "Techniques and Facilities for EMC Measurements," covered the following topics:

- "Radiated and Injected Measurements – When are they Equivalent?," by Professor Jose Perini, USA
- "Extending the Operation of Mode Stirred Chambers to Low Frequencies," by Professor Jose Perini, USA.

The EMC Society Workshops attracted a large proportion of the Symposium attendees.

Many thanks are due to Professor Perini for his efforts and support in organizing this workshop and to the speakers for their contribution to the success of the workshop.

The EMC Society was also represented by Professor Marcello D'Amore from the University of Rome, "La Sapeinza," Italy, who is Editor-in-Chief of the IEEE Transactions on Electromagnetic Compatibility. He made a presentation in the Plenary Session on "Transactions of the IEEE on Electromagnetic Compatibility" which enlightened many aspects of the publication, with topics such as "How Can I Become an Author for the Transactions?"

*The special EMC Society workshop in St. Petersburg was well attended.*

It is interesting to note that two formal languages were used in the Symposium: English and Russian. However, for the benefit of the attendees, simultaneous translation was provided in each meeting room and session.

A total of 107 participants, including 72 local (Russian) attendees and 35 international attendees, gathered in St. Petersburg, to attend the Symposium. Of the international attendees, the EMC Society was well represented by three members of the Board of Directors, including Professor Jose Perini, Mark Montrose and Elya Joffe.

The Symposium also provided an opportunity for engineering presentations and social "get togethers." In particular, it is noteworthy that the Organizing Committee arranged a special hospitality program for the international attendees and hosted them for special luncheons during each of the Symposium days.

A special reception by the Organizing Committee also took place for the international guests, where each and every attendee had the chance to taste good Vodka and other drinks, and a special meal featuring local cuisine.

It was evident that the Organizing Committee were truly making their best effort to make all guests welcome, and indeed, we did feel much "at home."

St. Petersburg, a city almost 300 years old, is one of the most beautiful cities in Russia and indeed, in all of Europe. Therefore, it was only natural that the Organizing Committee arranged tours both as part of the Spouse Program and on June 21 for all attendees of the Symposium.

Of particular interest were "The Hermitage," the Winter Palace of Alexander, the Tsar and "Peterhof," the "Great Palace." These sites truly reflected the glory of Russian history and art.

The Symposium met all expectations and the Organizing Committee intends to continue the tradition, and will hold another Symposium (No. V) in 2003.

Many thanks and congratulations to the Organizing Committee for a pleasant and interesting EMC event, enjoyed by all attendees. **EMC**

# EMC Society Membership News

*By Bruce Crain,*
*EMC Society Membership Chair*


Photo by Janet O'Neil

*The EMC Society Membership booth was ably staffed in Montréal by volunteers (from left) Doris Cory, John Windell, and Florence Haislmaier.*

## IEEE Membership Booth

The EMC Society had a successful IEEE Membership Booth in the Exposition Hall of the 2001 Montréal EMC Symposium. As in previous years, Florence Haislmaier volunteered her time to staff the booth – thank you Flo! Also, thanks to John Windell who volunteered to assist in staffing the booth. We signed up 15 new IEEE members and added two current members to the ranks of the EMC Society. We also distributed IEEE membership literature as well as FREE symposia records from the last several years to anyone who had room in their suitcase to bring them home.

## EMC Society Senior Membership Initiative

In keeping with the goals of the IEEE to increase the number of Senior Members, the EMC Board of Directors has started an EMC Society Senior Membership Initiative. The EMC Society will nominate qualified candidates for IEEE Senior Membership. We are making it as easy as possible for a candidate by:

1. Submitting the candidate's application to the IEEE as the nominating Society (thereby serving as one of the three required references)
2. Assisting the candidate to find additional references, if needed
3. Coordinating with the candidate's references to fill out their paperwork

All the candidate has to do is fill out a simple "Word" application form and email it to Bruce Crain along with a resume; the EMC Society will take care of the rest.

If you think you may qualify for Senior Membership, please email Bruce at crainbr@mail.northgrum.com for detailed information and an application form.

### *Why should you become a Senior Member?*

- It rewards you with recognition to your company and profession
- It doesn't cost anything additional. In fact, new Senior Members receive a $25.00 Society membership discount voucher
- You will receive a handsome wood and bronze engraved plaque
- Your employer will receive a letter of commendation from IEEE Headquarters
- You will receive a mention in the EMC Society Newsletter

### *What are the requirements for Senior Membership?*

- Ten years in the profession (not 10 years of IEEE membership). You will receive three years professional experience credit for a bachelors degree,

*continued on page 52*

THE 2003 IEEE INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY (EMC)

Tel Aviv, Israel, May 11-16, 2003

*http://www.ortra.com/emc2003/*

# Call For Papers

**Dear Colleagues and Fellow EMC Engineers, Shalom from Israel,**

We are delighted to announce the 2003 IEEE International Symposium on EMC to be held in Tel-Aviv, Israel on May 11–16, 2003. Workshops, tutorials, "Birds of a Feather" panels and special invited sessions will be organized on stimulating topics. The Symposium will be accompanied by a technical exhibition.

## Paper Submission

Prospective authors are invited to submit, by **July 15, 2002** abstract and preliminary manuscripts in English, either electronically, via e-mail or by regular mail. The official language is English. For detailed instructions on paper submission please visit the Symposium's official web site at **http://www.ortra.com/emc2003.**

## Technical Exhibition

The Symposium will be accompanied by a technical exhibition on EMC. Prospective exhibitors are invited to order a Exhibitor's Kit from the Symposium Secretariat for exhibition space, constructed stands, showcases, mural display areas and advertisement space in conference publications. We expect exciting new product launches and exhibitor events during the Symposium. Do not miss this unique opportunity!

Tel-Aviv - one of Israel's largest cities, is a thriving vibrant metropolitan that never sleeps! Often nicknamed in Israel "The Non Stop City". As an exciting and cosmopolitan mix of leisure activities, Tel-Aviv offers something for everyone – to be fully enjoyed in the ideal Mediterranean climate. Outdoor cafes, ethnic restaurants and cultural centers will compete for your attention with historic sites, open oriental markets and of course the Mediterranean coast and its golden beaches.

The Symposium will take place in the David Intercontinental Hotel, featuring Israel's largest Convention Center and Banqueting facility and ideally situated on the seafront, opposite the buzzing beachfront promenade.

FOR FURTHER INFORMATION PLEASE CONTACT THE SYMPOSIUM SECRETARIAT:

**ORTRA Ltd.**

1 Nirim Street, P.O. Box 9352, 61092 Tel-Aviv, Israel

Tel: +972-3-6384444 Fax: +972-3-6384455 e-mail: emc2003@ortra.co.il

OR VISIT OUR WEB SITE AT:

Web site: http://www.ortra.com/emc2003

Association of Engineers and Architects in Israel (AEAI)

Institute of Electrical Engineers (IEE)

International Union of Radio Science (URSI) Commission E

# EMC Society Annual Awards

EMC Society President Joe Butler presented numerous awards at the Annual Awards Luncheon held during the 2001 IEEE International Symposium on EMC in Montréal, Canada. He is shown below with some of the award recipients. For a complete listing of the awards presented in Montréal, please turn the page!

*Fred Bauer, Richard R. Stoddard Award*

*Marco Klingler, Best Symposium Paper Award Recipient, and Jean-Jacques Laurin, Symposium Technical Papers Chair*

*Marcello D'Amore, Best Transactions Paper Award*

*Diethard Moehr, Germany, Chapter of the Year Award*

*Donald R. Bush and Keith Hardin, Certificate of Technical Achievement*

*David Staggs, Lawrence G. Cumming Award*

*Takeo Yoshino, Honorary Life Member Award*

*Randy J. Jost, Utah State University, University Grant Award Recipient, and John Howard, University Grant Committee Chair*

*Al Ruehli, Certificate of Technical Achievement*

All photos by Dick Ford

Nominations for EMCS Awards to be presented at the 2002 IEEE International Symposium on EMC in Minneapolis, Minnesota will be solicited in the Winter 2002 issue of this Newsletter. Start thinking now of worthy candidates for these prestigious awards. Contact EMCS Awards Chairman, Henry Benitez, at henry_benitez@hp.com for more information or visit the EMCS website at www.emcs.org to see the list of award categories, the criteria for awards, and past award recipients.

# 2001 EMC Society Awards

*IEEE International Symposium on Electromagnetic Compatibility*

## CERTIFICATE OF ACKNOWLEDGEMENT

**Donald R. Bush**
**Michael Hatfield**
**Doug Smith**
**Jack Meyer**
**Art Light**
**Clayton R. Paul**
**Tom Van Doren**
**Jim Drewniak**
**Norm Violette**
**Maqsood Mohd**
**Ahmad Fallah**
**Bob Nelson**
**Jose Perini**
For contributions to the Demonstrations Forum at EMC Symposia

**Dave Bernardin**
For contributions to the San Diego EMC 2001 Tutorial and Exhibition

### For Chairing EMC Symposia:

**Professor D.V. Puzankov**
- *Chairman EMC 2001*
St. Petersburg, Russia International Symposium on EMC and Electromagnetic Ecology
**Dr. Peter Leuthold**
- *Chairman EMC 2001 Zurich*
**Professor Johan Catrysse**
- *Chairman EMC 2000 Brugge*

**Dr. Karl-Heinz Gonschorek**
For contributions to the development of EMC immunity basic test standards

## CERTIFICATE OF RECOGNITION

**Sharon Hall**
For contributions to the creation of an "Awards" nominations web page.

## CERTIFICATE OF APPRECIATION

### For contributions on the Washington D.C. 2000 EMC Organizing Committee:

**Bill Duff**
- *Chairman*
**Ernest Freeman**
- *Vice Chairman*
**Julius Knapp**
- *Secretary*
**Dick Ford**
- *Treasurer*
**Lawrence Cohen**
- *Technical Program*
**Jose Perini**
- *Technical Papers*
**Art Light**
- *Technical Papers*
**Claire Wyatt**
- *Registration*
**Bridget Arredondo**
- *On-Site Registration*
**Penny Caran**
- *Exhibits*
**Theodore Harwood**
- *Publications*
**Art Wall**
- *Local Arrangements*
**Mike Violette**
- *Publicity*
**Sandi Duff**
- *Hospitality/Companion Events*
**Shelly Grandy**
- *Patrons*
**Jan Agee**
- *Administrative Assistant*

**Donald L. Sweeney and Ferdy Mayer**
For contributions as a member of the EMCS Board of Directors through 2000

**Dan Arnold**
- *Registration and Exhibits*
**David Britton**
- *Technical Program*
For contributions to the Oregon and SW Washington 2001 Colloquium on Product Compliance

**Michel Mardiguian**
**Elya Joffe**
**Mark Montrose**
For contributions as Distinguished Lecturers for the EMC Society

**Dr. A.A. Worshevsky**
For contribution to the organization, development and successful activity of the St. Petersburg Joint EMC/AES/PE Chapter

# AUGUST 16, 2001
*Palais des Congrès de Montréal*

## FELLOW AWARD

**Donald R. Pflug**
For contributions to the development and promotion of electromagnetic analysis code validation

**Daniel J. Kenneally**
For contributions to the development and practice of computer-aided modeling, simulation, and diagnostics of electromagnetic interference effects on integrated circuits and multichip modules.

## BEST SYMPOSIUM PAPER AWARD

"On the Use of Three-Dimensional TEM Cells for Total Radiated Power Measurements" by Marco Klingler, Stéphane Egot, Jean-Pierre Ghys and Jean Rioult, INRETS-LEOST, Villeneuve d'Ascq, France

## IEEE TRANSACTIONS ON EMC 2000 BEST PAPER AWARD

"Theoretical and Experimental Characterization of the EMP-Interaction with Composite-Metallic Enclosures" (May Issue) by Marcello D'Amore and Maria Sabrina Sarto from the University of Rome "La Sapienza"

## UNIVERSITY GRANT AWARD

Utah State University

## BEST STUDENT DESIGN AWARD

Richard Chairez, Gaurav Khalsa, and Cynthia Abundabar, ECE Department, California State University, Chico, California and Christos Kinezos, ECE Department, Florida Atlantic University, Boca Raton, Florida

## BEST STUDENT SYMPOSIUM PAPER AWARD

"On the Enhancement of Radiated Electric and Magnetic Fields Associated with Lightning Return Strokes to Tall Structures" by J.L. Bermudez*, F. Rachidi, W. Janischewskyj, A.M. Hussein, M. Rubinstein, C.A. Nucci, M. Paolone, V. Shostak, and J.S. Chang (*student author)

## CERTIFICATE OF TECHNICAL ACHIEVEMENT

**Keith Hardin**
For contributions to the development of spread spectrum clocking technology

**Donald R. Bush**
For contributions to the development of spread spectrum clocking technology

**Al Ruehli**
For lifetime contributions to the development of inductance concepts, circuit extraction methods, and the partial element equivalent circuit (PEEC) method that has lead to well-accepted approaches and CAD tools for PCB EMC design

## LAWRENCE G. CUMMING AWARD

**David Staggs**
For outstanding contributions to membership and chapter development of the IEEE EMC Society

## RICHARD R. STODDARD AWARD

**Fred Bauer**
For a career and private life dedicated to the unification of worldwide vehicular radio frequency interference standards and for numerous innovations in the field of electromagnetic compatibility. These achievements demonstrate an understanding of the art of technical diplomacy and a tenacity of purpose that is rare in this or any other age

## HONORARY LIFE MEMBER AWARD

**Takeo Yoshino**
For years of service to the electromagnetic community in both research and education

**Donald R. Bush**
For contributions to the EMC Society in promoting applied engineering

## CHAPTER OF THE YEAR AWARD

Germany

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*Palais des Congrès de Montréal*

**2001 AWARDS** LISTING

# Scenes from the 2001 IEEE International Symposium on EMC, Montréal, Canada, August 13–17

Photo by Shmuel

*Glen Watkins of ETS-Lindgren attended the Exhibitor's Breakfast in Montréal and addressed exhibitor concerns regarding commercialism at the Symposium. Listening from the dias are (from left) Janet O'Neil, EMC Society Exhibitor Liaison, Richard Duhamel with Tektronix Canada and the Montréal Symposium Committee member who handled exhibits, and Dev Sharma, Director of Sales - International Conferences for JPdL Destination Management.*

Photo by Janet O'Neil

*Several members of the Montréal Symposium Steering Committee attended the Awards Luncheon on the Thursday afternoon of the Symposium week, including (from left) Christian Forget of the Centre de Recherche Industrielle du Quebec who handled Registration, the legendary Stan Kubina who served as an Advisor (Stan has been active in the EMC Society for decades), and Benoît Nadeau of Matrox, Symposium Chairman.*

*Don Shepherd, President of Amplifier Research (AR), is shown at left congratulating Mark Nave of Network Appliance. Mark won the drawing held by AR for a grand entertainment system.*

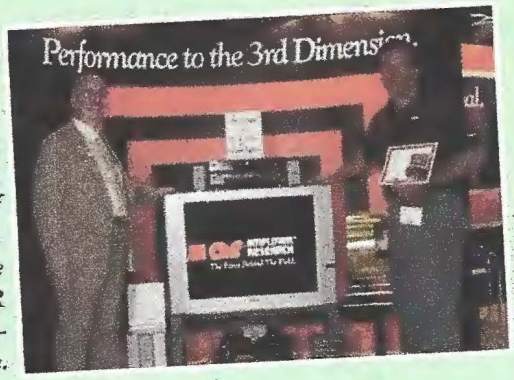



Photo by Dick Ford


Photo by Dick Ford

*Des Georgalos of Alliance Components and Bob Wersen of Panel Components Corporation were one of the many exhibitors that participated in the Montréal Symposium.*

Photo by Dick Ford

*It was a sell out crowd for the Wednesday evening gala during the Symposium week. The event was held at Windsor Station in downtown Montréal.*

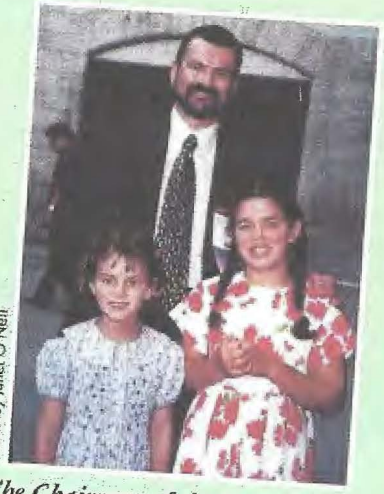


Photo by Janet O'Neil

*The Chairman of the Montréal Symposium Steering Committee kept two little secrets from us all: he has two beautiful daughters! Benoît Nadeau is shown at the Wednesday evening reception with his daughters Magali (left) and Dat[illegible]*

Photo by Philippe Bisaillon

*Entertainment provided by Acrobazia during the Wednesday evening gala was nothing short of spectacular. One could hear a pin drop during the difficult balancing acts performed by these two gentlemen.*

Photo by Philippe Bisaillon

*Chiffon performed high above the stage during the Wednesday evening gala. Her performance involved using only one very long white drape which she used to spin, drop, and curl herself into incredulous positions.*

Photo by Janet O'Neil

*Denise and Ken Hall traveled from Northern California to enjoy the city of Montréal. Ken joined several of his colleagues from various divisions of Hewlett Packard at the symposium.*

Photo by Philippe Bisaillon

*The entertainment included various performers on stilts during the reception preceding the Wednesday evening gala. Lise Thériault enjoyed a unique handshake with one tall fellow!*

Photo by Philippe Bisaillon

*The Palais des Congrès de Montréal was an excellent venue for the Symposium.*

Photo by Yaroslav Savenko

*Geneviéve Trudeau, Philippe Bisaillon, Richard Dubamel, Lise Thériault, and Christian Dubé (from left) enjoyed the Wednesday evening gala at Windsor Station.*

Photo by Janet O'Neil

*Bruce Butler and Garth D'Abreu of ETS-Lindgren enjoyed a kir royal at a cocktail party in Montréal (that's a French drink of champagne and cassis).*


Photo by Philippe Bisaillon

*An aerial view of the exhibit area within the Palais des Congrès de Montréal.*

Photo by Janet O'Neil

*NIST in Boulder, Colorado is celebrating their 100th year as a standards and technology institution. Contributing to the Institute's noted reputation for excellence are, from left, Chris Holloway, Perry Wilson, Dennis Friday (Chief of the Radio-Frequency Technology Division) and John Ladbury.*

Photo by Janet O'Neil

*Dave Staggs of Dell Computer and his wife Barbara were quite the elegant couple at the dB Society party. Dave is Vice-President of the dB Society.*

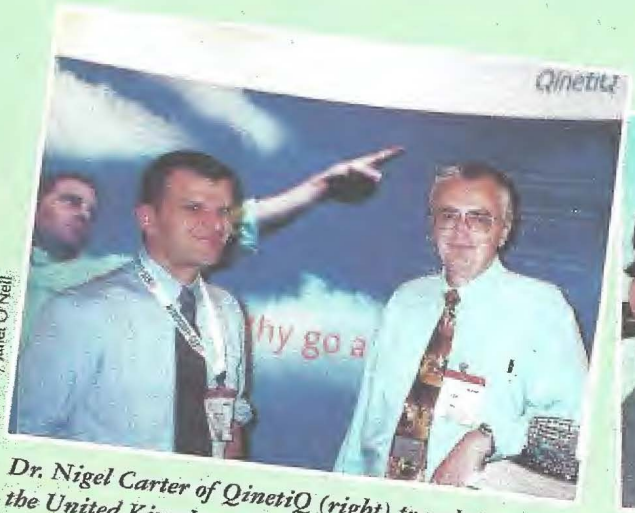



Photo by Janet O'Neil

*Dr. Nigel Carter of QinetiQ (right) traveled from the United Kingdom to staff his company's booth during the Montréal Symposium. Graeme Eastwood assisted him with his duties.*

Photo by Janet O'Neil

*Jerry Meyerhoff and John Koklys of Motorola and Chuck Blahunka of Hitachi, (from left) share an interest in automotive EMC and actually managed to "talk-shop" before the Symposium week got into full swing.*

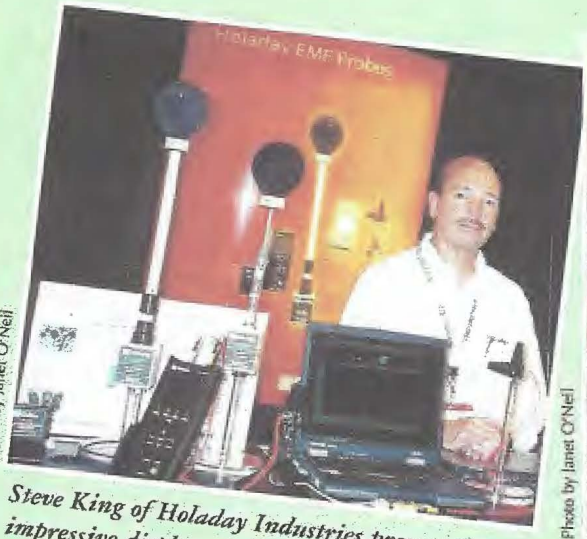



Photo by Janet O'Neil

*Steve King of Holaday Industries presented an impressive display of probes as a Montréal Symposium exhibitor.*


Photo by Janet O'Neil

*Tom Schneider of Retlif Testing Laboratories enjoyed the steady booth traffic during the Montréal Symposium.*

Photo by Janet O'Neil

*Not everyone in Montréal was serenaded during dinner with some wonderful French music. Art Wall of the FCC and his wife Hanna thoroughly enjoyed the strains of "Alouette." Nice shirt Art!*

*There was a lively atmosphere at the Wednesday evening gala in Montréal and these folks were especially ready to enjoy the festivities. From left, that's Cecille Fiachetti, John Hansen, Kemal Aygun, Tom Martin, and Clayton "Bo Diddley" Paul.*


Photo by Janet O'Neil

*Underwriters Laboratories Inc. sent their best and brightest to the Montréal Symposium, including (from left) Dwaine Chrustie, Dan Arnold, and Susan Roth.*


Photo by Janet O'Neil

*Aprel Laboratories did not have to go far to exhibit at this year's EMC Symposium in Montréal. They are based in Ontario, Canada.*

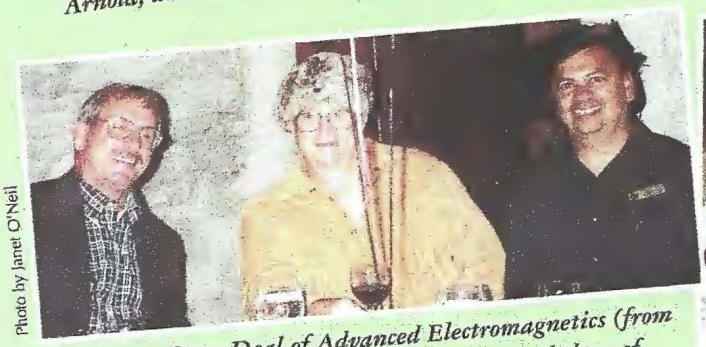


Photo by Janet O'Neil

*Hats off to Peter Deal of Advanced Electromagnetics (from left) who had no suitable head covering to rival those of his colleagues Bob Dockey and Henry Benitez, both of Hewlett Packard. Bob particularly got into the spirit of things and dressed as Samuel de Champlain, the founder of Quebec, at the dB Society costume party held during the Symposium week.*

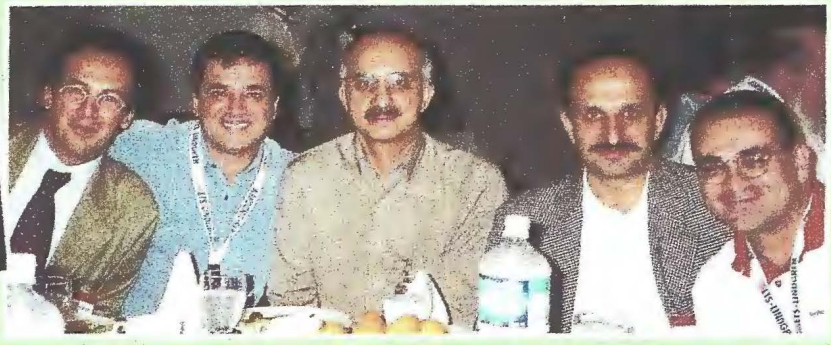


Photo by Janet O'Neil

*The Awards Luncheon provided a unique opportunity for friends to meet after a long absence, such as, (from left), Dr. Farhad Rachidi of the Swiss Federal Institute of Technology, in Lausanne, Switzerland, Moody Khandani of The Boeing Company in Wichita, Kansas, Dr. Hesam Sadeghi and Dr. Roozbeh Moini, both of the Amirkabir University of Technology in Tehran, Iran, and Ali Elmi of Xerox Corporation in Wilsonville, Oregon. It is interesting to note that these gentlemen are all originally from Iran, but now live and work in the EMC industry in various parts of the world.*

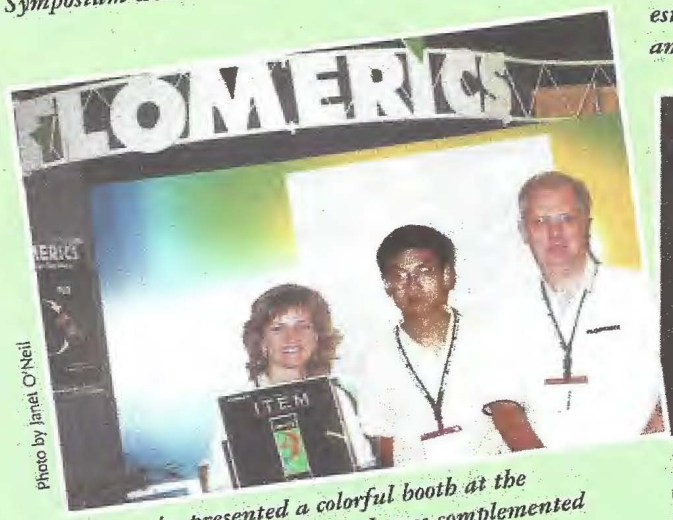



Photo by Janet O'Neil

*Flomerics presented a colorful booth at the Montréal Symposium which was complemented by the sunny personalities of (from left) Christina Patrick, Jin Liu, and Chris Aldham.*

Photo by Janet O'Neil

*The New England area had a strong showing in Montréal, including (from left), Michael Anderson of Cisco Systems, Kevin Baldwin of ETS-Lindgren, Ben Perreault of Cisco Systems, Steve Burgess of Integrity Design and Test, Rob Goyette of Cisco Systems, and Lyle Cookson of Datascope.*

# 2001 MONTRÉAL EMC SYMPOSIUM DEMONSTRATIONS AND A "CALL FOR EXPERIMENTS" FOR THE 2002 MINNEAPOLIS EMC SYMPOSIUM

*By Andy Drozd,*
*Vice Chair, EMC Society Education and Student Activities Committee*

## The Big Picture

The winning formula for this year's experiment demonstrations session in Montréal was one part diversity of topics, one part first-rate presentations, and one part super location. Our thanks to **Benoît Nadeau** of **Matrox** and the Montréal Symposium steering committee for arranging an ideal venue within the main Exhibit area of the Palais des Congrès de Montréal and for providing all the logistical support on behalf of the demonstrations. Complementing the hardware experiments for the first time this year was a suite of interactive computer modeling and simulation demonstrations conducted over the three main days of the Symposium. We adapted the tried and true format used for the experiments to launch this new special session aimed at demonstrating computational electromagnetics (CEM) problem solving methods for EMC. The EMC Society Education and Student Activities Committee sponsored both events, held in parallel.

Photo by Janet O'Neil

*New to the Demonstrations format this year were computer modeling and simulation demonstrations covering a range of subassembly to large, complex system-level EMC concerns. Colin Brench (seated) of Compaq Computer Corporation provided a demonstration entitled "Gaining an Insight into Complex Coupling Phenomena Through the Use of Modeling" for Paul Cook of Alpha EMC Inc.*

We are approaching our 10th year of conducting the experiment demonstrations. The experiments helped raise awareness of engineers to the importance of implementing good EMC design and measurement practices and provided keen insights into electromagnetic phenomena and effects. We expect the modeling and simulation demonstrations to achieve the same results.

Photo by Janet O'Neil

*Mike Slocum (left) of the Naval Surface Warfare Center in Dahlgren, Virginia is all smiles on the third and final day of the demonstrations held during the EMC Symposium in Montréal. Dan Merriam of Eastman Kodak (right) appreciated Mike's enthusiasm for the innovative mode stirred chamber he was demonstrating.*

This year we had a group of new presenters and demonstrations covering a broad range of topics related to the measurement of cable crosstalk and interference, noise suppression techniques on PCBs, enclosure shielding, lightning and transient effects, and power bus noise. This year's agenda consisted of 23 experiments. Some were partially based on the EMC Society Education Committee's EMC *Experiments and Demonstrations Manual, Volume 1* originally compiled and reviewed by Clayton Paul and Henry Ott (a PDF version of this document can be downloaded from the IEEE EMC Society Web Site at www.emcs.org). Contributions this year included:

*Parasitic Effects in Circuit Elements and the Effect on Signal Spectra* by Clayton Paul of Mercer University's School of Engineering, Macon, GA

*Canned Shielding* by James Muccioli of X2Y Attenuators, LLC, Farmington Hills, MI

*Shielding Effectiveness Compromised* by Bill Duff of the Sentel Corporation, Alexandria, VA

*Surge and Lightning Suppression Fundamentals* by Norman Violette of Violette Engineering Corporation, McLean, VA and Mike Violette of Washington Laboratories, Gaithersburg, MD

*Reducing ESD Effects on a Timing Circuit* by Ahmad Fallah of CIENA CSD, Cupertino, CA (experiment originally developed under the supervision of Dr. Robert Nelson from North Dakota State University)

*Reactive Terminations on Transmission Lines and Developing Lumped Element Models for Parasitics Using Time Domain Reflectometry* by Xiaoining Ye of the University of Missouri, Rolla, MO and the Intel Enterprise Architecture Labs (EAL), Hillsboro, OR

*Circuit and Transmission Line Characterization and Signal Integrity Issues for Traces within PCBs* by Mark Montrose of Montrose Compliance Services, Inc., Santa Clara, CA

*Static to Dynamic Field Converter* by Doug Smith of DC Smith Consultants, Los Gatos, CA

Photo by Janet O'Neil

***Greg Brox of Enterasys Networks, Bob Martin of Intertek Testing Services, and Len Carlson of NW Emetek Services (L-R) are shown in the demonstrations area. Bob provided a demonstration entitled "Methods of Doing ESD and Conducted Immunity Tests."***

*EMI Prediction of Rectangular and Trapezoidal Pulse Signals* by John Flinn of Lockheed Martin Systems Integration, Owego, NY

*Electromagnetic Leakage Through Seams* by Ron Brewer of Laird Technologies, Delaware Water Gap, PA

*Non Ideal Behavior of Capacitors* by Elya Joffe of KTM Project Engineering, Ltd., KFAR Sava, Israel

*How Parasitic Effects in Inductors and Capacitors Affect Electrical Equipment* by James J. Whalen, Department of Electrical Engineering, University of New York at Buffalo, Buffalo, NY

*Electromagnetic Field Containment Using the Principle of Self Shielding* by Thomas Van Doren

*Lightning Effects* by Fred Heather of the Naval Air Warfare Center, Patuxent River, MD

*Product Safety and the Use of EMC Techniques to Evaluate the 30-Amp Ground Continuity Test* by Richard Georgerian of Carrier Access Corporation, Boulder, CO and Ron Duffy of Agilent Technologies, Inc., Colorado Springs, CO

*Methods of Doing ESD and Conducted Immunity Tests* by Robert Martin of Intertek Testing Services NA, Inc., Boxborough, MA

*An Innovative Mode Stirred Chamber* by Mike Hatfield of the Naval Surface Warfare Center, Dahlgren, VA

*Immunity Testing of Electronic Systems Using an Impulse Noise Source and the Effects of Electrostatic Discharge on Electronic Systems* by Fumihiko Mitani, Masaharu Tsukada and Goh Furukawa of Noise Laboratory Co. Ltd., Kawasaki, Kanagawa City, Japan

*Fundamentals of Noise Coupling in Cables* by Lee Hill of Silent Solutions LLC, Amherst, NH

*PCB Power Bus Behavior* by Randall Vaughn of Silent Solutions LLC, Amherst, NH

*Effects of Component Lead Lengths and Grounding Aspects in Filter Designs* by Greg Snyder of Washington Laboratories, Ltd, Gaithersburg, MD

*The Grounded Franklin Rod: How it Does and How it Does Not Work* by Richard Briet of LT-MP Applications, Cypress, CA.

These experiments concentrated on issues pertaining to printed circuit boards, equipment, and subassembly EMC by implementing good design practices and effectively measuring radiated and conducted electromagnetic emission/immunity characteristics.

Additionally, we had demonstrations given on site by the winners of the Student Design Competition, also sponsored by the Education and Student Activities Committee. The 2001 winners were Richard Chairez, Gaurav Khalsa, and Cynthia Abundabar of the ECE Department at California State University, Chico, CA and Christos Kinezos of the ECE Department at Florida Atlantic University, Boca Raton, FL. The objective of the competition was to develop the best solution to a standardized broadband EMI problem using a design kit while maintaining the capability to perform required electronic functions for the 100 kHz to 100 MHz frequency range.

Whereas the experiment demonstrations mainly addressed important sub-unit level issues, the computer modeling and simulation demos covered a range of subassembly to large, complex system-level EMC concerns. The computer demonstrations are meant to illustrate the application of practical EMC modeling approaches and simulation techniques to simple canonical-type problems to show how EMC problems are analytically solved. These include the application of discrete analytical models as well as rigorous numerical techniques based on the moment method (MoM), uniform theory of diffraction (UTD) and variations on the asymptotic ray tracing method, finite difference time-domain (FDTD), finite element modeling (FEM), transmission line (TL) theory, and other approaches.

The computer demonstrations were conducted using general-purpose university codes and several commercial programs. The presenters were permitted their choice of computer codes, tools, or techniques for the demos. (Note: the IEEE EMC Society does not endorse the use of any particular software code, tool, or technique used in the demonstrations, and commercial presentations or endorsements of any type were strongly discouraged.) The emphasis was on demonstrating the efficacy of analytical, computer-based problem solving methodologies.

The premiere agenda of modeling and simulation demos included:

*Shielding Effectiveness Simulation Using the FDTD Method* by Bruce Archambeault of IBM, Research Triangle Park, NC

*Modeling the Shielding Effectiveness of Metallic Enclosures With Slots Using Integral Equation Techniques* by Ulrich Jakobus of Electromagnetic Software & Systems (EMSS), Stellenbosch, South Africa

*Understanding the Physics of Radiation Through Apertures, Gaskets and Joints* by Omar M. Ramahi of University of Maryland, Department of Mechanical and

Electrical Engineering, College Park, MD

*Large Complex System Analysis from Static to Microwave Frequencies by Using MLFMA* by Weng Chew, Jun-Sheng Zhao (Presenter), T. J. Cui, J. M. Song, H. Y. Chao and Y. C. Pan of the Center for Computational Electromagnetics, Electromagnetics Laboratory, Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign, Urbana, IL

*System-Level EMC Analysis* by David Johns of Flomerics, Ltd., Southborough, MA

*System-Level EMC Antenna Coupling Analysis for Large, Complex Structure Topologies Using A Multi-Fidelity Modeling and Simulation Method* by Andy Drozd and Irina Kasperovich of ANDRO Computational Solutions, Rome, NY

*Modeling of Simultaneous Switching Noise in High Speed Systems* by Sungjun Chun and Madhavan Swaminathan of Georgia Institute of Technology, Atlanta, GA

*Simulation of Heat Plate Radiation Using the Method of Moments (MoM)* by Toshihiko Matsuura of Fujitsu Ltd., Chiba, Japan

*Power Bus Resonance and Associated EMI Simulations for PCBs* by Z. L. Wang, O. Wada, A. Namba, T. Watanabe, Y. Toyota and R. Koga of the Communication Network Department, Okayama University, Japan

*EMC Simulation Techniques for Printed Circuit Boards* by Al Wexler, President of Quantic EMC Inc., Winnipeg, Manitoba, Canada

*Simulations to Aid Hospitals in Evaluating Wireless EMC Interaction Risks* by Glenn Kuriger of the Wireless EMC Center, University of Oklahoma, Norman, OK

*Demonstration of Power and Ground Voltage Fluctuations and Effects of Decoupling Capacitors on PCBs* by Jiayuan Fang of Sigrity, Inc., Santa Clara, CA

*FDTD Modeling of DC Power-Bus with Dispersive Media and SMT Components* by Xiaoning Ye, Intel Enterprise Architecture Labs (EAL), Hillsboro, OR

*Real-Time Calculation and Plotting of 2-D or 3-D Theoretical NSA Calculations* by Manny Barron of Tandem EMC Laboratory, Compaq Computer Corporation, Cupertino, CA

*Emitter Threat Analysis and Reporting* by Fred Heather of the Naval Air Warfare Center Aircraft Division, Patuxent River, MD

*FEM Analysis of Printed Circuit Board Signal Coupling* by John Howard, EMC Consultant, Sunnyvale, CA

*Demonstrating the Necessity of Model Validation for Electromagnetic Codes* by Maqsood Mohd of Sverdrup Technology, Eglin AFB, FL

*Printed Circuit Board Edge Effects* by Franz Gisin of the EMC/Signal Integrity Department, Sanmina Corporation, San Jose, CA and Zorica Pantic-Tanner of the School of Engineering, San Francisco State University, San Francisco, CA

*Simple Visualization of Fields in Radiated Test Sites* by David Mawdsley of Laplace Instruments, Ltd. North Walsham, Norfolk, UK

*Characterization and Optimization of 3D-TEM Cells* by Jean Rioult and Marco Klingler of INRETS-LEOST – France, Branko Kolundzija of the University of Belgrade, Yugoslavia and Tapan Sarkar of Syracuse University, Syracuse, NY

*Simulation of EMC Chambers Behavior at Low Frequency* by José Basterrechea Verdeja of the Dpto. Ingeniería de Comunicaciones, Universidad de Cantabria

*Gaining an Insight into Complex Coupling Phenomena Through the Use of Modeling* by Colin Brench of Compaq Computer Corporation, Marlborough, MA

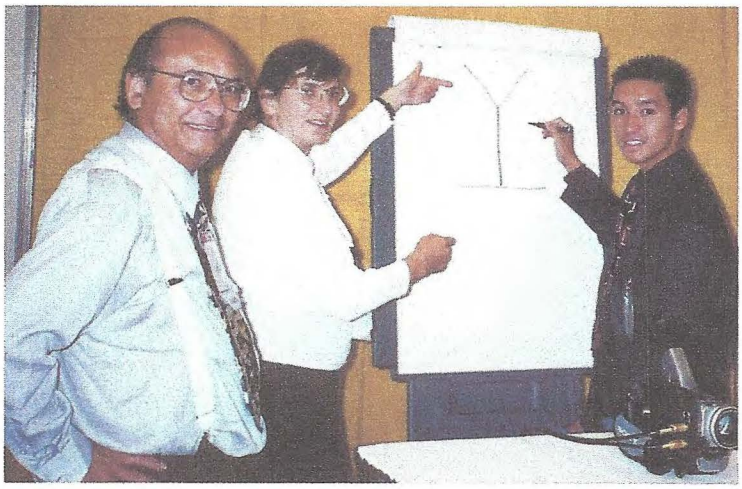


Photo by Janet O'Neil

***Marina Koledintseva (center), a visiting Associate Professor with the University of Missouri-Rolla, got a hands-on demonstration tutorial from the father and son team of Richard (left) and Pierre Briet (right). Richard, of LT-MP Applications, presented "The Grounded Franklin Rod: How it Does and How it Does Not Work."***

*DC Power Bus Modeling with CEMPIE, a (Cp, L, MLD) PEEC Method* by Jun Fan of NCR, San Diego, CA.

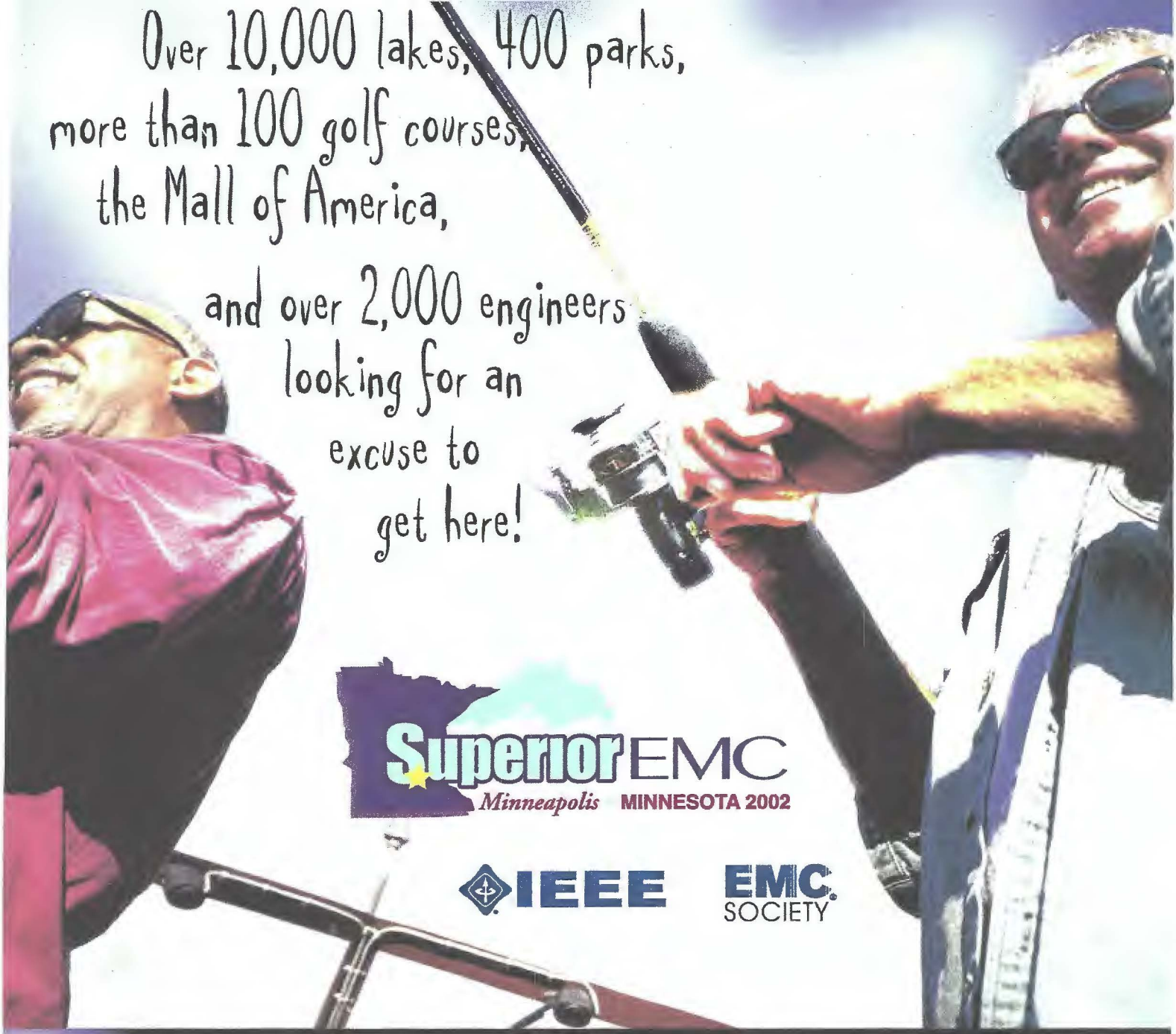
Once again, our thanks go out to each of the presenters for their skilled tutorials and for contributing to the overall success of the demonstrations.

## Acknowledgements

We are indebted to the behind the scenes supporters who helped coordinate and make the detailed arrangements for this year's experiment demonstrations. Included are **Larry Cohen** of **NRL**, **Greg Snyder** and **Mike Violette** of **Washington Laboratories**, and **Howie Mende** of the **Defence Research Establishment Ottawa** who in team fashion helped to schedule the experiments and acquire or supply the various test stands and other hardware. We are also very grateful to **Tektronix**, **Rohde & Schwarz**, **Advantest**, **Agilent/Hewlett-Packard**, **KeyTek**, and **Schaffner** for providing the oscilloscopes, spectrum and network analyzers, EMI receivers, signal and function generators, meters and probes, and other hardware for the demonstrations. I say it every year, but it's a fact that we cannot have a successful event without the cooperation of these organizations. We appreciate it folks!

## Call for Experiments

We have already begun planning for the 2002 IEEE International Symposium on EMC in Minneapolis. We are in the process of soliciting a *Call for Experiments* in an attempt to identify novel ideas. If you have ideas for an experiment and want to have it considered, please visit the EMC Society home page at *www.emcs.org* and follow the *Call for Experiments* link. Our goal is to establish a preliminary agenda of experiments by December 2001. Although not a requirement, we are interested in scheduling experiment demonstrations that may have a modeling and simulation or technical paper session counterpart. **EMC**

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**2002** IEEE INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

# Board of Directors Activities

**Montréal, Canada**
**Sunday, August 12, 2001**

## THE PRESIDENT'S OPENING REMARKS

President Butler called the meeting to order at 9:00 am. A round of introductions was made. Board members present included H. Benitez, D. Bush, J. Butler, L. Carlson, T. Chesworth, L. Cohen, B. Crain, A. Drozd, R. Ford, F. Heather, D. Heirman, D. Hoolihan, T. Hubing, E. Joffe, W. Kesselman, M. Montrose, J. Muccioli, J. O'Neil, H. Ott, J. Perini, A. Podgorski, C. Sartori, D. Smith, K. Williams, and T. Yoshino. Board members absent included D. Millard and G. Pettit. Guests present included B. Nadeau, K. Gonschorek, M. D'Amore, R. Goldblum, D. McLemore, M. Mohd, W. Gjertson, B. Wallen, and V. Arifles. President Butler welcomed all Board members and guests present. The agenda was then distributed. The agenda was approved as presented.

## TREASURER'S REPORT

Treasurer Warren Kesselman presented his report. The Society remains financially sound with a net worth of $1,220,830. Regarding year 2001 operations, as of June 30, 2001, the EMC Society 2001 overall operations were approximately on budget with a forecast of a net surplus of about $40,000. However, IEEE's 2001 year end corporate infrastructure charge will no doubt impact the 2001 net. An estimate of the EMC Society infrastructure share might be in the order of $315,000. If this were the case, then the EMC Society would have a 2001 deficit of $275,000. Mr. Kesselman reviewed some of the actions the IEEE will take to revitalize their financial health. The Board approved the Treasurer's report.

## SECRETARY'S REPORT

Secretary Janet O'Neil presented the minutes from the Board meeting on June 15, 2001. No changes were required. The Board approved the minutes as presented.

## STANDARDS SERVICES

Don Heirman, Vice-President of Standards, presented his report. It was noted that the webpage (http://www.standards.ieee.org) for EMC Standards is now operational. Standards activity covers three major areas: The Standards Education and Training Committee (SETCom) chaired by Hugh Denny, the Standards Advisory and Coordination Committee (SACCom) chaired by Elya Joffe and the Standards Development Committee (SDCom) chaired by Steve Berger. Mr. Heirman briefly reviewed the activities and goals of the Standards committees. The focus of this year's meetings will be on the currently active efforts to develop new standards and to revise/reaffirm existing ones. There are currently eight active working groups, which include three on the development of new standards. All standards are currently active. They will also explore an opportunity to provide coordination on the proposed Federal Election Committee voting equipment standard. The committee has contributed articles to the EMCS Newsletter on various EMC standards. Regarding SETCom, they will hold a workshop on "Processes and Procedures for the Development of EMC Standards" at the Montréal Symposium. Included will be a presentation by the IEEE Standards Office on the electronic balloting process for standards. Elya Joffe, the SACCom chairman, invited all Board members to attend the annual RAC/SACCom luncheon that will be held at the Montréal Symposium. All members of the Representative Advisory Committee will be present to provide brief reports on their respective activities.

## COMMUNICATION SERVICES

Len Carlson, Vice-President for Communication Services, presented his report. He introduced Professor Marcello D'Amore, Transactions Editor-in-Chief, who then gave his report. He reviewed his activities of the past year and plans for next year. They have two special issues planned for publication in 2001/2002; one will be a special issue on printed circuit boards (PCBs), the other will be a special issue dedicated to the late Transactions editor, Moto Kanda. The special issue on PCBs will be published in November 2001 with Flavio Canaverio as guest editor. The special issue in honor of Moto Kanda will be published in February 2002 with guest editors being Chris Holloway and Perry Wilson. He has organized a special session to be held during the Montréal symposium which addresses the Transactions on EMC. All Board members were invited to attend this session. His report provided topic statistics of the papers included in the 1998 issues of the Transactions on EMC. Statistics included 0% of papers on numerical techniques to 21% of the papers on EMP, lightning, ESD and HIRF and 21% on antennas and propagation. In 2000, the

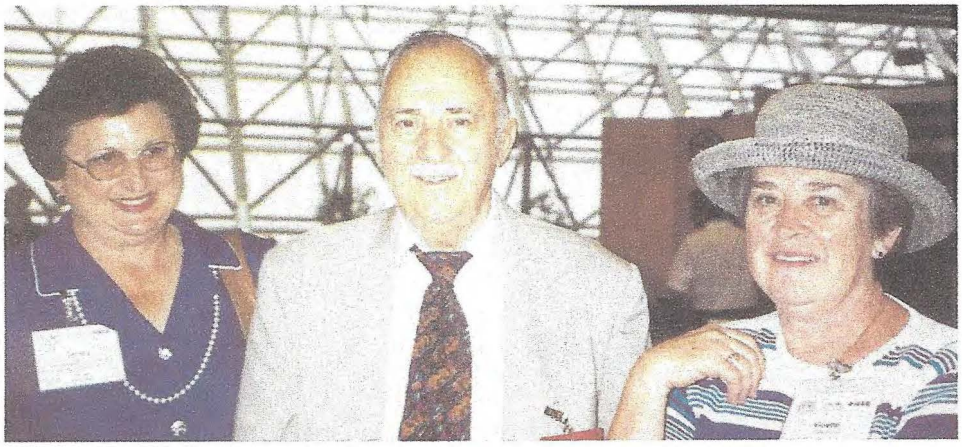


Photo by Janet O'Neil

*Past member of the EMC Society Board of Directors, Norm Violette of Violette Engineering Corporation, visited the exhibit area in Montréal with his wife Bette (right) and Joanne Dorsey of Washington Laboratories.*

topics ranged from spectrum utilization at 0% to shielding and filters at 17%. Numerical techniques amounted to 7% in 2000. His report also discussed the review process time of the papers submitted to the Transactions. A breakdown was provided of the papers published over the years 1998 to 2000 from the various IEEE Regions. The impact factor of the Transactions on EMC was discussed. Flavio Canaverio, the managing editor of the Transactions on EMC, is evaluating the electronic handling of Transactions papers using the IEEE Manuscript Central procedures. The "TEMC Manuscript Central" site www.temc.manuscriptcentral.com will be activated by the end of September 2001. Regarding the EMC Society Newsletter, Editor Janet O'Neil verbally reported that the current issue (Summer 2001) is 48 pages. Three practical papers were included in the issue as well as several letters to the Newsletter. There will be a special session at the Montréal symposium on the Transactions and the Newsletter. Papers will be solicited for the Practical Papers section of the Newsletter. Advertising for the Newsletter in 2002 will be solicited during the symposium by Susan Schneiderman of IEEE Media who will be walking the exhibit floor. She will also solicit advertising at the exhibitor's breakfast. A meeting will be held with Ms. Schneiderman, Len Carlson and Andy Drozd during the symposium week to coordinate advertising promotions on the EMCS website and in the Newsletter. Mark Montrose next presented his report as IEEE press liaison. There has been little activity at the IEEE Press since the last Board meeting, except for the acquisition of new authors and editing of texts in the pre-production cycle. Links have been established to refer customers from the IEEE's Online Store and Catalog and Wiley's online catalogue, where IEEE Press titles are now displayed. All books currently sponsored by EMC have been included. Proposed books for EMCS sponsorship include "Electromagnetic Anechoic Chambers" by Leland Hemming which has an expected release date of June to August, 2002. Andy Drozd presented his report as the Society Webmaster. He advised that the committee was formed in late 1999 to maintain the EMCS website and coordinate activities among the various EMCS technical and administrative committees. A web counter was uploaded and checked by Doug Smith. There have been some 3,700 hits since the counter was installed in June. The committee is reviewing different proposals from graphic designers to create a new look for the site. There are no new advertisers for the website. Lastly, Tom Chesworth advised that he had no news to report on the activities of his Public Relations committee since the last Board meeting in June.

Photo by Janet O'Neil

*During the Board of Directors meeting in Montréal, Treasurer Warren Kesselman (standing) presented a financial report on the EMC Society. Attending the Board meeting were (from left) Jim Muccioli of Jastech EMC Consulting, Ray Adams of Boeing Satellite Systems who is Chair of the Los Angeles EMC Chapter, and Board member Bruce Crain of Northrop Grumman.*

## MEMBER SERVICES REPORT

Andy Drozd, Vice-President for Membership Services, presented his report. Currently there are 4,907 active members of the EMC Society, a slight decrease from 2000. He introduced Bruce Crain who will be in charge of setting up the membership booth at the EMCS annual symposia. Mr. Crain advised that the Society would have two booths at the Montréal EMC Symposium. He acknowledged the efforts of the local symposium committee in helping to set up and organize the booth. They will offer free memberships in the EMC Society to all who sign up for IEEE membership at the symposium. Regarding senior members, it was suggested that authors who are presenting papers at the symposium could be candidates for senior membership. Mr. Crain has complete information for signing up for senior members so he encouraged Board members to give him e-mail addresses for potential senior members. The EMCS is at 7.14% of its goal for the number of senior members. Andy Drozd then reported for Lee Hill, chair of the DL program. The three new DLs for 2001-2003 were introduced in the last issue of the Newsletter. Applications for new DL candidates have been solicited and were sent out as requested. Henry Benitez reported on Awards. It was voted not to present a President's Memorial Award this year. The awards will be presented as a two-part event at the Montréal symposium. Some of the awards will be presented on Tuesday night at 5:30 pm prior to the welcome reception. During the awards luncheon on Thursday, a video will be shown of the awards presented on Tuesday evening. All people who will receive awards have been so notified so it is expected they will attend the awards events. His report included a complete listing of the awards to be presented as well as the notification letter award recipients have received. Mr. Drozd then reviewed Ghery Pettit's report on Chapter Activities. This includes a spreadsheet listing the activity status of each international chapter. The Chicago, Pikes Peak, and Washington (Northern Virginia) chapters are in the verge of being dissolved by RAB in November due to three consecutive years of inactivity and lack of reporting. He noted that the German chapter would receive the best chapter award this year. No chapter was eligible for the Most Improved Chapter award this year. Andy Drozd will chair the Chapter Chairman's Luncheon this year in the absence of Ghery Pettit. Elya Joffe presented the Region 8 report. EMCS membership material was distributed at the St. Petersburg, Russia, International Symposium on EMC June 19-22, 2001. The EMCS was a technical co-sponsor of this symposium. The Society will also be a technical co-sponsor of the EMC Europe 2002 conference in Sorrento, Italy and the International Conference on Electromagnetics in

Advanced Applications (ICEAA-01) in Torino, Italy. Regarding the conference in Russia, he noted that there is a strong language gap in Russia and all of the technical sessions had simultaneous translators. It appears that new membership in this country is also limited not just by the cost of joining, but also the limited benefit of all English publications such as the Newsletter and the Transactions on EMC. Jose Perini presented his report on Region 9. He advised that these are extremely difficult times financially in Argentina so he is focusing his outreach efforts in Brazil where EMC activity is at an all time high. He plans to visit Rio de Janeiro to give several EMC presentations over two weeks to various groups. Carlos Sartori advised that there is a group who will hold an EMC conference in November 2002 in Brazil. They expect some 300 people. The Board discussed holding its November meeting in Brazil in conjunction with this conference. Takeo Yoshino then reported on EMC activity in Region 10. He noted that there is a low level of EMC activity in Thailand, but this may change soon as there is an EMC conference planned for July 25-26, 2002 in Thailand. There will also be an AP/EMC/EMT joint conference in Korea on September 10, 2001. Over 400 people are expected. Dan Hoolihan, the Nominations and Bylaws Committee Chair, advised that the ballot for new Board members for 2002-2004 would be mailed to EMCS members in mid August. There are 11 candidates on the ballot. Ballots are due back at IEEE by October 1. Official results will be announced shortly thereafter. There are no changes required to the by-laws. Regarding the Fellows Search Committee, Mr. Drozd reported for Bill Duff that six Fellow nominations were received this year. They expect two to three candidates from this nominations list will receive the Fellow award next year. Mr. Drozd advised that there was no report submitted by the PACE chair, Bill McGinnis. Dick Ford next discussed the annual symposium survey. This will be distributed during the symposium and IEEE EMC Society mugs will be given to those who return the survey. There has been no activity on the formal IEEE EMC Society survey since the last Board meeting in June. He solicited volunteers from the Board to help him review this survey data with the goal to nurture new members and make them more active participants in the EMC Society. Regarding his work as the EMC Society photographer, Mr. Ford will take photos in the exhibit area and during the awards events. Video will also be taken during the awards events. The video of Doug Smith performing an experiment will be shown during the break. This video will also be shown in the membership booth during the symposium.

Photo by Janet O'Neil

*Immediate past President of the EMC Society, Dan Hoolihan of Hoolihan EMC Consulting and Benoît Nadeau of Matrox (L-R), toast to their shared commitment to the EMC Society's annual symposia. Mr. Hoolihan is Chairman of the 2002 EMC symposium while Mr. Nadeau was Chairman of the 2001 EMC symposium.*

## TECHNICAL SERVICES

Kimball Williams, Vice President for Technical Services, presented his report. The Technical Committees are attempting to pursue meetings on line. The formation of a new TC-10 on Signal Integrity is underway. The Product Safety Committee (TC-8) continues its evolution into its own IEEE Society. Andy Drozd and David Southworth are working to encourage more use of our web pages to communicate within the elements of EMCS. The symposia electronic paper review system is moving towards a cooperative implementation in conjunction with TC9, and the Antennas and Propagation and the Microwave Theory and Techniques Societies. Mark Montrose reported on his efforts to promote TC-8 (Electromagnetic Product Safety) and TC-10 (Signal Integrity and Microelectronics Technology). He will provide a thorough report on the activities of these committees during the symposium at the Thursday evening Board meeting. Maqsood Mohd next presented his report as Chairman of the Education Committee. He introduced Virgilio Arafiles who reported on Student Activities. The student paper contest was a big success this year. They received 22 papers this year versus 13 last year. They sent out 37 kits for the student design competition, however, only three were returned for the competition. Regarding the NARTE subcommittee, they are working closely with NATRE to review all their EMC examination questions. They have set up a committee to formally review these questions. Regarding the Experiments subcommittee, they have scheduled a record number of 25 experiments for the Montréal Symposium, including 23 software demos which are being included for the first time under the heading "Modeling and Simulation." The University Grant subcommittee has expanded their outreach efforts to include non-US universities. The Tutorials subcommittee will continue providing tutorials at the symposium with speakers who are leaders in their respective fields. Mr. Williams reported for RAC Chair Dave Case. They have organized their traditional RAC/SACCom luncheon at the Montréal EMC Symposium. The RAC report includes a budget review and cost reduction efforts. RAC is hosting a special session on "Wireless" at the Montréal EMC Symposium. Lastly, Mark Montrose reported that he would attend the Nano Technology symposium in Maui, Hawaii. There will be a meeting of the Intelligent Transportation Systems Council which Mark Montrose will also attend as a representative of the EMC Society.

## CONFERENCE SERVICES

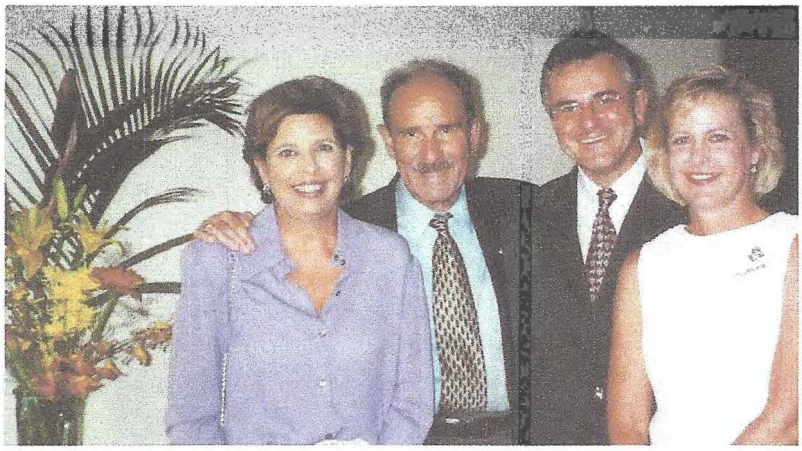
Henry Ott, Vice President for Conference Services, presented his report. Mr. Ott then called upon Barry Wallen, Chair of the International Symposia Committee. Mr. Wallen reported on the various upcoming symposia as follows:

2000 Washington DC: The audit should be completed by the IEEE in August. The projected surplus is expected to be approximately $189,000; 2001 Montréal: The committee expects to meet the attendance levels of the Seattle symposium, and 80% of the attendance at the Washington DC symposium. 251 booths have been sold, 14 table top display tables have been reserved. They expect to meet their 20% surplus projection; 2002 Minneapolis: There will be a booth for this symposium in the exhibit area. The symposium website address is www.2002-ieee-emc.org. The committee will undertake considerable marketing efforts to promote the symposium early on. The committee is requesting a greater advance to fund their aggressive marketing approach. The Board approved sending a $30,000 advance to the 2002 IEEE Symposium on EMC in Minneapolis steering committee. Mr. Ott noted that this would be an addition to the $10,000 advance already received by the committee, for a total advance of $40,000; 2003 Boston: Jon Curtis of Curtis-Strauss is the new chairman for the 2003 Boston Symposium Steering Committee. They have contracted with IEEE Conference Management Services to run this symposium. All of the hotels are within walking distance of the Heinz Auditorium where the symposium will be held; 2005 Chicago: There are communication problems with the steering committee and these will be resolved before the next Board meeting; 2006 Location to be Determined: Mr. Ott reported that the location for the Symposium in 2006 has not been determined to date. He introduced Karl Gonschorek of the German EMC Chapter who gave a presentation on their proposal to host the EMC symposium in 2006 in the city of Dresden. 2006 marks the 800th anniversary of the city of Dresden. It is visited by large amounts of tourists every year, it has many large hotels and a large convention center. A copy of a letter from the German Chapter Chairman, Heyno Garbe, was circulated. This formally renews their invitation from 1998 to the EMC Society to hold the International Symposium in Germany. Regarding the 50th Anniversary of the EMC Society, Dan Hoolihan advised that the committee is looking at two possible locations for this anniversary symposium in 2007, including Las Vegas and Hawaii. Other locations suggested were Disney World in Orlando, Florida and Atlantic City, New Jersey. Mr. Hoolihan will write an article for the Newsletter which solicits suggestions for locations, themes, etc. to celebrate the anniversary. He is also working with the IEEE History Center to ensure EMC Society history is represented at the symposium. Global Symposium Coordinator Elya Joffe next presented his report. Regarding recent global activities, the EMCS held a special workshop at the EMC conference in St. Petersburg during June 19-22, 2001. Speakers included Jose Perini, Mark Montrose and Elya Joffe. There were 35 international participants and 72 local participants. 133 papers were published. Future global activities for the committee include the EMC conference in Torino, Italy on September 10-14, 2001; the EMC Symposium in Beijing, China on May 21-24, 2002; the Wroclaw EMC Symposium on June 25-28, 2002; EMC Europe 2002 in Sorrento, Italy on September 9-13, 2002; the Zurich 2003 EMC Symposium in February 2003; and the 2003 IEEE International Symposium on EMC in Tel Aviv, Israel. Mr. Joffe has created a document on "How to Obtain EMCS Co-Sponsorship" for global EMC symposia which are not organized by the EMCS. This document is available for viewing from the EMCS website on a password protected basis by members of the Board. Mr. Joffe solicited comments from the Board. Mr. Joffe's report also included a proposal for support of symposia and scientists in low-income countries. Travel expenses support and IEEE membership dues were reviewed and discussed. Janet O'Neil presented her report as Exhibitor Liaison. Ms. O'Neil has gathered data from Dev Sharma of JPdL, the Montréal symposium management company, about the "gray areas" in the point system policy for exhibitors. She then met with Barry Wallen to discuss some modifications to the policy to address these gray ateas. They would like to have this revised policy reviewed by an "exhibitor advisory committee", so to speak, for comment/critique and then have this reviewed by IEEE's legal department. Then, the material would be posted to the EMCS website along with the updated point allocation grid (which will be updated after the symposium). The "exhibitor advisory committee" would be small and would be composed of members who represent long time and brand new exhibitors, large companies and small companies, so there is balanced representation. The exhibitor's breakfast plans are underway and this will be held on Thursday, August 16 at the Palais de Congrès. Speakers at the breakfast include the Montréal symposium chairman, Benoît Nadeau, this year's exhibits personnel and JPdL management, as well as next year's IEEE management for the Minneapolis Symposium. Elya Joffe will distribute the exhibitor's kits for the Tel Aviv Symposium and make a presentation about the facility for exhibits. Future considerations for the Exhibitor Liaison include the points to be awarded in 2003 to exhibitors who exhibit in Boston and/or Tel Aviv and also the institutionalization of the program advertising/sponsorship component of each symposia committee. Janet O'Neil also presented her report as Regional Conferences

Photo by Janet O'Neil

*Following the EMC Society Board of Directors meeting on Thursday night in Montréal, a few Board members gathered to celebrate Don Heirman's birthday, including (from left) Dan Hoolihan, Henry Ott of Henry Ott Consultants, Don Heirman of Don HEIRMAN Consultants, Lois Heirman, and Todd Hubing of the University of Missouri at Rolla.*

Chair. There are no plans for table-top/regional conferences in the summer months. (Five were held from April to June 2001.) The Rocky Mountain EMC chapter has scheduled one for October 3, 2001. The speaker will be Clayton Paul, among others. No other table top shows are planned as of this date for the fall months. The table-top/regional conferences are posted in a separate section of the EMC Society Newsletter and conference chairmen have been advised in advance that they can place free ads in the Newsletter to promote their respective shows if they so desire. There currently is an ad for the Rocky Mountain EMC chapter show on October 3 in the Spring issue and one will run in the Summer issue. Lastly, Larry Cohen advised that the AMEREM conference on high power electromagnetics would be held on June 3-7, 2002 in Annapolis, Maryland. Don McLemore, Chairman of TC-5 (High Power) supports this proposal for the EMC Society to be a technical co-sponsor of this conference. He gave a presentation on AMEREM (American Electromagnetics) to the Board. AMEREM deals with HPEM (High Power EMC) and UWB (Ultra Wide Band).



*Before the start of a hectic symposium week, a few Board members enjoyed a quiet night in Montréal. Shown from left are Myrthes Perini and Board members Jose Perini, Carlos Sartori of the Escola Politecnica da Universidade de Sao Paulo, Brasil and Janet O'Neil of ETS-Lindgren.*

## OLD BUSINESS

The following item was discussed under Old Business:

ELECTRONIC MOTION: Andy Drozd spoke about the motion he submitted electronically about the policy regarding distribution of the excess EMC symposia CDs, programs, etc. The motion passed by a simple margin, however, there were enough comments received with the no votes that he withdrew the motion. He also asked IEEE to review the motion and they had comments regarding legal implications of the distribution of this material. Mr. Drozd would like to incorporate these comments into a new policy and have IEEE review this. Then, he will prepare a new motion for presentation at the November Board meeting.

## NEW BUSINESS

The following items were discussed under New Business:

ELECTRONIC SECURITY ISSUES: Doug Smith discussed potential problems with viruses on computers that are received via e-mail attachments. He addressed security issues as well. Andy Drozd suggested that this fall under the Webmaster Committee, which he chairs. Jose Perini and Doug Smith volunteered to help Mr. Drozd with this work.

TIP CODES: Joe Butler asked about the IEEE TIP (Technical Interest Profiles) Codes that are included on the IEEE Membership Applications. These codes are used by IEEE to capture and reflect the primary technical interests of each IEEE member. More than half of the TIP codes shown on the IEEE form are never selected. Thus, the IEEE would like to hear from the EMC Board of Directors to help them consolidate and eliminate the TIP codes. The Board indicated that they did not use the TIP Codes, with the exception of Don Heirman who advised that he's used the TIP code information when working on Standards.

*The Board adjourned for the day at 5:00 pm on August 12. The Board reconvened on August 16 at 6:00 pm.*

President Butler welcomed everyone to the continuation of the August Board meeting. A round of introductions was made. Guests for the evening included Vita Feuerstein, Maqsood Mohd, Bob Hofmann, Markus Heidemann, Gao Yougang, Benoît Nadeau, and Ray Adams. The agenda for the evening meeting was distributed. Mr. Butler requested that the Vice-Presidents present an overview of their respective activity during the symposium week before continuing with New Business on the agenda.

## ACTIVITY OF VICE PRESIDENTS DURING MONTRÉAL SYMPOSIUM

### *STANDARDS*

Don Heirman advised that SDCom met on Monday morning. All 14 committee members were present for the meeting chaired by Stephen Berger. There were six guests present. They gave a presentation on each standard that the committee is working on for the benefit of the guests present. This new format worked well. Several standards working groups met during the week. The SACCom meeting chaired by Elya Joffe was also well attended. Meetings will also take place on Friday of the symposium week. Elya Joffe reported that 25 people attended the annual RAC/SACCom luncheon.

### *TECHNICAL SERVICES*

Kimball Williams advised that all of the Technical Committees met during the symposium week. Some were not as well attended due to travel restrictions and also committee members dropping out. The succession planning for each committee is well underway. The video program was reviewed in relation to producing in PAL or CD. They will survey potential users of their video to see what format is the most popular. This effort to produce the video will start after January 1, 2002. By the November meeting, Mr. Williams expects that the plan for teleconferencing/synchronic type will be ready for a demonstration for the Executive Committee. There will be a web training workshop at the Minneapolis symposium for the TC chairs and others who would like to post material to the EMCS website. Regarding electronic paper reviews, Mr. Williams

suggests that we work with the MTT and AP Societies to write a specification for what our Society needs in this area from IEEE so that we get a product that is tailored to our needs. Electronic paper review of the symposium papers is expected to happen soon. Maqsood Mohd advised that the experiments area provided for this symposium was the best ever. The students present at the symposium commented that they really enjoyed the demonstrations.

### *MEMBERSHIP SERVICES*

Andy Drozd advised that the week went well. The awards reception on Tuesday night was well attended. The new video effort of the awards program was well received. Mr. Drozd thanked Mr. Ford for his efforts with the video. Regarding the surveys, to date Mr. Ford has received 68 completed forms. As photographer, he attended the exhibitor's breakfast and learned that only one exhibitor requested a photo from those he's taken at last year's symposium. He took several photos in the exhibition hall and during the awards luncheon. Several exhibitors requested that he send photos to them. Regarding the membership booth activity, Bruce Crain advised that 13 new IEEE members signed up at the symposium. Two students signed up to join IEEE. 11 members took advantage of the Senior Member campaign. Four existing IEEE members joined the EMC Society to get their first year membership in EMCS for free.

### *COMMUNICATION SERVICES*

Len Carlson advised that he met with Susan Schneiderman of IEEE Media during the symposium week. Andy Drozd and Janet O'Neil also attended the meeting. The purpose of the meeting was to discuss advertising on the EMCS website as well as the Newsletter. A bundling of opportunities and fees were discussed to promote both advertising mediums.

### *CONFERENCES*

Henry Ott advised that there were several new programs implemented at the Montréal symposium, including a children's program that was well received. There was also discounted pricing on the tours for children. Several issues concerning customs and bringing in printed matter and paying duties were discussed.

## NEW BUSINESS Continued

The following additional items were then discussed under New Business:

## MONTREAL SYMPOSIUM NEWS

Benoît Nadeau, Chairman of the Montréal Symposium, advised that the chapter was only three years old when their request in 1993 to host the 2001 symposium was approved by the Board. The chapter has come a long way since their formation in 1990. Some of the new programs implemented during the symposium, including the Press Room, were very well received. Several press representatives visited the press room and took advantage of the information on EMC that was available. He commented that 1,574 people attended the symposium and of this number, there were 489 fully registered IEEE members and 301 fully registered nonmembers. They received several favorable comments on the audio-visual equipment that was provided during the technical sessions. Don Heirman advised that the technical program was very well organized. The session chairs were appropriately selected for the sessions and the local committee worked well with the technical committees.

## REPORT OF THE FINANCIAL POLICY COMMITTEE

Dan Hoolihan reported that the ad hoc committee has reviewed a draft of this policy that was prepared by Warren Kesselman. It concerns reimbursements for Board member travel, entertainment, funding of special sessions presented at various EMC conferences, etc. The goal is to have one document/policy that will address the various requests for funding by Board members. Mr. Hoolihan advised that the committee would have a report for the November meeting.

## IEEE DISASSOCIATION COMMITTEE

Dick Ford advised that Bob Goldblum would like to join this ad hoc committee, which includes members Larry Cohen, Ghery Pettit and Jose Perini. The committee had a teleconference meeting recently on this issue. They would like to conduct a one-hour interview with Dan Senese of IEEE. They would like to obtain information from the IEEE that they can publish. Mr. Carlson suggested that the committee go through the proper channels to gather this information. For example, the committee should interview the IEEE volunteers to whom the IEEE staff report. The TAB VP or Division IV Director should be contacted instead of Dan Senese who is an IEEE staff member. The committee will meet in San Diego in November in conjunction with the Board meeting. Mr. Podgorski asked if academia, industry and government were represented on this committee. Mr. Ford replied that anyone is welcome to join this committee. The Board approved adding Bob Goldblum to the IEEE Disassociation Committee. The Board then approved suspending the activities of the Disassociation from IEEE Committee until the November 2001 Board meeting.

## TC-10 AND TC-8 PROPOSALS

Mark Montrose advised that the new TC-10 on Signal Integrity held a very successful workshop in Montréal. There were 90 people present for all four speakers. The TC-10 committee meeting had 19 attendees. The committee elected Chas Grasso as chair, Franz Gisin as vice-chair and Jim Drewniak as secretary. The committee drafted the following mission statement: TC-10 is concerned with the design, analysis, simulation, modeling, and measurement techniques useful in maintaining the quality and integrity of electrical signals. These activities encompass all aspects of signal integrity from the integrated circuit level to the system level. A workshop on TC-10 was slated for the Minneapolis symposium and speakers are now being recruited. The Board approved validating the efforts of TC-10 and formalizing this new Technical Committee. Regarding TC-8, the group advised at their committee meeting that they are attempting to become a Technical Council of TAB. Mr. Montrose contacted Mary Ward Callahan of the IEEE to pursue this matter. The TC-8 workshop on Product Safety was well attended. Mr. Benitez commented that

this committee needs guidance in putting down on paper their plans and timelines to become their own independent entity within the IEEE. Mr. Montrose will now redirect his efforts from TC-10 to TC-8 to accomplish this task.

## NOVEMBER 2001 BOARD MEETING – LONG RANGE PLANNING SESSION

Todd Hubing, EMCS President-Elect, discussed the schedule for the Board meeting in November. The Board approved extending the November Board meeting to include one full day on Tuesday, November 13 and the morning (half day) of Wednesday, November 14.

## NOVEMBER 2002 SAO PAULO EMC SYMPOSIUM/POTENTIAL BOARD MEETING

Carlos Sartori advised that there would be an Abericen (Brazilian Association of EMC) international EMC symposium on November 25-26, 2002. The local EMC chapter, of which Mr. Sartori is chairman, will support this conference. This will feature invited papers/lecturers. Mr. Hubing would like to hold the Board meeting on Sunday, November 24 in order that the Board can get involved and participate in the symposium. The location will be in downtown Sao Paulo at a large hotel. There will also be an exhibition with the technical program.

## REGIONAL CONFERENCE MOU

Kimball Williams advised that he is working on this document with Janet O'Neil. It will be ready for the Board to review at the November meeting.

## AMEREM

The Board approved the request of AMEREM for the EMC Society to be a technical co-sponsor of their conference that will occur on June 3-4, 2002. During discussion of this co-sponsoship, President Butler commented that the EMCS is currently a technical co-sponsor of the following EMC conferences next year: Beijing, Wroclaw, and Sorrento. Mr. Hoolihan shared his concerns that the EMCS is becoming saturated with technically co-sponsoring several EMC conferences each year. This has the potential of diminishing attendance at the Minneapolis 2002 EMC symposium, for example. The financial implications of the Board supporting these various conferences, which it technically co-sponsors, were also discussed. Treasurer Kesselman discussed the costs associated with the EMCS being a technical co-sponsor, including a flat $50 fee for maintaining the IEEE database.

## ACTION ITEM REVIEW

President Butler reviewed the action items discussed during the meeting and those assigned at past meetings.

## NEXT MEETING

The next meeting of the EMCS Board of Directors will be on Tuesday, November 13, 2001 in San Diego, California from 9 am to 5 pm. The long range planning session of the meeting will be held on Wednesday, November 14 from 8:30 am to noon.

There being no further business, the meeting then adjourned at 8:55 pm.

Submitted by:

*Janet O'Neil*
*Secretary, EMC Society*
*Board of Directors*
**EMC**

# New Members of the IEEE EMC Society Board of Directors Announced!

As you know, a ballot for the election of the six members to the IEEE Electromagnetic Compatibility Society Board of Directors was issued on August 1, 2001. The ballots were due into the IEEE by October 1, 2001. The returned ballots have been counted and the following candidates have been elected for a three-year term beginning January 1, 2002:

Ron Brewer
Tom Chesworth
Elya Joffe
John Norgard
Zorica Pantic-Tanner
Ghery Pettit
Kimball Williams

Dan Hoolihan, EMCS Nominations Committee Chair, reports that this election resulted in a tie between two candidates for the sixth position. Since the EMCS Bylaws have no provision for handling a tie situation, both candidates were placed on the Board. The EMCS Bylaws will be revised in the future to address this situation.

Brief biographies of these candidates will be featured in the next issue of the EMC Society Newsletter.

# IEEE Transactions on Electromagnetic Compatability: An Overview

*by Marcello D'Amore*
*damore.editor@*
*elettrica.ing.uniroma1.it*

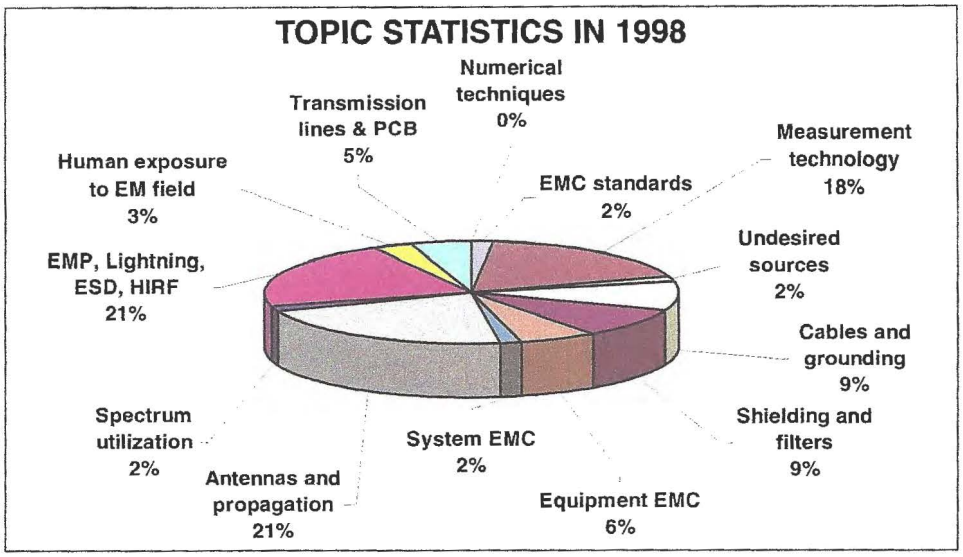
*Editor's Note: This article contains highlights from the special session held during the Montréal EMC Symposium. The session addressed the Transactions on EMC, IEEE Xplore, as well as the EMC Society Newsletter. Marcello D'Amore, Editor-in-Chief of the Transactions on EMC, organized this special session which drew a standing room only crowd.*

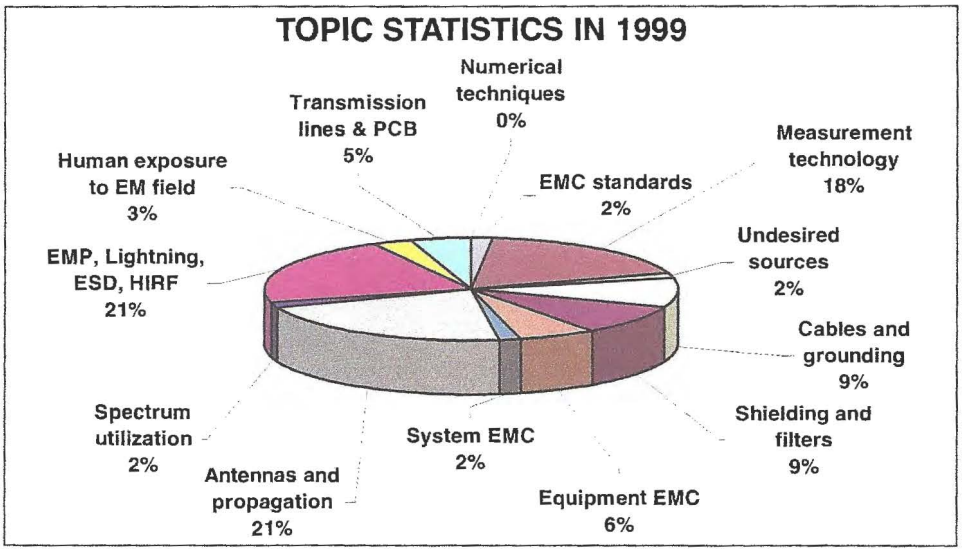
## The Editorial Board

The Editorial Board consists of the Editor-in-Chief, the Managing Editor, three members of the Advisory Board (AB) and eighteen Associate Editors representing nine different countries. The AB members express their opinion about the scientific level and the developed topics of the Transactions and address any criticism received. The AB members may be involved in the review process in some cases, for instance when the final decision concerning the acceptance of a paper is very uncertain. The previous number of 52 Associate Editors has been sensibly reduced in order to guarantee a paper review process at a high technical-scientific level, homogeneity of the evaluation criteria, and efficiency. For the overall management of the Transactions, the Editor-in-Chief counts on close collaboration with Flavio Canavero, Managing Editor, and on the experience and suggestions of Len Carlson, EMC Society Vice-President for Communication Services.

## Technical-Scientific Contents

The technical-scientific contents of the Transactions are inspired to the main objectives of the EMC Society: *"The IEEE EMC Society strives for the enhancement of electromagnetic compatibility through the generation of engineering standards, measurement techniques and test procedures, measuring instruments, equipment and systems*



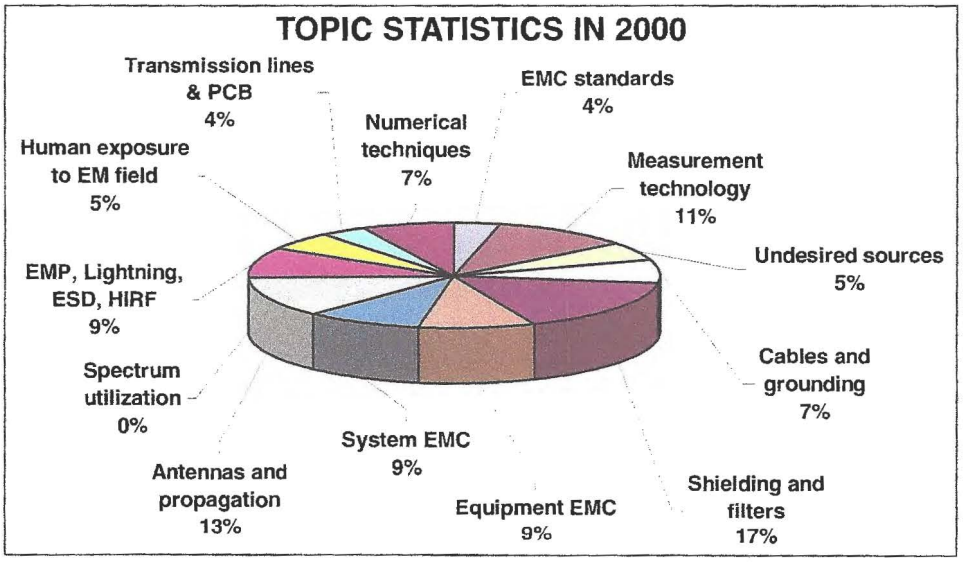




*Figure 1. Topic statistics of papers published in the Transactions on EMC in the years 1998, 1999, and 2000.*

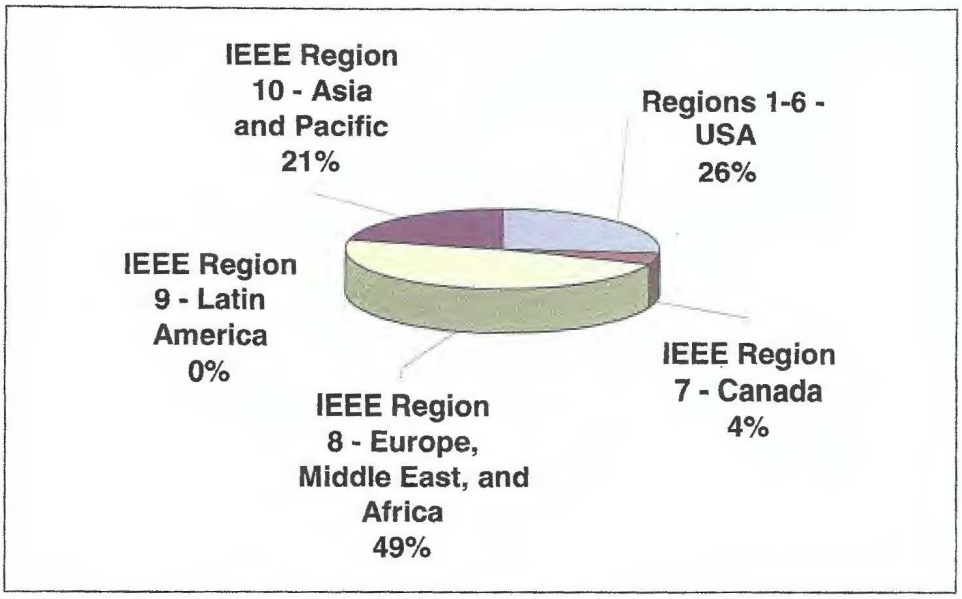



*Figure 2. Worldwide distribution of papers published in the Transactions on EMC in the years 1998, 1999, and 2000.*

| | | | |
|---|---|---|---|
| EMC | 0.549 | Magnetics | 0.758 |
| AP | 0.806 | Neural Networks | 1.941 |
| MTT | 1.004 | PWRD | 0.346 |
| CAS, Part 1 | 0.732 | Aerospace & Electronic Systems | 0.459 |

*Table 1. Journal Impact Factors of some IEEE Transactions.*

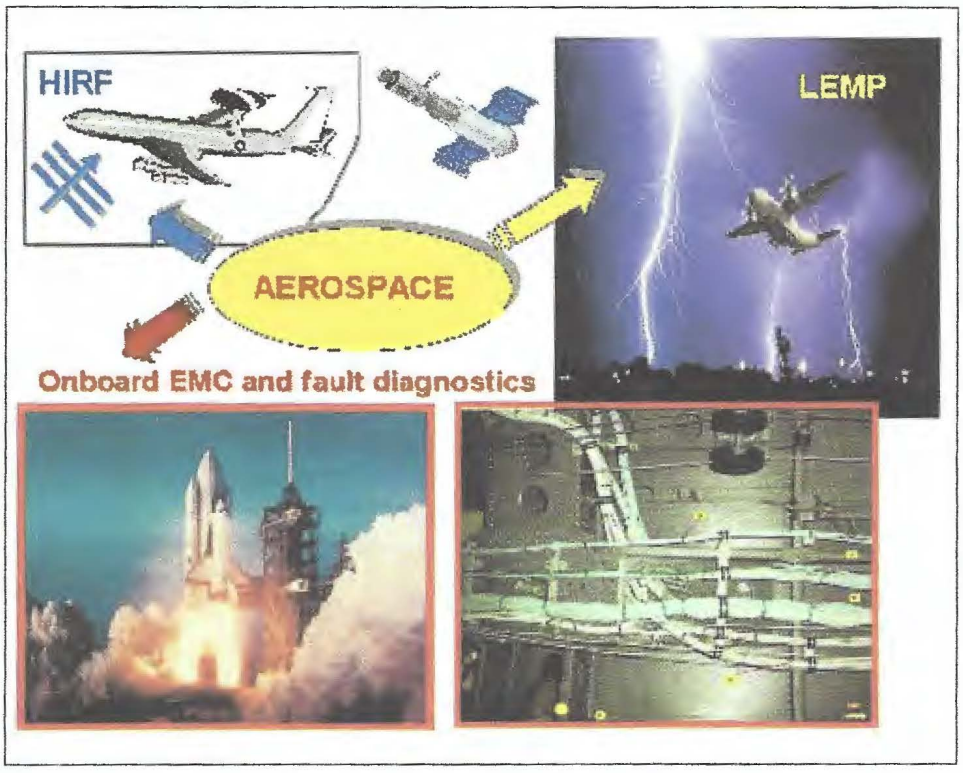



*Figure 3. The EMC environment in aerospace.*

*characteristics, improved techniques and components, education in EMC and studies of the origins of interference."*

The Transactions is an appropriate medium through which the IEEE members may benefit from the activity of the EMC community in the world; a "paper" is the proper vehicle for the presentation of thorough EMC engineering work of archival (long-lasting) value, including both advances in the state of the art, theoretical and experimental, and tutorial information.

The topics focus primarily on the electromagnetic fields, the circuits and the measurements; the methodologies can be analytical, numerical, and experimental; the applications concern numerous different industrial sectors. Such aspects highlight the characteristics of the high inter-disciplinary of Electromagnetic Compatibility, which is a science difficult to teach and to learn, on the boundary with other fields. As a consequence, the scientific investigation is stimulating because it can count on a wide range of methodologies, it can recognize problems and solutions that are common to several sectors, and it can become a synthesis of qualifying experiences. Nevertheless, the same characteristic of inter-disciplinary can represent a negative aspect, such as when the considered topics are of prevalent interest to other sectors than EMC, or lack original EMC contents.

Fig.1 shows the topic statistics of the papers published in the Transactions in 1998, 1999 and 2000. The worldwide paper distribution in the same three years is represented in Fig.2 for the IEEE Regions. It is appropriate to promote actions in order to encourage authors to submit papers from countries from which very few papers have been submitted in the past.

## Main Goals of the Management

The main scope of the management is the preservation of the EMC content and the attention towards topics of interest to the EMC community that are in strong evolution or not strongly represented in the Transactions on EMC. For instance, *Electronic Interconnects and Packaging*, *High Power EM Fields*, *Intentional EMI*, *Information Security*, *Innovative Materials*, and *Wireless Systems*, *Transport Systems* and

*Aerospace*, for which the EMC environment is suggested by Fig.3.

A very important objective is the definition of the current/future scientific/technical trends in order to maintain the high level of the Transactions, and to increase its competitiveness with respect to other Journals, which represent higher values of Impact Factor (IF), according to Table I. It should be pointed out that the number of the submitted papers per year is low compared to other IEEE Societies, such as MTT, AP, PES, and CAS. Information activities should be developed in order to involve experts in the EMC fields that are poorly represented in the Transactions on EMC. In synthesis, the elements on which the development of the Transaction should be founded are described in Fig.4.

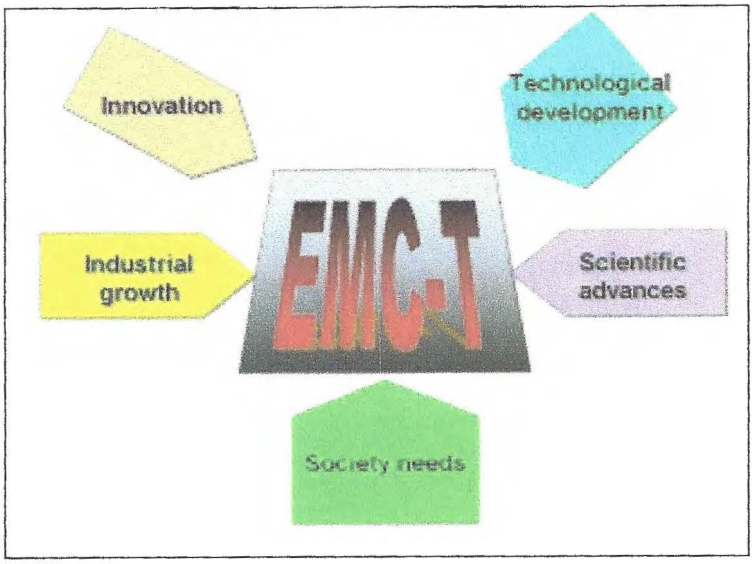



*Figure 4 – The elements on which the development of the Transactions on EMC should be founded.*

It is also very important to achieve a substantial reduction in the time that elapses between submission of a manuscript and its publication. Fig. 5 shows the revision time of papers accepted for publication in 2000. The review status of the papers submitted in 2000 is represented in Table II (July 31, 2001). The revision time depends on the following factors: the choice of the reviewers, the time required by each reviewer to complete the first revision, the eventual request of mandatory changes, the time needed by the authors to make the required corrections and changes, and the time needed by the second revision. Such a procedure, which is applied in most cases, allows one to improve the technical and scientific level of the submitted manuscripts. However, the Associate Editors and the reviewers should avoid excessively detailed changes, i.e. they should not act as "co-authors." In other words, it is necessary to find a compromise between the changes requested and a short revision time. Much of the review process time can be justified only by scientific reasons concerning the contents of the submitted manuscript, but not by the indolence or poor availability of the reviewers. Each reviewer should require no more than one month for a paper (actually three weeks are requested, but this is generally not respected). The review process should be completed within three months.

The problems concerning the relations between the Editor-in-Chief and the Associate Editor, between the Associate Editor and the reviewers and between the Editor-in-Chief and the authors are described in Fig. 6. The management foresees the publication of Special Issues concerning themes of broad interest in the world. However, the Transaction budget is limited to 600 published pages each year. Such a page count allows the publication of four regular issues per year, and makes the publication of Special Issues difficult. Nevertheless, the Special Issue on "Recent Advances in EMC of Printed Circuit Boards," prepared by Guest Editor Flavio Canavero, will be published in November 2001. Moreover, the Special Issue "In Memory of Motohisa Kanda," with Guest Editors Chris Holloway and Perry Wilson, is scheduled for publication in February 2002. Finally, the new Special Issue "Advanced EMC Numerical Modeling" with Guest Editors Christos Christopoulos and James Drewniak is planned for February 2003 (deadline to submit full papers is May 15, 2002).

PAPER STATISTICS IN 2000

| paper status | number of paper | % |
|---|---|---|
| submitted | 106 | 100 |
| accepted | for publication: 40 | 38 |
| | conditionally: 11 | 10 |
| under revision | 11 | 10 |
| rejected | 44 | 42 |

*Table II. Review status of the papers submitted in 2000 (July 31, 2001)*

## The Electronic Paper Submission and Review Process

In 1998, one of the IEEE strategies for the future established a goal to "reduce the time from submission to delivery of a peer-reviewed article dramatically while maintaining or improving quality." As a consequence of this assignment, the IEEE Publication Activities Board, after a sur-

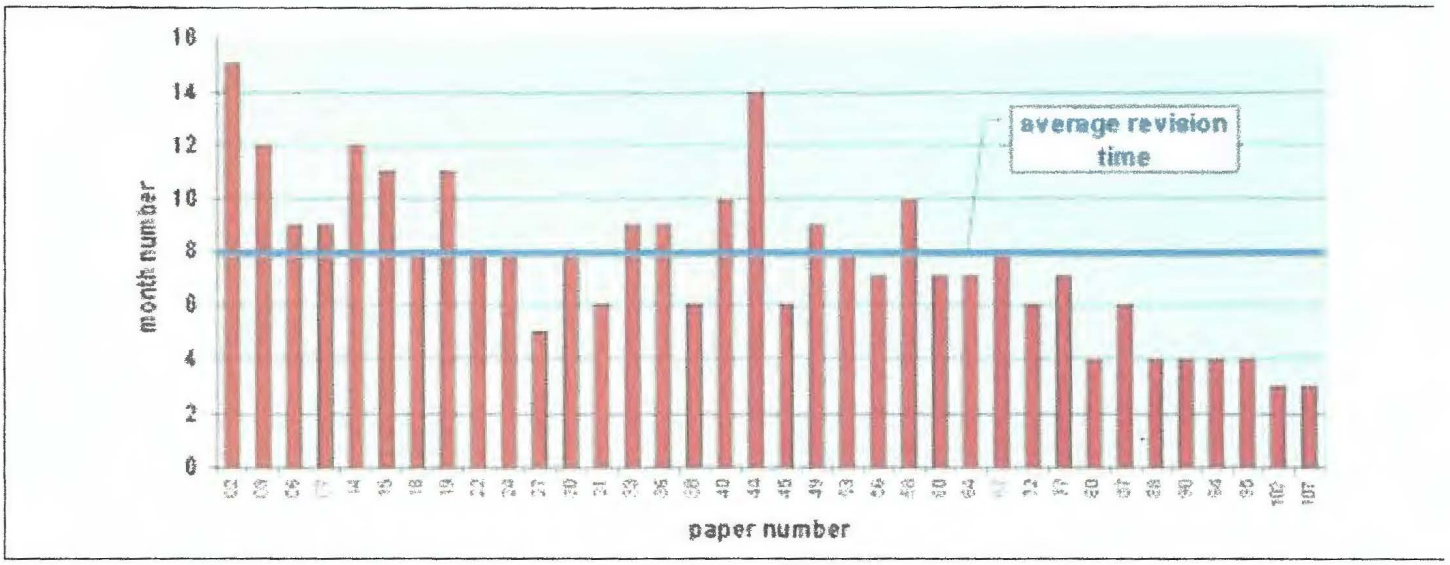
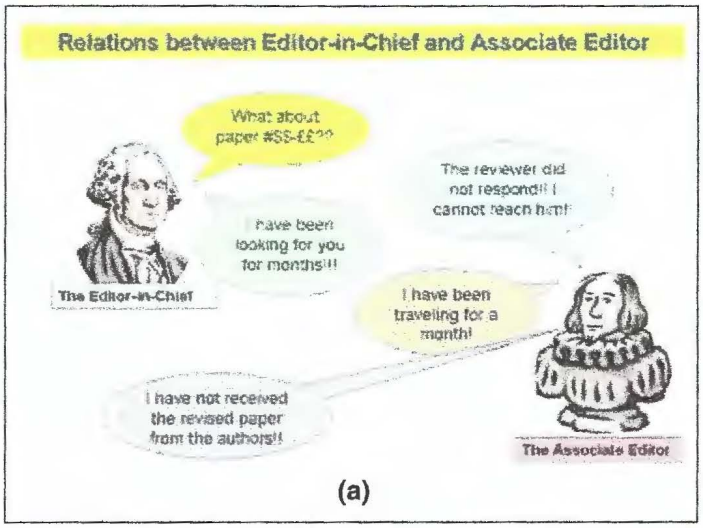
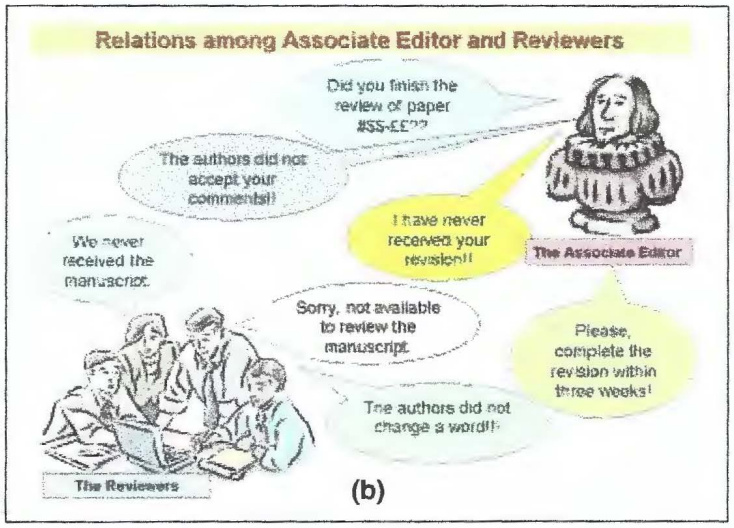



*Figure 5. Revision time of papers accepted for publication in the Transactions on EMC in 2000.*



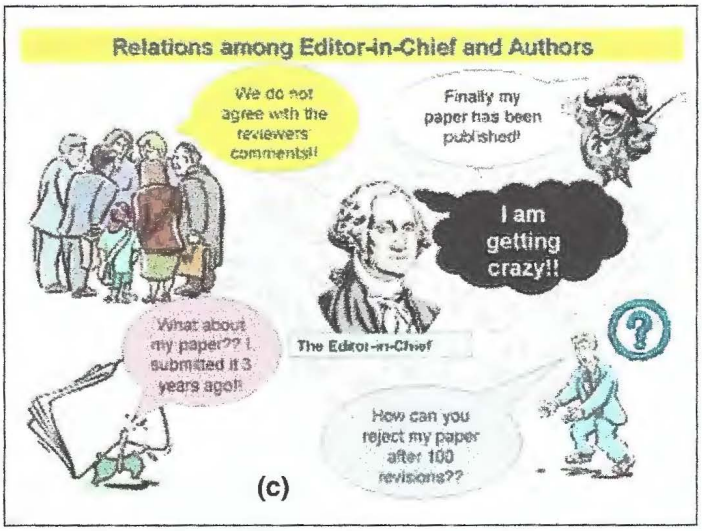




*Figure 6 – Representation of the difficulties encountered in the relations between Editor-in-Chief and Associate Editor (a), between Associate Editor and reviewers (b), and between Editor-in-Chief and authors (c).*

vey of the peer-review process at different journals, developed a plan that led to the Manuscript Central project that enables the entire peer-review process to take place completely online. Since last September, the electronic paper submission and review has been activated for the Transactions on EMC by using the Manuscript Central system.

Authors are invited to submit their manuscript electronically on the web to http://temc-ieee.manuscriptcentral.com. From this entry page, access can be obtained to all information required for the submission of a manuscript. It should be noted that manuscripts must be submitted either as a PDF document or as a Postscript document. *continued on page 52*

# EMCABS

## EMC Abstracts

*Osamu Fujiwara, Associate Editor*

Following are abstracts of papers from previous EMC symposia, related conferences, meetings and publications.

### EMCAB COMMITTEE

Bob Hunter, Consultant
*r.d.hunter@ieee.org*
Sha Fei, EMC Research Section, Northern Jiatong University, Beijing, China
*emclab@center.njtu.edu.cn*
Ferdy Mayer, L.E.A.D., Maisons, Alfort France
*FerdyMayerLEADFrance@compuserve.com*
Maria Sabrina Sarto, Department of Electrical Engineering, University of Rome, Italy
*sarto@elettrica.ing.uniroma1.it*

### "How Can I Get a Copy of an Abstracted Article?"

Engineering college/university libraries, public libraries, company or corporate libraries, National Technical Information Services (NTIS), or the Defense Technical Information Center (DTIC) are all possible sources for copies of abstracted articles of papers. If the library you visit does not own the source document, the librarian can probably request the material or a copy from another library through interlibrary loan, or for a small fee, you can order it from NTIS or DTIC. Recently it became clear that EMCABs were more timely than publications which were being listed in data files. Therefore, additional information will be included, when available, to assist in obtaining desired articles or papers. Examples are: IEEE, SAE, ISBN, and Library of Congress identification numbers.

As the EMC Society becomes more international, we will be adding additional worldwide abstractors who will be reviewing articles and papers in many languages. We will continue to set up these informal cooperation networks to assist members in getting the information or contacting the author(s). We are particularly interested in symposium proceedings which have not been available for review in the past. Thank you for any assistance you can give to expand the EMCS knowledge base. **EMC**

**EMCABS:01-11-2001**

ON THE AMBIGUITY OF DEFINING AND MEASURING INTERHARMONICS
Chun Li and Wilsun Xu
Department of Electrical Engineering, University of Alberta, Edmonton, Canada
IEEE Power Engineering Review, July 2001, pp. 56-57.

*Abstract*: This paper points out that the "fractional harmonics," i.e., interharmonics, may be indicated by Fourier Transform measurements even when such interharmonics are not present. This results from the use of particular window sizes and locations as well as variations in the "signal" being analyzed. Since many power quality meters use window sizes covering multiple cycles, the cited ambiguity can result. On the other hand, a window size longer than one fundamental period is required to detect interharmonics. The authors suggest selection of appropriate window sizes and the repeating of measurements with different window sizes and positions to avoid these ambiguities.
*Index terms:* IEC Standard 1000-2-1, window effects on Fourier transforms, power quality meters, measurement of interharmonics.

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**EMCABS:02-11-2001**

AN ELECTRONIC BALLAST WITH WIDE DIMMING RANGE, HIGH PF, AND LOW EMI
S. Y. Ron Hui, Leung Ming Lee, Henry Shu-Hung Chung and Y. K. Ho
Department of Electronic Engineering, City University of Hong Kong, Kowloon, Hong Kong
IEEE Transactions on Power Electronics, Vol.16, No.4, July 2001, pp. 465-472.

*Abstract*: This paper describes an electronic ballast that can be used to provide dimming control of fluorescent lamps. The circuit has a high Power Factor (PF) and low emissions. The SEPIC (Single-Ended Primary Inductance Converter) provides, with high PF and low EMI, a variable dc control voltage to provide dimming control followed by a Half-Bridge LC resonant ballast driver. The disadvantages of other electronic dimmers are viewed and the advantages of this circuit are summarized, one of which is constant frequency operation. IR (Infra-Red) interference with remote control systems is also reduced. The experimental results are given including circuit details and waveforms.
*Index terms*: IR interference reduction, PF correction for fluorescent lamp ballast, EMI reduction by soft switching.

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**EMCABS:03-11-2001**

ELECTROMAGNETIC ENVIRONMENTAL IMPACT OF POWER ELECTRONICS EQUIPMENT
Richard Redl ELFI S.A. En Mont vaux, Farvagny, Switzerland
Proceedings of the IEEE, Vol.89, No.6, June 2001, pp. 926-938.

*Abstract*: This authoritative survey paper is a good tutorial on EMC in Power Electronics. It covers line harmonics, voltage fluctuation and flicker, with emphasis on harmonics. High frequency noise sources are reviewed along with EMC standards and regulations. Mitigation techniques are covered with special cautions on line filter induced oscillations. The author

includes a critique of EN 61000-3-2 and compares it to IEEE Std. 519-1992 as regards to harmonic suppression. He questions if harmonic suppression is needed at all. A good list of 47 references makes it possible to "dig deeper."
*Index terms*: Power electronics EMC, line harmonics standards and regulations, power supply line filters, harmonics mitigation, noise reduction in power supplies.

**EMCABS:04-11-2001**

TOPOLOGIES AND DESIGN CONSIDERATIONS FOR DISTRIBUTED POWER SYSTEM APPLICATIONS
Fred C. Lee, Peter Barbosa, Peng Xu, Jindong Zhang, Bo Yang and Francisco Canales,
Center for Power Electronics Systems -CPES, The Bradley, Department of Electrical and Computer Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0179, USA, (Jindong Zhang later joined Linear Technology Co.)
Proceedings of the IEEE, Vol.89, No.6, June 2001, pp. 939-950.

*Abstract*: Distributed power systems (DPS) are usually used with larger computer equipment such as servers. Circuits of choice are described for both single-phase and thtee-phase systems. Much of the discussion is on Power Factor Correction (PFC) "front ends," and the other requirements for such circuits, e.g., holdup time, etc. The relative advantages and disadvantages of the major circuits are compared in light of new technology. Circuit techniques for reducing line filter size and simplifying magnetics are described. The power supply problems posed by future microprocessors are also reviewed with possible solutions. Experimental results and supporting references are included.
*Index terms*: Power factor correction (PFC), server power systems, power supply circuit comparisons, dc-dc converters, new power supply technology.

**EMCABS:05-11-2001**

LIGHTNING OVERVOLTAGES IN WIRING SYSTEMS OF THE BUILDING
L. K. Augustyniak
Technical University of Bialystok, Faculty of Electrical Engineering, Grunwaldzka 11/15, 15-893, Bialystok, Poland
Proceedings of IV International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, June 19-22, 2001, Saint-Petersburg, Russia, pp. 78-81.

*Abstract*: During a direct lightning strike into a building, there is the injection of high impulsive currents in the lightning protection system (LPS) of the building. These high currents flow through down conductors resulting in a corresponding electromagnetic field, which can induce currents and voltages in loops of conductive installation inside the building. The induced voltages can be very high and may disturb or damage the electronic equipment. This paper presents the selected results of investigations of the induced overvoltages in low voltage power supply installation (LVPI) and structural cabling systems due to electromagnetic fields from surge currents in the LPS. The trials of numerical calculations of the induced overvoltages are also included.
*Index terms*: Lightning, building, high impulsive currents, wiring systems, induced voltage, calculation.

**EMCABS:06-11-2001**

POTENTIAL DISTRIBUTIONS IN GROUNDING SYSTEMS OF TELECOMMUNICATION OBJECTS STRUCK BY LIGHTNING
R. Markowska
Technical University of Bialystok, Faculty of Electrical Engineering, Grunwaldzka 11/15, 15-893, Bialystok, Poland
Proceedings of IV International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, June 19-22, 2001, Saint-Petersburg, Russia, pp. 94-98.

*Abstract*: This paper presents the results of computations of voltage distributions in telecommunication grounding systems in case of lightning currents flows. In many cases, the voltage difference between various points of such grounding systems is much convenient value, especially in design, than for example the surge impedance of the system. For that some possible ways of reduction of these transient voltage differences from a point of view of protecting of electronic equipment have been analyzed. Those were mainly the influence of the structure of grounding system and the presence of various additional elements such as vertical ground rods and horizontal conductors. As it is shown in the paper by adding these elements, it is possible to reduce significantly these transient voltages.
*Index terms*: Communication towers, lightning strikes, grounding systems, voltage distribution, surge impedance, computation.

**EMCABS:07-11-2001**

RADIATION FROM BENT TRANSMISSION LINES
S. Lee+, M. Hayakawa+ and M. Omid++
+Department of Electronic Engineering, University of Electro-Communications, Chofu Tokyo, 182-8585, Japan
++Teheran University, Center of Informatics and Statistics, Iran
Proceedings of IV International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, June 19-22, 2001, Saint-Petersburg, Russia, pp. 103-107.

*Abstract*: This paper deals with the radiation phenomenon from bent transmission lines numerically and experimentally. At first, the radiation loss for different types of the bent transmission lines has been estimated by using the method of moments (MoM), in order to suggest the most optimal design for a bent line in terms of a radiation loss. So, the simplest line with a right-angle bend is recommended. Then, the radiation patterns from such a right-angle bent transmission line have been numerically calculated, which may indicate that the radiation is originated mainly at the bend, but other parts are also found to contribute to the overall pattern with many extra lobes. All of the numerical results were confirmed by the corresponding experiment.
*Index terms*: Bent transmission lines, radiation, method of moment, experiment.

**EMCABS:08-11-2001**

MEASUREMENT OF IC CONDUCTED EMISSIONS BY A NOVEL TECHNIQUE
F. Fiori and F. Musolino
Dipartmento di Elettronica, Politecnico di Torino C.so Duca degli Abruzzi, 24-I-10129 Torino, Italy
Proceedings of IV International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology,

June 19-22, 2001, Saint-Petersburg, Russia, pp. 134-134.

*Abstract*: This paper presents a new technique for the measurement of IC conducted emissions. In particular, the current spectrum of each IC port is obtained by the measurement of RF power radiated by a microstrip line in a TEM cell. This measurement method is effective since a direct relationship between transmission line radiated power and IC pin current exists.
*Index terms*: ICs, conducted emissions, TEM, measurement.

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**EMCABS:09-11-2001**

ALTERNATIVE METHOD EMISSION MEASUREMENTS WITH THE USE OF HALF LOOP ANTENNAS

T. W. Wieckowski
Wroclaw University of Technology, Institute of Telecommunication and Acoustics, Wybrzeze Wyspianskiego 27, 50-370 Wroclaw, Poland
Proceedings of IV International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, June 19-22, 2001, Saint-Petersburg, Russia, pp. 182-185.

*Abstract*: The paper herein presents various issues related to the use of half loop antennas for alternative emission measurements. The theoretical possibilities to use a half of the loop antenna supplied relative to a conductive surface have been presented for an emission measurement stand. The new type of setup for emission measurements with the use of loop antennas has been presented. The calibration procedures and sample measurement results have also been presented.
*Index terms*: Emission measurements, half loop antennas, double loaded loop antennas, equivalent dipoles.

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**EMCABS:10-11-2001**

MEASUREMENT OF VOLTAGE TRANSITION DURATION AND FREQUENCY SPECTRA DUE TO MICRO GAP DISCHARGE AS LOW VOLTAGE ESD

Ken Kawamata+, Shigeki Minegishi++ and Akira Haga++
+Department of Electrical Engineering, Hachinohe Institute of Technology, 88-1 Ohbiraki Myo Hachinohe-sho, 031-8501 Japan
++Faculty of Engineering, Tohoku Gakuin University, 1-13-1 Chuo Tagajo-shi, 985-8537 Japan
Proceedings of IV International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, June 19-22, 2001, Saint-Petersburg, Russia, pp. 186-189.

*Abstract*: The transition duration due to starting of gap discharge was investigated in time and frequency domain. The transition durations were observed with a very wide-band transient digitizer. The gap space was set very small for voltages below 1500 V as a simulation of the CDM ESD and the gap discharge of switch devices. The measurement system consists of a distributed constant line system with a tapered coaxial electrode, which has the matched impedance for the characteristic impedance of the distributed constant line system. The insertion loss of the tapered coaxial electrode was within –3dB in the frequency range below 4.5GHz. The atmosphere around the electrode is ordinary air. This experimental system enables one to measure the high-speed transients of about 100 ps due to gap discharge in time domain. As a consequence of the experiment, the frequency spectra of the transition durations were 2.9GHz and over in positive polarity, while the frequency spectra were below about 2.9GHz in negative polarity.
*Index terms*: Micro gap discharges, voltage transition duration, frequency spectra, measurement.

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**EMCABS:11-11-2001**

MEASUREMENT OF DISTURBANCES DUE TO THE USE OF LOW VOLTAGE POWER NETWORKS FOR DATA TRANSMISSION PROCEDURES AND RESULTS

Michel Ianoz, Emmanuel Marthe, Farhed Rachidi, Swiss Federal Institute of Technology, Power Systems Laboratory, CH-1015 Lausanne, Switzerland
Proceedings of IV International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, June 19-22, 2001, Saint-Petersburg, Russia, pp. 205-209.

*Abstract*: The use of the low voltage power network for data transmission can produce radiated disturbances. A measurement procedure which attempts to take into account the large variety of existing in house configurations has been proposed by the University of Karlsruhe. The paper describes the measurement procedure and presents experimental results on different sites. It also shows that the commonly adopted assumption of a plane wave to calculate the electric field from magnetic field measurements can lead to significant errors, especially for the determination of the indoor electric field radiation. However, these errors are within the uncertainty resulting from the large variety of indoor electrical network configurations.
*Index terms*: Data transmission, low voltage power network, radiated disturbances, measurement.

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**EMCABS:12-11-2001**

RE FIELD MEASUREMENT AND THEORETICAL CALCULATION FOR CELLULAR BASE STATION ANTENNAS

Ali Ihsan Yurekli and Bahattin Turetken
TUBITAK-UEKAE EMC Laboratory, Gebze 41470 Kocaeli-Turkey
Proceedings of IV International Symposium on Electromagnetic Compatibility and Electromagnetic Ecology, June 19-22, 2001, Saint-Petersburg, Russia, pp. 320-323.

*Abstract*: In this study, the radiation characteristics of cellular base station antennas are investigated. As a first step, the total radiation of an array-antenna which is intended to transmit in the GSM 900 MHz band is obtained analytically. The antenna under investigation is an array of four vertical dipoles positioned along the z-axis [1-3] The method is explicit and, once the radiation characteristic of any single dipole has been calculated analytically, the general pattern of the array can then be calculated. Secondly, measurements are carried out on different points near an actual base station transmitter which is designed to transmit in the 1800MHz range. Final discussion is on the determination of the minimum distance to a BSA in order to comply with international RF safety guidelines.
*Index terms*: Cellular base station antennas, health hazard, radiation characteristics, measurement and calculation. **EMC**

## Personality Profile

*continued from page 18*

ments, and chaired symposia sessions as well. He holds a patent on Spread Spectrum Clock Generation, which is assigned to Lexmark International.

Don retired from IBM/Lexmark in 1996 and founded dBi Corporation. Currently he provides EMC services such as seminars, EMI/EMC measurements, and design consultation. He is a registered professional engineer, a NARTE certified EMC engineer, and is currently a member of the IEEE EMC Society Board of Directors.

He has been married to his wife Sandra since college days, and she has been attending EMC symposia whenever possible since 1974! They have three children and three grandchildren who all live within an hour's drive of their old Kentucky home.

Don can be reached at d.bush@ieee.org **EMC**

## EMC Society Membership News

*continued from page 25*

four years credit for a bachelors plus masters degree, and five years total credit for a Ph.D.

- Five years of significant performance. Significant performance is defined as publication of engineering/scientific materials, technical direction/management of important engineering/scientific work (with evidence of accomplishment), recognized contributions to the profession, development or furtherance of important scientific/engineering courses in a "recognized educational program" or similar contributions in technical editing, or patent prosecution or law.

Many prospective applicants make the mistake of assuming that "significant performance" requires special awards, patents or other extremely sophisticated technical accomplishments; such is not the case. Substantial job responsibilities such as team leader, task supervisor, engineer in charge of a program or project, engineer or scientist performing research with some measure of success (papers), or faculty developing and teaching courses with research and publications, all are indications of significant performance.

- Three references who are Senior Member grade or higher. However, when the EMC Society nominates you, you only need two references.

For more information, contact Bruce Crain at phone 321-951-6395 or email: crainbr@mail.northgrum.com **EMC**

## IEEE Transactions on Electromagnetic Compatability: An Overview

*continued from page 48*

***Marcello D'Amore** has been full professor of Electrical Engineering since 1980 at the University of Rome "La Sapienza." He was head of the Electrical Engineering Department from 1983 to 1985 and from 1989 to 1995, and President of the National Group "Electrotechnics" from 1984 to 1990. He has published more than 100 papers in the field of power systems and electromagnetic compatibility. Current research interests include lightning interaction with aircraft, radiated susceptibility and emission of complex networks, and shielding. He was the central coordinator of an EMC Project supported by the European Communities in Science Plan in 1994, and Chairman of the National Committee "Human-exposure to high frequency EM fields" of CEI from 1991 to May 2001. He was Guest Editor of the 1996 Special Issue of the IEEE Transactions on EMC addressing "EMC Research in Italy" and Guest Co-Editor of the 1998 Special Issue addressing "Lightning" of the IEEE Transactions on EMC, and was Chairman of the International Symposia EMC ROMA '94, '96, and '98. He is Chairman of the EMC National Group of AEI, Director of CIRCE-EMC Research Network, Chairman of ISC of the International Symposium EMC EUROPE 2002, and Editor-in-Chief of the IEEE Transactions on EMC. Professor D'Amore received the Best Paper Award of the 1993, 1997 and 2001 IEEE International Symposia on EMC as well as the ISH '97 award in Montréal. He has been a Fellow of the IEEE since 1990.* **EMC**


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## Letter from the Editor

*continued from page 3*

Maqsood shares his perspective on the September 11 tragedy as a Muslim living in this country. I encourage you to read this article. It shows that we all have our own unique reactions to this tragedy. It is worthwhile to stop and consider the feelings of others.

I would like to personally acknowledge and thank my many colleagues in the EMC community overseas who took the time to send me an e-mail and offer condolences immediately following September 11. It showed me that this was indeed a crime not only against Americans, but freedom loving people everywhere. **EMC**

*(Right) Sometimes editors go "incognito" to get "scoops" and bring along accomplices for help in getting that scoop. Actually, Coco Chanel and the Man Behind the Iron Mask never did get a "scoop," but they did enjoy the French themed costume party hosted by the dB Society in Montréal. (Coco, i.e. Janet O'Neil, is shown with Mike Windler of Underwriters Laboratories.)*

# Calendar

## EMC Related Conferences & Symposia

### 2001

***December 3-7***
**Five Day Reverberation Chamber Course (with Experiments)**
NSWC Dahlgren, Virginia
Mike Hatfield
Phone: 540.653.3451
E-mail: HatfieldMO@NSWC.navy.mil
*http://www.egginc.com/dahlgren*

### 2002

***May 21-24***
Sponsored by the Chinese Institute of Electronics (CIE)
**2002 International Symposium and Technical Exhibition on EMC**
Beijing, China
Professor Liu, Dayong
Phone: +8610.68283463
Fax: +8610.68283458
E-mail: dyliu@public.bta.net.cn
*http://www.cie-china.org/emc2002/*

***June 3-7***
**AMEREM 2002**
**(combined conferences for High Power Electromagnetics, Ultra-WideBand Short-Pulse Electromagnetics and Unexploded Ordnance Detection and Range Remediation)**
US Naval Academy
Annapolis, MD
Terence Wieting, 202.767.2101
Terence.wieting@nrl.navy.mil
*http://www.AMEREM.org*

***June 25-28***
**16th International Wroclaw Symposium and Exhibition on EMC**
Wroclaw, Poland
Professor W. Moron
Phone: +4871-348-3051
Fax: +4971-372-8878
E-mail: emc@il.wroc.pl
*http://www.emc.wroc.pl*

***September 9-13***
Organized by the Associazione Elettrotecnica ed Elettronica Italiana, the University of Rome "La Sapienza", the University of L'Aquila, the University of Naples "Federico II"
**EMC Europe 2002**
Sorrento, Italy
Massimo Iandolo
Phone: +39.02.77790-218/230
Fax: +39.02.798817
E-mail: emceurope2002@aei.it

***November 3-8***
***AMTA 2002: 24th Annual Meeting and Symposium***
Sponsored by the Antenna Measurement Techniques Association (AMTA)
Cleveland, OH
Sally Kronk, 614.888.2700 x218
Sally.kronk@lintek.aeroflex.com
*http://www.amta.org*

## EMCS Cooperating Symposia

**U.K.**: Biannually, even years, in September
**Zurich**: Biannually, odd years, in February
**Wroclaw**: Biannually, even years, in June

## EMCS Symposia Schedule

| | |
|---|---|
| 2002 | Minneapolis/St. Paul<br>Hyatt Regency, Minneapolis<br>Dan Hoolihan<br>651.213.0966<br>E-Mail: d.hoolihan@ieee.org |
| 2003 | Tel-Aviv, Israel<br>(International IEEE)<br>Elya Joffe<br>Fax: 972.9.765.7065 |
| 2003 | Boston, MA<br>Sheraton Boston<br>Jon Curtis<br>978.486.8880 |
| 2004 | Santa Clara, CA<br>Franz Gisin<br>408.495.3783 |
| 2005 | Chicago, IL<br>Derek Walton<br>815.637.3729 |

## IEEE EMC Society Board of Directors Meetings

*(For information on all meetings, contact Janet O'Neil, 425.868.2558)*

**February 13, 2002**
Tempe, Arizona

**May 31, 2002**
Boston, Massachusetts

**August 18 and 22, 2002**
Minneapolis, Minnesota
(in conjunction with the IEEE EMC Symposium)

## IEEE EMC Chapter Colloquium and Exhibition "Table-Top Shows"

**February 25, 2002**
Seattle EMC Chapter, Wireless 2002
Contact: Janet O'Neil, 425.868.2558
*http://www.ieee-seattle.org*

**March 11, 2002**
Phoenix EMC Chapter, Fundamentals of EMC with Clayton Paul
Contact: Terry Donohoe, 602.436.5974
E-mail: Terry.donohoe@honeywell.com

**March 13, 2002**
Milwaukee EMC Chapter, Fundamentals of EMC with Clayton Paul
Contact: Jim Blaha, 262.375.4400 x104
E-mail: jblaha@lsr.com

**April 8-10, 2002**
Southeastern Michigan Chapter, Automotive EMC
Contact: Kimball Williams, 248.354.2845
E-mail: k.williams@ieee.org

**May 21, 2002**
Chicago Chapter, 4th Annual Chicago EMC Mini-Symposium
Contact: Frank Krozel, 630.924.1600
*http://www.ewh.ieee.org/soc/emcs/chicago*

# Institutional Listings

The IEEE Electromagnetic Compatibility Society is grateful for the assistance given by the firms listed below and invites application for Institutional Listings from other firms interested in the electromagnetic compatibility field.

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