

# IEEE ELECTROMAGNETIC COMPATIBILITY SOCIETY NEWSLETTER



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ROBERT D. GOLDBLUM, *Editor*

## MESSAGE FROM THE PRESIDENT



**H.R. HOFMANN**  
PRESIDENT, EMC SOCIETY

competition, and long- and short-range planning. I expect that our review will show that our Society is doing well.

We have active chapters, membership is showing a steady increase well above the IEEE average, our publications are reaching our members, our finances are excellent, we have had a very active standards group, our Board of Directors has taken a very conservative fiscal approach while seeking to serve all the members, and we do not seem to have any strong outside competition. Our Board of Directors has adopted a long-range plan that is reviewed at our Board meetings, to see that Board actions are consistent with our long-range plans.

However, we cannot afford to become complacent. We must continue to look for new ideas and new ways of doing our jobs better. As our world becomes increasingly dependent on electronics, the importance of EMC and its impact on our daily lives will continue to grow. Answers to the biological questions raised recently must be determined, and we must improve our ability to explain to the general public what EMC is all about.

To get the new ideas means that we must continue to get new, younger

engineers involved. Looking out at the audience at the Dallas symposium, I was disappointed, although not surprised, at the number of graying heads and the almost non-existent minorities in the audience. We tend to be a Society of older engineers, trained at a time when minorities did not enter engineering. We must work to get new engineers with fresh uninhibited thinking and ideas to join with our more experienced engineers if the Society is to remain up-to-date and viable. This will mean that our Chapters, the backbone of the Society, will have to continue to attract members through innovative chapter meetings. The Board of Directors will be challenged to continue to come up with programs to make membership in the Society attractive.

*Continued on page 19*

I would like to take this opportunity to thank the members of the IEEE EMC Society for their great cooperation during the past two years that I have served as your President. Without the cooperation and hard work of the many members who serve the Society in some volunteer position, the work of the Society would come to a complete standstill.

As this column is being written, we are preparing to meet with the IEEE Technical Advisory Board Society Review Committee. This committee reviews the various Societies within the IEEE, looking at how they operate, how they serve their members, etc., probing for strengths and weaknesses. The committee reviews meetings, membership, publications, finances, standards activities, administration,

### MEMORIAL FUND CONTRIBUTORS

The IEEE EMC Society recognizes two contributors to this worthy fund.

Mrs. Amy Green  
Fair-Rite Products Corp.

The Newsletter staff regrets that this acknowledgment is belated.

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## IEEE EMC SOCIETY NEWSLETTER PUBLICATION SCHEDULE

### PUBLICATION DATES

February  
May  
August  
November

### EDITORIAL DEADLINES

December 15  
March 15  
June 15  
September 15

Editorial contributions for the February 94 issue should be received by December 15.

## BACK ISSUES OF THE EMC SOCIETY NEWSLETTERS ON MICROFICHE

We still have a few sets of the microfiche copies of the back issues of the IEEE EMC Society Newsletters from the present to 1955 when it was called "Quasies and Peaks." The price is \$25.00 postpaid. If you would like to have one of these sets you can order it from: Dr. Chester L. Smith, EMC Society Historian, 2 Jonathan Lane, Bedford, MA 01730.

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**DON HEIRMAN**  
ASSOCIATE EDITOR

The third EMCS Board of Directors' meeting for 1993 was held on Monday, August 9 and Thursday, August 12 at the Grand Kempinski Hotel in Dallas, TX which was the venue for the 1993 EMC Symposium. All members except Don Weber and Al Mills were present. The Board was saddened by the death of BoD member John Adams, and expressed its deep sympathy to John's wife and family. Many guests were present including BoD working group chairs, chapter representatives, and the local symposium committee.

The meeting was called to order by President Hofmann. After changes to the agenda, the minutes of the June 6 meeting were approved as presented by Secretary O'Neil. Dick Ford's Treasurer's report was approved. Dick showed our Society's worth to be \$436k as of July 15.

Next, Director Dan Hoolihan (Member Services) presented his reports. There are now 4052 EMCS members which is a 6 percent increase over the previous period in 1992. This is well above the IEEE's growth rate. Dave Staggs (Chapter Coordinator) announced that as of August 13, 1993, Toronto has an EMC Chapter jointly sponsored with the AP and MTT Societies. Southern Maryland also has a chapter with Fred Heather as its chair. We now have thirty-eight active chapters with eleven outside Regions 1-6. There was a chapter chair luncheon on August 12 at the symposium which brought the activities of each chapter to the attention of the BoD. Dave also handed out the first BoD Handbook which described the EMCS services

available to all chapters as well as all members.

Bill Duff (Fellows Evaluation Committee) reported that seven evaluations were forwarded for review by the committee. Ed Bronaugh (Constitution and Bylaws) provided a draft of a bylaw change that will better describe the BoD member reimbursement policy in cases where affiliation funding is withdrawn or substantially reduced. The proposed change will be reviewed by IEEE headquarters before action is taken by the BoD.

Director Bill Gjertsen (Communications Services) presented his reports. Chet Smith (History Committee) reported that the microfilming of EMC conferences and symposia is proceeding. Bob Goldblum (Newsletter Editor) indicated that the cost of publishing the Newsletter by the IEEE is about half of the previous costs by his organization. As such, there were questions about the subsidy that the IEEE may be enjoying to print such newsletters. Bob will monitor.

Hugh Denny (IEEE Press Liaison) reported that five books on EMC topics are either about to be published or are in development stages. He is looking for reviewers. Call him on 404-894-3522. Gene Cory (Symposia Committee) reviewed the plans for symposia through 2001. Montreal has asked for the 2001 symposium. Moto Kanda (*Transactions* editor) solicited more practical EMC papers. He added that the review process is rigorous, but fair.

Director Walt McKerchar (Professional Services) reported that we now have EMCS coffee mugs available for sale. Herb Mertel (Transnational Committee) showed copies of *Worldwide EMC Standards*, which was presented at the Tenth Zurich Symposium this March. It is available for \$20/copy (see ad on page 20). Al Mill's (PACE) report was entered into the minutes. He reported that jobs are the focus for the September 3 to 6 1993 PACE Conference. Finally, Walt submitted his resignation with regrets. The BoD will surely miss him and his ability to make us laugh. Don Weber will serve out his term.

Director Heirman (Technical Services) introduced his chairs. As Standards Committee chair, Don reported on the progress of many EMCS standards. Herb Mertel's report will highlight the need for more volunteers for standards 473,475,482 and 1128. P1140 (Near field E and H from VDTs) has been challenged as to how negative ballots are resolved. The resolution is being worked on by Dave Traver, Steve Berger and Dheene Moongilan.

Kimball Williams (Education Committee) reported that the experiments exhibit at the Dallas Symposium was very well attended at the symposium. Also, the EMC abstracts are now on Internet. The EMC Experiments booklets and the EMC educational manual are about to be published.

Wilf Lauber (Technical Advisory Committee) reported that the TAC TC's review of the Dallas papers was accepted in large part by the local committee. In addition, each TC continues to make progress and will prepare a year-end report.

Joe Butler (Representative Advisory Committee) reported on SAE, EOS/ESD, IEEE COMAR and other RAC liaison activity. Call Joe for more details.

Director Heirman announced that he will step down at the end of the year as Director. Joe Butler will succeed him. Thanks were extended to Don for playing a pivotal role for over a decade in moving technical activities forward.

Finally, our 1994 budget was approved. President Hofmann continues to work on the BoD policy manual. Bob steps down as President this year as well. Several committee posts are available. Call Bob for details and opportunities.

The meeting adjourned at 9 P.M. on August 12, 1993. The next meeting is in November in New Orleans. For further information, call Janet O'Neil at (213) 870-9383.

## CHAPTER CHATTER



**TODD HUBING**  
ASSOCIATE EDITOR

Electromagnetic compatibility is a dynamic field. Every day EMC engineers around the world are presented with unique and challenging engineering problems that require days, weeks, or months of concentrated effort to fully solve. Occasionally, this dedication to one's profession results in a forgotten birthday or anniversary, leaving the devoted engineer in desperate need of a last-minute gift.

With the holiday season upon us, I would like to offer a few gift ideas. These gift suggestions are dedicated to those devoted engineers who, in their relentless pursuit of electromagnetic compatibility, have fallen behind in their holiday shopping.

First, for those of you with small children at home, consider making human and animal figures out of leaded ferrites and ferrite cores. Your kids will have hours of fun playing with their ferrite friends.

For older children, a ferrite bead sample kit and a spool of #24 wire is an instant "make your own jewelry" set. Ferrite necklaces, bracelets, and rings could soon adorn all the members of your household, leaving no doubt in the minds of others that there is a hard-working, generous EMC engineer in the family.

Beryllium copper finger stock also makes nice jewelry. It is particularly useful for creating shiny, attractive tie clasps or clip-on earrings.

Of course, with all this new jewelry, the members of your family will need a safe place to store it. You can make a simple jewelry box out of an empty sample kit container. Decorate the outside of the box with copper tape and line the inside with sheets of antistatic bubble-pack. This will not only make the gift more attractive, but will also serve to protect your family's sensitive electronic jewelry.

Some other gift ideas that show you care, while reflecting your interest in EMC, include

- A mosaic art supply kit (a bag of assorted surface mount components)
- A combination tie rack and belt holder (a retired log-periodic antenna)
- A high-fashion multi-colored belt (made from ribbon cable)
- A frequency allocation chart (the perfect gift to replace that Bart Simpson poster in your teenager's bedroom)
- An EMC Society insulated coffee mug (while they last!)

In Rolla, Missouri, the closest shopping mall is about 100 miles away so we do a lot of our holiday shopping by catalog. This year, to assist my family in selecting a gift for me, I've highlighted several items in catalogs from EMCO, Fair-Rite, Steward, HP, Tektronix, and others, then left them lying conspicuously around the house. 'Tis the season to be compatible. I hope your holiday season is a safe and happy one!

### CHICAGO

Norm Muelleman of Power Integration Equipment Enterprises



Photo: DICK FORD

*Eighteen chapters represented at the EMC Symposium Chapter Chair's Luncheon. Front Row (l to r): Larry Cohen (Wash., D.C.), Magsood Mohd (NW Florida), Ferdy Mayer (France), John Howard (Santa Clara Valley, CA), Jean-Jacques Laurin (Montreal), Ev Evans (Rocky Mt.). Back Row (l to r): Tom Watt (Baltimore/ Annapolis), Fred Heather (S. MD), Roy Thompson (Centr TX), Takeo Yoshino (Tokyo), Ray Sasinowski (S.E. MI), Heinrich Garn (Austria), Janet O'Neil (LA, CA), Elya Joffe (Israel), Andrew Podgorski (Ottawa), Peter Landgren (Sweden), Al Mills (San Diego, CA), and Steve Mullenix (Dallas/Ft. Worth).*



Inc. (PIEE) was the speaker at the April meeting of the Chicago chapter. The topic of his talk was "Ground Conditioning." At the June meeting, Bob Hofmann from Bell Labs (and EMC Society President) gave a presentation entitled "A Comparison on ANSI C63.4-1991, ANSI C63.4-1992 and FCC MP-4."

#### DALLAS/FORT WORTH

Congratulations are in order for the Dallas/Fort Worth chapter. The 1993 International IEEE EMC Symposium was a huge success. It was educational, entertaining, and very well organized.

#### PHOENIX

Dr. Larry Dworsky of Motorola gave a presentation on "Band Pass Filter Technologies for Communications Systems Applications" at the September 14th meeting of the Phoenix chapter. On September 21st, Dr. Majid Hashemi, also from Motorola, was the featured speaker. His topic was "InP-Based FETs for Power Applications."

#### SANTA CLARA VALLEY

Congratulations to the Santa Clara Valley chapter for receiving their third consecutive Chapter of the Year award at the International Symposium in Dallas.

#### SOUTHEASTERN MICHIGAN

Despite the poor weather, there was a good turnout at the April meeting of the Southeastern Michigan Chapter. Henry Ott, of Henry Ott Consultants, was the guest speaker. Henry reviewed experimental results illustrating the effect of a conductive plane on printed circuit board emissions.

#### TORONTO

A new EMC chapter has been established in Toronto, Ontario, Canada. It is joint with the Antennas and Propagation Society and Microwave Theory & Techniques Society. Welcome, Toronto!

#### TWIN CITIES

Jerry Becker reports that the May meeting of the Twin Cities EMC Chapter was held at the Minneapolis Convention Center in conjunction with Midwest Expo. The meeting featured a presentation by Larry LaCoursiere entitled "Bio-electromagnetics" and a presentation by John Maas on "Electrostatic Discharge." There was also an encore panel discussion of "Power Line Harmonic Problems" presented by members of the EMC and Power Engineering Societies. Panelists include Daryl Gerke, Ellen Kresse, Dan Nordell, Eric Persons, and Dave Shonts.



*Steve Cabral, Chairman of the Santa Clara Valley.*

Photo: DICK FORD



*John Howard, Vice Chairman of the Santa Clara Valley Chapter.*

Photo: DICK FORD



*Jeff Evans, Treasurer of the Santa Clara Valley Chapter.*

Photo: DICK FORD



*Washington D.C. Secretary/Treasurer P.J. Mondin (r) thanks Dr. Charles Goldblum (R&B Enterprises) for his presentation to the chapter on coherent measurements.*

Photo: DICK FORD

## LETTERS TO THE EDITOR

*The following letters were received in response to the US and EC Test Laboratory articles which appeared in the Summer 93 issue.*

I have reviewed the referenced articles with considerable interest, and considering the fact that my laboratory and I are mentioned throughout I would like to express my comments.

I am troubled by the "tone" that both articles set. They imply that something wrong has been done. Quite honestly I do not view it as such. I am still confused, as was mentioned in the article, but that fact has nothing to do with what has occurred.

I truly believe that any EC Competent or Notified Body has every right to impose whatever requirement they wish on a U.S. laboratory which they are entering into a relationship with and from whom they will "blindly" be accepting data. The fact that one charges a fee for the review and another does not is confusing, but in my view it does not make one organization right and the other wrong.

I cannot speak for DLS and AT&T, both of whom were named along with RETLIF in the articles. However, we are all big boys, each totally capable of making our own decision when it comes to such matters as accreditations and approvals. I would also suggest that we are all rather well-known laboratories with impressive listings and accreditations and that we probably did not need yet another accreditation or approval. Again, I can't speak for them, but at RETLIF we elected to go this route solely for its potential marketing value and for its potential value with our existing customer base, a concept which seems to escape Mr. Kuspiec of the

EC. I viewed it no differently than if I were buying a new spectrum analyzer or building a test site. Is there a need and what will be the return on the investment? Plain and simple.

As far as the comments related to the Department of Commerce were concerned, I can only say that the quote was totally taken out of context. The "concern" expressed was not with regards to laboratory approval, but rather whether or not the concept of the competent body approach would address a wide enough range of U.S. manufacturers' needs.

Until we in this country understand the need for and have a national laboratory accreditation system which is either government-run or recognized and which accordingly would be recognized by other countries, we in the independent testing industry are going to be continually forced to forge our own relationships just as RETLIF, DLS and AT&T did. If each of us is happy with those relationships and they address our customers' needs, so be it.

**Walter G. Poggi**  
President

*Retlif Testing Laboratories*

I have reviewed the latest EMC Newsletter containing the article from the *Electronic Times* of England, 17 June 1993 entitled "EMC Practice Blasted" and the article from *Microwave Engineering*, Europe. I would like to explain our position on this subject. D.L.S. Electronic Systems, Inc. is an appointed test laboratory authorized to carry out EMC tests by order and under the supervision of TÜV Rheinland, a competent body from Cologne, Germany.

1. We can perform these tests according to the European EMC standards published in the European journal and our customers can use our data to put the CE mark on their products based on our results. They are required to issue a Declaration of Conformity stating that all the requirements have been met and have it signed by their authorized agent in Europe before their product can be sold in the European community.

2. If a technical construction file is required by the product, because there are no harmonized standards available or harmonized standards are used only in parts, D.L.S. is able to advise our customers how this can be accomplished. The "technical construction file" must be created and held by the manufacturer or his European representative as required by the EMC directive.

I want it understood that D.L.S. is not a competent body but an EMC subcontractor based on the rules for EMC subcontractors of November 1992 issued by TÜV Rheinland.

I can assure you, to the best of my knowledge and understanding, our testing will be accepted by TÜV Rheinland and throughout Europe. D.L.S. has the right and obligation to perform these tests.

**Donald L. Sweeney**  
President and Senior EMC Engineer  
*D.L.S. Electronic Systems, Inc.*





**HERB MERTEL**  
ASSOCIATE EDITOR

## THE ROLE OF COMPETENT BODIES

In spite of the publicity received by the EC Directive on EMC, some areas of the regulations are still misunderstood. This article will clarify the role of the competent bodies and their relationship to U.S. manufacturers.

First and foremost, any test lab in the U.S. can offer testing according to the EC/EMC Directive without a special contract with an EC competent body. Since most products designed according to the relevant EN standards do not require mandatory testing, the manufacturer can declare conformity through his own in-house testing.

The manufacturer can also outsource the whole testing. There are several reasons for doing this: lower costs; more flexibility; specific experience with regulations and requirements of an outside lab; product liability; and marketing programs.

In principle U.S. companies can outsource to three categories of labs: any test house; a test lab related to a competent body; and a competent body which has its lab in an EC country.

Every outsourcing alternative is possible and legal in the voluntary product categories. Thus the choice in 95 percent of all cases will not depend on the relationships of the U.S. test labs with EC competent bodies, but on the specific need of the manufacturer.

According to the outsourcing reasons mentioned above, the crucial factors for a U.S. test lab in successfully acquiring orders are:

- Costs, time, service, specific consulting expertise.
- Experience, technical expertise, size, insurance coverage. (Experience and technical expertise may be emphasized through a relationship with an EC competent body.)
- Certificates of a test laboratory which can use the name of a competent body in the EC may give more confidence to national authorities or to customs people if there are doubts that the product fulfills the directive.

If the competent body also can offer through its U.S. lab a mark which is recognized as an important conformity mark there is even more trust regarding free circulation and selling those marked products.

From a technical and legal perspective a contract with a competent body is not necessary for U.S. test labs when mandatory testing is not needed.

If mandatory testing is needed (e.g., for telephone terminal equipment), a U.S. test lab can only become involved if the competent body subcontracts a defined specified part of the testing. Thus a contract is necessary for the specific subcontracting. The competent body itself is responsible for results and particularly for the evaluation. It must assure itself of the quality of the testing being performed by the subcontractor. Usually this will not be done without a general contract defining the terms and conditions, particularly the technical basis and the liability aspects.

"Acceptable" to a competent body does not mean that in the mandatory equipment area, all testing can be

done in the U.S. without a representative of the competent body witnessing the testing.

In the voluntary area "acceptable" indicates only that the respective competent body is satisfied with the quality of the testing in the U.S. lab. So for marketing reasons the U.S. lab has a better standing depending on the reputation of the contracted competent body.

To summarize: a contract with a competent body gives U.S. labs the opportunity to gain the increased confidence of their American clients. Depending on the reputation of the competent body, this approach can enhance the marketability of those U.S. labs. But legally these contracts are unnecessary and will only help in the mandatory areas in which a part of the testing is performed under specific, exactly defined conditions.

## BOARD OF DIRECTORS ELECTION

A ballot for the election of six members to the IEEE Electromagnetic Compatibility Society Board of Directors was issued on July 30, 1993. The ballots returned have been counted, and the following candidates have been elected for a three-year term beginning January 1, 1994:

Joseph E. Butler  
Richard T. Ford  
Ferdy Pierre Mayer  
William H. McGinnis  
Henry W. Ott  
J.L. Norman Violette

We wish the newly elected members of the Board of Directors success and thank all candidates for their willingness to serve and for permitting their names to be included on the ballot.



**JOSEPH BUTLER**  
ASSOCIATE EDITOR

### **EOS/ESD ASSOCIATION**

**Bill Ritenour**

**RAC Representative**

The fifteenth annual EOS/ESD Association Symposium was held on September 26 through 30 this year in Orlando, Florida. A six-hour seminar on ESD Basics and a four-track 16-session ESD Viewpoint were held on September 26th. Sessions included: "System Level ESD Standards," "Fast Transient Analysis," and "Surge and Circuit Back Protection."

The symposium began on Tuesday the 28th and was single track with twenty-three sessions through Wednesday afternoon. Wednesday evening and Thursday morning featured nineteen additional sessions. Several of the session papers were eye catching: "A New Type of Furniture ESD and its Implications" and "About the Effectiveness of Grounding Chains on Carts and the Unexpected Behavior of Insulating Wheels" are two such papers. As in all the EOS/ESD Association's previous symposiums, each of the sessions contained up-to-the-minute papers on every aspect of ESD from device testing to latency modeling.

### **SAE AE-4R HIRF**

The AE-4R Committee is considering

issuing the document, "Advisory Circular-Certification of Aircraft Electrical/Electronic Systems for Operation in the High Intensity Radiated Fields (HIRF) Environment." The original plan of the committee was to issue it concurrently with an FAA Notice of Proposed Rulemaking (NPRM) on HIRF. Due to delays with the NPRM, the AE-4 committee is considering the above.

### **SAE SURFACE VEHICLE EMC**

**SAE Automotive EMI & EMR**

**Ed Bronaugh**

**RAC Representative**

The SAE EMI and EMR TC's are still working to finish all of the planned parts of J551 and J1113. The EMI TC is coordinating J1113 with ISO/TC-3/WG3, and their inputs to J551. The EMR TC is coordinating their parts of J551 and J1113 with CISPR/D. Also EMR is working on methods to characterize integrated circuit EMI emissions using loop probes and TEM devices (Crawford cells and GTEM cells).

### **IEEE TPC Committee on Man and Radiation (COMAR)**

**Dan Hoolihan**

**RAC Representative**

COMAR had its most recent meeting on June 14 in Los Angeles but as of this report the minutes have not been received. Minutes of the previous meeting on November 12, 1992, in San Diego are reported herein.

COMAR's proposed entity position statement on "Human Exposure to Radio Frequency Fields from Portable and Mobile Telephones and Other Communications Devices" has been approved by the Technology Policy Council and is pending full IEEE U.S. Activities Board approval. COMAR has begun review of the 1990 IEEE-USA entity position on

"Biological Effects of Electric and Magnetic Fields from Video Display Terminals" as well as the 1991 entity position statement "Health Effects of Power Line Frequency Electric and Magnetic Fields." A new draft entity position statement, "Role of Epidemiology in Evaluating Exposure to ELF Fields as a Potential Human Health Hazard" is in process. It was also reported that COMAR member Robert Ashley voted against Draft 9 of IEEE Standard P1140 "Standard Procedures for the Measurement of Electric and Magnetic Fields from Video Display Terminals" with a statement that there is no basis for approval of such a standard until good measurement science research has been done.

### **IEEE TPC DEFENSE R&D**

**IEEE TPC Engineering**

**Dick Ford**

**RAC Representative**

I attended subject meetings on June 9th. This was my first participation in the engineering meeting as I was just recently appointed to this committee. Both committees discussed the USAB proposed Commercialization Award. This would encourage tech transfer from DoD to the commercial area by recognizing folks who have transitioned a significant tech issue. We also discussed a planned USAB sponsored National Forum on Conversion, Modernization and Restructuring of U.S. Resources to be held June 29-30, 1993 at Johns Hopkins University. (It was held but I was unable to attend.) There was review and discussion of a proposed statement to the Senate's Subcommittee on Commerce, Justice, etc., regarding budgeting and future plans for NIST as well as review of NSF's budget and programming strategy.





**KIMBALL WILLIAMS**  
ASSOCIATE EDITOR

## JUST DO IT

For several years I have had a small poster either hanging on my office wall, or more recently, on my office door which shows a gaggle of ducks going in all directions. The caption reads:

"Do something, lead, follow, or get out of the way!"

This expresses both a philosophy and a frustration. All of us can probably remember a "decision maker" who actively avoids making decisions, or a "manager" who refuses to manage and just lets things slide along as they are.

Most of us would rather follow Spike Lee's advice and "Do the Right Thing." But what is the right thing? Is there some way that we can, like Davy Crockett, "Be sure you're right, then go ahead"?

For most issues I have always held the opinion that if there is something that I know should be done, then I am probably the person who should either be doing it, or making sure that it gets done. For the people who work with me I ask them to use the same criteria in their work. If there is a question or concern it never hurts to ask, but in general, if you see that it needs doing, you own it!

## VOLUNTEER

The most obvious arena for application of the above principle is in volunteer work. At the symposium in Dallas this year I heard several comments through the week which usually began

with the words "somebody in the society should . . ." and the speaker would go on to describe an action that, in several cases, seemed like a good idea to me. However, when I suggested to one person that I knew of an active committee working in that area that they could contact and offer their services and get any help they might need to do the task themselves, the person looked at me like I had just suggested something indecent! What? Do it themselves? Who ever heard of such an idea!

Granted, some of us are so busy that another item in the agenda might indeed break the camel's back. On the other hand, if there is time to complain about something, there is probably enough time to do something positive about it instead.

There is a tradition among religious sects which expresses the condition of an awareness of a job or task that should be done as "Receiving THE CALL." Yes, you can actually hear the capital letters when someone says the phrase! However, THE CALL doesn't usually come accompanied with a blast of celestial trumpets, the sky doesn't open and the earth doesn't crack. THE CALL usually comes when the person receiving the message becomes aware that there is a task that needs doing. Sound familiar?

So, if you have received "THE CALL," how do you know "you're right" and that you should go ahead? One of the easiest ways is to ask if anyone is already working on the problem, and if they need help. If you are not sure who to ask, a call to any one of the members of the Board of Directors should result in a positive referral to the appropriate committee or person. Consider what you can do for the society as a volunteer.

## EXPERIMENTS DEMONSTRATIONS

Several years ago Henry Ott and Clayton Paul received THE CALL to collect experiments that could be used to illustrate the fundamental principles of EMC. That work became the basis for the first of a series of EMC demonstrations that were presented

by the education committee at the symposium in Dallas this year.

Andy Drodz organized (and in one case conducted) the series of demonstrations which spanned the three days of the core of the symposium. The experiments were changed every half day and two were run side-by-side for most of the sessions. Most demonstrations were directly from the experiments section of the EMC Education Manual, but we were seeing some for the first time. An excellent job by all involved.

The initial verbal comments ranged from "Wow, I never really had a FEEL for that before. Now I really understand it!" to "These are too basic. We should be more advanced than this stuff." We have yet to receive the total set of comments from the symposium staff, but our overall perception was that the response was mostly positive. This was a case of believing we were right and going ahead.

At the next symposium in Chicago in 1994 we are going to continue with the experiment demonstrations. We are also planning to begin the first of what we hope will be a yearly workshop dealing with EMC fundamentals. These workshops will be directed to students and new engineers coming in to the field of EMC engineering, or those who want to brush up their basic skills.

Our intention is not to steal any thunder from the excellent workshops already being conducted for more advanced engineers, but rather to provide a brief introduction to the discipline and an overview for the neophyte who may have just arrived on the EMC scene and is seeking guidance and direction. Again, we believe this is the right thing to do, and we are going ahead. However, we are open to comments, suggestions and of course help if you are so inclined. The gentleman charged with this effort is: Maqsood Mohd, (904)678-2001; FAX: (904)729-6377. I am sure that he would appreciate hearing from you. If you wish to comment to me, I remain: Kimball Williams, (313)354-2845; FAX: (313)354-6815.



ANTHONY ZIMBALATTI  
ASSOCIATE EDITOR

### CREDIBLE ELECTROMAGNETIC FIELD MEASUREMENTS FOR SAFE HUMAN EXPOSURE

Too often, I have encountered incredible reporting of electromagnetic field measurements pertaining to safe human exposure. The latest examples of such incredible reporting occurred at two recent EMC Chapter presentations and in a recently reviewed report. That reporting pertained to measurements of fields radiated from high voltage power distribution lines and from radio and microwave transmitters.

Such incredible reporting must be stopped to preclude disservice to telecommunication endeavors, the electrical engineering profession, IEEE and our EMC Society. Here are my thoughts on the needs for engendering credible reporting of safe human exposure measurements of electromagnetic fields. These fields may radiate from power lines, transmitters, or other communication/electronic equipment.

In identifying what needs doing to engender such credible reporting, I will make use of a letter report that I recently reviewed and deemed not credible. Documented in that letter was a safe human exposure measurement survey performed outside the schools of a town located near several transmitting antennas. That letter issued from an American state public health department, to a

town health department of that state.

Why did that health department letter lack credibility? Summarily, that letter contained five discrepancies that need correcting to engender a credible report. These discrepancies were due to:

1. the inadequate description of the measurement instrumentation and usage;
2. the omission of the process and factors used to convert instrumentation readings to field levels;
3. the omission of the credentials of the persons conducting the survey measurements;
4. the omission of important information, including identifying the electrical parameters of the nearby transmitters, antennas, and the geometry of these antennas and schools; and
5. the omission of an analytical determination of the electromagnetic field levels expected at the measurement sites.

It is obvious that measurement reports having discrepancies 1, 2 or 3 lack credibility. Obviously, rejection of such reports must occur pending correction of discrepancies. However, it is not obvious why reports having discrepancies 4 and 5 lack credibility and need rejection pending correction of these discrepancies. This question will be answered after discussing how to eliminate the aforesaid discrepancies from measurement reports.

It is easy to eliminate from measurement reports, the measurement information insufficiencies like those delineated in discrepancies 1, 2 and 3. How? Scientifically skilled personnel need to develop and promulgate a guideline that delineates the measurement information that needs documenting. Such a guideline needs to form a part of the standards that delineate safe human exposure electromagnetic field levels.

Somewhat harder, but doable, is the elimination of discrepancies 4 and 5 from measurement reports.

Eliminating discrepancy 4 requires the reporting of important information about the source of the measured fields, including that identified in this discrepancy. This information will be used in eliminating discrepancy 5 and for other purposes as discussed later. Eliminating discrepancy 5 requires the reporting of an analytical determination of the expected field levels at the measurement sites. How are these discrepancies to be eliminated? Again, scientifically skilled personnel need to include in the aforesaid guideline the important information and the analytical determination that needs documenting. Also, it is highly desirable for that guideline to provide simplified models for computing the expected field levels.

Another argument for requiring the reporting of the information like that identified in discrepancy 4 is that readers of these reports could analytically determine whether measurements appeared credible. Most important is the requirement for reporting the analytical determination of the expected field levels at the measurement sites. Comparisons of the expected and measured field levels would accredit the measurement techniques and accuracy. It goes without saying that measurement reports not having discrepancies 4 and 5 would be compelling to the reader of such reports!

It will be said that elimination of the aforesaid five discrepancies from measurement reports will incur undue burdens. On the contrary, it is worse to allow reports to have these discrepancies. Why? The correction of discrepancies 1 through 4 is not an undue burden. This is because competent readers automatically reject reports having these discrepancies, which creates





REINALDO PEREZ  
ASSOCIATE EDITOR

## EMC, ELECTROMAGNETIC THEORY TO PRACTICAL DESIGN

P. A. Chatterton and M.A. Holden  
John Wiley and Sons  
\$54.95

It is possible that because EMC is gaining more interest among members of academia and the industrial establishment in general, more introductory electromagnetic compatibility books are appearing on the market. Since this editor started reviewing this book, two other introductory EMC books caught my attention. For now, we turn our attention to an introductory EMC book by Chatterton and Holden, who were both at the University of Liverpool, UK.

This introductory book is divided into six chapters and five appendices. The appendices deal mostly with some special aspects of electromagnetic (EM) theory, including Stoke's theorem, wave impedance of short wire and magnetic dipole antennas, and some special properties of transmission lines. As in most introductory EMC books, the material presented follows a familiar pattern. Chapter 1 deals with the introduction of some basic concepts about EMC including definitions, noise sources, EMC requirements, and testing. Chapter 2 is a review of material usually covered in university courses on electromagnetic theory, e.g., Maxwell's equations, Poisson/Laplace equations, wave propagation in different media, wire and loop

antennas, Faraday and Amperes's laws, etc. Chapter 3 applies the general concepts of EM theory from Chapter 2 in order to review TEM waves, transmission line theory, waveguides and cavities, and coupling among transmission lines. Chapter 4 devotes itself to shielding theory, covering not only quasi-static models, but also circuit models and transmission line models of shielding properties.

Chapter 5 treats the subject of spectral analysis, which is a subject common in all EMC books. The author covers the familiar subjects of harmonic distortion and intermodulation (very briefly), Fourier series and transforms, FFT, etc. The chapter ends with good reviews of antenna and radiation models as well as some physical and elementary mathematical models for radiated EMI prediction. A brief review of EMC testing facilities (TEM cells, GTEM cell, etc.) is covered at the end of the chapter. Finally, Chapter 6 addresses EMI control techniques such as grounding, filtering, isolations and circuit design for EMC.

Though there is a tendency for introductory EMC books to cover relatively the same topics, there are fundamental differences between EMC books. These differences are the result of the author(s)' intent and objectives when writing such books.

It seems that the main objective of this book is not on "doing EMC" but rather on providing a basic "understanding" of EMC phenomena. The authors dedicate about half of the book to reviewing the basic foundations of EM theory and explaining how these familiar concepts relate to basic EMC. The objective is to "bridge" the two subjects, EM theory and EMC, for those readers who may need this understanding. We can illustrate this approach with several cases. In Chapter 3 for example, the basic theory of absorbers design is addressed after covering more general EM subjects such as lossy

materials and TEM transmission theory. In the same chapter, coupling among conductors is reviewed in conjunction with the subject of transmission line theory. The concept of shielding, which occupies the totality of Chapter 4, is treated in conjunction with basic EM theoretical concepts such as plane wave propagation, quasi-static interpretation of electric and magnetic fields, and circuit models of shielding. Simple radiated prediction models, commonly used in EMC, are covered in conjunction with the study of antennas and their radiation parameters, particularly the small wire and small loop antennas and their near- and far-field characteristics.

A peculiarity of this book is its emphasis on radiated electromagnetic interference (EMI). For example, though the concept of common mode current is briefly mentioned and explained, and the coupling among conductors (crosstalk) is discussed at the introductory level using generalized transmission line theory, the space devoted to these and other related issues is relatively small when compared with the amount of work spent in the study of EM wave propagation and its EMC implications. For example, a whole chapter is dedicated to the control of radiated EMI through shielding (a very complete chapter) while other control techniques such as grounding, filtering, isolation and circuit design for EMC are lumped into several sections of a single chapter.

This book can serve as a reference for EMC and is especially recommended for those engineers with very little knowledge of EMC who need a "fundamentals" primer on the nature of EMC phenomena. Its heavy theoretical emphasis on EM, lack of worked example problems, and lack of assigned problems make the book somewhat difficult to use as a textbook. However, the book provides very good and ample references throughout.



Photo: DICK FORD

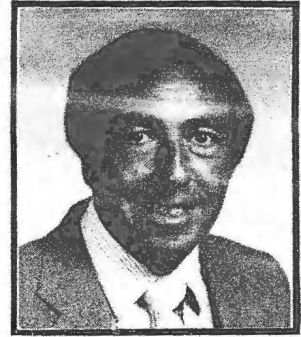
**STEPHEN CAINE**  
**EMC PERSONALITY**

Stephen Caine received his Bachelor of Science degree in Engineering in 1962 from George Washington University. After graduation, he started his long career path in electromagnetic compatibility with RCA Services, where he worked on shipboard EMC and RADHAZ testing projects between 1962 and 1964. Steve went into government service in 1964 with the Navy Bureau of Ships. Not long after making this career move, he was appointed chairman of the Tri-Service Committee that developed the original versions of MIL-STDs 461 and 462.

When his BUSHIPS function was transferred to NAVELEX in 1966, Steve moved to the NAVELEX EMC Branch, where among other EMC projects, he chaired the Tri-Service Committee developing MIL-STD-469 (the Radar Engineering Design Standard). From 1969 to 1982, Steve served as secretary of the American National Standards Institute (ANSI) C-95 Committee on Radio Frequency Radiation Hazards.

He also founded NAVELEX's EMC Improvement Program (EMCIP), originally organized to investigate and resolve fleet EMI problems involving NAVELEX's (now SPAWAR) product lines and inter-platform EMI problems. EMCIP, the NAVSEA Shipboard EMC Improvement Program (SEMCIP), and NAVAIR's Air Systems EMI Corrective Program (ASEMCIP) have since cooperatively addressed the identification, documentation and correction of mission degrading EMI problems throughout the fleet. It was during this period that Steve spearheaded the development and coordination of the first version of MIL-HDBK-237, providing guidance to the acquisition community on early, formal planning for prevention of operational E<sup>3</sup> problems throughout the system's or platform's service life.

As his position evolved during organizational changes in the Navy, Steve evolved as leader of SPAWAR's expanded E<sup>3</sup> organization, in which development



**WILLIAM G. DUFF**  
**ASSOCIATE EDITOR**

and upgrading of EMC standards remained an integral part. Steve has headed up the EMC Branch or Division of SPAWAR's E<sup>3</sup> office since 1986.

Since 1988, he served as the U.S. delegate to NATO Special Working Group 10 on E<sup>3</sup>, and U.S. Project Officer for an International Exchange Program on EMI with the U.K. He had a major input in developing NATO Standardized Agreements (STANAGS) 4435, 4436 and 4437 on EMI requirements and test procedures for metallic hull surface ships, non-metallic hull surface ships, and submarines, respectively.

From May 1989 to September 1992, he served as the Navy's Deputy Director of the OSD Joint Service EMI test project (JEMI). In conjunction with this Joint Services project, Steve managed the development of the initial Capability Joint Spectrum Management System (JSMS), which was used to support Desert Storm and Operation Provide Comfort. Steve initiated projects that have evolved into recognized tools of the E<sup>3</sup> trade, e.g., the Battle Force EMI Evaluation System (BEES)- a combined wargaming and engineering analysis system to assess the impact of EMI on Navy, joint and combined (international) operations; and ASPECTS, which is the Navy's program for communications



planning and frequency management (of radar and communications systems).

Most recently, Steve chaired the TRI-Service working group that prepared major revisions to MIL-STD-461D/462D, which were published in January 1993. He has continued his emphasis on taking extra care that MIL-STDs are coordinated with industry EMC committees in the EIA, SAE, IEEE, and ANSI professional organizations. He continues to lead panel sessions during professional and international military symposiums to ensure that the implications and applications of MIL-STDs 461/462 are understood.

Numerous training courses and audiovisual aids on military standards, E<sup>3</sup> planning, acquisition and problem solving have been developed under his direction, and annotated in several languages.

In 1992, at the IEEE Symposium in Anaheim, CA, Steve, a NARTE certified EMC engineer, received formal recognition by the IEEE EMC Society for his long-standing efforts in promoting commonality between military and industry EMC standards that recognize and serve both the unique and common requirements of civilian and military acquisition in the rapidly changing '90s.

Residents of Springfield, VA, Steve and his wife, Marilyn have two children, Edward and Shana. An avid league bowler for over thirty years, Steve also coached boys' and girls' soccer teams from 1973 to 1985. His girls' traveling team won both national and international tournaments in 1983 and 1985. He has been regularly active in community affairs, serving as chairman, vice president and treasurer of various local civic associations throughout his long career in the Northern Virginia area.



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**APPLICATION:** Further information and application forms can be obtained by calling Chris J. Brantley at (202) 785-0017, by faxing (202) 785-0835, by electronic mail to c.brantley@ieee.org (Internet), or by writing:

**Congressional Fellows Program  
IEEE United States Activities  
1828 L Street, N.W.  
Washington, D.C. 20036-5104**

**Applications must be postmarked no later than March 31, 1994 to be eligible for consideration.**

# 1993 IEEE INTERNATIONAL SYMPOSIUM ON EMC



*Mark Nave sets a new high score in the "quick draw" contest held at Tuesday evening's "Evening at the Ranch."*



*Dick Hess tests his skills at one of the games hosted by EMCO (more to the right Dick!).*



*EMCS Secretary Janet Nichols O'Neil was recognized for sustained contributions to the EMCS.*



*An EMCS Certificate of Appreciation was presented to Joe Butler for revitalizing and furthering the RAC.*



*Awards chairman Pat Coles (r) presents Ed Bronaugh (past EMCS President) with an award for his outstanding standards work.*



*EMCS President Bob Hofmann (r) presents a Certificate of Appreciation to Symposium Chairman Ed Vance.*



*FCC's William Luther, the keynote speaker, discussed "Negotiated Rulemaking in Government."*



*An EMCS Certificate of Appreciation was presented to Wilf Lauber for development of the technical committees.*





*Becky Patterson (l) displays a prize (Stetson Cowboy hat) to Jeff Horlick of NIST.*



*Electronic Industries Association G-46 Chairman John Windell (l) presents a special Certificate of Appreciation to Ken Javor for his outstanding work on the new EIA document, "A Historical Rationale for Military EMI Limits."*



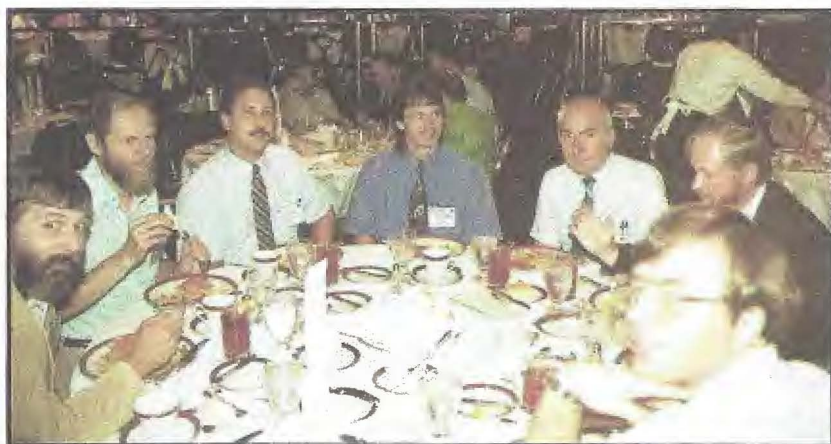
*A "pro" in action! Are you taking notes, Dick?*



*Kimball Williams was honored for furthering the objectives of the EMC Society Education Committee.*



*Dr. Paul Clayton received the Richard R. Stoddard Award for his contributions to furthering EMC education.*



*Mike Hatfield (r, hand extended) explains his latest theory on mode stirring to folks mainly focused on the outstanding food served at the Grand Kempinski.*



*Glen Watkins (l) presents Franz Gisin one of the many prizes won at the EMC Publishers Reception.*

Photos: DICK FORD



# IEEE EMC SOCIETY QUESTIONNAIRE RESULTS — 1993 SYMPOSIUM

H. R. HOFMANN

At its November 6 and 7, 1993 meeting, the EMC Society Board of Directors will review the results of the attendee survey distributed during the August 1993 Dallas, TX Symposium. The summary I will present to the Board is also reproduced below so that members will have a copy of the presentation to the board.

Due to our vigorous efforts to obtain responses, we received a total of 287 forms by the conclusion of the Dallas symposium. This is a tremendous increase over previous years. A majority of the forms were from EMC Society members. Although they may not be truly representative of the more than 4000 members of the Society, they nevertheless represent an appreciable portion of the membership and their views are important. An additional scientific survey of Society members worldwide is being developed, and it will be interesting to compare the results of the two surveys.

As I indicated to those present at Dallas, the Board is going to study the responses and use them to help in our planning process. I will be passing all 287 actual response forms to our newly-elected President at the conclusion of the November meeting for his review. Also, copies of those forms containing comments on the newsletter have been sent to the newsletter editor, and copies of those containing comments on the Transactions have been sent to the Transactions editor. Some forms were only partially filled out, some questions were not applicable to all respondents, etc., and so the total responses for each question varied from 100% to about 90%. To simplify the results, responses are normalized to 100% for each question.

I personally read every one of the 287 forms, some several times, and noted the specific comments as written in, and, as far as possible, paraphrased the comments into as few different categories as made sense. Many of the responses were repeated several times, and those that appeared multiple times have a (Number) following the response to indicate the number of times that particular response was given.

Your comments are welcomed. Please send them to: Bob Hofmann, Room 2B-220, AT&T-Bell Labs, 2000 North Naperville Road, Naperville, IL 60566. Please note that this report deals only with membership/publications/symposia issues. The information/salary portion of the survey responses has been copied and sent to Bill Johnson for him to prepare the salary survey for the newsletter early next year.

1. *Are you an IEEE member?*

Y-69%, N-31%

An EMC Society member? Y-64%, N-36%

2. *If you have a "local" EMC Society chapter, do you attend the meetings?*

All-17%, Most-31%, Some-36%, None-16%

*Comments:*

Chapter programs are excellent (20)

Time conflicts with meeting time (18)

Driving distance too far (18)

Need better topics/speakers (16)

Attend meetings to network with other engineers/  
keep up to date on EMC events (14)

Need more advance notice/publicize schedule/have  
regular schedule of meetings (12)

Chapter programs are not interesting to me (8)

Use national/distinguished lecturers more often (5)

Encourage local members to attend chapter meetings (4)

Encourage students to attend chapter meetings (2)

Use symposium topics for chapter topics/speakers (1)

Make video tapes of chapter meetings to send to  
"overseas" chapters (1)

3. *If you do not have a "local" EMC Society chapter, would you be interested in helping to form a chapter? We obtained names of several interested individuals and they will be contacted.*

4. *Do you read the quarterly newsletter?*

All-37%, Most-40%, Some-22%, None-1%

*What do you find interesting in the newsletter?*

Technical articles (24)

Late-breaking news (18)

Board of Directors' news and activities (17)

Everything (17)

People news/personality profiles (15)

Education related news (4)

Point/counterpoint (4)

Editorials (3)

*What do you look for in the newsletter?*

Standards/regulatory news (24)

Information on new books, emcabs (21)

Meeting/event schedules (19)

Late-breaking technical news (15)

Chapter information (12)

Practical articles (12)

PC applications (1)

*What could the newsletter editors do to encourage feedback from readers?*

Encourage questions/letters to the editor section (13)

Write editorials on, and encourage feedback on  
controversial subjects (12)

Put in a "postpaid Bingo" form (8)

Have a reader survey on a particular subject (8)

Publish E-mail addresses/have a bulletin board (3)

Solicit technical articles, especially from Symposia  
authors (3)

- Offer a "lottery" prize for the best response to a given topic (3)  
 Have guest authors (1)  
 Publish EMC articles for beginners (1)
5. *Do you read the EMC Society Transactions?*  
 All-15%, Most-27%, Some-52%, None- 6%
- What kinds of articles do you read in the Transactions?*  
 Technical/practical/application-oriented articles (36)  
 Measurement/testing articles (14)  
 Measuring method articles (11)  
 Numerical modeling articles (11)  
 Articles are too theoretical (10)  
 Shielding articles (8)  
 OATS/antenna articles (8)  
 Absorber/GTEM articles (4)  
 ESD/EMP/lightning articles (3)  
 Radiation hazard articles (1)
- What kinds of articles would you like to see in the Transactions?*  
 Practical application-oriented articles (49)  
 Modeling vs. actual measurement results (14)  
 Computational models/numerical methods for PCs (10)  
 EMC design (10)  
 Antenna calibration (5)  
 Environmental/biological issues (5)  
 New theories (4)  
 Measurement techniques (3)  
 ESD (2)  
 Military/aircraft EMC (2)  
 Hi-frequency EMC (1)
6. *How can the EMC Society help you in your career?*  
 Espouse certification/accreditation (50)  
 Provide technical educational opportunities (48)  
 Continue to have a high-quality symposium (20)  
 Job placement/networking services (17)  
 Emphasize importance of EMC to industry leaders (14)  
 Continue to publish a good technical journal (11)  
 Provide career planning (6)  
 Support standards (4)  
 Make information available to "overseas" chapters (2)  
 Reduce age/sex discrimination (2)  
 Promote chapter activities (2)  
 Fund research projects (1)
- What issues/actions/policies should the EMC Society Board of Directors be addressing on behalf of the Society members?*  
 Address transnational standards harmonization (24)  
 Promote EMC education for engineers and management (23)  
 Promote biological/health issue studies (10)  
 Support professional certification/accreditation (8)  
 Promote EMC to the general public (4)  
 Help to cut IEEE HQ fees (4)  
 Lobby for portable pension, retirement benefits (3)  
 Symposium quality varies from year-to-year (3)
- Set up a job post/help fund unemployed EMC engineers (3)  
 Promote chapter activities (2)  
 Promote product safety (2)  
 Minimize government intervention (2)  
 Avoid involvement in "social" issues (1)  
 Participate in frequency allocation talks (1)  
 Promote hi-frequency EMC (1)  
 Put best symposium papers in the Transactions (1)
8. *Pent-up opinions/ideas/gripes/suggestions about EMC activities you want to tell the board.*  
 Encourage minorities and younger members to become active in the Society (8)  
 Problems with overlapping symposia workshops/session scheduling (6)  
 Board is doing ok, keep up the good work (6)  
 Could not read handwriting (5)  
 Employers pressure engineers to pass products with high emissions (3)  
 Board of Directors too elitist/won't talk to peons (2)  
 West Coast is poorly represented on BoD (2)  
 Help to pay for new/younger EMC Society members to attend symposia (2)  
 IEEE membership cost too high (2)  
 Develop an EMC course on video tape (1)  
 Continue the EMC education manual demonstrations at the symposium (1)  
 Promote more practical EMC activities (1)  
 Beware of any conflict-of-interest activities (1)  
 IEEE HQ spends too much time and money promoting insurance (1)  
 Too much emphasis on 1-2 dB accuracy (1)  
 Need more emphasis on automotive EMC (1)  
 Sell pins? at IEEE booth (1)  
 Lunch at BoD meetings is only for BoD members, visitors are resentful (1)  
 Symposia exhibit hours too long (1)  
 Symposia exhibit hours too short (1)  
 Provide an IEEE EMC Society review committee for non-IEEE EMC publications to ensure accuracy of published articles (1)  
 Send advance programs to all last year's symposia attendees (1)  
 Symposia registration starts slowly (1)  
 Use electronic VGs at symposia (1)
9. *Do you like the 1993 Symposium format with Monday and Friday workshops?* Y-90%, N-10%
- Include workshop fees in registration, make handouts for all attendees (M)  
 Only have one day of workshops - five days overall too long
10. *Do you like skipping the Tuesday plenary session for additional technical sessions?* Y- 50%, N-50%
- Have plenary sessions if an outstanding EMC speaker (8)  
 Short session with no speaker (4)

## IEEE EMC SYMPOSIUM SPECIAL SESSION: EMC DEMONSTRATION EXPERIMENTS

ANDY DROZD  
SUBCOMMITTEE CHAIR FOR  
EMCS EDUCATION COMMITTEE

For the first time in its history, a new and different kind of session has been added to the IEEE EMC Symposium agenda. This session entitled "Special Session D1: EMC Demonstration Experiments," is devoted to demonstrating physical experiments which illustrate fundamental EMC concepts and principles in an interesting, innovative, and educational way. The session, which is planned and sponsored by the IEEE EMC Society Education Committee, premiered at the August 1993 EMC Symposium held at the Grand Kempinski Hotel in Dallas, TX.

According to the majority of those who attended the symposium and witnessed the special session experiments, the newly-added feature was considered a tremendous success, and one which provided an interesting extra dimension to the symposium.

The purposes for including this special session as part of the conventional symposium format are to educate and inform novices on the EMC field, and to provide an interesting refresher to veteran EMC technologists. The experiments demonstrated at the Dallas symposium were largely based on the "EMC Education Manual: Experiments and Demonstrations in Electromagnetic Compatibility," prepared by the IEEE EMCS Education Committee and edited by Henry Ott and Clayton Paul. Invited experiments not currently included in this manual were also successfully demonstrated. These additional experiments illustrated real-world EMC concerns and solutions applicable to the power supply and automotive industries, for example. Promoting the development of additional, innovative experiments to augment the ones presently described in this manual, as well as to illustrate other EMC concepts and phenomena not currently covered, is yet another reason for conducting this special session.

At the Dallas symposium, a total of nine diverse experiments were demonstrated by ten individuals. The list of experiments and presenters is as follows:

"Crosstalk in Cables," designed and demonstrated by Dr. Clayton R. Paul, University of Kentucky, Lexington, KY.\*

"Magnetic-Field Coupling of Current Loops," designed and demonstrated by Dr. Jasper J. Goedbloed, Philips Research Labs, Eindhoven, the Netherlands.\*

"The Thinking Engineer's Voltage Measurement," designed and demonstrated by Dr. Andy Marvin, University of York, UK and demonstrated by Dr. Clayton R. Paul, University of Kentucky, Lexington, KY.\*

"Field-to-Cable Coupling and Bulk Current Injection: Some Important

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*\*Note: Based on the "EMC Education Manual: Experiments and Demonstrations in Electromagnetic Compatibility," prepared by the IEEE EMCS Education Committee.*



Photo: DICK FORD

*Ken Javor (r) explains his experiment while Mark Nave "waits on deck." The experiments manual demonstrations were very popular with symposium attendees.*



Parameters Not Considered in Automotive BCI Limits and Test Procedures," designed and demonstrated by Mr. Ken Javor, EMC Compliance, Huntsville, AL.

"Filter Development Using Conduction Mode Isolation," designed and demonstrated by Mr. Mark Nave, EMC Services, Huntsville, AL.

"Non-Ideal Behavior of Circuit Components," designed and demonstrated by Dr. Donald D. Weiner, Syracuse University, Syracuse, NY.

"A Concise Description and Experimental Demonstration of the Damaging Effects of EOS/ESD," a variation on an experiment designed by Tony Nasuta, Westinghouse Electric Corporation, as demonstrated by Dr. Maqsood Mohd, Sverdrup Technologies, Eglin AFB, FL, and M. Issa and M. Ahmed, Oklahoma State University, Stillwater, OK.\*

"Electromagnetic Leakage Through Seams and Gasketed Joints," a variation on an original experiment designed by Richard J. Mohr, R.J. Mohr Associates, Inc. as demonstrated by Mr. George M. Kunkel, Spira Manufacturing Corporation, N. Hollywood, CA.\*

"Effect of Pulse Rise/Fall Time on Signal Spectra," a variation on an original experiment designed by Dr. Clayton R. Paul, and demonstrated by Mr. Richard T. Ford, Naval Research Lab, Washington, DC.

The experiments were set up in exhibit booth style and situated near the registration desk exhibit entrance and IEEE membership booth in order to optimize exposure of and access to the setups for symposium onlookers. This arrangement encouraged audience participation and promoted discussions with the presenters while they were conducting their

experiments. The format in which each experiment was demonstrated also tested the presenters' abilities to play the role of "spin doctor" by performing impromptu and clever variations of their demonstrations (no, not magic tricks) and experimental setups in response to audience questions. Due to its success, our current plans are to continue this type of Special Session format for the 1994 Chicago EMC Symposium and beyond. We will also be looking to demonstrate other diverse experiments in the future.

Heartfelt thanks and appreciation go out to all who supported the idea of the special session and who did a great deal of preparation behind the scenes to assure a technically worthy, successful, and of course, enjoyable event. This preparation included: the planning assistance and moral support given by Kimball Williams, Chairperson of the EMC Society Education Committee, and Clayton Paul, previous Committee Chairman, both of whom were very instrumental in getting the initial concept off the ground; the Special Session Subcommittee members who provided much-needed assistance and guidance from beginning-to-end (you know who you are); the coordination provided by Joe Stanfield and Dick Schultz of the Symposium Exhibits and Technical Sessions Committees, respectively; and the encouragement of Ed Vance, the Dallas Symposium Committee Chairman.

Of course, special recognition and thanks goes out to the presenters who did an excellent job, and the equipment suppliers who donated their impressive, state-of-the-art hardware as well as personal support to the cause. Needless to say, without the help of the equipment suppliers, the task of putting on the session would have been much more difficult. In particular, appreciations go to: Bob Swarts and Henry Benitez of Tektronix, and Tektronix

representatives Al Guarino and Roger Williams; Al Wilcox of Hewlett-Packard; Phil McDouall and Jack Cowper of Rohde & Schwartz, Inc.; Mary Laxon and Bill Grindele of Fluke & Philips; and last but not least, Henry Ott of Henry Ott Consultants for use of the "Curly" box for Demonstration #3. Their assistance in coordinating the use of the various pieces of equipment was invaluable. Their continued participation and support for future symposia is encouraged.

Finally, we extend recognition and thanks to the IEEE EMC Society members who had originally proposed the idea of such a session and who helped promote it at the top ranks of the EMC Society.

The IEEE EMC Society Education Committee is currently preparing for next year's Special Session. Thoughts from the membership and EMC community at large are welcome regarding the possibility of additional experiments or ideas for the future. Please contact:

Andrew Drozd  
Kaman Sciences Corporation  
258 Genesee Street  
Utica, NY 13502  
(315)734-3608 (day phone)  
(315)734-3699 (fax)

Next stop: Chicago — See you there!

**MESSAGE FROM THE PRESIDENT . . .**  
*Continued from page 1*

I am optimistic that these challenges will be met. Our Board and committees will have many new members next year, and I expect that these members will seize the opportunities they will have to move the Society forward. If you are requested to help, please respond. If you have some ideas or concerns, let some member of the Board know. Their names and contacts are listed in the front of the newsletter. The Society can only function if we all work together.

## MANPOWER COMMITTEE CONTINUES TO CHALLENGE THE U.S. DEPARTMENT OF LABOR'S LMI PROJECT

On behalf of IEEE's U.S. members, USAB Chairman Charles K. Alexander wrote to members of the House and Senate Judiciary Committees on July 1. Alexander's letter supported Labor Secretary Robert Reich's request to the House and Senate Judiciary Committees that a statutory requirement for a Labor Market Information (LMI) Pilot Program be removed from the Immigration Act of 1990.

"It should be clear from the adverse comments received by the Labor Department that the LMI Pilot Program ought to be terminated," Alexander said. The proposed program could seriously damage the careers of U.S. scientific and engineering professionals by allowing foreign nationals in certain occupations to receive expedited permanent resident status in the United States.

IEEE-USA also urged the Department of Labor to delay further implementation of related rulemaking until Congress can thoroughly review the matter at hearings and develop appropriate legislative recommendations.

The Manpower committee sent a Legislative Alert to volunteers and contacts in other concerned organizations, including an update on recent developments, and asked them to terminate the LMI Pilot Program by writing to one or more members of the Judiciary Subcommittees that handle immigration issues. Changed economic circumstances, including increased unemployment in scientific and engineering fields, is the primary justification for recommending that the program be repealed or amended. (*IEEE USA Hot Lines*, Vol.10, No. 8 September 1993)

## METRIC POLICY

The following IEEE metric policy, prepared by the IEEE Metric Policy Committee, is being submitted to the IEEE BoD for review and possible approval. Comments on the draft are welcome and should be sent to Edwin Bronaugh, The Electro-Mechanics Co., P.O. Box 1546, Austin, TX 78767, FAX: (512)835-4729, or to Anne O'Neill, Staff Engineer, IEEE, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. FAX: (908)562-1571.

### 9.20 — IEEE METRIC POLICY (draft July '93)

All IEEE Organizational Units shall:

- A. Actively support the use of the International System of Units (Le Systeme International d'Unités, or SI), the modernized metric system.
- B. Follow SI-based metric practice as detailed in IEEE Standard 268, *American National Standard for Metric Practice*, to express measured and calculated values of quantity in all IEEE publications, including standards.
- C. Promote the understanding and use of SI in education at all levels, both within the profession and in society at large.

Plans for implementation of this policy by January 1, 1998, at the latest, shall be developed by the major boards of the Institute and reported to the Board of Directors no later than January 1, 1995. Necessary exceptions to this policy, such as where a conflicting world industry practice exists, must be evaluated on an individual basis and approved by the responsible major board of the Institute for a specific period of time. The major board responsible for the publication or activity will be responsible for monitoring compliance.

# WORLDWIDE EMC STANDARDS

Presented by members of the IEEE EMC Society at the Tenth International Zurich EMC Symposium in March, 1993, *Worldwide EMC Standards* comprises tutorial papers. Articles address military and commercial EMC standards, international standards, EMC education, and EMC requirements for ISM. The cost is \$20.



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AKIO MORITA, CHAIRMAN AND CEO  
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• THE IEEE PROVIDES NEC WITH AN INTERNATIONAL DIALOGUE THAT IS ESPECIALLY IMPORTANT TO US IN OUR TASK OF MAKING THE INTEGRATION OF COMPUTER AND COMMUNICATIONS TECHNOLOGY A REALITY. THE INSTITUTE KEEPS OUR ENGINEERS IN TOUCH WITH THE LATEST IN LEADING-EDGE TECHNOLOGY, HELPING US TO COMPETE IN THE WORLDWIDE MARKETPLACE.

KOJI KOBAYASHI, CHAIRMAN EMERITUS  
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TA-93

**YOUR IEEE MEMBERSHIP - THE PROFESSIONAL AND TECHNICAL EDGE**



Following are abstracts of papers from previous EMC Symposia, other conferences, meetings and publications.

## EMCAB COMMITTEE

Mike Crawford, NBS

Bob Hunter, Texas Instruments

R. M. Showers, Univ. of Pennsylvania

Yoshio Kami, Univ. of Electro-Communications

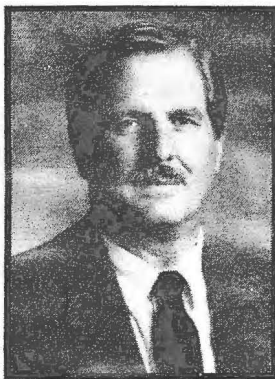
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Ferdy Mayer, L.E.A.D., Maisons, Alfort, France

Diethard Hansen, Euro EMC Service, Switzerland



**WILLIAM H. MCGINNIS**  
ASSOCIATE EDITOR

Also, the steering staff of the Japan Technical Group and the EMC-J Tokyo chapter have offered to act as a central point for requests of papers abstracted here. Most of the papers will be available in Japanese only. The steering staff will assist in routing your request to the author(s) but will not do translating of the papers. The contact person is Prof. Yoshio Kami, the University of Electro-Communications, 1-5-1, Chofugaoka, Chofu-Shi, Tokyo 182, Japan. Abstracts of papers from EMC-J will be clearly identified.

Some of the Chinese papers are not available in English. Associate Professor Sha Fei, EMC Research Section, Northern Jiatong University has offered his time and assistance in routing requests for papers to the appropriate author(s). He is not furnishing a translation service.

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 requesters in getting the information or contacting the author(s). The library at Southwest Research Institute, 6220 Culebra Road, San Antonio, Texas, 78228-0510 has agreed to catalog, shelve, and have available for interlibrary loans proceedings from symposia and meetings which are donated to the library. Any such donations can be sent to me at the above address and I will review them for suitable articles and then forward them to the SWRI library. We are particularly interested in symposium proceedings which have not been available for review in the past. Neither the abstractors nor myself have a budget for acquiring proceedings; we rely on those we receive through attendance at symposia and from various subscriptions. Thank you for any assistance you can give in expanding the EMCS knowledge base.

## "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 or 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, 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.

# EMC TRANSACTIONS EDITOR

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**COMPACT ELECTROMAGNETIC TEST RANGE USING AN ARRAY OF LOG-PERIODIC ANTENNAS****EMCABS: 01-11-93**

P.S. Excell, N.N. Jackson and K.T. Wong  
Dept. of Electrical Engineering, Univ. of Bradford, Bradford, West Yorkshire BD7 1DP, UK  
(Wong is now with Asia Satellite Telecommunications Co. Ltd., Hong Kong.)  
IEE Proceedings — H  
Vol. 140, April 1993, pp. 101-106

*Abstract:* The work of D.A. Hill and others at NIST on near-field plane wave synthesis is applied to a compact range, previously reported by the authors, to provide an immunity/susceptibility test facility. The use of Yagi-Uda antennas rather than the reflector types frequently used in compact ranges solves a frequency limitation problem. Numerical pattern synthesis techniques led to a magnitude-only approach for the array element excitations with little loss of planarity. The theory was verified by an experimental range that was built and tested.

*Index Terms:* Array synthesis, near-field plane waves, compact ranges, immunity/susceptibility testing, numerical pattern synthesis, Yagi-Uda antenna arrays

**THE EMC SOCIETY CONTRIBUTION TO EMC STANDARDS****EMCABS: 02-11-93**

Edwin L. Bronaugh  
The Electro-Mechanics Company, Austin, Texas  
Tenth International Zurich EMC Symposium  
Worldwide EMC Standards, 8 March 1993, pp. 1-6

*Abstract:* This paper discusses how the IEEE Electromagnetic Compatibility (EMC) Society is involved in both international and United States domestic standards development and writing. It discusses the organization of the Institute of Electrical and Electronics Engineers (IEEE) and the EMC Society as it applies to EMC standards. Also shown is the interaction of the EMC Society, ANSI-ASC C63, the SAE Land Vehicle and Aerospace Standards Committees, the IEC/CISPR and the ISO.

*Index Terms:* Standards, international societies

**INFLUENCE OF IEC WORK ON NATIONAL ELECTROMAGNETIC COMPATIBILITY STANDARDS****EMCABS: 03-11-93**

R.M. Showers, Emeritus Professor of Electrical Engineering  
University of Pennsylvania, Philadelphia, PA 19104-6390  
Tenth International Zurich EMC Symposium  
Worldwide EMC Standards, 8 March 1993, pp. 7-12

*Abstract:* Originally, work at the national level took the lead in the development of EMC standards. In more recent times, work at the international level has begun to move to the forefront. In part this has been due to changes in the phenomena of concern (immunity vs. emission) and in part due to regulatory actions. In the future international efforts can be expected to dominate, but national activities will continue if for no other reason than to assist in developments at the international level.

*Index Terms:* IEC, national standards

**MILITARY EMC STANDARDIZATION****EMCABS: 04-11-93**

Herbert K. Mertel  
EMACO Product Service, 7562 Trade Street, San Diego CA 92121  
Tenth International Zurich EMC Symposium  
Worldwide EMC Standards, 8 March 1993, Pages 13-30

*Abstract:* This paper traces the history of military EMC specifications and presents details of the newest MIL-STD-461 and MIL-STD-462 requirements to be released in 1993. It compares various national specifications and graphically demonstrates new considerations of MIL-STD-461.

*Index Terms:* Military EMC

**COMMERCIAL EMC STANDARDS IN THE UNITED STATES****EMCABS: 05-11-93**

Donald N. Heirman  
AT&T Bell Laboratories, Holmdel, NJ, 07733-3030  
Tenth International Zurich EMC Symposium  
Worldwide EMC Standards, 8 March 1993, Pages 31-43

*Abstract:* With the proliferation of high-speed computers with associated fast rise time clocks used next to sensitive electronics, all immersed in a typical RF environment punctuated by TV and radio broadcast transmitters, the need to design electromagnetic compatibility (EMC) into products has intensified. Meeting mandatory and contract-imposed EMC requirements is an important consideration. The regulatory requirements abound in national and regional areas such as the European Community (EC) where its EMC Directive has imposed emission and immunity essential requirements. To show conformance to these regulations and requirements implies that a measurement regime is needed that is repeatable and accurate. This paper will highlight a series of standards published in the USA that concentrate on methods of measurement for a host of conditions and products. The standards of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE) are particularly addressed as typical of the USA commercial EMC standards.

*Index Terms:* Commercial US EMC standards

**EMC REQUIREMENTS FOR ISM****EMCABS: 06-11-93**

Daniel D. Hoolihan  
AMADOR Product Service, Taylors Falls, Minnesota  
Tenth International Zurich EMC Symposium  
Worldwide EMC Standards, 8 March 1993, pp. 45-53

*Abstract:* Rules on electromagnetic emissions from Industrial, Scientific and Medical Equipment (ISM) have been in existence for years in both the United States and internationally. The purpose of these rules on electromagnetic emissions is to prevent interference to authorized (licensed) communication services. Recently, international requirements have begun to appear in the electromagnetic immunity area especially with respect to specialized medical and scientific equipment.

This paper briefly reviews the history of ISM equipment, summarizes the status of electromagnetic compatibility (EMC) requirements on ISM and proposes some future directions for EMC in relation to ISM.

*Index Terms:* ISM EMC standards

# **INTERNATIONAL SYMPOSIUM ON EMC, ST. PETERSBURG, RUSSIA**

**WILLIAM DUFF**  
ASSOCIATE EDITOR

I recently had the opportunity to attend and participate in the International Symposium on EMC in St. Petersburg, Russia. The Symposium was held at the St. Petersburg Electrotechnical University during the week of June 21, 1993. The chairman of the symposium was Professor Yuri B. Zubarev, Director of the Radio Research Institute. Professor Victor I. Vinokurov was the chairman of the Program Committee. The symposium organizers included the State Committee for Science and Higher Education; Academy of Science of Russian Federation; Ministry of Telecommunication; Electrotechnical University, St. Petersburg; Stock Company "Innovation of Leningrad Institutes and Enterprises" (ILIP); and Russian Stock Exchange "Intellect."

The symposium featured technical sessions on the following topics:

- Spectrum Utilization
- Certification and Standards
- Analysis, Modeling and Prediction
- Radio Communication, Radio Location and Radio Navigation
- Electromagnetic Fields and Propagation
- Antennas, Filters and Microwave Equipment
- Design and Development of Equipment
- Immunity
- Methods and Means of Measuring and Testing
- EMC in Vehicles
- Electromagnetic Pulse
- Power Engineering
- Biological Effects

Papers were delivered in Russian and English and simultaneous

translation was provided. A two-volume printed transaction was provided to all attendees.

The technical program also included a guided tour of a test site with large EMP simulators on Friday, June 25, 1993.

In addition to the technical program, there was an excellent social program that included a cocktail reception, a riverboat sightseeing excursion of St. Petersburg, an evening at the ballet, and a dinner banquet with an excellent meal and many toasts to the success of the symposium and international cooperation.

Approximately 300 individuals attended the symposium. About 10 percent of the attendees were from outside of Russia.

Overall, my impressions of the symposium were very positive. The symposium committee provided an extensive technical program and a number of good technical papers were presented. The only problem was that on the first day there were 13 parallel sessions and this made it difficult to attend all of the papers of interest. The administrative staff did an outstanding job of organizing and coordinating all of the symposium-related activities. In particular, Ms. G. Volkova, the ILIP Exhibition and Competitive Manager, was very hospitable and helpful.

St. Petersburg is a beautiful city with many tourist attractions and cultural activities. It was a good location for the symposium.

The symposium committee is planning to hold the next symposium in June of 1995. I hope that I can attend it. Maybe I will see you there.

# **IEEE SCV EMC-94 "PRODUCT COMPLIANCE, UNDERSTANDING THE FUNDAMENTALS"**

The IEEE EMC Society, Santa Clara Valley Chapter, is hosting a two-day colloquium March 29-30, 1994. This conference will emphasize a fundamental understanding of electromagnetic compatibility (EMC) and product safety. Both technical sessions and state-of-the-art exhibits will be offered. Practical demonstrations are also planned.

The technical sessions will cover the following:

- Fundamentals of EMC
- Compliance Management
- PC Board EMC Layout
- EMC Emissions Measurements
- Shielding and Cabling Design
- EMC Troubleshooting
- Compliance Standards Review
- Product Safety Design and Test
- Telecom
- EC (European Community) EMC and Product Safety Issues

Registration fees are \$30 for IEEE Members, \$35 for non-IEEE members. For further information, contact Darryl Ray at (408)974-6257. For registration information contact Ghery Pettit at (408)285-2528. For exhibit information, contact Jim Duckett at (415)390-5277.



#### A TOOL FOR EMI FILTER DESIGN: SELECTABLE MODE REJECTION NETWORK

EMCABS: 07-11-93

See Kye Yak

ASTEC Custom Power (S) PTE Ltd, 514 Chai Chee Lane, #02-01, Singapore 1646, R. of Singapore  
IEMCS-92, International EMC Symposium, Singapore, Republic of Singapore  
7-9 December 1992, Pages 17-24

*Abstract:* A line impedance stabilization network (LISN) interfaces the power utilities and the Equipment Under Test (EUT), providing repeatable measurement for conducted emissions in the live and neutral lines of the EUT. It has been used as a standardized network for conducted emissions measurement. However, a LISN measures only the total contribution of common mode (CM) and differential mode (DM) emissions in the live or neutral line. It cannot differentiate whether the emissions is CM or DM in nature. A selectable mode rejection network (SMRN) based on C.R. Paul's design was constructed. This paper describes a systematic approach in power line EMI filter design with the aid of a SMRN.

*Index Terms:* Line filters, Selectable Mode Rejection Network

#### RESONANT POWER CALIBRATION OF RECTANGULAR SHIELDING ROOM FOR ACCURATE RADIATION MEASUREMENT

EMCABS: 08-11-93

Jeffery Fu (1), Kwang-tien Tung (2), Emily Choo (1), and Ping Hui (1)

(1) School of E&EE, Nanyang Tech U., Singapore 2263, (2) Chung Shan Inst. of Science and Tech, Lung Tan, Taiwan 325, China  
IEMCS-92, International EMC Symposium, Singapore, Republic of Singapore  
7-9 December 1992, pp. 26-31

*Abstract:* This paper describes a calibration method which will prevent shielding room resonant frequencies from affecting the accuracy of the radiated power measured. Measurement was performed using a 30 to 70 MHz transmitter/receiver set in a shielding room with dimensions of width = 4.952 m, length 7.452 m, and height = 3.600 m. A highly shielded coaxial cable was first used as the calibration transmission medium between the transmitter and the receiver. Significant power increment was observed at resonant frequencies with the cable removed. This relative power surge at resonant frequencies can be used to create the calibration data for the enclosure. Accurate testing data can then be obtained by deducting the respective calibrated resonant power from any measured data.

*Index Terms:* Shielded Room Resonants, Radiated Emissions

#### MUTUAL IMPEDANCE CORRECTION FACTORS FOR BROADBAND ANTENNAS FOR A CORRECT & EASY MEASUREMENT OF SITE ATTENUATION

EMCABS: 09-11-93

Dipl. Ing. Manfred Stecher, Muhldorfstr. 15, Munchen, Germany

IEMCS-92, International EMC Symposium, Singapore, Republic of Singapore  
7-9 December 1992, pp. 40-45

*Abstract:* Test sites for the measurement of radiated emissions to commercial EMI standards have to be validated by measuring the normalized site attenuation for various site geometries. Measurement antennas may be either tuned halfwave dipoles or broadband dipoles. Since the antenna factor plays an important role, all antennas have to be carefully calibrated. Antenna factors are defined and calibrated as free-space antenna factors. However, standardized site geometries dictate small separation distances between antennas and ground and between transmit and receive antennas. As a consequence, coupling between antennas and ground and between the antennas influences the normalized site attenuation so that it deviates from the theoretical value. For tuned half-wave dipoles this coupling effect can be calculated and verified by measurement on excellent test sites. For broadband antennas the concept of type-specific mutual impedance correction factors is introduced. These can be measured on a reference site for a certain type of antenna and then applied to other sites using pairs of the same antenna type. The paper shows to what extent the site attenuation measurement can be ameliorized by applying type-specific mutual impedance correction factors.

*Index Terms:* Antennas, Site Attenuation Measurements

#### TESTING FOR IMMUNITY TO MAINS DISTURBANCES: AN INTRODUCTION TO THE PROPOSED NEW EUROPEAN REQUIREMENTS

EMCABS: 10-11-93

Warren Boxleitner, KeyTek Instr. Corp., Wilmington, MA

IEMCS-92, International EMC Symposium, Singapore, Republic of Singapore  
7-9 December 1992, Pages 55-62

*Abstract:* Because of the European Directive, designers of electronic products all over the world are now facing mandatory requirements that their designs be immune to Electromagnetic Interference (EMI). For the Europeans, EMI includes any electrical disturbance that can reasonably be expected to upset or damage electronic products. This includes common disturbances on the AC mains, such as notches, dips, and interruptions in the mains voltage. Although some engineers have done some testing for such effects in the past, the European requirements will be based on new test standards which are presently being developed by the International Electrotechnical Commission (IEC). The tests defined in these new draft IEC standards will simulate the important characteristics of the AC mains in a much more realistic manner than ever before. For example, the inrush drive current in these new tests can exceed hundreds of Amps. Such a realistic inrush drive current capability has never previously been required by a standard. Thus the new tests could cause many electronic products to fail, even though those products survived previous limited tests. This paper provides an introduction to this new field of EMC testing called power failure testing.

*Index Terms:* IEC standards, Immunity Testing

#### A NEW TYPE OF TEM CELL WITH A SLIDING CROSS AS INNER CONDUCTOR

EMCABS: 11-11-93

Weigan Lin

U. of Electronic Science and Technology of China, Chengdu 610054, China  
IEMCS-92, International EMC Symposium, Singapore, Republic of Singapore  
7-9 December 1992, Pages 187-193

*Abstract:* Solved is the problem that Riblet's rectangular line with off-center strip inner conductor is changed into one with a symmetrical cross as inner conductor which can be slid vertically.

*Index Terms:* TEM Cell, Sliding Cross Inner Conductor

#### EFFICIENT CALCULATION OF ASYMMETRIC TEM CELL IMPEDANCE USING BOUNDARY ELEMENT METHOD

EMCABS: 12-11-93

Feng Zhang and Junmei Fu

Dept. of Information and Control Engineering, Xi'an Jiaotong University, Xi'an 710049, P.R. of China

IEMCS-92, International EMC Symposium, Singapore, Republic of Singapore  
7-9 December 1992, Pages 220-222

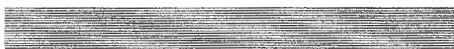
*Abstract:* The electric scalar potential distribution within asymmetric TEM cells are obtained by solving Laplace's equation using a boundary element method (BEM). The method is accurate and covers the metallization thickness and asymmetric cross-section. Calculations can be performed using less computation time and memory.

*Index Terms:* TEM Cell, Impedance Calculation

## 1993 PACE CONFERENCE AND WORKSHOP

The 1993 PACE Conference and Workshop was held in Portland, Oregon during the Labor Day weekend. Approximately 220 people, including members of the United States Activities Board, PACE representatives from sections, councils, regions, divisions, and societies, and guests attended this annual event. The conference was designed to communicate, educate and train PACE leaders. The theme of the 1993 PACE Conference and Workshop was "Survive, Grow, Prosper." Panel presentations on "Jobs, Jobs, Jobs," "Government Policy," and "Benefits" were held.

Martha Sloan, IEEE President, presented a number of critical issues affecting the Institute's professional activities worldwide. A strategic reassessment was begun in 1992 as the Institute seeks ways to better serve its members. The following issues are under consideration:



**POINT & COUNTERPOINT . . . Continued from page 10**

additional expenditures associated with the correction, resubmission and the review of the resubmitted reports.

With respect to the remaining discrepancy 5, its correction, on first blush, seems an undue burden. I say no for three reasons. First, it is important to document credibly that an area is safe for human exposure to electromagnetic fields; otherwise, imperiled is the quality of life. Second, the public wariness with respect to unsafe electromagnetic radiation must be overcome to lessen its adverse impact on telecommunication operational development; incredible measurement reporting aggravates this wariness. Third, the documentation of the analytically determined expected field levels at the measurement sites verifies measurement efficacy.

- How can the Institute's structure better serve the professional needs of all members worldwide?
- How can the Institute minimize conflicts between USAB and Technical Societies? Can the IEEE be both a national professional society for U.S. members, and a global technical society for non-U.S. members?
- Should the IEEE Vice President for Professional Activities also be the Chair of the USAB?
- Who should receive the U.S. members' assessments: USAB, Regions 1 to 6, or both?
- Could USAB dues be optional and still serve the professional needs of all U.S. members?
- Should the IEEE join other engineering and related societies in the U.S. for public affairs activities such as lobbying and educational programs?
- Can any of USAB's existing professional services be provided on an optional basis, for an optional fee?
- Can USAB develop new services such as publications, conferences with proceedings, etc., that can be included on an annual dues bill?
- Should USAB members be selected by U.S. members only?

In addition to the three panel sessions, a number of workshops were held. Subjects discussed in the workshops included: Consultancies, small businesses, section/council-operated jobs/skills banks, cost/benefits of IEEE/USAB to members, programs and resources to help you and your members in handling cover transitions, and pension reform.

## EMC '94/SENDAI

The 1994 International Symposium on Electromagnetic Compatibility will be held in Sendai, Japan, May 17-19. The meeting is sponsored by the Technical Group on EMC of Electronics, Information and Communication Engineers of Japan, and by the Technical Group on EMC of the Institute of Electrical Engineers of Japan. It is co-sponsored by the IEEE EMC Society and its Tokyo chapter.

For information on the symposium, contact: Prof. H. Echigo, Tohoku Gakuin University, Dept. of EE, Tagajo City, Miyagi Pref. 985, Japan. FAX: +81-22-368-7070.

## 11TH INTERNATIONAL ZURICH SYMPOSIUM & TECHNICAL EXHIBITION ON EMC

Electromagnetic compatibility (EMC) is a rapidly growing discipline affecting all fields of electrotechnology, and there is a lively interest in meetings on EMC among scientists and professionals worldwide. The 11th International Zurich Symposium and Technical Exhibition on Electromagnetic Compatibility (EMC Zurich '95) will be held from March 7 to 9, 1995. EMC Zurich is one of the most important conferences on the theme of EMC.

For information call:

Dr. Gabriel Meyer  
ETH Zentrum — IKT  
CH-8092 Zurich, Switzerland  
Phone: (+411) 632 27 90  
FAX: (+411) 262 09 43

## CALL FOR PAPERS FOR EUROEM 94

Electromagnetic environments and consequences is the theme for the EUROEM 94 International Symposium to be held at the Bordeaux-Lac Convention Center, May 30 - June 3, 1994.

A call for papers has been issued. Abstracts must be received by December 1, 1993. For information on the large number of proposed topics, contact: EUROEM 94 Symposium, Technical Program Committee, Centre d'Etudes de Gramat, 46500 Gramat - France. FAX: (33)-65-10-54-33.

## PIERS 1994 CALL FOR PAPERS

The Progress in Electromagnetic Research Symposium (PIERS 1994) will be held July 11-15, 1994, at the European Space Research and Technology Centre (ESTEC) in Noordwijk, The Netherlands, taking place outside the U.S. for the first time.

The main emphasis at this meeting will be on electromagnetic research for remote sensing and space applications. Suggested topics for papers include:

- Active remote sensing
- Passive remote sensing
- Wave propagation
- Antennas
- Devices and materials
- Electromagnetic theory
- Electromagnetic compatibility.

Abstracts must be received by December 17, 1993. For complete information, contact: Mr. Bertram Arbesser-Rastburg, PIERS 1994 Technical Chairman, c/o Mrs. Gonnie Elfering, ESTEC Conference Bureau, Postbus 299, 2200 AG Noordwijk, The Netherlands, Tel: +31-1719-85056. FAX: +31-1719-85658. E-mail: aelferin@vmprofs.estec.esa.nl.

## EMCS SYMPOSIA SCHEDULE

- 1994** Chicago, IL: August 22-26  
Palmer House Hotel  
Bob Hofmann  
(708)979-3627
- 1995** Atlanta, GA: August 21-25  
Marriott Marquis Hotel  
John Rohbaugh  
(404)894-8235
- 1996** Santa Clara, CA: August 19-23  
Santa Clara Convention Center  
Doubletree Hotel  
David Hanttula  
(415)335-1071
- 1997** Austin, TX: August 18-22  
Austin Convention Center  
Hyatt Hotel  
John Osburn  
(512)835-4684
- 1998** Denver: August 9-14  
Radisson Hotel
- 2000** Washington, DC  
Bill Duff  
(703)914-8450

## EMCS COOPERATING SYMPOSIA

- 1994** Sendai, Japan: May 17-19  
Sendai International Center  
T. Takagi  
Tohoku University  
Aoba Aramaki  
Sendai, Japan
- Bordeaux, France:  
May 30 - June 3  
NEMP Symposium  
Ed Vance  
(817)478-5653
- 1997** Shenzhen, China:  
May 21-23
- 1999** Japan: May 15-17
- 2000** Washington, DC  
Bill Duff  
(703)914-8450

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

## CALENDAR 1993

December 15-18  
**4th INTERNATIONAL SYMPOSIUM ON RECENT ADVANCES IN MICROWAVE TECHNOLOGY (ISRAMT-93)**  
New Delhi, India  
Banmali Rawat  
Dept. of Electrical Engineering  
University of Nevada, Reno  
Reno, NV 89557-0153  
(702)784-1457  
Fax: (702)784-6627

## CALENDAR 1994

February 28-March 4  
**PITTCON '94**  
Chicago, IL  
300 Penn Center Blvd., Suite 332  
Pittsburgh, PA 15235-5503  
(800)825-3221

March 29-30  
**SVC EMC 94**  
Santa Clara Convention Center  
Santa Clara, CA  
Contact: David Hanttula  
(415)360-1071  
FAX: (415)962-9439

May 24-27  
**1994 INTERNATIONAL AEROSPACE AND GROUND CONFERENCE ON LIGHTNING AND STATIC ELECTRICITY**  
MESAGO  
Messe & Kongress GmbH  
Rotebuehistrasse 83-85  
D-7000 Stuttgart 1, Germany  
FAX: +49-711-618079

June 27-July 1  
**CONFERENCE ON PRECISION ELECTROMAGNETIC MEASUREMENTS**  
Boulder, CO  
Gwen E. Bennett  
NIST  
325 Broadway  
Boulder, CO 80303  
(303)497-3295



# 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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