

IEEE

EMC SOCIETY



Newsletter

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EDITOR: ROBERT D. GOLDBLUM

DR. ROBERT J. HAISLMAIER June 26, 1929 - January 11, 1992



It is with great sorrow that we mark the passing of a much loved and admired engineer and Fellow of the IEEE.

Dr. Robert J. Haislmaier, Supervisor of the Electromagnetic Effects Branch of the Naval Air Systems Command, passed away unexpectedly on Saturday, January 11, 1992, at his home in Hyattsville, MD. He

was 62 years old. Born in Milwaukee, Wisconsin, he graduated from Marquette University with a master's degree in physics in 1954. He earned a doctorate in physics from Catholic University in 1974 with a dissertation on "Equation of State Using a Lattice Gas Model."

He began his professional career in 1955 at the Naval Ordnance Laboratory/Naval Surface Warfare Center (White Oak Laboratory), working in aerophysics research in the hyperballistics ranges and shock tubes. In 1969 he helped start the new nuclear weapons effects program which included electromagnetic pulse (EMP). He was later assigned as the Naval Material Command sponsored program manager for Electromagnetic Environmental Effects (E³) on weapons,

after which he was promoted to the position of EMP Branch Head.

In 1979 he joined the staff of the Office of the Chief of Naval Operations (OCNO) where he served as the Navy Electromagnetic Interference (EMI) Control Program Coordinator. During his tenure at OCNO, Dr. Haislmaier directed and coordinated the Navy-wide EMI control program, was alternate Navy member of the Interdepartmental Radio Advisory Committee (IRAC), and was an alternate member of the IRAC Spectrum Planning Subcommittee (SPS). In November, 1989, he assumed responsibility as the Supervisor of the Electromagnetic Environmental Effects Branch at the Naval Air Systems Command.

In the course of his work he directed a national team of experts in assessing and measuring target interaction effects of directed energy weapons, pioneered the application of electromagnetic pulse hardening technology to navy ships, aircraft and systems, and participated as an expert on several major electronic and weapon systems.

In a slow-moving bureaucracy it is easy to become frustrated and give up. Not so with Bob Haislmaier. Bob had a sign at his desk which read, "In every project there is a point at which

Continued on page 3

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IEEE NEWSLETTER PUBLICATION SCHEDULE

PUBLICATION DATES	EDITORIAL DEADLINES
May	March 15
August	June 15
November	September 15
February	December 15

Editorial contributions for the May 92 issue should be received by March 15.

BACK ISSUES OF THE EMC NEWSLETTERS ON MICROFICHE

We still have a few sets of the uFiche 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.

(Continued from page 1)

it is time to shoot the engineer and go into production." He maintained a global view of what was needed and what could be done. This view enabled him to develop and set into motion concepts that have not only touched upon but greatly improved working conditions within the civilian and operational communities of the Navy. In particular, his insistence upon adequate training for fleet personnel was just one example of his commitment to build and maintain a strong, effective defense capability for our country.

While he never lost sight of the ultimate goal, he was a consensus leader and a true gentleman in every sense of the word. He never used harsh words or language but tried to draw the best from people through recognition of the need for their contribution. He challenged us to develop a similar commitment towards achieving excellence in our own personal and professional endeavors. He was fond of quoting one of his college professors who would ask him, "Ya, but vat does it mean?" He would often turn the same thought to us in what we were doing. He did not ask if we finished; he asked, "What does it mean that we did the work?"

He was an active professional. He was an active member of the IEEE, where he assumed positions of leadership both at the local/regional level and in his technical society. He was a Director and publications chairman of the Washington section for many years, and was a member of the steering committee and was Banquet Committee chairman in the National Capitol Area Council; but his most extensive participation was in IEEE's Electromagnetic Compatibility (EMC) Society. He served on the Board of Directors as Director of Communications Services; Arrangements chairman for the 1990 International EMC Symposium in 1990; and chairman of the Planning Committee for the International EMC Symposium to be held in Washington in the year 2000.

He was elected a fellow in the IEEE in 1987, with the citation "For contributions to the development of engineering practices and standards for hardening ships against nuclear-generated electromagnetic pulses." Other IEEE awards include the coveted Lawrence C. Cumming Award, both the Washington section's and the National Capitol Area Council's Patron Awards, as well as a number of certificates of gratitude for his contributions to the EMC Society and local EMC chapter.

He and his wife were a wonderful team who in all their diverse activities worked together harmoniously. They were also result-oriented. As a consequence, the entire family became a closely knit group who work together, play together and as a matter of course, share each other's burdens and problems. His successful life and painless passing will help all of them as well as his friends to ease the grief of mourning; his memory and example will challenge all of us who knew him well to live our lives a little more fully, a little more dedicated.

Dr. Haislmaier is survived by his wife Florence Richstatter Haislmaier; three sons, Edmund and his wife Helen, Fredrick and his wife Anne, and Andrew; a daughter, Clare Anne; three grandchildren, Bridget, Karl and Paul; three brothers, George, Harold and Howard, and two sisters, Hildegard and Juliet.

The family asks that in his memory, donations may be made to: The St. Mark's Educational Scholarship Fund, 7501 Adelphi Road, Hyattsville, MD 20873.

This biography was written by Russell Carstensen, Tom Doeppner and Eugene Lockhart, all friends and officers in the Washington Northern Virginia Chapter of the IEEE EMC Society.

PRESIDENT'S MEMORIAL AWARD

A proposal for a new IEEE EMCS President's Memorial Award to link the Society's past, present, and future has been submitted for approval to IEEE headquarters by the Board of Directors. The memorial award will honor a deceased member of the Society, and will involve his or her surviving relative, the EMCS President and a graduate student. In some cases the award may also be made in general remembrance of the Society's deceased pioneers.

The presentation of this award will be made at the annual EMC Symposium awards banquet. The EMCS President and the deceased eminent member's relative will jointly make a scholarship award in memory of the deceased. The President will also give the relative the award in remembrance of the occasion and in honor of the deceased member's contribution to the EMC community.

Although the Society is awaiting approval of this award by the IEEE headquarters staff, scholarship candidates are now being solicited. The candidate must be a student or regular member of the IEEE and be enrolled in or be formally accepted for a full-time postgraduate study program pursuing a M.S. or Ph.D. degree. Candidates must have demonstrated a commitment to the field of EMC and be endorsed by at least three people, two of whom are EMCS members.

For additional information on the award and scholarship candidate nominations, please contact Patricia L. Coles, Hewlett-Packard, M/S 24LS, 11000 Wolfe Road, Cupertino, CA 95014, Tel. 408-447-6847, FAX 408-257-5034.

PRESIDENT'S MESSAGE



BOB HOFMANN
PRESIDENT,
EMC SOCIETY

It was an honor to be elected President of the EMC Society and I am looking forward to a productive year working with the Board of Directors, the directors of the Technical and Standing Committees, and all the other people who work to make our society one of the best in the IEEE.

The status of the Society is excellent. Our finances are in good condition, thanks to several years of successful symposia and prudent spending by the Board. We have been able to send copies of the Symposium Record to all regular members of the Society, fund the Distinguished Lecturer program for the chapters, and use the Angel program to help chapters with unique requirements. A superb video tape has been prepared to tell others about the EMC Society, and we are continuing to add new members and chapters, primarily outside the United States, at a rate that is one of the highest in the IEEE.

A special word of thanks is due to our outgoing President, Ed Bronaugh. Ed has guided the Society for the past two years with a careful, steady hand. Fortunately, he will continue to serve the Board for at least two more years as an elected director and his advice will be welcomed.

One of the most valuable members of the Board, Bob Haislmaier, passed away suddenly in early January. His official title was Communication Services Director, but that did not encompass his many contributions to the Board and to the Society. Bob will be sorely missed. In accordance with the By-laws of the Society, I will nominate a person to fill the vacancy during the February Board of Directors meeting. The Board will vote on the nomination, and will also vote on a person to fill the Communication Services Director position.

One of the activities that I stressed while I was a member of the Board was service to the members. That emphasis on serving the members of the Society will continue, for it is the fundamental reason for the existence and growth of the Society.

For the Society to continue to grow, the Board can not function in a vacuum. The support of many members is necessary.

There are a large number of opportunities for the individual engineer to contribute in an important way to the Society. We have chapters in many locations that are always in need of people to help run chapter activities. If you are in an area with no EMC chapter, maybe you could help to form a chapter. Local sections are also always in need of volunteers for section activities. Participation at the section level is a way to promote knowledge of EMC among other engineers. It is another way to learn about IEEE structure should you aspire to a higher position within IEEE.

Perhaps you could help with this newsletter, or maybe agree to become a paper reviewer for the Transactions. There are eight technical advisory committees devoted to EMC subspecialties that may be of particular interest. Our annual International Symposium and other regional meetings offer other opportunities to serve the IEEE and also become familiar with activities beyond the normal day-to-day engineering that most of us perform.

Although participation in any activity or on any committee involves time and effort, the individual also grows as a result of that time and effort, becoming a better engineer as a result. All the current members of the Board have served in many of these other capacities before joining the Board, and many continue to have multiple interests as indicated on the directory included in this newsletter.

At the same time, the Board itself must have fresh input from its members as to what services the members need. The survey conducted during the annual symposium provides some feedback to the Board, and is being examined by the Planning Committee. However, the survey represents input from only a tiny fraction of our total members. Past requests for other input to the Board have been made in this newsletter with negligible response. All the Board members are anxious to hear from our members. Our names, address and phone numbers are listed on page 15 of this newsletter. Let us know what you would like YOUR Society to do. Please let us hear from you.

Bob Hofmann, Room 2B-220, AT&T Bell Labs,
2000 N. Naperville Rd., Naperville, IL 60566.
Phone (708) 979-3627, Fax (708) 979-5755

EMCS BoD ACTIVITIES



DON HEIRMAN
ASSOCIATE EDITOR

Ford and Bill Gjertson. Members absent were Chet Smith, Herb Mertel, and Bob Goldblum. Guests included Terry Cantine, Derek McNally, Glen Whiting, George Kunkel, Oscar Crawford, and Ed Nakauchi.

President Ed Bronaugh called the meeting to order at 10:15 AM. The agenda and the minutes from the meeting of August 17, 1991 were introduced, amended and then approved. Dick Ford presented his treasurer's report that showed a net worth for the Society of \$364K as of 8/30/91. Our long-term investment now stands at approximately \$230K of that amount. The treasurer's report was approved.

Next, Director Bob Haislmaier (Communications Services) presented his report. Bob Goldblum (Newsletter Editor) informed Bob that the newsletter will feature a center 2-page color spread twice a year. One of the spreads will highlight the EMCS symposium. Next Dr. Kanda (Transactions Editor) proposed and the Board accepted a special issue of the Transactions in 1993 on "EMC Applications of Numerical Modeling Techniques." Chet Smith (History Committee) reported that he is investigating using CD-ROM as the media for storing Newsletters, Transactions, and other EMCS history since microfiche is losing in popularity. Hugh Denny (IEEE Press Liaison) requested volunteers to review potential IEEE Press books on EMC-related topics. If you are interested call call Hugh on (404) 894-3522. Pat Coles (Membership) will also be forming an ad hoc group to promote the sales of these books which yield income to the Society. She also plans to help stimulate sales in our EMCS standards. If you want to help Pat, call her on (408) 447-6847.

Gene Cory provided updates on our symposium activity. Don Heirman and Warren Kesselman reported a net surplus estimate of \$105K from the Cherry Hill EMC Symposium. Taking into account the cost to print and mail the Symposium Record to all full status members, the return to the EMCS Treasury will be on the order of \$80K, a record surplus. Don also indicated that his committee has written a detailed planning guide for future symposia based on the Cherry Hill model. Future symposia chairmen can request this guide from Gene Cory. Congratulations on all the hard work by the symposium committee and to our members and colleagues who turned out in near record numbers, even in the midst of the recession. Next, Terry Cantine and many of her 1992 symposium

steering committee members apprised the Board on the progress for the 1992 symposium. A five-day activity program (similar to that at Cherry Hill) is scheduled with tutorials/workshops on Monday afternoon and Friday morning. Hence, the new dates are 17-21 August 1992. In other symposium business, Gene will work with the Israeli Section in Region 8 to determine their needs to interact with the Tel Aviv EMC Symposium in November, 1992. The Board approved cooperation with the Tokyo Chapter for their 1999 International EMC symposium.

Director Dan Hoolihan (Membership Services) gave his report. Our Society had 3803 active members as of 30 September 1991; that is a growth rate of 1.5% over last year's September figures. There are 33 active chapters; 9 of these are transnational:

- Region 7 (Two in Canada)
- Region 8 (Five in Europe)
- Region 9 (None)
- Region 10 (Two in Pacific rim)

A chapter startup kit has been sent to Eglin Air Force Base in Florida. Dan discussed a proposal for an EMC pioneer award to honor the original pioneers of the Society. Possible awardees would be those instrumental in establishing chapters since our founding in 1958. The Board tabled approval until further research is conducted with the IEEE on the particulars of setting up the award and administering it. The Board approved the establishment of a permanent research committee for nominating EMCS members for IEEE major field awards. Pat Coles will be heading up that project.

Director Don Heirman (Technical Services) presented his report. As chairman of the EMCS Standards Committee, he was pleased to report that, with the November 1991 publication of IEEE STD 299 on Shielding Effectiveness of Shielded Enclosures, all 1950-1960 era EMCS standards have been updated to current status. The BoD formally expressed their appreciation for the hard work of the Standards Committee



Terry Cantine, Chairman of the 1992 EMCS Symposium (center) reviews plans with Rick Mills, Assistant Director of Convention Services, Anaheim Marriott Hotel (left) and Derek McNally, Exhibits Chairman (right).

Photo: Dick Ford

Continued on page 6

BoD ACTIVITIES (Continued from page 5)

and its working group members. Work continues on P1140 (Near-field Measurement of Emissions from VDTs); draft 9 is being distributed for final comment since it contains text to take into account negative ballots on draft 8. For more information, call the chairman - Dheena Moomgilan - on (908) 834-1806. P509 (Gasket Shielding Effectiveness Measurements) has been approved for withdrawal. A new PAR with a better focussed purpose and coordination will be generated if appropriate. Hugh Denny has this responsibility.

Don Heirman presented Clayton Paul's report (Education Committee). Clayton has recently written to Chapter Chairmen in Regions other than 1 through 6 to request that they nominate local Distinguished Lecturers. Three nominations have been received. Don announced that Dave Hanttulla has resigned as chairman of the Distinguished Lecturer Program (DLP) and that he was replaced by John Adams of NIST. The Board approved a congratulatory letter to Dave for his pioneering efforts in establishing the DLP. Clayton also asked and the Board approved that the DLP become part of Member Services which is the more appropriate location for administration purposes. Finally, Clayton reported that the undergraduate EMC course preparation package is almost complete. Anyone interested in this activity should call Clayton on (606) 257-1644.

Next, Don Heirman read Wilf Lauber's report (Technical Advisory Committee) about the Technical Committee activity. Dr. Louis Libelo replaced Ed Vance as Chairman of TC-5 on EMP. Thanks were in order for the many years of effort Ed put into the job. The TCs are gearing up to review papers for the 1992 symposium. This is a challenging project, because only half of the submitted papers can be accepted, according to George Kunkel, Technical Program Chairman.

Joe Butler (Representation Advisory Committee) personally gave his report. His address covered IEC/CISPR, EOS/ESD EIA G-46 and Aerospace R&D activities as reported by our EMCS liaison representatives to their committees. For details, call Joe on (617) 935-4850. Another item arising out of Don's reports included a motion that was approved by the Board: "That a workshop on EMC fundamentals be considered for each EMCS-sponsored symposium starting in 1993 (until attendance no longer justifies this effort)."

Director Walt McKerchar (Professional Services) presented his report, which covered public relations, PACE, employment analysis/survey, transnational affairs, and the Society for the Social Implications of Technology. Bill Gjertson was appointed chairman of the Public Relations Committee. His work includes a second EMCS video to promote our Society and EMC, especially to the general public, including high school students. The Board approved the video plan, and hopes to have the video available by the 1992 symposium. PACE chairman All Mills commented on the "Engineering Careers in the 1990s" workshop he attended on Labor Day weekend. Bob Brook (SSIT) commented on the SSIT activities. Walt Johnson (Employment Analysis/Survey) was invited to continue this activity and to expand it with the help of Don Hoolihan.

In other business, the Board accepted the offer of a complimentary booth at the EMC/ESD Expo in Denver in April 1992. The Board then empowered the Membership Chairperson - Pat Coles - to accept free booths at "appropriate" events. Other discussions and action items directed:

- Hugh Denny to place a call for IEEE Press Reviewers/Authors in the IEEE EMCS Newsletter.
- Ed Bronaugh to send a disk of EMCS membership to Dan Hoolihan.
- Clayton Paul to correct headquarters' errors in IEEE Distinguished Lecturer advertisements.
- Dan Hoolihan to invite Bill Johnson to be a member of the ad hoc committee on EMCS surveys.

The last item was the election of officers for 1992. There was contested balloting for President, Vice President, and Directors of Member Services and Professional Services. The winners were:

President: Bob Hofmann
Vice President: Warren Kesselman
Secretary: Janet O'Neil
Treasurer: Dick Ford

Directors:

Communications Services: Bob Haislmaier
Technical Services: Don Heirman
Membership Services: Dan Hoolihan
Professional Services: Walt McKerchar

Congratulations to our 1992 officers!

The meeting adjourned at 5:00 PM with the Board giving Ed Bronaugh a standing ovation for his two years of outstanding commitment as our EMCS president.

The next meeting will be on 10-11 February 1992 at the Grand Kempinski Hotel in Dallas, the site of our 1993 symposium. The EMCS Standards Committee will meet on 11 February between 8 and 10 AM with the Board continuing its meeting at 10:15 AM. For more information, contact Secretary Janet O'Neil at (213) 870-9383.



EMCS President Bob Hofmann (center) with newly-elected board members John W. Adams (right) and William G. Gjertson (left).

Photo: Dick Ford

EMC CERTIFICATION & ACCREDITATION STATUS REPORT



RUSSELL V. CARSTENSEN

Marketing for the EMC testing business is complex to say the least. The test lab must continually seek out test projects as prime item developers bring their products to market. Finding work takes energy and resources. To secure work, test labs must compete for available test projects against other similarly or lesser equipped labs. Sometimes, in the case of price competition, the work is awarded

to labs not adequately experienced or equipped to do the work. This process discourages investment in plants and facilities.

With respect to end-item acceptance testing, the Naval Air Systems Command (NAVAIR) has required since November of 1989 that final EMC or EMI control acceptance tests be conducted in a laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology.

Thus far there are 12 such EMC laboratories accredited by NVLAP to conduct MIL-STD-462 test procedures. There are another four labs in the pipeline for MIL-STD-462 EMC testing accreditation. The initial labs in the first flight were accredited all at the same time to avoid an undue competitive advantage. They were accredited for 14 months as a group in May of 1990. After the first flight, additional laboratories were accredited as they applied.

The renewal rate for accredited laboratories has been 100%. The initial first flight labs are due to renew again in 1992. For their renewal they will be revisited by a two-person assessment team this summer. They will be subjected to the same intense review of procedures, facilities and documentation as they were in the initial accreditation.

Two actions are proceeding in parallel with daily lab operation and program administration. The first is revision of the MIL-STD-462 test procedures. The second is expansion of requirements for EMC certification and laboratory accreditation by other services.

The revision of MIL-STD-462 has been in process since June of 1989. The Tri-Service Standardization Working Group responsible for the revisions is made up of three members

from each military service, one industry member and a National Security Agency observer. The standardization working group presented the status of the revision effort at the 1991 IEEE EMCS Symposium. At that time they anticipated circulation of the draft revisions for comment in January 1992 with comments due in April. NVLAP has kept pace with the evolving revision to MIL-STD-461 and 462. The NVLAP assessors are drawn from the practicing community and will be able to assess compliance with the revised standards.

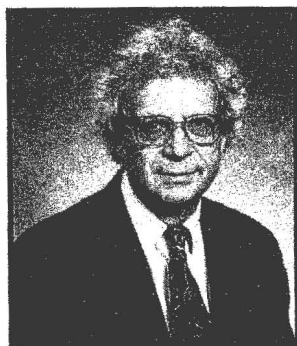
With respect to expansion of certification and accreditation, NAVAIR began the requirement for accreditation of laboratories and certification of EMC technical personnel as a pilot effort in response to direction from the Office of the Chief of Naval Operations. The pilot effort has proven successful. There is now an effort underway to bring the other Navy acquisition systems commands into the same process. NAVAIR is in the process of notifying the other systems commands of the success thus far and working with the Office of the Chief of Naval Operations to establish full compliance. The end result, which will take a year, will be full implementation across the acquisition structure.

In March of 1991 the Army issued an action plan for electromagnetic environmental effects. The action plan included a task on certification of EMC technical personnel which recognized that the purpose of certification is to assure E³ expertise in critical acquisition and maintenance positions. The action plan anticipated taking advantage of the Navy experience in certification and lessons learned from implementation of the NARTE process.

They have moved to the point that a memorandum of agreement is being negotiated between U.S. Army Information Systems Command (USAISC) and the National Association of Radio and Telecommunications Engineers (NARTE). The memorandum has been agreed to by NARTE and is being staffed through USAISC for final signature. It is expected that the agreement will include a grandfather period for army EMC technical personnel.

In summary, both accreditation of EMC test laboratories and certification of EMC technical personnel are in place and expanding. Users (buyers of test services and employers of certified personnel) need to advise the certification and accreditation agents of issues or problems. They do listen and they do respond.

DIVISION IV DIRECTOR'S REPORT



MARTIN SCHNEIDER
DIVISION IV DIRECTOR

and surrounding countries. The following special events are being planned:

1. EUROCON '92 — IEEE Conference on European Electrotechnology in a Worldwide Market. This conference is sponsored by the IEEE Region 8, the Communications Society, Computer Society and the Switzerland Section of IEEE. It will be held from May 18-21, 1992 at the Congress Centre in Zurich, Switzerland. The first day will be reserved for tutorials, followed by workshops on the second day, and talks by industry leaders on the last day of the conference.

2. IEEE Colloquium '92 — The purpose of this program is to offer the IEEE Sections in Region 8 the opportunity to invite a lecturer of their choice to present a one-day or two-day tutorial on a topic which will benefit the members. The events will take place throughout the year and will be sponsored by the IEEE Societies which are active in the Region, the IEEE Technical Activities Board, and IEEE Region 8.

The Colloquium '92 organizing committee is co-chaired by Kurt Richter, Director Region 8, Troy Nagle, Past Vice-President of TAB, and Ed Parrish, Director Division V.

I am working actively with the EMC Society President to ensure that the Electromagnetic Compatibility Society will be fully represented in this activity by suggesting speakers and topics which will interest our members and stimulate the technical activities in our field of interest. We plan to make good use of existing resources such as our Distinguished Lecturer Program which could be enhanced by additional experts who are already located in Europe. A meeting is planned during the forthcoming visit of Georgio Molinari (University of Genova, Italy and Region 8 Education Chairman) at the IEEE Service Center in Piscataway to work on some of the details of this program.

CALL FOR BoD NOMINATIONS

Nominations are now being accepted for candidates for the IEEE EMC Society Board of Directors. In accordance with the Bylaws, nominations may be made by petition or by the Nominations Committee. The petition shall carry a minimum of 15 names of Society members, excluding those of students. Nominees should possess professional stature and significant technical skills in electromagnetic compatibility. They must have adequate financial support outside the Society and have approval of their organizations or employers to actively participate. Duties will include attendance to three or four Board meetings a year and participation on committees, both of which require telephone communications, correspondence, etc. Nominees must be full members of the IEEE and members of the EMC Society. Elected Directors must serve a three-year term starting January 1, 1993. No member can serve for more than six consecutive years, including partial terms. All nominees are required to submit a biographical summary to the Nominations Chairman. The summary must not exceed a one-half typewritten page and must be in the following format:

1st paragraph	Name, title, place of employment, educational background
2nd paragraph	Technical and professional experience
3rd paragraph	IEEE service and activities including offices, committees, awards, etc.

Please submit petitions and biographical summaries to the Nominations Chairman. Submissions must be postmarked no later than May 30, 1992.

Edwin L. Bronaugh
Nominations Chairman
EMCO
P.O. Box 1546
Austin, TX 78767
Telephone: (512) 835-4684, Ext. 665
FAX: (512) 835-4729

Information can be obtained from the Nominations Chairman.

(Nomination petition is printed on facing page.)

NOMINATION PETITION ELECTROMAGNETIC COMPATIBILITY SOCIETY BOARD OF DIRECTORS

(Nomination guidelines given on facing page.)

I. NOMINEE'S NAME _____

MEMBERSHIP NO: _____

ADDRESS: _____

PHONE: _____

II. BIOGRAPHICAL SUMMARY: ATTACH TYPED COPY

III. SIGNATURES: (Minimum of 15 names.)

We, the undersigned, all of whom are current IEEE Electromagnetic Compatibility Society (EMCS) members in good standing, nominate the above mentioned person to serve on the EMCS BoD for a three-year term beginning January 1, 1993.

MEMBER'S NAME (PRINT)

SIGNATURE

MEMBERSHIP NO.

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EMCS BoD VISITS LA CHAPTER

**JANET NICHOLS O'NEIL,
SECRETARY OF THE EMCS BoD
ARRANGEMENTS CHAIRMAN OF THE LOS
ANGELES EMC CHAPTER**

The Los Angeles EMC Society Chapter took advantage of the local talent when the EMC Society Board of Directors was in town for a regularly scheduled Board meeting. Then Vice-President Bob Hofmann, and the late Dr. Robert Haislmaier, Director of Communication Services, were speakers for the November 14 chapter meeting. Mr. Hofmann's presentation was entitled "New ANSI C63.4 Measurement Test Procedures for EMC." Dr. Haislmaier presented "Software: A tool and an Impediment for EMC." Both presentations were held at TRW, Redondo Beach, and were well received by all.

Prior to the chapter meeting, the entire Board met with chapter members for dinner at the lively local watering hole, Tequila Willies. Over 60 people attended for cocktails and dinner. Despite the fact that only 40 people made prior reservations, beer, margaritas and enchiladas were fortunately available for all! It was an ideal opportunity for the local chapter members and their guests to informally visit with the Board of Directors. Several chapter members resurfaced after a long absence from attending chapter meetings, including Ms. Jacqueline R. Janoski, a former President of the EMC Society. The 1992 International EMC Symposium committee, including Chairman Terry Cantine, also attended and all looked remarkably chipper considering their hard efforts working on the upcoming August symposium. This will be held in Anaheim, California (near Disneyland!). After dinner, Ray Adams of TRW, chapter Secretary, rose to the occasion in successfully moving the boisterous crowd from the restaurant to the TRW Presentation Room.

The Los Angeles EMC Chapter meets once a month, typically on the second Thursday, September through June. Each meeting follows the same format, starting with the Mexican dinner at Tequila Willie's and the presentation at TRW. (We tried to change the format once, and well, you know how engineers react to change.)

The Los Angeles EMC chapter has planned a great program for the September, 1991 through June, 1992 year. The year started out with a bang featuring a "New Product Forum" wherein five local manufacturers of EMC related products discussed newly released products, with a ten-minute limit per speaker! Question time was available after the presentations. The January meeting featured Steve Jensen of Steve Jensen Consultants, who spoke on "Circuit Symmetry Effects in EMI Power Line Filters on Conducted Emissions Test Results." Upcoming speakers include Scott Roleson of Hewlett Packard, San Diego (a favorite speaker at annual EMC Society Symposiums), Jerry Boone of the Navy at Point Mugu, California, and a TRW team presentation on ESD.

The Los Angeles EMC Chapter welcomes new members and guests at its monthly meetings. Chapter members range from new-timers to old-timers, so everyone will feel comfortable. EMC engineers travelling to the Los Angeles area on the second Thursday of the month are encouraged to attend the EMCS chapter meetings.

Contact Janet Nichols O'Neil at 213-870-9383 for information on joining the chapter or adding your name to the mailing list for monthly meeting notices.



Photo: Dick Ford

EMCS BoD members with LA Chapter officers. (l-r) The late Dr. Robert Haislmaier, Director of Communication Services, EMCS BoD and featured speaker, Dick Dunn, Vice-Chairman of LA EMCS Chapter, Ray Adams, Secretary of LA EMCS Chapter, Bob Hoffmann, Vice-President of the EMCS BoD and featured speaker, Janet Nichols O'Neil, Publicity/Arrangement Chairman of LA EMCS Chapter and Secretary of the EMCS BoD, and Derek McNally, Program Chairman of the LA EMCS Chapter, and Exhibits Chairman of the 1992 International EMCS Symposium.

This column continues a theme developed over the past one or two, in announcing the availability of EM-relevant software, as well as including another example of visual electromagnetics.

THE TSAR (TEMPORAL SCATTERING AND RESPONSE) FDTD (FINITE-DIFFERENCE TIME DOMAIN) EM CODE DEVELOPED AT LAWRENCE LIVERMORE NATIONAL LABORATORY

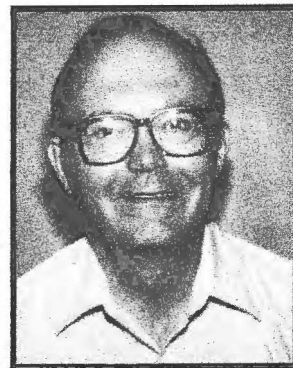
According to Dr. Scott Ray, LLNL, "We are now ready to release this code for external use. This is being done in two ways. US government employees should get the code through the National Energy Software Center at Argonne National Lab by writing or calling the National Energy Software Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439, (312) 972-7250. In order to encourage the development of the code, a second distribution mechanism exists, mainly intended for those in academics and industry. Under this arrangement, the code is distributed with an agreement to collaborate on its continued development. By DOE regulations, the number of collaborators we may have is limited, so we encourage those who can, to take advantage of the Argonne distribution."

THE MACVERIFY SOFTWARE PACKAGE

MacVerify is a Macintosh-based application for debugging wire-frame models for NEC and GEMACS. It is available from Mr. Robert R. Tipton, Concurrent Engineering Tools, Inc., PO Box 32080, Mesa, AZ 85275-2080, (602) 464-8208. MacVerify provides the following features, allowing you to:

- Find and identify modeling errors which can invalidate your analysis.
- Interactively edit your model input files to correct errors.
- Read and write both NEC and GEMACS input files.
- Highlight all segments connected to a selected segment; this procedure can be repeated to show large connection networks.
- Retrieve information about individual wire segments or the entire model.
- Display your models at almost any scale and any viewing angle in full color.

- Simultaneously examine up to nine models, allowing before-and-after comparisons.
- Create printouts/hardcopies of your model for use in presentations or reports.
- Create PICT files which can be imported into many other Macintosh applications to add professional-looking graphics to your documents.



E.K. MILLER

VISUAL ELECTROMAGNETICS

Professor Hao Ling, Department of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712-1084.

Professor Ling made a presentation on computing scattering from inlets and ducts at a workshop I attended this summer. In his talk, he showed results obtained using "shooting and bouncing rays" (H. Ling R. Chou and S. W. Lee, "Shooting and Bouncing Rays: Calculating the RCS of an Arbitrarily Shaped Cavity," *IEEE Trans. Antennas Propagat.*, AP-37, pp. 194-205, 1989). For comparison, he also showed results obtained from a modal approach. I was especially interested in the graphics he showed because this seems to be such an effective way for comparing two different solution techniques and especially seeing the consequences of physical phenomena omitted from the approximate formulation.

The commentary Professor Ling provided to describe these results is as follows: "Based on the geometrical optics picture, the field inside the waveguide should behave as a truncated beam bouncing back and forth between the two plates. For a large waveguide, this is indeed the case as the 'actual' results (computed from modal sum and Kirchoff's approximation) resemble those depicted by the ray picture. The plots show the Poynting vectors inside the waveguide where the size of the arrow is proportional to the magnitude of the Poynting vector and the direction of the energy flow. When the plate separation is decreased to 5, however, the actual results begin to deviate from the GO picture, as the beam becomes blurry after some distance into the guide. Additional edge diffraction contributions at the waveguide opening become more important and must be taken into account to accurately model the field behavior in smaller waveguides."

EMC PERSONALITY PROFILE



WALTER POGGI

assurance manager and testing laboratory supervisor.

In 1978 he founded Retlif Testing Laboratories, which he has led for the past thirteen years. As president of Retlif, Walter's experience and accomplishments in the field of EMC testing, shielding and filtering are well known within the industry. He has guided the development of Retlif Testing Laboratories from a one-man commercial EMC testing laboratory in 1978 to a 32-man full-service military and commercial testing organization with two facilities and specialized test instrumentation for all aspects of EMC testing. In addition, Retlif also provides services in the electromagnetic pulse (EMP), electrostatic discharge (ESD), high intensity radiated field (HIRF), and environmental stress simulation (ESS) areas.

Walter has been very active in many testing industry and EMC related issues. As an active member of the American Council of Independent Laboratories (ACIL), he contributed to the development of ACIL's EMC/Telecommunication Subcommittee and currently holds the position of Chairman of ACIL's Government Relations Committee. He has also been very active in the area of laboratory accreditation. He worked for the creation of the National Institute of Standards and Technology NVLAP accreditation program and for worldwide acceptance of U.S. laboratory data. To this end he recently chaired a National Institute of Standards and Technology (NIST) workshop on EMC and EC1992 matters and represented ACIL and the independent testing community in recent trade talks between the U.S. and the EC. Being a leading spokesman for both the EMC testing community and small businesses, Mr. Poggi has testified before the National Institute of Standards and Technology, the House of Representative's Small Business Committee and the N.Y.S. Small Business Committee.

Walter is a NARTE certified EMC engineer and a registered Canadian P.E. for his work with Canadian DOC. Walter has

Walter Poggi received his Bachelor of Science degree in 1969 from New York Institute of Technology. While at NY Tech, he organized the first student chapter of the IEEE at the college. Upon graduation he was employed at Grumman Aerospace on such projects as the VAST program and the AGE fighter plane. He then moved on to All-Tronics, Inc. where he held the positions of quality

been a member of the IEEE and the EMC Society since 1981.

A resident of Nesconset, NY, Mr. Poggi is married with two children. He has been active in community affairs and held such positions as president of his parish church's finance committee, president of the school board, general manager of a high school hockey club and coach of a high school girls softball team. He was also a member of the military reserves for nine years from 1971 to 1980, from which he received an honorable discharge and achieved the rank of staff sergeant in charge of communication at an infantry company level.



WILLIAM G. DUFF
ASSOCIATE EDITOR

WANTED AUTHORS & REVIEWERS

The IEEE Press is currently emphasizing publication of original monographs of interest to IEEE members and societies. The Press is working diligently to establish closer and better ties to the societies.

A major aspect of this program is a coordinated effort to attract authors and editors and to define the books wanted and needed by members of the societies. Consequently, a splendid opportunity now exists for experts, researchers, teachers and practitioners in the broad field of EMC and EMI to submit ideas for books to be published by the IEEE Press. (The royalty schedule offered by the IEEE Press is very competitive with that of other scientific technical publishers.)

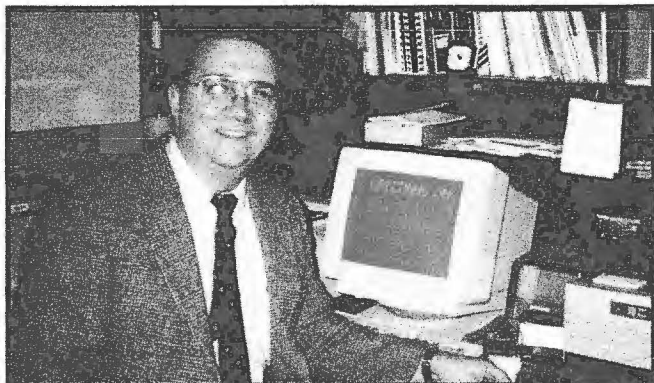
In addition to authors, there is a need for EMC professionals to review proposals for books and to provide comprehensive editorial reviews of manuscripts. Individuals who are selected to review proposals will be eligible to receive complimentary copies of the published book and other Press publications of their choice. Honoraria may be available to those who provide comprehensive, annotated editorial reviews, depending upon the amount of effort required.

If you have an idea for a book or are interested in serving as a reviewer of a proposal or a manuscript, please call Hugh Denny at 404-894-3522 or fax him your interests and qualifications at 404-894-3906. Send Hugh your resume and a listing of your specific EMC/EMI interests and areas of expertise.

ON COUNTING BEANS

& OTHER VITAL, BUT UNIMPORTANT, MATTERS

(A REPORT ON OUR SOCIETY'S FINANCIAL HEALTH)



RICHARD FORD, *nce*, EMCS TREASURER

In the last twelve years we've grown from a small society of 1700 members with a total budget of about \$130K to a society of 3800 members having an annual budget of over a half million dollars. I've been treasurer for half of those twelve years. Like most of you, I'm an EMC engineer. So it's a change of pace to act in a "bean counter's" role. It's been an interesting, but at times frustrating, job.

The data I present in this report is "cooked." By that I mean I had to adjust it when I knew it was wrong or it didn't make sense. In the IEEE, society treasurers are "non-bursared." In plain language this means we don't have any direct control of the funds. Headquarters keeps the money, writes the checks, and has the official responsibility for tracking (or accounting for) the funds. The major part of the elected society treasurer's job is to approve and submit vouchers for processing by headquarters. The minor part of the job is to try to keep up with, and understand, the mounds of paper sent out by headquarters. Unfortunately the minor job is much harder than the major job! Headquarters has changed the chart of accounts/accounting system twice in the last six years. Their new system has twenty-seven numbers in the accounting code! They relocated from New York City to Piscataway a few years ago and there's been a large turnover of people. Final data on 1991 won't be available until April (or May), the data provided me from headquarters for the time before I became Treasurer is clearly in error in many respects, and headquarters simply does not present data in a way that best serves the Society (in my humble opinion). Given this state of affairs get your "grain of salt" ready....

Looking first at the large view, Figure 1 shows income/expense by calendar year from 1980 to 1991. There are two sets of curves shown. Gross income and gross expense is basically headquarter's data with errors corrected as best I could. Net income and net expense is data I derived by treating EMC Symposium events and EMC Transaction publishing as "profit centers" (I know these are dirty words in a nonprofit organization but please bear with me). I did this because both these items produce major income for the society yet we have

very little direct control over the costs. We are *required* to use headquarters to produce the transactions and headquarters sets the costs. The regional committees run the symposiums and although the society approves their budget, the committees have a very free hand in running their symposium (with attendant cost impact). Ignore the data for 1983; each year's data includes the data from the previous year's symposium and I have not been able to obtain good data for the 1982 symposium. The net figures reveal that the mid-80s were very good to the society. Our income was more than double our expenses! This was very healthy for the society. Figure 2 shows reserves per member and reserves as a percent of yearly expenses for this same time window. Generally speaking very healthy societies have reserves per member of \$100 or more, and reserves as a percent of expenses of at least 120%. Our society peaked in the 1984-1985 time-frame. Since that time a combination of net revenue fall-off and increased expenditures have somewhat eroded our financial health. But EMCS is still in the top quarter of better performing societies and we now know we will have a very healthy surplus from the 1991 Cherry Hill Symposium (which gets reported in 1992). So I have the privilege of reporting to you that we did well during the past decade.

Figure 3 looks at income. It compares a 1991 all-society average, our 1980 to 1991 average, and the 1991 EMCS data (related, not to 1991, but to the 1980-1991 EMCS avg). It shows some interesting things. EMCS has traditionally received much less income from membership dues (MEMBERSHIP) than the average society. It's gone up a bit since we increased our dues from \$7 to \$10/yr, but still we only get about one third of our income from dues, whereas the average society gets about 42%. We get a great deal more from INTEREST on our reserves. This is because we're much healthier than the average society and because in 1986 under then president Len Carlson, we invested most of our reserves in the IEEE long

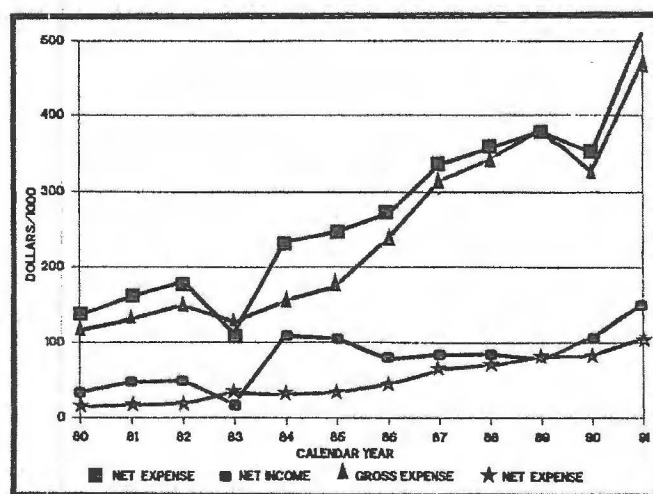


Figure 1. Income and Expense by Year.

Continued on page 14

term investment fund. IEEE has done an excellent job of managing this fund. We do much better than average on our Transactions (XACTION NET). This is not because headquarters does better by us than with other societies. It's because Dr. Kanda uses more volunteer labor and keeps costs down as did his predecessor Dick Shultz. The Book Broker program (BOOK NET) is a program wherein headquarters sells our publications (other than the Transactions) for us. Essentially the only Book Broker item we have is our Symposium record. The chart indicates that we're not doing as well as other societies. This is misleading (because the chart is plotted in percent), since our net income is over five times more than the average society. We made \$3.7K in 1991 compared with \$4.5K for the average society and, as the chart shows, the 1980-1991 avg was higher: \$4.8K. Over the decade our Symposiums haven't been especially profitable (SYM NET) (except 84-86). The BOD recently has attempted to improve this by advising symposium committees to budget for at least a twenty percent surplus. As a result the 1990 and 1991 Symposiums produced healthy surpluses. As to the "other" category, I'm not sure how we derive income from "other." Other societies sell videos, perhaps software and even courses.

Looking now at the net expenses (Figure 4), the graph shows our 1991 NEWSLETTER cost, as a percent of net expenses, is running above society average. However I didn't have good figures on all societies and remember, some societies don't have a newsletter. Perhaps a better viewpoint is to note that our 1991 costs are smaller than the average percent of our yearly expense budget. This is part of the reason why the BOD voted to spend additional money for additional pages and some color page printing. Our non-periodical (NON-PERIOD) costs are much higher than the average society because this is where costs accrue for sending each member his/her own personal copy of the symposium record. Recent costs have been over thirty thousand dollars per year for this benefit. Our society expense (SOCIETY EXP) is much higher than the average society for a simple reason. The EMC Society provides considerable member benefits, e.g., the Angel Program, the Distinguished Lecturer Program, and our awards program. The last item in Figure 4 is headquarters administration (HDQ ADM). This is what societies pay for headquarters support. Again, a graph in percent can be misleading, although the average society pays a larger percent¹ of its expenses to headquarters, we actually (because of our larger budget) provide them more money (\$17.2 for 1991 vs \$11.2 for the average society).

In summary, we enter the 1990's as one of IEEE's fastest growing societies. Yes this reflects growing interest in our technical discipline. But it also reflects the unselfish efforts of a lot of volunteers. Thanks to these volunteers, we are a very healthy society. EMCS dues are only \$10/yr, yet the society is providing benefits to the membership which I conservatively value at \$42/yr (this includes a cost of \$17/yr for EMC Transactions which we get as an unreflected benefit of the "Transactions cost center"). If we maintain this health, surely we can expect continued robust growth for the foreseeable future.

1. Here's one place where net expense data is quite revealing.

I'm sure most societies don't realize they pay over half their expenses for headquarters support. When headquarters adds in transactions and symposium costs, it makes this number appear much smaller.

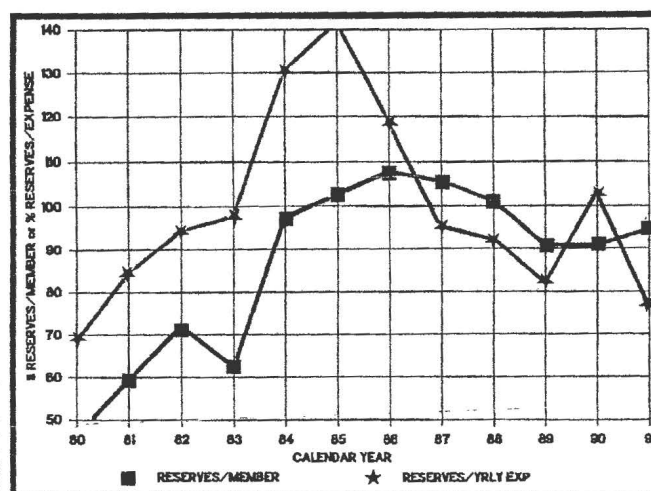


Figure 2. Reserves by Year.

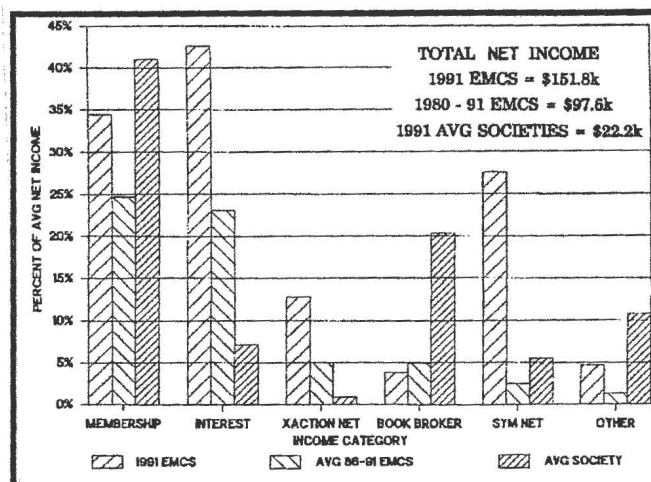


Figure 3. Income.

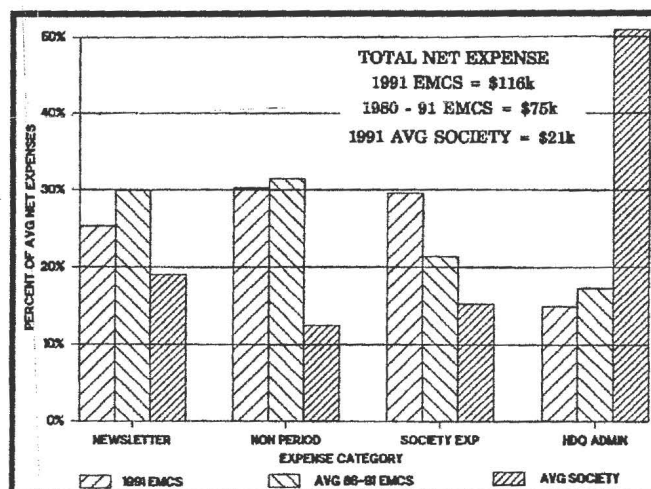


Figure 4. Net Expenses.

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Secretary
Treasurer
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1992

H R Hofmann
W A Kesselman
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R T Ford
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1992 - Beijing China 25-27 May
1992 - Los Angeles CA 17-21 Aug
1993 - Dallas TX 10-12 August
1994 - Sendai Japan 17-19 May
1994 - Chicago IL 22-26 August
1995 - Atlanta GA 22-24 August
1996 - Santa Clara CA 20-22 August

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H W Ott (6/92)

Please send all corrections and changes to Daniel D Hoolihan January 1992

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M Kanda
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OFFICIAL SUMMARY
USA - 24
Foreign - 9

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Daniel D Hoolihan
January 1992

IEEE ANNUAL EMPLOYMENT SURVEY

By BILL JOHNSON

An employment survey was conducted during the 1991 IEEE International EMC Symposium in Cherry Hill, New Jersey. The average annual salary of EMC engineers who responded to the 1991 survey jumped to \$71,800, in sharp contrast with last year's average of \$56,000. The large jump may be attributed to two factors which influenced the results. First, the small sampling, which comprised only 84 survey respondents in 1991, distorts the statistics because a high percentage of EMC Society leadership responded. Secondly, several high salary categories were added since last year's survey. A maximum category is now "over \$100K"; last year's survey used "over \$75K" as a maximum. This provides more accurate averages for the future by including those in the higher brackets, but again may be distorted because of the number and status of those included this year.

The rapid expansion of EMI/EMC requirements in the non-military arena has contributed to a change in the career opportunities in this field. Several years ago, the majority of EMC engineers were employed in military applications. This year 56% of those responding worked primarily in the commercial EMC field. Those working in the commercial area continue to be paid a higher salary (\$72.4K vs \$72.1K) and are younger (45.1 vs 46.4 years old) than those working in military EMC. While only 18% of those involved in military work are optimistic about staffing increases and 30% see a decline in the future, fully 36% of those involved in commercial EMC are optimistic with only 6% seeing a decrease.

The hypothetical average respondent to this year's survey is a member of the IEEE, works for private industry, specializes in commercial EMC applications, is 45.7 years old, has received or is working on an advanced degree, has 19.6 years experience, earns \$71,800 in salary, is NARTE certified and lives east of the Mississippi River.

This year we have been able to compare salaries and employment opportunities in different geographical areas. It is probably not surprising that the highest salaries are paid in the southwestern and northeastern U.S. followed by the West and Northwest. The lowest salaries reported by those responding were outside the U.S. and in the eastern U.S. The Midwest was near the average.

By comparing the staff increase and decrease expectations of those responding, the areas where the job market is perceived to be the strongest are the Midwest, Northeast, Europe and Canada, with the lowest expectations in the eastern and southeastern U.S.

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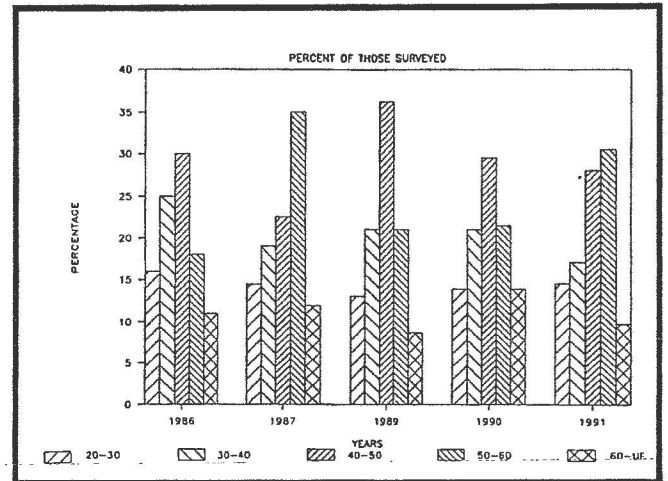


Figure 1. Age.

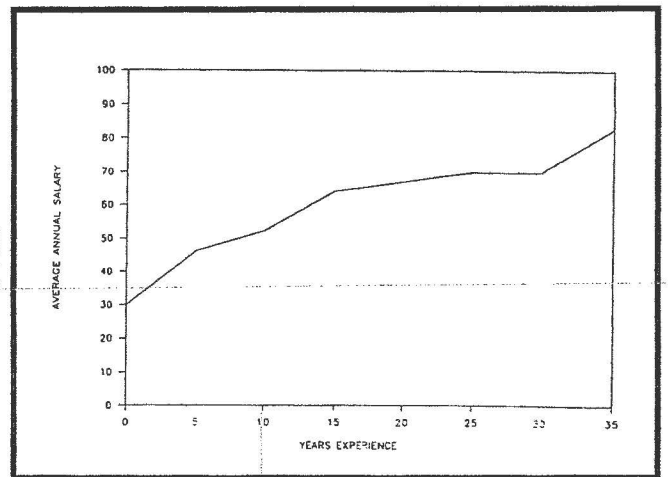


Figure 2. Average Salary Compared with Experience.

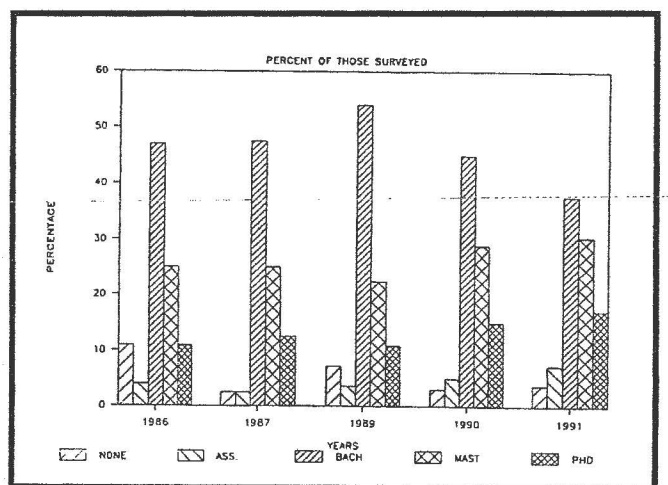


Figure 3. Highest Degree Earned.

Fully 45% of all respondents are NARTE certified engineers, including 53% of those working primarily in the military EMC field and 38% of those working primarily in commercial EMC.

Figure 1 shows that the age of those responding continues to increase as the number of people in the 50 to 60 age group increase and there is a corresponding decrease in those between 30 and 50.

Figure 2 shows a direct correlation between years of experience and average salary. In previous years this curve peaked out at about 25 years experience and declined thereafter.

Figure 3 shows a slight increase over previous years in the educational level of those responding, while Figure 4 shows that very few non-members of IEEE answered the survey. This confirms the earlier assumption that the survey results are skewed by the low sampling level.

The IEEE EMC Society Board of Directors is attempting to improve the methods of conducting surveys and providing information to the membership. We look forward to receiving comments for the improvement of our data gathering and survey methods.

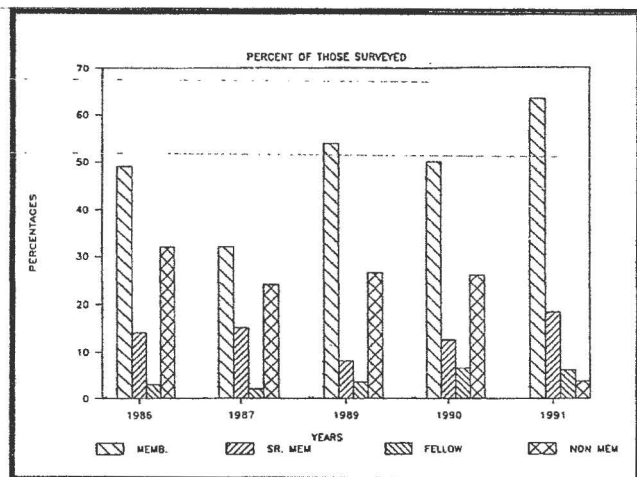


Figure 4. Membership Grade.

LITERATURE FOR SALE

ARCHITECTURAL ELECTROMAGNETIC SHIELDING HANDBOOK

A Design and Specification Guide

by Leland H. Hemming, McDonnell Douglas Technologies, Inc.

1991 Order #PC0282-4-PIE approx. 256pp.

Member \$47.50List \$59.95Sale \$40.00

COMPUTATIONAL ELECTROMAGNETICS

Frequency-Domain Method of Moments

edited by Edmund K. Miller, Los Alamos National Laboratory, Lou Medgyesi-Mitschang, McDonnell Douglas Corporation, and Edward H. Newman, Ohio State University

1991 Order #PC0270-9-PIE approx. 524pp.

Member \$55.00List \$69.95Sale \$45.00

BIOLOGICAL EFFECTS OF ELECTROMAGNETIC RADIATION

edited by John M. Osepchuk

1983 Order #PC0159-4-PIE 608pp.

Member \$60.00List \$79.95Sale \$5.00

INSTRUMENTATION AND TECHNIQUES FOR RADIO ASTRONOMY

edited by Paul F. Goldsmith

1988 Order #PC0236-0-PIE 576pp.

Member \$60.00List \$79.95Sale \$10.00

SPECTRUM MANAGEMENT AND ENGINEERING

edited by Frederick Matos

1985 Order #PC0183-4-PIE 504pp.

Member \$44.00List \$54.95Sale \$10.00

INTERFERENCE ANALYSIS OF COMMUNICATION SYSTEMS

edited by Peter Stavroulakis

1980 Order #PP0133-9-PIE 432pp.

Member \$32.00List \$39.95Sale \$10.00

ELECTROSTATIC DISCHARGE AND ELECTRONIC EQUIPMENT

by Warren Boxleimer

1988 Order #PC0235-2-PIE 128pp.

Member \$24.00List \$29.95Sale \$19.50

UNITS AND CONVERSION CHARTS

by Theodore Wildi, Chairman,

Canadian Metric Practice Guide Committee

1991 Order #PC0266-7-PIE 96pp.

Member \$16.50 List \$21.95 Sale \$14.00

1991 Order #PP0267-5-PIE 96pp. Softcover

Member \$11.25List \$14.95Sale \$9.50

ELECTRICAL TRANSIENTS IN POWER SYSTEMS SECOND EDITION

ALLAN GREENWOOD

JOHN WILEY & SONS, INC., 1991 \$79.95

**JOHN T. BROWN, P.E., N.C.E.,
GUEST REVIEWER**

The analysis and design of electric power systems has blossomed since the first edition of this work was published in 1971. While the same basic perennial problem of transients is with us today, what has emerged are new manifestations in new equipment and the automated numerical techniques for attacking the problem. This edition covers these developments in a significant way. Like the first edition, this one is directed toward the interests of designers and operators of electric utility and industrial power systems. The expanded coverage gives practical treatment of transient problems in power networks and components. Those students, practicing engineers, and technologists whose concern lies in transient protection from the power user's perspective will find the chapters on measuring transients both interesting and applicable.

The book progresses in complexity from the analysis of single phase circuits to polyphase and HVDC networks, thus making it suitable for both undergraduate and graduate curricula. The text is an appropriate blend of experimental as well as analytical treatments which emphasize the physical aspects of the problem while at the same time updating the computational approach. Two new chapters have been added on the modeling of systems and apparatus. The issues of model adequacy, correlation with the physical entity, and precautions for correct usage are also addressed. Chapter sixteen has been updated to reflect new technological developments in metal-oxide surge arrestors and a new chapter on insulation coordination has appropriately been added to cover this essential aspect. The two chapters on measurement techniques have been heavily revised to cover the thrust of contemporary digital techniques. The climax of the second edition is a chapter which uses actual case studies to illustrate the application of the modeling techniques. Updated references and student exercise problems, over 100 in all, together with additional photographs, figures, and diagrams, now embellish each chapter.

The first four chapters give tutorial treatment to the fundamental notions about electrical transients, Laplace Transform methods, simple switching transients, damping, etc. The capstone of this section is chapter five's discussion of the practical significance of "abnormal" transients caused when energy storage exists as an initial condition in the system. This includes capacitance switching, transformer magnetizing inrush current, ferroresonance, other restriking phenomena, etc. Chapter six then concludes the circuit analysis portion with an explanation of the importance of the type of neutral connection and the symmetrical-component method for solving switching transients in three-phase networks.

Before launching directly into electromagnetic phenomena under transient conditions, the author included a chapter dedicated to transients in direct current circuits, both low voltage as well as HVDC transmission, and their associated conversion equipment and static VAR controls. Transients occur in dc circuits for much the same reasons that they occur in alternating current circuits: lightning, switching operations, etc. However, the pertinent conversion equipment, rectifiers and inverters function by performing a continuous sequence of switching operations which produce a continuum of so-called commutation transients. Likewise, the same is true for VAR control apparatus. Notoriously vulnerable solid-state components, which are almost universally used in such applications, makes this study imperative for safe and economical designs. The engineering treatment of this subject is concise but not superficial.

Two foundation chapters on transient electromagnetic phenomena precede those on transient modeling principles. The logical inclusion of such basics as induction, flux penetration, traveling waves, lattice diagrams, multiconductor systems, etc, all lead to the main theme of computational aids for the calculation of electrical transients. The author includes a section on switching surges on an integrated power system to show a real world situation. A few novel twists are added, such as the implications of cryogenic systems as well as other electromagnetic manifestations of a more practical concern.

The kernel of the second edition is found in chapters 11, 12, and 13. These deal with the transient modeling of transformers, generators, motors, transmission lines, cables and miscellaneous components. An entire chapter forms a virtual compendium of parameters for typical power system components. In addition, methods are described for

Continued

characterizing equipment by experimental measurement. Authoritative references for this coverage date back to 1904. Likewise, three entire pages of references guide the avid investigator to the detailed sources on the component model derivations. Most are available and well known in the industry. Finally, Greenwood surveys available computer programs which include modern transient analysis, including those which employ either the traveling wave approach or Fourier transform methods. The relative merits of each are addressed. Skeletal treatment is given to the electromagnetic transients program (EMTP). This industry workhorse, which was first developed in the early 1960s, has continued to mature into the present day Version 2.0 (1989). Understandably, it would be impossible to justify more than guiding the reader through the salient features of this computational tool. It must be pointed out, however, that the cited program also encompasses a steady-state analysis capability and that workstation versions are now available for those wishing that convenience.

Supporting chapters on lightning, insulation coordination, and surge protection devices precede those on measurement techniques. As the finale, the author cites case studies in electrical transients to enhance the reader's overall comprehension.

SPEAK OUT!

**EMC Society BoD members
are eager to hear from
Society members. Let them
know what you would like
your Society to do.**

**Names, addresses and
phone numbers are listed
on page 15. Call a board
member. Speak out.**

SPEAK OUT!

INTERNATIONAL SYMPOSIA SCHEDULE

- | | |
|-------------|--|
| 1992 | Beijing, China: May 25-27
Prof. You-Gang Gao
P.O. Box 171
University of Post &
Telecommunications
Beijing, 100088 China |
| | Los Angeles, CA:
August 17-21
Anaheim Marriott Hotel
Terry Cantine
(818) 767-6770 |
| 1993 | Dallas/Ft. Worth, TX:
August 10-12
Grand Kempenski Hotel
Ed Vance
(817) 478-5653 |
| 1994 | Sendai, Japan: May 17-19
Sendai International Center
T. Takagi
Tohoku University
Aoba Aramaki
Sendai, Japan |
| | Chicago, IL: August 22-26
Palmer House
Bob Hofmann
(708) 979-3627 |
| 1995 | Atlanta, GA: August 22-24
Marriott Marquis Hotel
John Rohbaugh
(404) 894-8235 |
| 1996 | Santa Clara, CA:
August 19-23
Santa Clara Convention Ctr.
Double Tree Hotel
David Hanttula
(415) 335-1071 |
| 1997 | Austin, TX: August 18-22
Austin Convention Center
Hyatt Hotel
Gene Cory
(512) 736-0714 |
| 1999 | Japan: May 15-17 |
| 2000 | Washington, D.C.
Bill Duff, (703) 914-8450 |

1992 INTERNATIONAL EMC SYMPOSIUM, BEIJING, CHINA

Special group arrangements have been made for travel from North America to Beijing, China for the 1992 International EMC Symposium. The Basic Plan includes round trip airfare from the West Coast, all transfers, four nights at the symposium hotel, three meals daily, departure taxes, etc. for \$1475 each, double occupancy. Several options are also available.

Contact The Accent Group, 225 South 15th Street, Suite 916, Philadelphia, PA 19102. Telephone (215) 545-7670 or 1-800-422-2368 for details.

The technical program will have approximately 200 papers, presented in English. The abstracts were reviewed by Gene Cory, who believes that the program will be very good. Gene can be contacted at (512) 736-0714.

IEEE STANDARDS MEDALLION AWARD

The IEEE Standards Medallion was conferred during the awards luncheon at the 1991 EMC Symposium in Cherry Hill, NJ.

Don Heirman, the Chairman of the EMCS Standards Committee, and Gene Cory, the Chairman of the EMCS Standards Awards Committee, presented the IEEE Standards Medallion to Jack E. Bridges, Harold E. Taggart (not present), Leonard W. Thomas, Sr., and Ralph M. Showers. This award recognizes their outstanding achievements in the development and implementation of electromagnetic compatibility related standards work.

The recipients have been active in EMC standards activity for a combined total of 130 years as working group participants, authors, receiver committee members, and officers within the IEEE, ANSI, SAE, EIA, IEC-U.S. National Committee, IER, and CISPR. Their technical and administrative contributions to their chosen profession have been truly outstanding. We look forward to many years of their continued participation.



EMCS members (l-r) Leonard Thomas, Sr., Don Heirman, Ralph Showers, and Jack Bridges receive award presented by Gene Cory (far right).

1992 REGIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY ISRAEL

The 1992 Regional Symposium on Electromagnetic Compatibility will be held at the Tel-Aviv Hilton Hotel, in Tel Aviv, Israel on November 2-5, 1992. The Symposium is entitled "1992 - From a Unified Region to a Unified World." The theme of the Symposium is "Europe 1992 EMC Directive - Its Applications and Implications." Papers will be presented on the current state of EMC technology. Other topics will include: EMI sources; lightning; EMP; ESD; EMI coupling and crosstalk; the electromagnetic environment; EMC measurements; shielding and grounding; and filters and transient protection devices.

The Symposium will provide excellent opportunities for EMC researchers and engineers to present the latest research results and exchange views and experiences. For information, contact Rafi Rubinstein, Symposium Chairman. Tel: 972-3-7545628, FAX 972-3-7545468.

1992 JOINT SYMPOSIA

The 1992 Joint Symposia will be held at the Hyatt Regency Chicago from July 18 to 25, 1992. The Symposia comprises the IEEE-APS International Symposium, the URSI Radio Science Meeting, and the Nuclear EMP meeting. The theme of the Symposia will be the future of electromagnetism in a changing world environment.

The symposia is sponsored by the IEEE Antennas and Propagation Society, the USNC Commissions A, B, D, E, and K of the International Union of Radio Science, and the Permanent NEM Committee. The technical sessions will cover the five-day period July 20-24, 1992, and will be coordinated among the three symposia to provide a comprehensive, well-balanced program.

General information about the 1992 Joint Symposia may be obtained from P. L. E. Uslenghi, Symposia Chair (phone 312-996-5487, FAX 312-413-0024). Technical program inquiries may be directed to Allen Taflove, Technical Program Committee Chair (phone 708-491-4127, FAX 708-491-4455), or to one of the Co-Chairs: K. R. Umashankar (phone 312-996-3192, FAX 312-413-0024) or P. L. E. Uslenghi.

Industrial exhibits will be open from Tuesday July 21 through Thursday, July 23. Interested exhibitors can obtain detailed information by writing to: 1992 Symposia, Exhibits Committee, P.O. Box 6805, Chicago, IL 60680-6805, USA.

CALENDAR 1992

May 17-22	EIGHTH WORLD CONGRESS OF THE INTERNATIONAL RADIATION PROTECTION ASSOCIATION Montreal Convention Centre Montreal, Quebec, Canada	Contact: IRPA8 2155 Grey Street, Suite 820 Montreal, Quebec Canada H3H 2R9 FAX: 514-932-9419
May 25-27	IEEE INTERNATIONAL SYMPOSIUM ON EMC Fragrant Hills Hotel Beijing, China	Contact: Prof. Zhanj Linchang EMC Research Section Northern Jiatong University Beijing 100044, China
July 18-25	NEM 1992 Hyatt Regency Chicago, IL	Contact: 1992 Joint Symposia Technical Committee Program P.O. Box 6805 Chicago, IL 60680-6805
July 25	EM CHARACTERIZATION OF MATERIALS FOR ANTENNA IRCS APPLICATIONS Hyatt Regency Chicago, IL	Contact: Steve Brumley Boeing Helicopter P.O. Box 16858, M/S P30-27 Philadelphia, PA 19142 215-591-2302, FAX: 215-591-7015
August 18-20	1992 IEEE INTERNATIONAL SYMPOSIUM ON EMC Anaheim Marriott, Anaheim, CA	Contact: Terry Cantine AVX Filters 818-767-6770
August 24-25	ASIA-PACIFIC CONFERENCE ON ELECTROMAGNETIC COMPATIBILITY Centre for Electromagnetics Madras, India	Contact: Coordinator APC-EMC Sameer Centre for Electromagnetics CIT Campus, 2nd Cross Road Taramani, Madras 600113 INDIA FAX: (44)2350747
September 2-4	11th INTERNATIONAL WROCLAW SYMPOSIUM ON EMC Wroclaw, Poland	Contact: Mr. W. Moron EMC Symposium Box 2141 51-645 Wroclaw 12, Poland
September 7-11	ICEC '92 Loughborough, U.K.	Contact: Dept. of Electronic & Electrical Eng. Loughborough Univ. of Technology Loughborough, Leicestershire, LE11 3TU U.K.
September 16-18	14th ANNUAL ELECTRICAL OVERSTRESS/ELECTROSTATIC DISCHARGE SYMPOSIUM Loews Anatole Dallas, TX	Contact: Charvaka Duvvury Texas Instruments, Inc. 12840 Hillcrest, Suite 200 Dallas, TX 75230 214-917-7969, FAX: 214-917-7487
September 21-24	8th INTERNATIONAL CONFERENCE ON EMC Edinburgh Conference Centre Heriot - Watt University, Edinburgh, Scotland	Contact: Conference Services IEEE Savoy Place London WC2R 0BL U.K.
October 19-23	ANTENNA MEASUREMENT TECHNIQUES ASSOCIATION SYMPOSIUM	Contact: Paul Swetnam Lintek, Inc, P.O. Box 210 Powell, OH 43065 614-888-2700, FAX: 614-888-4778
October 1992	1992 INT'L AEROSPACE & GROUND CONFERENCE ON LIGHTNING & STATIC ELECTRICITY Atlantic City, New Jersey	Contact: Mike Cupples 609-484-5228 FAX: 609-484-4005
November 2-5	1992 SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY Tel-Aviv, Israel	Contact: Rafi Rubinstein, EMC 1992 Symposium Chairman Elisra Ltd. 48 Mivtza Kaddesh St. Benei-Beraq 51203 Israel Tel: (972-3)7545628, FAX: (972-3)7545468
December 2-4	THIRD INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY (INCEMIC) Calcutta, India	Contact: Shri V.R. Katti Electrical Integration Group Indian Space Application Centre Vimanapura - Post, Bangalore 560 017 India

SOCIETY MEMBERS ELECTED TO FELLOW GRADE AS OF JANUARY 1, 1992

The following five EMC Society members have been elected to the Fellow Grade as of January 1, 1992. The citation for each has been included. We wish to congratulate our distinguished members.

Professor Paolo Corona

Naval University of Naples
Inst. of Electromagnetic Waves
Via Acton, 38
80133 Naples, Italy

For the development of continuous-mode stirred chambers, and their application in electromagnetic compatibility evaluations.

Professor Robert G. Olsen

Dept. of Electrical Engrg.
Washington State University
Pullman, WA 99164

For contributions to the understanding of electromagnetic fields and interference from power lines.

Professor Masaaki Shinji

Imaizumidai 7-9-15
Kamakura-shi 247 Japan

For contributions to antennas for public telecommunication systems, and for leadership in radio transmission systems development.

Dean Bradley J. Strait

L.C. Smith College of Engrg.
Syracuse University
Syracuse, NY 13244

For leadership in university-industry collaborative research and engineering education.

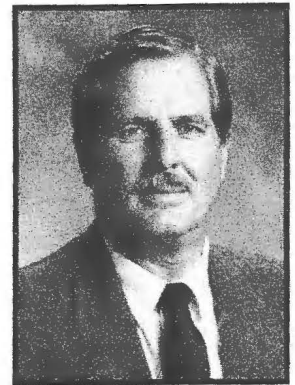
Dr. Frederick M. Tesche

Electromagnetic Consultant
6921 Spanky Branch Drive
Dallas, TX 75248

For the development of transient electromagnetic field models, and contributions to their application.

EMCABS

In this issue we continue publishing abstracts of papers from previous EMC Symposia, other conferences, meetings and publications. The EMCABS committee is composed of the members listed below. By way of introduction to the community, they are listed with their company affiliations:



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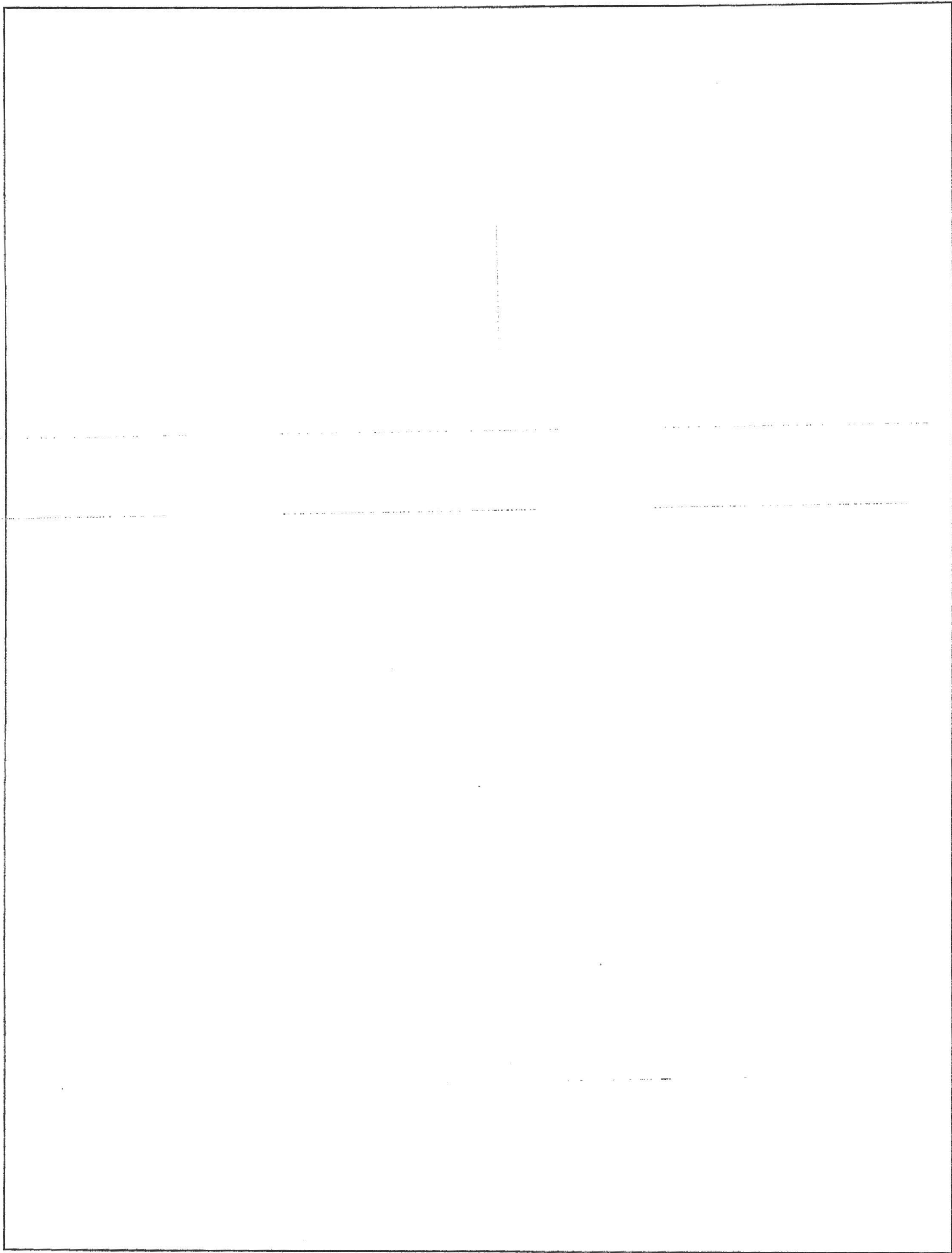
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NOTE: The steering staff of the EMC Japan Technical Group and the EMCS Tokyo Chapter have graciously offered to act as a central point for requests of papers abstracted. Most of the papers will be in Japanese only. The Steering Staff will assist in routing your request to the author(s) but will not do translating of the papers. The contact person is Yoshio Kami, The University of Electro-Communications, 1-5-1, Chofugaoka, Chofu-Shi, Tokyo 182, Japan.

Readers should be aware that many 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). However, he cannot supply translations.

<p>REVERBERATING CHAMBER DEVELOPMENT OVERVIEW Myron L. Crawford National Institute of Standards and Technology, Boulder, CO Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p>ABSTRACT: This paper presents the results of work at the National Institute of Standards and Technology, Boulder, CO, to carefully evaluate, develop (where necessary), and document the methodology for performing radiated electromagnetic compatibility (EMC) measurements using a reverberating chamber. The paper gives a brief description of the theory of operation, construction, evaluation, functional operation, and use of reverberating chambers for performing EMC measurements. The limitations and advantages of the measurement technique are also discussed in order to assist potential users in determining the applicability of this technique to their EMC measurement needs.</p> <p>INDEX TERMS: Radiated EMC/V measurements, reverberating chamber</p>	<p>EMCABS: 01-2-92</p>	<p>CURRENT DEVELOPMENTS IN THE USE OF REVERBERATION CHAMBERS AT McDONNELL DOUGLAS John M. Collum and Brian K. Matthews McDonnell Douglas Missile Systems Company, St. Louis, MO Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p>ABSTRACT: This paper discusses the uses of the Translational Electromagnetic Environment Chamber, or TEMEC facility, located at MDC, St. Louis, MO. The two primary uses are: for shielding effectiveness measurements of enclosures, cables and materials; and for characterizing equipment and system susceptibilities to high power electromagnetic environments (EMEs). Improvements to the TEMEC facility since its inception are described. Descriptions of the current TEMEC testing configurations, for both shielding and high power environment testing, are presented. Recent MDC investigations into improving TEMEC measurements are also described.</p> <p>INDEX TERMS: Radiated EMC/V measurements, reverberating chamber, shielding effectiveness measurements</p>	<p>EMCABS: 04-2-92</p>
<p>SHIELDING EFFECTIVENESS MEASUREMENTS USING MODE-STIRRED CHAMBERS Michael Hatfield NSWC-H22, Dahlgren, Virginia Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p>ABSTRACT: This paper presents methodologies for performing shielding effectiveness measurements using mode-stirred chambers. Instrumentation approaches, data collection schemes, chamber excitation methods, and the use of test fixtures are addressed. Locating points of leakage and evaluating "fixes" or hardening techniques are discussed. Also, examples of system level testing as well as component and material evaluations are presented.</p> <p>INDEX TERMS: Radiated EMC/V measurements, reverberating chamber</p>	<p>EMCABS: 02-2-92</p>	<p>SUSCEPTIBILITY MEASUREMENTS USING REVERBERATION CHAMBERS AT ROME LABORATORY Carmen J. Luvera Rome Laboratory, Griffiss AFB, NY Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p>ABSTRACT: Facilities located at the Electromagnetic Environmental Effects Research Center at Rome Laboratory, Griffiss AFB, New York are described. These consist of two anechoic chambers, two reverberation chambers, two screen rooms and a large supporting laboratory. These facilities are used to evaluate the electromagnetic susceptibility/vulnerability (EMS/V) of Air Force C³ and weapon systems. How the reverberation chambers are used to complement (not replace) anechoic chamber measurements is described.</p> <p>INDEX TERMS: Radiated EMS/V and emissions measurements, reverberating chambers, shielding effectiveness measurements</p>	<p>EMCABS: 05-2-92</p>
<p>MODIFICATIONS TO A MIL-STD-1344 METHOD 3008 FIXTURE TO PROVIDE RELIABLE SHIELDING AND EASY REMOVAL OF CONNECTORS Diane R. Kempf NAC-B1443, Indianapolis, Indiana Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p>ABSTRACT: In MIL-STD-1344 Method 3008 shielding effectiveness testing of connectors, the potential for leakage of unsoldered adapters to semi-rigid coaxial cable is high. While soldering the adapter to the coaxial cable removes the potential for leakage, it is not always expedient or practical. This paper discusses an improved method for connecting adapters to semi-rigid coaxial cable. This improved method uses threaded adapters which screw onto a threaded collar on the coaxial cable. The fixture is reliable with at least 100 dB of shielding at 10 GHz. Changing adapters for different sized connectors can be quickly and easily performed without disturbing other fixture interfaces.</p> <p>INDEX TERMS: Cable/connector shielding effectiveness measurements, reverberating chamber</p>	<p>EMCABS: 03-2-92</p>	<p>MODE-STIRRED CHAMBER FIELD STATISTICS: CORRELATION WIDTHS Bill Boverie Sandia National Laboratories, Albuquerque, NM Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p>ABSTRACT: A description of the statistical parameters generated inside a reverberating chamber are described. These include random variables and processes obtained by changing the paddle-wheel angle, changing the frequency, or changing the location at which the sample is taken. Correlation widths are defined for each of these three variables. Sample results are given in the paper.</p> <p>INDEX TERMS: Reverberating chamber, random process, statistical descriptors</p>	<p>EMCABS: 06-2-92</p>



<p>CHARACTERISTICS OF A SHIELDED ROOM FOR USE AS A REVERBERATION CHAMBER Janalee Graham General Motors Corporation, Milford, Michigan Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p><i>ABSTRACT:</i> A study to determine the feasibility of using an existing shielded room as a reverberation chamber is described. This includes theoretical and empirical determination of the chamber's quality factor (Q) and the influence of a wood table on Q. To further enhance the performance of the reverberation chamber, two stirrers were constructed and tested. A comparison of the stirrers' performance is given. The final overall performance of the reverberation chamber is presented along with General Motors' future plans regarding reverberation chamber usage.</p> <p><i>INDEX TERMS:</i> EMS testing, quality factor, reverberating chamber</p>	<p>EMCABS: 07-2-92</p>	<p>UTILIZING A PROTOTYPE TRANSVERSE ELECTROMAGNETIC/REVERBERATING CHAMBER COMBINATION FOR THE CONDUCT OF RADIATED SUSCEPTIBILITY AND VULNERABILITY TESTING OF LARGE TACTICAL SYSTEMS Robert L. Weeks and Jeffrey S. Bolton USAEPP, Fort Huachuca, AZ Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p><i>ABSTRACT:</i> This paper discusses a test and evaluation methodology to determine the susceptibility and survivability of tactical platforms when exposed to high level electric fields (E-fields). The test and evaluation methodology presented is radiated susceptibility and vulnerability testing within a combination transverse electromagnetic cell/reverberating (TEM/REV) chamber. The paper presents a description of the operational concepts of both the TEM and reverberating modes, a discussion of the benefits of the TEM/REV chamber, and an overview of testing concepts utilizing the TEM/REV prototype chamber.</p> <p><i>INDEX TERMS:</i> EMS/V testing, TEM/reverberating chamber</p>	<p>EMCABS: 10-2-92</p>
<p>ELECTROMAGNETIC VULNERABILITY MEASUREMENTS USING MODE-STIRRED CHAMBERS Michael Hatfield NSWC, Dahlgren, VA Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p><i>ABSTRACT:</i> This paper presents and compares the methods of performing electromagnetic vulnerability measurements using mode-stirred chambers to more conventional techniques. Vulnerability data collected on a generic test device using two mode-stirred chambers (MSC), anechoic chamber (AC), and bulk current injection (BCI) techniques are presented and compared. Also, direct injection data on individual components of the generic test device is compared to results obtained using the AC, MSC, and BCI techniques.</p> <p><i>INDEX TERMS:</i> Anechoic chamber, bulk current injection, comparison of EMV results, direct injection, reverberating chamber</p>	<p>EMCABS: 08-2-92</p>	<p>FREQUENCY STIRRING, AN ALTERNATE APPROACH TO MECHANICAL MODE-STIRRING FOR THE CONDUCT OF ELECTROMAGNETIC SUSCEPTIBILITY TESTING Thomas A. Loughry Phillips Laboratory, Kirtland AFB, NM Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p><i>ABSTRACT:</i> This paper summarizes the results of an experiment designed to determine the effectiveness of using frequency stirring to provide field homogeneity in a reverberation chamber. Frequency stirring is accomplished by up-converting band limited White Gaussian Noise to microwave frequencies, and thus exploits both the high mode densities achievable in a narrow bandwidth at microwave frequencies and the pseudo-statistical nature of the reverberation chamber's eigenmodes. The ultimate goal is to replace the mechanical stirring devices currently used in reverberation chambers with an equivalent electronic eigenmode stirrer.</p> <p><i>INDEX TERMS:</i> EMS/V and SE measurements, frequency stirring, reverberating chamber</p>	<p>EMCABS: 11-2-92</p>
<p>TIME DOMAIN CHARACTERISTICS OF MODE-STIRRED CHAMBERS Gary T. Roan and Ming C. Li NRL, Washington, D.C. Reverberating Chamber User's Group Meeting Abstracts of Talks/Papers, August 1-2, 1991</p> <p><i>ABSTRACT:</i> Time domain characteristics of an aluminum and steel mode-stirred chamber are presented. Special attention is paid to the rise time, fall time and the peak power level of both chambers as a function of the input frequency and stirrer orientation. It is shown that the maximum steady state amplitude is simply related to the decay constant, and that the decay constant is insensitive to stirrer position. The importance of proper mode stirring from the time domain perspective is discussed.</p> <p><i>INDEX TERMS:</i> Reverberating chamber, time domain characterization</p>	<p>EMCABS: 09-2-92</p>	<p>BASIC PROBLEMS IN EMC TEST SITE (ASSESSMENT AND THEMES OF NEW CISPR RECOMMENDATION DRAFT) Shigekazu Shibuya and Haruo Ishizuka System-Consultant and Radio-Wave Consultant IEEE EMC-S Technical Chapter EMCJ91-14, June 14, 1991</p> <p><i>ABSTRACT:</i> In this paper the differences of electric field strength, which depends on mounting height, test distance and directivity are studied. It is pointed out that the prime cause is the use of "test site with a metal ground plane." A method of using a "quasi-free-space type test site" is proposed.</p> <p><i>INDEX TERMS:</i> CISPR, open area test site</p>	<p>EMCABS: 12-2-92</p>

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