

IEEE

# Electromagnetic Compatibility Society



Newsletter

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EDITOR: ROBERT D. GOLDBLUM

## NOMINATIONS FOR BOARD OF DIRECTORS

Nominations now are being accepted for election of the EMC Society Board of Directors. In order to be nominated, a petition form, including biography summary, must be received by the nominating committee before May 1, 1984.

Petition forms and information can be obtained from:

William G. Duff  
Nomination Chairman  
Atlantic Research Corporation  
5390 Cherokee Ave.  
Alexandria, VA. 22312  
Phone (703) 642-4049

Biography summaries in the petition must not exceed one-half typewritten page and contain the following:

Education History  
Work History  
Technical Committee Service  
IEEE/EMC Membership

Nominations without petition may be accepted by the committee. The committee will consider service benefit to the Society as evidence in the half-page biography summary. Candidates must be members of IEEE and the EMC Society at the time of nomination.

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## BIOLOGICAL EFFECTS OF ELECTROMAGNETIC RADIATION

The publication of *Biological Effects of Electromagnetic Radiation, a Book of Selected Reprints*, has been announced by the IEEE Press, book publishing arm of the Institute of Electrical and Electronics Engineers, Inc. The volume was sponsored by the IEEE Committee on Man and Radiation, and edited by John M. Osepchuk of the Raytheon Research Division.

Engineers, biologists, physicists, health professionals, lawyers, legislators, and the informed public — all have a need to know about the interaction of nonionizing radiation with living systems, particularly with humans. The literature on this complex subject is vast and in some cases confusing and contradictory. The goal of this book is to bring together a collection of key papers, carefully selected to reflect the spectrum of subjects and schools of thought, so that the reader is given a coherent history and overview.

The 61 papers, one of which was specially written for this volume, are arranged by subject into seven parts: Quantitation of Electromagnetic Fields in Biological Systems; Biophysical Chemical Basis of RF Field Interactions; Effects of Radio Fields on the Central Nervous System; Pathophysiological Aspects of Microwave/RF Energy; Medical Applications of Electromagnetic Fields; Safety Standards; Interference Effects. The editor and his six associate editors each concentrated on organizing one of these parts. The reprints in each part are preceded by specially written material giving introductory, background, and bibliographic information. The resulting book provides a much-needed state-of-the-art tutorial on a subject of increasing concern.

*Biological Effects of Electromagnetic Radiation* (PC01594) is priced at \$79.95. IEEE members may purchase this book for \$47.95, a 40% discount. This 593-page volume may be ordered postpaid from the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854.

## NEWSLETTER STAFF

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Gene Knowles  
EMC Society President

TO: EMC Society Members and those interested in EMC disciplines

SUBJECT: An Invitation to EMC 84/Tokyo

By now, most of you know that the EMC Society of IEEE will hold its International Symposium at the Pacific Hotel in Tokyo, Japan during October 16-18, 1984. As Jim Hill noted in the last issue of the Society Newsletter, it is altogether fitting that in the year of the 100th anniversary of the founding of the Institute, our Society is presenting its first International Symposium outside the United States.

Chairman, Dr. Risaburo Sato, his colleagues, and the EMC Society Board of Directors have been working to put together an excellent technical program for this Symposium. The final call for papers has been issued. The deadline for paper abstract and summaries is January 31, 1984. Requests for the Advance Program should be addressed to: EMC Tokyo, c/o Prof. Takagi, Tohoku University, Dept. of Communications, Sendai, Japan 980.

I strongly advise *AIRMAIL* for any correspondence since ordinary mail will take too long. Write now, or send the special card to Prof. Takagi, and request the advance program. A hotel reservation form will be included with the advance program.

With all the preparation, this EMC Symposium should be a memorable one. The planning committee has scheduled it during the best time of year to visit Japan. The general climate of Tokyo is very similar to Portland, Oregon. They are about the same latitude. Temperature is generally in the 20's C with an average humidity of 64 percent and a mean of eleven rainy days during October. Light weight clothing is suggested.

Japan, generally, and Tokyo, particularly, has an excellent public transportation system. Tokyo itself is very cosmopolitan. The planning committee has made a special effort to identify a wide variety of eating places to accommodate a diversity of tastes at reasonable prices. We can expect conditions similar to any other large cosmopolitan city.

Special arrangements are being made with United Airlines to fly direct from West Coast cities to Tokyo at a rate of \$732. Special United roundtrip add on fares are available, such as: \$276.85 from Washington, New York, Pittsburgh, and \$275.95 from Chicago. These fares are substantially less than usual. Mr. Tei Iki, of Sony Corporation, has worked to bring this about.

The official agency for the EMC Symposium in Tokyo is Donick Travel & Tours, Inc. This special airfare with United Airlines for this symposium is available only through this agency. Sightseeing tours throughout Japan are available, as well as extensions to Hong Kong. For details, contact:

Donick Travel & Tours, Inc.  
12425 Rancho Bernardo Road  
San Diego, CA 92128  
Phone: (619) 451-2330

So, let me invite you to the 1984 International Symposium in Tokyo. It is an opportunity to expand your technical knowledge, experience technology in another culture and, for many of you, a unique change for further human enrichment. Come to EMC/84, Tokyo, Japan.

## PROJECT 2000; SERVING NATO'S FUTURE NEEDS

In October 1981, NAVAIR sponsored an aircraft EMC forum which was presented at the North Atlantic Treaty Organization (NATO) Air Electrical Working Party (AEWP) meeting in Brussels, Belgium. This Forum was attended by forty-two engineers representing nine countries. Nineteen presentations were made: seven by representatives of government agencies and twelve by airframe manufacturers.

The participants of the October 1981 forum concluded that this unique program fulfilled its intended purpose and goals. The Forum provided a platform for an exchange of aircraft EMC test and control techniques and initiated a process for the development of future requirements, systems and materials. Significant elements missing from the Forum were the voices from instrumentation, equipment and material designers. The AEWP recommended that if another Forum were organized, spokespersons from those domains should also be included.

Advance planning is underway at this time for another Forum, "Project 2000: Serving NATO's Future Needs", to be held in Europe, perhaps in the fall of 1984. The Forum will bring together airframe, sub-system, material, and instrumentation specialists to assist the NATO/AEWP in designing future aircraft requirements. The Forum will again be planned as an open exchange of current problems and future needs of NATO, and will solicit a response to those needs from industry. Industry will gain insight as to the present problems, future needs and the developments required for NATO's concerns as they relate to EMC.

Planning is currently underway in Europe for hosting another NATO-oriented forum. To support the planning, the Canadian and United States AEWP delegations will hold a coordination meeting in the Spring of 1984. This meeting will screen proposals for Canada and United States presentations and forward them to the host nation.

The forum is not an open meeting. To meet our hosts' request, participation and presentations will be by invitation only. Selections will be by the United States AEWP delegation (Navy, Army, Air Force), and by the Canadian AEWP delegation (Headquarters of the National Defense).

The United States coordination effort and program is being sponsored by NAVAIR (J. Fisher). The Canada coordina-

tion effort and program is being sponsored by the Canadian National Defense Headquarters (J. Belanger).

Those interested in participation or presentations should respond by letter prior to April 1, 1984, indicating the field of EMC control in which they would participate. The projected fields are:

Aircraft Testing (up-date)  
Antennas (EMI measurement only)  
Computer Analysis  
Connectors - Backshells  
Filters  
Flight Line Grounding/Earthing  
Interagency Liaison  
International Liaison  
Instrumentation  
Interference Suppression Devices  
Materials:  
• Composites  
• Coatings  
• Anechoic  
• Gaskets  
• Lubricants  
• Windows  
• Tapes  
• Cloth  
• Arc Sprays  
• Shielding  
Radiation Hazards  
Subsystem/Equipment Testing  
Shielded Rooms  
Technical Publications  
Wiring/Cabling

Responses from the United States should be directed to:

Mr. Walter McKerchar  
NATO Project 2000  
c/o Northwest Engineering Service  
P.O. Box 1888  
Poulsbo, WA 98370-0269  
(206) 779-7069

Responses from Canada should be directed to:

Mr. A. Chubukjian DMAEM 4-4-4  
NATO Project 2000  
National Defense Headquarters  
Ottawa, Ontario, Canada K1A 0K2  
(613) 993-1312



## 1984 INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

The 1984 International Symposium on Electromagnetic Compatibility will be held in Tokyo from October 16-18, 1984. Sponsors of the conference are the Technical Group on EMC of the Institute of Electronics and Communication Engineers of Japan, The Institute of Electrical Engineers of Japan and the EMC Society of the IEEE.

The EMC Symposium, the first to be held in Japan, will be supported by The Science Council of Japan; Ministry of Education; Ministry of International Trade and Industry; Ministry of Posts and Telecommunications; URSI Commission E, CISPR, Institute of Television Engineers of Japan; Society of Instrument and Control Engineers; Japan Society of Medical Electronics and Biological Engineering; Information Processing Society of Japan, Institute of Electrostatics, Japan; Japan Society of Applied Physics; and The Society of Automotive Engineers of Japan.

Technical areas will include EMP; ESD; EM Environments; Sensors; Field Measurements and Analysis; Biological Effects; Hyperthermia; EMC in Communications, Instrumentation, CPU/VLSI, Navigation and Aerospace; Consumer Products; Transportation; and High Energy Generation.

A final call for papers has been issued. Abstracts and summaries must be submitted by January 31, 1984 to Professor Takagi at the address listed below. English will be the official language of the Symposium. A technical exhibition will be held in parallel with the symposium to offer participants the opportunity to become acquainted with recent product developments and technical services.

For more information contact: EMC'84/Tokyo, c/o Professor Takagi; Tohoku University, Department of Communications, Sendai, Japan 980.

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### TRAVEL PLANS TO TOKYO FOR THE 1984 IEEE INTERNATIONAL EMC SYMPOSIUM

1984 is the first year in which the IEEE International EMC Symposium will be held outside of the United States. The 1984 Symposium is scheduled for October 16-17-18 in Tokyo, Japan. Many engineers from the USA will be interested in attending, but may be hesitating because of the cost of air travel to Japan. If we can get enough people traveling together to form one or more groups, we should be able to take advantage of group fares or, possibly, charter a flight. While this event is a year away, it is not too early to poll the interest of IEEE members and non-members so that we can explore the possibilities of cost-saving on air travel. If you have any possible interest in attending the Tokyo Symposium, please fill in the questionnaire form below so that we can put you on the mailing list to keep you up-to-date on travel arrangements.

I am interested in traveling to Japan to attend the EMC'84 Symposium. I understand that my reply on this form does not obligate me in any way.

Name \_\_\_\_\_

Address \_\_\_\_\_ Tel.: (     ) \_\_\_\_\_

Zip \_\_\_\_\_

1. Preferred point of departure: New York \_\_\_\_\_ Chicago \_\_\_\_\_ Washington \_\_\_\_\_ Los Angeles \_\_\_\_\_ San Francisco \_\_\_\_\_  
Other \_\_\_\_\_

2. My employer requires that I travel on USA Carrier. Yes \_\_\_\_\_ No \_\_\_\_\_

3. I am interested in staying for just one week. Yes \_\_\_\_\_ No \_\_\_\_\_

4. I am interested in staying two weeks for the symposium and a week of travel. Yes \_\_\_\_\_ No \_\_\_\_\_ Before symposium \_\_\_\_\_  
after \_\_\_\_\_

5. Include hotel in package \_\_\_\_\_ Include rental car in package \_\_\_\_\_

6. Other comments \_\_\_\_\_

Return this form to Jim Hill, 6706 Deland Drive, Springfield, VA 22152; Telephone: 703-451-4619.

## EMCS STANDARDS ACTIVITY AND YOU!!

by Don Heirman, Chairman  
EMCS Standards Committee

The continuing technical contribution our Society makes to the EMCS discipline can be readily measured by the standards it produces and maintains current. Long after we are no longer active in the Society, our standards still serve. Our EMCS Standards Committee, which now numbers 15, is responsible for keeping our 11 existing standards current and for writing or seeing to it that working groups write new standards needed for the new challenges and topics in EMC.

The Institute's Standards Board maintains a standards manual which identifies the operation of society's standards committees. In particular, every 5 years we must review each existing standard and either reaffirm, revise, or withdraw the standard. Any updates/revisions must be preceded by a Project Authorization Request (PAR) which is sent to a Review Committee (REVCOM) of the Standards Board. REVCOM ensures that proper coordination is accomplished among the various interested societies and other national and international standards organizations. For our part, great care must be given to ensure that any changes or revisions do not impact on those present users of the standard, especially if the existing standard is cited in a regulatory document such as the FCC Rules or in a MIL STD. Generally, we have taken the approach of not fixing what is not broken. However, we now find ourselves with several standards that have not been really updated since the 1950's and 60's. In particular the majority of our standards listed in Table I are in need of revisions.

A brief update of the activity on each standard shown in Table I will give you an idea of where we stand and where we need help.

- |             |   |
|-------------|---|
| STD 139     | <i>Jim Klouda of Elite Electronic Engineering chairs this revision with considerable help from Lou Weinberg of IBM. A draft document has been circulated to the EMCS standards committee and comments are needed prior to balloting approval. Those interested in this topic should contact Jim on (312) 495-9770.</i>  |
| STD 140     | <i>Gene Knowles has on his committee Jim Maw, Lamont Wilson, Jim Klouda, Bill Willett, and Bill Stone. A draft revision is due for initial review now. Call Gene on (206) 575-5280 if you have something to contribute to this area.</i>  |
| STD 187     | <i>Prof. Sato of Tohoko University (Japan) chairs this revision. He needs US inputs to this standard especially from those in the home entertainment electronics field. Call Tei Iki (Prof. Sato's US contact) on (619) 487-8500.</i>   |
| STD 213/214 | <i>Hank Knoller of Lockheed has put together a minor update of these standards which have been approved by the EMCS standards committee. What he needs is a new project to introduce standards on the use of the newer Line Impedance Stabilization Networks. Those of you who manufacture such LISNs are especially welcomed. Call Hank on (213) 847-1485.</i> |
| STD 263     | <i>This standard is in urgent need of a working group and chairman. Ignition noise will not completely go away and the need for measurement standards still exist. We are interested in our Vehicular Technology/EMC members to help out. Call Don Heirman on (201) 834-3566.</i>   |

- STD 299 *Dick Schulz has put together a revision to this standard which is meant to also replace MIL STD 285. The proposed standard is out for ballot approval, but an in-depth review by shielded room vendors is needed. We urge these vendors to get in touch with Dick on (214) 689-6340.*
- STD 376 *This work was completed by Ralph Showers, University of PA, and is one of our most recent updates. It is due for reevaluation in 1985. So if you want to see any changes, now is the time to get started. We think that EMI receiver and spectrum analyzer manufacturers would want to input to Ralph on (215) 898-8123.*
- STD 377 *In 1980, the standards committee reaffirmed this standard. If your interests lie in this area, especially those of you in cellular radio, get a copy and see where we can update this effort scheduled for reappraisal in 1985.*
- STD 475 *The work of Ralph Taylor has paid off in adding the field disturbance sensor standard to our offerings. Order a copy from IEEE headquarters if you are interested in this area.*

We now will review our new standards ideas and current efforts by the several working group chairmen. Table II lists these activities. The status of this work is as follows:

- P473 *Ed Skomal of Aerospace Corp. is pushing to get this published soon. His committee has been one of the best organized in recent years and their efforts show.*
- P478/482/509 *This work is chaired by George Kunkel of Spira and vice-chaired by Jim Parker of Data General. The working group includes Pete Madle and Bruno Weinschel. There is a real need for connector and cabling manufacturing representation as well on this committee. Contact George on (213) 843-5880.*
- P626 *This committee needs a working group and chairman. The need to provide measurement and technical standards for good RF grounds on printed wiring boards to chasses is to be addressed. We hope to especially interest EMC consultants or manufacturing mitigation experts in this work. Contact Don Heirman if you are interested.*

Now that we have indicated where we stand, do any of our readers want to help or know of someone who can contribute? We need new ideas on standards as well. WE NEED YOUR HELP NOW. We must go beyond the present committee members to expand our work and in fact to get better representation according to the IEEE standards manual. For example, all working groups should contain membership representing producers (manufacturers), users, and those who have general interest. No one of these three groups can constitute more than 50 percent of the working group. This is difficult to follow if there is a one person committee. Hence, we would like to take the following steps.

- Search through our EMCS membership for volunteers—YOU!!
- Include a standards interest questionnaire with the new or renewal membership applications.
- Seek out past symposium speakers and Transactions authors on related subjects.

Have we missed another effective way? Please let us know.

We have listed the EMCS Standards Committee members in Table III and their addresses and phone numbers. Each will be more than happy to discuss their work or explain how we operate. Of course, you can always call Don Heirman, the chairman, on (201) 834-3566. The next Standards Committee meeting will be at the national symposium in San Antonio in April 1984. Our meeting will be posted and of course always open to you our members. Why not stop by. Even better, why not pick up your phone and call any of us on the committee and volunteer your services. WE WANT TO HEAR FROM YOU!!

Table I. Present Standards Under Cognizance of EMCS

IEEE Standard — Year	Title
139-1952	<i>Measurement of Field Intensity Above 300 MHz from Radio Frequency Industrial, Scientific, and Medical Equipment.</i>
140-1950	<i>Minimization of Interference from Radio Frequency Heating Equipment</i>
187-1951	<i>Open Field Method of Measurement of Result of Spurious Radiation From FM and TV Broadcast Receivers</i>
213-1961	<i>Radio Interference: Methods of Measurement of Conducted Interference Output to the Power Line from FM and TV Broadcast Receivers in the Range of 300 kHz to 25 MHz.</i>
214-1961	<i>Construction Drawing of Line Impedance Network Required for Measurement of Conducted Interference to the Power Line from FM and TV Receivers in the Range of 300 kHz to 25 MHz.</i>
263-1965	<i>Measurement for Radio Noise Generated by Motor Vehicles and Affecting Mobile Communications Receivers in the Frequency Range 25 to 1000 MHz</i>

299-1969	<i>Measurement of Shielding Effectiveness of High-Performance Shielding Enclosures</i>
376-1975	<i>Measurement of Impulse Strength and Impulse Bandwidth</i>
377-1980	<i>Spurious Emission from Land Mobile Communications Transmitters</i>
475-1983	<i>Field Disturbance Sensors</i>

Table II. New Standards in Progress.

PAR	Topics
P473	<i>EM Site Surveys</i>
P478/482/509	<i>Measurement of Shielding Effectiveness of Cables/Connectors/Backshells</i>
P626	<i>Signal Grounding Practices</i>

Table III. IEEE EMSC Standards Committee Members

(as of 1/1/84)		Phone: US Contact:
Donald N. Heirman (Chairman)	Hugh Denny	Tei Iki
AT&T Information Systems Laboratories	Georgia Institute of Technology	Sony Corp.
Crawfords Corner Road	Engineering Experiment Station	1650 W. Bernardo Drive
Room 2E-514	Communications Division	San Diego, CA 92127
Holmdel, NJ 07733	Atlanta, GA 30332	Phone: (619) 487-8500/Ext. 332
Phone: (201) 834-3566	Phone: (404) 894-3533	
Art Wall (Vice-Chairman)	Hank Knoller	Dr. Ralph M. Showers
10651 Breezewood Drive	Lockheed Corporation	Moore School of Engineering D2
Woodstock, MD 21163	9444 Beckford Avenue	University of Pennsylvania
Phone: (202) 653-8247 — Office	Northridge, CA 91324	Philadelphia, PA 19174
(301) 465-2119 — Home	Phone: (213) 847-1485	Phone: (215) 898-8123
Edwin L. Bronaugh	Eugene D. Knowles	Edward Skomal
Electrometrics	BEC Engineering, Inc.	Aerospace Corporation
Div. of Penril	625 Andover Park West	P.O. Box 92957
100 Church Street	Tukwila, WA 98188	Los Angeles, CA 90009
Amsterdam, NY 12010	Phone: (206) 575-5796	Phone: (213) 648-7024
Phone: (518) 843-2600	(206) 575-5781	H. E. Taggart
Gerard T. Capraro	George M. Kunkel	National Bureau of Standards
USAF Rome Air Development Center	Spira Manufacturing Corporation	div. 723.000
EMC Branch	2808 North Naomi Street	Boulder, CO 80303
Rome, NY	Burbank, CA 91504	Phone: (303) 497-3462
Phone: (315) 330-2519	Phone: (213) 843-5880	Ralph E. Taylor
(315) 423-4349		630 5th Avenue, N.E.
W. E. Cory	Prof. Risaburo Sato	Hickory, NC 28601
Southwest Research Institute	Department of Information Science	Phone: (704) 324-0371
P.O. Box 28510	Faculty of Engineering	Leonard W. Thomas, Sr.
San Antonio, TX 78228	Tohoku University	1604 Buchanan Street, N.E.
Phone: (512) 684-5111	Sandai, JAPAN 980	Washington, DC 20017
		Phone: (202) 526-2545

#### CHAIRMEN OF WORKING GROUPS BUT NOT STANDARDS COMMITTEE MEMBERS

Jim Klouda  
Elite Electronic Engineering Co.  
1516 Center Circle  
Downers Grove, Ill 60510  
Phone: (312) 495-9770

Richard B. Schulz  
Xerox Corporation  
Mockingbird Lane  
Dallas, TX  
Phone: (214) 689-6340



# **1984 IEEE 21ST ANNUAL CONFERENCE ON NUCLEAR and SPACE RADIATION EFFECTS CALL FOR PAPERS**

The 1984 Conference on Nuclear and Space Radiation Effects will be held at the Broadmoor Hotel in Colorado Springs, Colorado. The program, consisting of eight to ten sessions of contributed papers, several invited papers, and a poster session, will be held July 23 through July 25. In addition, a short course on radiation effects will be offered on July 22. The conference will be sponsored by IEEE/NPSS Radiation Effects Committee and cosponsored by the Defense Nuclear Agency; DoD, Jet Propulsion Laboratory; NASA, Sandia National Laboratories; and DOE.

This Conference will cover nuclear and space radiation effects and electromagnetic pulse effects on electronic devices, materials, circuits, and systems, as well as semiconductor processing technology and techniques for producing radiation-tolerant (hardened) devices, integrated circuits, and memories.

Papers describing significant findings in the following or related areas are solicited:

- Basic Radiation Effects Mechanisms for Materials and Devices;
- Radiation Effects and Spacecraft Charging in Satellites;
- Radiation Transport, Energy Deposition, Dosimetry, and Radiation Facilities;
- Radiation Effects, Methods of Design and Manufacturing for Radiation-Hardened Electronic Devices,

Integrated Circuits, and Systems;

- Electromagnetic Pulse Phenomena, Assessment of Coupling, and Measurement Technology (IEMP, SGEMP, SREMP);
- Single-Event, Upset, and Latchup Phenomena;
- Hardness Assurance Technology and Testing Techniques;
- Radiation Effects on the Materials and Electronics of Nuclear Reactors (Power and Space);
- New Developments and New Technologies of Interest to the Nuclear and Space Radiation Effects Community;

Prospective authors must submit eight copies plus the original of a 35-word factual abstract and an informative summary (appropriate for a 10 to 15-minute presentation), two to four pages in length, including figures. The summary must furnish sufficient details to permit a meaningful review and clearly indicate the purpose of the work, the significant results, and how it advances the state of the art.

The original and copies of the summary must be received by the 1984 Technical Program Chairman no later than March 1, 1984. A. H. Kalma, 1984 NSRE Technical Program Chairman, Northrop Research and Technology Center, One Research Park, Palos Verdes Peninsula, CA 90274. Tel.: 213-377-4811 x255.

For additional information, contact B. D. Shafer, Div. 2115, 1984 NSRE Publicity Chairman, Sandia National Laboratories, Albuquerque, NM 87185. Tel.: 505-846-0629.

**1984  
INTERNATIONAL IEEE/AP-S  
SYMPOSIUM  
and  
NATIONAL RADIO SCIENCE  
MEETING**

The 1984 International Symposium, sponsored by the IEEE Antennas and Propagation Society and the National Radio Science Meeting, sponsored by the USNC/URSI Commissions A, B, E and F, will be held jointly at the Westin Hotel, Copley Place, Boston, MA from June 25-28, 1984. The technical sessions for IEEE AP-S and the National Radio

Science Meeting will be coordinated to provide a comprehensive and well-balanced program. Inquiries regarding the technical program may be directed to Harold R. Raemer, Technical Program Committee Chairman, Department of Electrical Engineering, Northeastern University, Huntington Avenue, Boston, MA 02115.

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**INSTITUTION OF ELECTRONIC  
AND RADIO ENGINEERS**

The Fourth International Conference on EMC will be held at the University of Surrey in Guilford, Surrey, Great Britain from September 18 to 21, 1984. Because of the large number of paper synopses which have been received consideration is being given to extending the conference to four days to accommodate a greater number of papers. Information and registration forms are available from the Conference Secre-

tariat, Institution of Electronic and Radio Engineers, 99 Gower Street, London, WC1E 6A2, England. Telephone 01-588-3071.

ZURICH, SWITZERLAND - This conference is scheduled for March 1985.

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**EMC SYMPOSIUM & TECHNICAL  
EXHIBITION-ZURICH 1985**

A call to authors has been issued for the 6th EMC Symposium, which is planned for March 5 to 7, 1985 in Zurich. The Swiss Electrotechnical Association will sponsor the conference.

Prospective authors are invited to submit 10 copies of an abstract and summary not exceeding 5 pages before March 15, 1984 to the Technical Program Committee EMC 1985,

ETH Zentrum-IKT, 8092 Zurich, Switzerland. Summaries should describe projects, including results and conclusions, and should preferably be accompanied by graphs and other pictorial material. Authors will be notified by June 18, 1984. Photo-ready manuscripts will be due by October 31, 1984. For further information contact: Dr. T. Dvorak, ETH Zentrum-IKT, 8092 Zurich, Switzerland. Phone (.411) 256-2790, Telex 53 178 ethbi ch.

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**WROCLAW SYMPOSIUM  
ON EMC**

This Seventh International Wroclaw Symposium on EMC which had been scheduled for June 26 to 28, 1984 has now been changed to June 18 to 20, 1984 to accommodate the date to the CCIR Preparatory Meeting connected with the World Administrative Radio Conference on the Use of the Geostationary Satellite Orbit which begins in Geneva on June 25th. All other arrangements remain the same. Papers will be presented in English or Russian language,

with simultaneous translation provided.

Hotel accommodations, transportation, etc. will be arranged by the Congress Bureau of the Polish Travel Office, ORBIS, in cooperation with all major travel agencies. The preliminary program is scheduled for the Spring of 1984. For additional information contact W. Moron, EMC Symposium, Box 214, 51-645 Wroclaw 12, Poland. Telex: 0712118 ilw pl.

# EMC PERSONALITY PROFILES



**DR. ROBERT J. HAISLMAIER**

The EMC Personality for this issue of the IEEE EMC Newsletter is Dr. Robert J. Haislmaier who is presently the Navy EMC coordinator for the Chief of Naval Operations. In this capacity, Dr. Haislmaier (or Bob to those of us in the EMC community that have worked closely with him) is responsible for formulating policy and directing and guiding the Navy wide program for EMC and EMI control in all Navy assets afloat, airborne, and ashore. Bob's responsibilities include Navy research, development, test and evaluation efforts that are directed toward EMC/EMI control, spectrum management, and survivability of Navy command and control from nuclear generated EMP. The major technical thrusts have been in state-of-the-art microprocessor-based rugged test instruments which can be used by Fleet technicians with minimum skill; interference suppression technology for EMI problems in the Fleet; prior EMC analyses to prevent EMI in system development; upgrade or issue of standards, specifications, and handbooks to enforce EMC in systems acquisition; and an extensive program for awareness and training in EMC maintenance and EMI prevention. Bob is currently involved in directing the compilation of the training plan and curricula development for a comprehensive Navy wide EMI control and awareness training at all levels of Navy military and civilian personnel, and including industrial personnel such as those at ship yards. It is expected that this will bring awareness and training in recognizing and controlling EMI to over 500,000 Navy personnel per year by 1986.

Before his current assignment, Bob was a senior technical staff member and supervisor in the Nuclear Effects Division, Naval Surface Weapons Center. As a primary Navy expert in EMP and associated electromagnetic environmental effects,



by William G. Duff

Bob directed a Navy program office responsible for electromagnetic effects on weapons, and initiated military standards and procedures to prevent inadvertent degradation of nuclear hardening of U.S. defense systems. In his work at the Naval Surface Weapons Center, Bob directed a national team of experts in assessing and measuring target interaction effects of directed energy weapons; pioneered the application of EMP hardening technology to Navy systems and ships; and participated as an EMP expert on EMC advisory boards to guide development of several major electronic and weapon systems so that EMC and EMP were achieved.

Bob started his career in aerophysics/electronic engineering at the Naval Ordnance Laboratory where he performed research, development, test and engineering in electromagnetic theory applied to aerophysics research.

Born in Milwaukee, Wisconsin on June 26, 1929, Bob attended Marquette University in Milwaukee where he received a B.S. in Physics in 1951 and a M.S. in Physics in 1954. After graduation from Marquette, Bob came to Washington D.C. to work for the Naval Ordnance Laboratory. He later attended the Catholic University of America in Washington where he received his Ph.D. in Physics in 1976.

During his career, Bob has made a number of significant contributions to the technical community. He has published a number of reports and papers on EMC and EMP, and has presented papers at several of our recent IEEE EMC Symposia. Bob is very active in the IEEE EMC Society. He is currently the secretary of the Washington and Northern Virginia Chapter of the EMC Society and he was the Chairman for the awards committee and co-chairman of the government liaison committee for the 1983 IEEE International EMC Symposium in Washington, D.C. He is also a member of the publicity committee for the IEEE sponsored 1984 Nuclear EMP Meeting (NEM) in Baltimore, Maryland, and he is a member of SAE A-4 committee on electromagnetic compatibility.

We all wish Bob success in his important position as Navy EMC Coordinator and hope that he will be able to accomplish the extensive EMI awareness and training program that he has initiated. This program will represent a major step toward making personnel more aware of EMI and achieving EMC in the Navy and should help to make all of our jobs easier.

## SURVEY DATA

### 1983 EMC SYMPOSIUM ATTENDEES

An attendee survey was performed at the 1983 EMC Symposium in Washington, D.C. There were 153 responses received (about 10% of the attendees). Note that the upward trend of non-member attendance is apparently accelerating. The high level of optimism concerning future employment opportunities in the field appears to remain about the same. The median salary level of the attendees was about \$41,000 per year and the median age about 44.

The raw data is available in the event others may want to do further analysis. If so, please contact Ernest R. Freeman at (301) 262-4400.

#### *IEEE Membership Grade*

Associate	0%
Member	46%
Senior Member	11%
Fellow	5%
Not Member	38%

#### *Age*

20-25	3%
26-30	11%
31-35	13%
36-40	9%
41-45	23%
46-50	11%
51-55	12%
56-60	12%
Over	6%

#### *Highest Earned Degree*

None	6%
Associate	8%
Bachelor	40%
Professional Degree	4%
Master	33%
Doctorate	9%

#### *Employment Status (select one)*

Employed full-time in EMC area	60%
Employed full-time in other than EMC area	17%
Employed part-time in EMC area	21%
Unemployed involuntarily	0%
Unemployed voluntarily	0%
Retired-not available for employment	0%
Retired-available for employment in EMC area	1%
Self employed	1%

#### *Registration/Organized Representation*

Registered Professional Engineer	22%
Engineer in Training	9%
Certified Engineering Technician	1%
Member Professional Bargaining Unit	1%
None	67%

#### *Number of EMC/EMI Employees at Your Place of Work*

1 - 4	46%
5 - 9	22%
10 and Over	32%

#### *Are You Active In*

EMC Chapter	45%
Other Technical Chapters	31%
IEEE Section	24%
Student Activities	0%

#### *Which of the Following Are Useful to You?*

EMC Symposiums (held in USA)	35%
EMC Symposiums (held outside of USA)	5%
EMC Transactions	28%
EMC Newsletter	24%
EMC Chapter Symposia	8%

#### *Do You See a Reduction of EMC Engineering Manpower in Your Company?*

Is so, indicate the time when this might occur:	
Three Months	2%
Six Months	1%
One Year	1%
Two Years	2%
No Opinion	8%
No Reduction	86%

#### *Do You See An Increase in EMC Engineering Manpower in Your Company?*

Is so, indicate the time when this might occur:	
Three Months	16%
Six Months	24%
One Year	13%
Two Years	7%
No Opinion	17%
No Increase	23%



*Supervision Responsibility*

No Supervision Responsibility	20%
Indirect or Staff Supervision	24%
Supervise Team or Unit	11%
Supervise Project or Section	22%
Manage Department or Division	16%
General Management	5%
Self Employment	2%

*Number of Years of Professional Experience*

0-5	11.4%
6-10	13%
11-15	13%
16-20	20%
21-25	17%
Over 25	26%

*Present Annual Base Compensation or Salary*

Under \$20K	3%
\$20-\$30K	11%
\$30-\$40K	26%
\$40-\$50K	36%
\$50-\$60K	17%
\$60-\$70K	4%
\$70K and above	3%

*Number of Employees in Your Entire Company or Institution*

1 - 99	9%
100 - 199	3%
200 - 499	12%
500 - 1499	12%
1500 - 2999	11%
3000 - 4999	12%
5000 - 9999	8%
10000 & Over	33%

## EMC SOCIETY 25TH ANNIVERSARY MEDALLION NOW AVAILABLE

In commemoration of the 25th anniversary and the 25th annual symposium of the EMC Society the Symposium Committee ordered the Franklin Mint to strike a medallion in German Silver. Each registrant for the full symposium received one of these medallions. The mint run was limited to one thousand pieces so some 200 are available for sale to members and collectors who were not able to attend but would like to have this memento of the EMC Society's anniversary events. The medallion is 39.5 mm. in diameter, about the size of a silver dollar, and has brilliantly polished surface similar to a proof coin. It comes in a protective clear plastic case which can be snapped open for closer examination of the coin. For those who want to put it to practical use there are a number of mounting devices available in coin shops. It can be incorporated in bill clips, key chains, desk display stands, pendants, etc. One side highlights the symposium held in Washington with the Lincoln Memorial, Washington Monument, and Capitol Building. The reverse side notes the 25th anniversary of the EMC Society which started on October 10, 1957 as the Professional Group on Radio Frequency Interference of the Institute of Radio Engineers and became today's IEEE EMC Society. Medallions can be ordered by sending a check for \$5.00 made out to the IEEE EMC Society to Jim Hill, 6706 Deland Drive, Springfield, VA 22152. The medallion will be shipped postpaid within the United States, Canada, and Mexico. To other countries add \$2.00 for postage.



# Book Reviews

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by Jim Hill, EMXX Corporation.

We have finally prevailed on "Sully" Sullivan to do another book review for you. As you know, Sully was General Chairman of the recent EMC '83 Symposium held here in Washington last August. He was so heavily involved in that event (attendance was 1718) that he refused to do a book review. Now that EMC '83 is over, he has consented to review *Interference Suppression Techniques for Microwave Antennas and Transmitters* which can be considered a companion publication to *Electromagnetic Compatibility Design Guide*. Ernest R. Freeman is author of the first book and co-author with Herbert M. Sachs of the EMC design guidebook which was reviewed in Issue No. 116 of this EMC-S Newsletter.

## ***INTERFERENCE SUPPRESSION TECHNIQUES FOR MICROWAVE ANTENNAS AND TRANSMITTERS***

by

*Ernest R. Freeman*

*Published by Artech House, Inc.*

*Copyright 1982*

*Hardbound \$40.00 (245 pages)*

*Reviewed by A. H. Sullivan, Jr.*

*7121 Wolfree Lane*

*Rockville, Maryland 20852*

To this reviewer's knowledge this is the first book to emphasize and concentrate on the antenna and transmitter aspects of interference suppression. Microwave frequencies play a major part in communications, navigation, command and control. Electromagnetic emissions at these frequencies are a prominent source of interference to receivers which are situated in frequency or geographic relation such that they are affected by the emissions. One approach to reduction of this interference is to design interference suppression technology into antennas. This book discusses these techniques in detail.

The introduction to this book and the first ten chapters discuss antennas and methods of reducing interference resulting from antenna radiation. Two chapters discuss radar absorbing materials (RAM); other chapters discuss fences (reflective or absorptive barriers), corrugated horns, the dielectric guide, the tunnel antenna, horn reflector antenna, arrays, pillbox antennas, dielectric rods, and emission spectrum measurements.

One chapter (chapter 12) discusses inter-system electromagnetic compatibility problems and the attempt to alleviate these problems by establishing standards for reasonable limits on system performance. MIL-STD-469 ("Radar Engineering Design Requirements, Electromagnetic Compatibility") published by the Department of Defense is one such standard. In chapter 12, MIL-STD-469 design difficulties are analyzed and it is pointed out that because of the increasing congestion of the radio spectrum with more and higher powered transmitters, MIL-STD-469 requirements may become more stringent, and other non-military EMC standards will also need to be established.

Chapter 13 discusses the effects of emission spectrum measurement errors and suggests some new methods for further investigation. This is followed up by analyses in the Appendix (including mathematical approaches) of spectrum signature tests and development of spectrum signature calibration techniques.

This book is an excellent study of interference suppression techniques, but be prepared - it leans rather heavily on the theoretical side. For the engineer who is directly involved in

antenna design, this book is a "must". Antennas should not only be designed to deliver their radiation to an intended receiver but should be (and in the future must be) designed to minimize radiation delivered to unintended receivers. This book points the way.

This reviewer has a few suggestions for improvements - all relatively minor. On page 153, the "Summary of Antenna Techniques" should be made a separate chapter, rather than being incorporated in chapter ten on Dielectric Rods. There are a few typographical errors scattered throughout the book and it is suggested that the book be reviewed sentence by

sentence to weed them out. Two sentences in chapter 12 (EMC and MIL-STD-469) on page 181 should be extracted and placed in a more prominent position in the book for they are the very core of EMC engineering philosophy. We therefore leave these words with the reader: "The most economical and effective way of achieving compatibility is to establish limits on system performance by balancing off the expense of overstandardizing against the expense of encountering and solving problems in specific situations. Determining such a balance, and establishing meaningful limits based on it, is perhaps one of the most difficult tasks in the EMC field."

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### **SAB PANEL REVIEWS EPA'S RF/MW BIOEFFECTS REPORT**

The EPA's Office of Research and Development (ORD) is currently preparing a draft report on the biological effects of radiofrequency/microwave (RF/MW) radiation. Ultimately, the EPA will publish the report, which will be used as a guide for general population exposure standards. An analysis of thermal risks forms the core of the report, which is subject to evaluation and approval by a Scientific Advisory Board (SAB).

The SAB panel met in September to discuss the draft. The Panel accepted many sections of the report, but directed the section of thermal physiology to be rewritten. The analysis

was based on direct extrapolation from animals to humans in thermal threshold response levels. According to the panel, humans are better thermoregulators than animals, making direct extrapolation spurious. The panel requested that the threshold be recalculated using data from human models and different animal experiments. A revision of this section will change the thermal activation point, which is calculated in Specific Absorption Rates (SARs), and translated into power density exposures of mW/cm<sup>2</sup> at resonant frequencies.

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### **QUESTIONS NEEDED FOR PROFESSIONAL ENGINEERS EXAM**

The IEEE United States Activity Board (USAB) is seeking licensed professional electrical and electronics engineers to compose questions for the electrical engineering portion of the Professional Engineering (PE) examinations. Contributors are not required to be IEEE members. Honoraria will be given for questions accepted by the National Council of Engineering Examiners, preparers of the PE exam.

Qualified engineers can obtain information by requesting the "Question Writer's PE Packet" from Joel B. Snyder, PE, Co-Task Force Leader, IEEE/USAB Licensure and Registration Task Force, c/o IEEE Washington Office, 1111-19th Street, N.W., Suite 608, Washington, DC 20036, or by calling 202-785-0017.

# EMC DIRECTORS

This directory is provided to permit letter and telephone contact between Society officers, committee chair and chapter chair. Use it when you have questions or discussion on society matters. It is up-to-date as of September 15, 1983.

Since some chapter elections will take place in the next months, names will change. This is as it should be in a moving society. This directory is only as good as we make it. You can help by calling or writing me concerning changes. Otherwise I shall find you. H. R. Hofmann\*

## FUTURE EMC SYMPOSIA

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1984 - Tokyo, October 16-18	R. Sato
1984 - San Antonio, TX, April 24-26	M.J. Johnson
1985 - Boston, MA, August 20-22	C.L. Smith
1986 - San Diego, CA, September 9-11	H.K. Mertel
1987 - Atlanta, GA, Fall	H.W. Denny
1988 - Seattle, WA, Fall	E.D. Knowles
1989 - Boulder, CO, Fall	

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Changes - H. R. Hofmann  
CHICAGO

November 15, 1983

# CHAPTER CHATTER

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by Charles F.W. Anderson

My apologies for the lack of a column in the Fall '83 issue — the weekend I would have been typing the draft, I spent in the hospital recovering from a most unexpected eye operation.

## CENTRAL NEW ENGLAND

On November 16th, the Chapter held a meeting on the subject "Lightning Phenomenology and Protection — New Developments." George Briggs (retired from GTE) and Chapter Vice Chairman Art Murphy (GTE) were the speakers. Of the 27 attendees, there were three EMC-S members and two students. The presentation was an update of one given back in May '78. Highlights of the June '83 Lightning Symposium were presented by George Briggs. Art Murphy described a computer simulation comparing MOVs and spark gaps for protecting power systems against EMP and lightning. The talks engendered considerable interest, judging by the discussion participation. Future meetings will feature talks on 461B, EMP protection, and FCC 20780 impact on consumer electronics. (Thanks to John Clarke, Chapter Sec/Treas, for the above.)

## CHICAGO

The November 15th meeting of the Chapter was held at IITRI. Officers for the 1984 term were elected. Bob Hofmann will be the Chairperson, assisted by John Kincaid (Belden Tech Center) as Vice Chairperson. Don Sweeney (DLS Electronic Systems) will carry the secretarial load and Gerry Bouska (Commonwealth Edison) will handle the Chapter funds. Jim Krstansky of IITRI discussed that organization's EMC work. Dr. James Cook gave a talk on Technology Forecasting. Arthur Vogt conducted a tour of the IITRI

Electronics Division, including the Metrology Lab. A demonstration of the Railroad Locomotive Simulator was also included.

(Bob Hofmann has provided me with an up-to-date list of the Chapter Chairpersons, which I will use to get in touch with those Chapters which have not been sending in reports. I'll have more to say about this at the end of the column.)

## LITTLETON

The Chapter's quarterly meeting was held on October 19th. A discussion of the meetings which the Boulder Chapter has been holding jointly with other groups was the first order of business. The possibility of the Chapter holding one meeting per year in Boulder or Colorado Springs was mentioned. Consideration will also be given to having dinner meetings. Herb Bass gave a brief report on the NBS Seminar on Open-field Measurements for FCC Requirements, which was held in September.

John W. Adams (NBS-Boulder) presented two papers: "Effect of EMI on Electroexplosive Devices" and "Shielding Effectiveness." The first paper discussed some laboratory measurements and field tests of EED EMI. The second paper examined the new revision to MIL-STD-285 and explained new procedures developed by NBS to determine shielding effectiveness of materials.

Ghery Pettit, who was the Chapter Secretary/Treasurer, relocated to the Santa Clara, CA area.

(Thanks to Dave Lubar (Martin Marietta) for the input. He's the acting Sec/Treas.)



## **LOS ANGELES**

The LA Chapter meeting on September 29th had Bill Parker (Genisco) as the speaker. He discussed design, applications, benefits and limitations of common-mode power-line filters. Part of Bill's presentation was a report on the status of his current SAE AE-4 project concerning test methods for common-core filters.

On October 20th, Dr. Gunther Sorger (Eaton Corp - Sunnyvale, CA) presented a paper on "Sensors and Generators for Electromagnetic Interference Measurements." Dr. Sorger is the Director, R&D Center of Eaton's Electronic Instrumentation Division. After reviewing some field theory, Dr. Sorger discussed the individual antennae used for the 20 kHz to 18 GHz range. He also reviewed general current-probe theory, particularly with regard to frequency limitations. The transfer impedance term derivation was covered, as were the purpose and characteristics of LISNs. Brief discussions of the current probes used for measurement and injection of conducted interference were included.

On November 17th, Al Parker (Mr. Solar Electronics to you who don't know him) spoke on "Line Impedance Stabilization Networks." Al used his extensive background in this area to give the attendees considerable enlightenment about this topic.

## **NEW JERSEY COAST**

Paul Major, Chief of the Spectrum Management Branch in the Center for Systems Engineering and Integration of the Communications-Electronics Command, gave a talk on "Spread-spectrum EMC: Measurements and Analysis." He discussed measurements which were made of a spread-spectrum transmitter as an interference source to conventional receivers. The data obtained permitted some validation of EMC models for analysis. Paul covered the analytical model and the initial results and tentative conclusions. Paul has received the Chapter's Man-of-the-Year

award for 1983 — Congratulations!

## **SAN DIEGO**

The Chapter held a dinner meeting on October 19th. Jim Knighten (IRT) spoke on NEMP effects. Particular emphasis was on the vulnerability of digital electronics components to the NEMP threat.

The Chapter hosted the Regional Conference on the Impact of RFI and EMC Requirements for Product Design, which was held recently. Two seminars were conducted, which covered EMI in commercial/consumer products and EMC/EMP specifications for the military sector. An exhibition of items of RFI, EMC, ESD suppression devices was a feature. The Los Angeles and Orange County Chapters cooperated with the San Diego Chapter in arranging the Conference.

## **TOKYO**

Ten papers were presented at the October 3rd meeting. Among the topics were: antennae for use in hyperthermal therapy, RF induction into telecommunications lines, and EM radiation from microcomputers.

On November 15th, 14 papers were presented. A wide range of titles — for example: Filter Parameter Measurements; Cables for Roadside Radio Systems; Limits and Measurement Techniques for EDP and Office Electronic Devices; and Results of an Investigation of Use of Short Metal Fibers.

**TO ALL CHAPTER CHAIRS/SECRETARIES:** Help me make this column more truly reflect the activities of EMC-S during 1984. Even if your meetings are few and far between, tell me what you are planning, and/or what individual members have done (attendance at technical meetings, presentation of formal papers or informal talks). Reports don't have to be typed or in final form — I'll do any necessary editing.

## TWO EMC SOCIETY MEMBERS ELECTED TO FELLOW GRADE

Two members of the Electromagnetic Compatibility Society of the IEEE have been elected IEEE Fellows. Dr. Carl E. Baum, of Albuquerque, NM., is awarded Fellow Grade for pioneering the singularity expansion method and electromagnetic topology in electromagnetic theory. Dr. Baum is also cited for development of EMP simulation and electromagnetic sensors. Dr. Hiroshi Kikuchi of Tokyo is recognized for contributions and leadership in plasma studies. Dr. Kikuchi's IEEE Society memberships also include Antennas and Propagation, Nuclear and Plasma Sciences, Electron Devices and the Microwave Theory and Techniques Society.

## EMCABS

In this issue, we are publishing 30 abstracts. These are abstracts on various EMC topics. We plan to continue publishing abstracts of papers from previous EMC Symposia and from other conferences. The EMCABS committee is composed of the members listed below. By way of introduction to the community, they are listed with their company affiliations.

L.F. Babcock, Bell Aerospace Textron  
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MELVIN J. JOHNSON

**"HOW CAN I GET A COPY OF AN ABSTRACTED ARTICLE?"** The answer to this frequently asked question follows.

Most large public libraries, some small public libraries, all engineering school libraries, and most other college or university libraries have copies of publications in which articles appear. If they happen not to have the desired publication, such libraries usually can obtain it or a copy of the article from other libraries or sources. Many company libraries, both large and small, also have such arrangements. Many articles also are available from the National Technical Information Service (NTIS) and/or the Defense Technical Information Center (DTIC). To retrieve an article or publication containing an article abstracted in EMCABS, it is suggested that you contact your company library, a nearby engineering school library, a university library, or your municipal public library. If the library does not have the publication, go to the librarian, explain what you need and he or she will help you get the publication on loan, perhaps, from another library, or for a nominal charge, from NTIS. If you have a Department of Defense contract, the contracting officer, or your company librarian, can help you get publications from DTIC. The information needed is contained in the EMC abstract heading.

<p>EMI Resisted Without Shielded Cables, Elaborate Enclosure, Metal Detector Circuit Functions in 100 V/M Field Brian J. Hogan Midwest Editor Design News Vol. 38, No. 24; 20 December 1982; p. 67-68 <b>ABSTRACT:</b> A forage harvester's metal detector contains a coil shaped like a figure eight. Stray RF noise is readily picked up by the detector coil. Filtering, a copper ground plane and highly stable amps allow designers to pick off spurious EMI. Thus they prevent the circuit from falsely indicating ferrous junk in the crop. <b>INDEX TERMS:</b> Farm machine, Suppression, RF field, metal detector</p>	<p>Filtering Connectors Meet The Challenge of EMI Thomas Howell The Deutsch Co. Defense Electronics Vol. 14, No. 5; May 1982; p. 93-97 <b>ABSTRACT:</b> Filter pin connectors are space and weight efficient, effective, and a relatively inexpensive solution to the problem of conducted EMI, which may enter a system through power line connectors, signal and control lines, or be generated within an electronic device and exit through the same connectors. Filtering connectors can also help reduce the emission of signals that interfere with other nearby equipment. <b>INDEX TERMS:</b> Filters, connectors, MIL-C-81511, MIL-C-38999, reliability, filter pins</p>
<p>Designing From The Ground Up Ted Reeder ECOS Electronics Corp. Test &amp; Measurement World April 1983; p. 12-13 <b>ABSTRACT:</b> Equipment manufacturers often pay little attention to the importance of good quality ground paths for their products. But properly designed low impedance grounds can not only provide a measure of safety for the operator, but can reduce service calls and even increase profits. <b>INDEX TERMS:</b> Grounds, national electric code</p>	<p>Radiation Monitors Measure Potential Health Hazards Jack Browne Associate Editor Microwaves &amp; RF Vol. 22, No. 3; March 1983; p. 121-154 <b>ABSTRACT:</b> Radiation monitors can tell a user when the strength of an em field is outside the limits of accepted guidelines. To do this, the sensor probe must be carefully designed and calibrated. <b>INDEX TERMS:</b> Safety, microwave radiation, ANSI, standards, limits, measurement, receiver</p>
<p>Understanding EMI-Type Noise Alan Rich Analog Devices Semiconductor Electronics Test Vol. 6, No. 5; May 1983; p. 34-46 <b>ABSTRACT:</b> Designers must understand the complete noise system (source, coupling medium, receiver and relationships) before employing noise-reduction techniques. Noise reduction is not a mystical job for wizards, but a practical and analytical task for engineers. Obviously the most effective approach is prevention-applying noise-reduction analysis and minimization techniques before building the system. <b>INDEX TERMS:</b> Common mode noise, capacitively coupled noise, magnetically coupled noise, power line transients, noise sources</p>	<p>Follow Driving, Grounding Rules to Optimize ADC, DAC Operation Bill Travis Associate Editor EDN Vol. 28, No. 6; 17 March 1983; p. 187-192 <b>ABSTRACT:</b> Understanding grounding, driving and loading problems can help you obtain optimum performance from fast D/A and A/D converters. You can thus avoid some of the pitfalls these circuits present to the unwary user and obtain full performance. <b>INDEX TERMS:</b> Grounding, D/A, A/D, power supply ripple, decoupling, wire coupling, converters</p>

<p>Focus on EMI/RFI Shielding: The FCC Forces The Issue          Morris Grossman          Associate Editor          Electronic Design          Vol. 31, No. 4; 17 February 1983; p. 165-176  <b>ABSTRACT:</b> With a properly shielded enclosure, the designer need not consider electromagnetic radiation a problem. Many solutions are available, from metal and magnetic barriers to applied coatings.  <b>INDEX TERMS:</b> Shielding, FCC, regulation, commercial, foil, wire mesh, radiation, flame spraying, vacuum metalization, grills, conductive paint</p>	<p><b>EMCABS:7-12-83</b></p>	<p>Subjectivity In Standards; The Case of ANSI C95.1-1982          Nicholas H. Steneck, Prof. History          University of Michigan          Microwaves &amp; RF          Vol. 22, No. 5; May 1983; p. 137-166  <b>ABSTRACT:</b> The newest ANSI RFPG is "based on the best available interpretations of the literature". By literature the reports authors mean exclusively "scientific literature." ANSI C95.1-1982 was drawn up by scientists using and interpreting the science they produced. It is not a policy document drawn up by persons expert in making policy decisions; it is not a social document drawn up by social scientists nor a political document drawn up by politicians.  <b>INDEX TERMS:</b> Radio frequency protection guide, safety, biological effects, RF radiation, human exposure</p>	<p><b>EMCABS:10-12-83</b></p>
<p>FCC and VDE Impose Tight Conducted RFI/EMI Specs          Wayne Mitchell          Corcom Inc.          Electronic Design          Vol. 30, No. 26; 23 December 1982; p. 141-147  <b>ABSTRACT:</b> Because industrial and other types of equipment are seldom found in residential areas, they are less likely to interfere in home radio and television services. For that reason the FCC and West Germany's verband deutscher electrotechniker (VDE) each has established two levels of conducted noise emission limits: an "a" level for industrial equipment and a "b" level for consumer devices like personal computers and TV games.  <b>INDEX TERMS:</b> FCC, VDE, regulation, conducted emission, line filters measurement, grounds, shielding, safety</p>	<p><b>EMCABS:8-12-83</b></p>	<p>An ANSI Radiation Protection Guide Conformal Probe          Edward Aslan          Narda Microwave Corp.          Microwave Journal          Vol. 26, No. 4; April 1983; p. 87-91  <b>ABSTRACT:</b> The electromagnetic monitor to be described here utilizes dipole-diode sensors designed to create a sensitivity versus frequency that is the inverse of the ANSI protection guide in the 300 KHZ to 1.5 GHZ region. In this band the RFPG levels vary over a 20 db range. Using this probe results in a meter read out in % of the recommended RF protection guide.  <b>INDEX TERMS:</b> Radiation, safety, biological effects, regulation, ANSI C95.1-1982, measurement, field strength</p>	<p><b>EMCABS:11-12-83</b></p>
<p>ELF/VLF Receiver Design          Warren Gruber          Watkins-Johnson Co.          Watkins-Johnson Tech-Notes          Vol. 10, No. 3; May/June 1983; p. 2-11  <b>ABSTRACT:</b> MIL-STD-462 and other recent EMC standards have created the need for high performance, VLF and ELF receivers. Electromechanical and low-frequency clock signals are the emissions of primary concern in this band. This article tells some of the problems encountered in the development of a 20 HZ to 10 KHZ ELF tuner.  <b>INDEX TERMS:</b> Radiated emission, RF fields, VLF/ELF, measurement, receiver, development, EMC tests</p>	<p><b>EMCABS:9-12-83</b></p>	<p>Coping with Static Electricity-Part XXXVI, ESD Protective Packaging          Wm. R. Armstrong          Sealed Air Corp.          Evaluation Engineering          Vol. 22, No. 3; April 1983; p. 80-91  <b>ABSTRACT:</b> Materials are available that provide both ESD protection and physical protection. Classified as antistatic, conductive and shielding, these materials include foams (polyethylene, expanded polystyrene, and polyphophylene), air cellular (open and closed cell), and combinations of these products with various films, foils and metallized structures.  <b>INDEX TERMS:</b> Static electricity, ESD, packaging materials, conductive plastic, antistatic</p>	<p><b>EMCABS:12-12-83</b></p>

## EMCABS:13-12-83

## Three Microprocessors Control Electromagnetic Compatibility Tests

Brian J. Hogan

Midwest Editor

Design News

Vol. 39, No. 5; 14 March 1983; p. 182-183

**ABSTRACT:** The introduction of small, inexpensive computers and microprocessor-based data gathering instruments in recent years enabled engineers to solve the problem of developing a versatile, relatively inexpensive, fully automated EMC test facility. A typical product is now tested in seven hours which is 1/3 of the time previously required.

**INDEX TERMS:** EMC tests, automation, microprocessor control, test facility, computer, anechoic chamber

## EMCABS:16-12-83

## Static Electricity: A Problem In American Industry (Part I)

Joseph P. Lerro, Jr.

Senior Editor

Design News

Vol. 37, No. 20; 19 October 1981; p. 56-68

**ABSTRACT:** At long last there is a growing awareness that static electricity is a real problem. Problems caused by its presence require careful control measures, not only on the production line but also in assembly, packaging, storage and shipping areas.

**INDEX TERMS:** Static electricity, conductivity, static meter, ionizing air gun, explosives, work stations.

## EMCABS:14-12-83

## RFI/EMI Shielding Scheme for FTM Keyboard

Joe Jesson and Russ Krawczyk

Oak Switch Systems Inc.

Digital Design

Vol. 13, No. 4; April 1983; p. 44-48

**ABSTRACT:** The low emission levels of the switches in a keyboard can be masked by connecting a ground to the metal keyboard frame, if there is one. If not, a special conductive layer or material must be added. Masking the emissions of the electronics is a much more difficult task, but they can be reduced in several ways.

**INDEX TERMS:** Shielding, keyboards, FCC regulations, computers, full-travel membrane

## EMCABS:17-12-83

## Designer's Guide to Noise Suppression

J. F. Kalbach

Consultant, Altadena, CA

Digital Design

Vol. 12, No. 1; January 1982; p. 26-35

**ABSTRACT:** Failure to follow proper noise suppression and grounding rules is leading to increased problems for computer system designers. It is a growing problem due to systems that are more EMI-susceptible, unsophisticated users, increasing number of computer systems.

**INDEX TERMS:** Noise suppression, computers, grounding, FCC, shielding, differential mode, balun, common mode

## EMCABS:15-12-83

## Understanding EMI Test Methods Eases Product Acceptance.

Glen Dash

Dash, Stratus and Goodhue Inc.

EDN

Vol. 28, No. 11; 26 May 1983; p. 183-191

**ABSTRACT:** The FCC's emi-emission rules will increasingly affect digital-circuit design and test. You can meet the new rules-and thus maintain a design edge-by understanding the commission's test techniques.

**INDEX TERMS:** EMI test methods, FCC, emission, regulations, computers, industrial equipment, mass market equipment

## EMCABS:18-12-83

## TEM Test Cell Boasts Various EMC Applications

Instruments for Industry, Inc.

MSN

Vol. 12, No. 4; April 1982; p. 121-124

**ABSTRACT:** The TEM test cell is an effective means for measurement of susceptibility and emitted radiations. It is suitable for a wide range of biological laboratory research and RF/electromagnetic compatibility (EMC) test applications from DC to 300 MHz.

**INDEX TERMS:** TEM cell, crawford cell, radiated tests, plane wave fields, E-field generation



<p>EMCABS:19-12-83</p> <p>Methods For Controlling Static Electricity On Employees Scott Sheldon The Simco Co. Insulation/Circuits Vol. 28, No. 12; November 1982; p. 25-27 <b>ABSTRACT:</b> Each movement may generate only a few hundred volts of static, but static voltages are cumulative. Therefore the ungrounded individual soon may be carrying around several thousand volts of static electricity just waiting to be discharged. At this point, contact with any static-sensitive component surely will result in degradation or destruction of that component unless precautionary measures are employed. <b>INDEX TERMS:</b> Static electricity, work station, grounding, wrist straps, floor mats, shoe heel grounder, seat covers, garments</p>	<p>EMCABS:22-12-83</p> <p>Avoiding Power Line Transients and the Problems They Can Create in Electronic Equipment Barry Epstein Amtek Systems Inc. Instruments &amp; Control Systems Vol. 55, No. 12; December 1982; p. 27-28 <b>ABSTRACT:</b> This article covers transients that come from commercial power lines, including long duration changes (occurring over several cycles) and high voltage spikes (short duration changes). After overiewing the problems these can cause, it looks at devices used to "clean them up". <b>INDEX TERMS:</b> Transients, power line, suppression, isolation transformers, varistors, diodes, filters, voltage regulators</p>
<p>EMCABS:20-12-83</p> <p>Compact Programmable Spectrum Analyzer Aids EMI Measurements Dave Barnard Tektronix, Inc. MSN Vol. 12, No. 4; April 1982; p. 65-76 <b>ABSTRACT:</b> Once a spectrum analyzer with optimum selectivity, sensitivity, and range is produced, the next quantum jump in improvement comes from endowing it with "smarts" via microprocessor control. <b>INDEX TERMS:</b> Spectrum analyzer, EMI tests, conducted emission scan, microprocessor, waveform storage, FCC part 15, MIL-STD-461</p>	<p>EMCABS:23-12-83</p> <p>Grounding in the Design of Buildings and Facilities for Safety Protection Hugh W. Denny Engineering Experiment Station, Georgia Institute of Technology, Atlanta Georgia EMC Technology and Interference Control News Vol. 2, No. 1; Jan-March 1983; p. 22-28 <b>ABSTRACT:</b> A building ground and earthing system is used for safety protection of personnel and facilities. The purpose is to clear electrical power faults and their associated hazards. When combined with air terminals and down conductors, the earthing systems also offer control of lightning to prevent large voltage gradients in building structural members. Thus, the grounding system affects fault and lightning common-mode currents which can flow through electrical apparatus and electronic equipment. It can also adversely impact the EMI situation. The former is addressed in this report while the EMI consequences are mostly covered in some companion articles. <b>INDEX TERMS:</b> Grounding systems, building design and safety protection</p>
<p>EMCABS:21-12-83</p> <p>Use an RF Shield to Prevent EMI From Altering Your Results Arnold Zais Ray Proof Div. of Keene Corp. Industrial Research and Development March 1983; p. 127-129 <b>ABSTRACT:</b> The increasing amount of EMI present in the environment has become a major concern to R &amp; D scientists involved in developing and testing electronic devices. As a result, RF-shielded rooms are becoming standard equipment in industrial labs. <b>INDEX TERMS:</b> Shielded enclosures, anechoic chamber, Industrial, RE measurement</p>	<p>EMCABS:24-12-83</p> <p>A New Concept for EMI Protection of Cables and Harnesses Albert R. Martin Raychem Corporation, Menlo Park, California 94025 EMC Technology &amp; Interference Control News Vol. 2, No. 2; April-June 1983; p. 60-65 <b>ABSTRACT:</b> Interconnect wiring has two faults from an EMI viewpoint: (1) Wires act like all-pass filters, conducting unwanted energy from one part of the system to another and (2) wires act like antennas, converting the ambient electromagnetic field to currents which are then conducted to various parts of the system. By changing the nature of dielectric layers surrounding the conductor, a wire can be converted from an all-pass to a low-pass filter, thereby reducing conducted interference. As an additional benefit, the coupling efficiency of the antenna to the ambient field is reduced, lowering the currents injected into the system from that source. This approach is attractive, in many cases, because system EMI problems can be controlled in the interconnect wiring without having to modify equipment that make up the system. <b>INDEX TERMS:</b> Interconnect wires, cables, harnesses</p>

<p>Electromagnetic Interference Measurements of Fluorescent Lamps Operated with Solid-state Ballasts  Alan A. Arthur, Rudolph R. Verderber, Francis Rubinstein and Oliver C. Morse  Lawrence Berkeley Laboratory, University of California, Berkeley, CA 94720  IEEE Trans. Industry Applications  Vol 1A-18, No. 6; Nov/Dec 1982; p. 647-652</p> <p><b>ABSTRACT:</b> Solid-state ballasts were placed in fluorescent lamps in various areas of a hospital to determine if these high-frequency systems would adversely affect any hospital operations. The general areas tested included a lobby and an office space. Potentially sensitive areas containing hospital diagnostic and monitoring equipment, including a computerized axial tomography (CAT) scanning room, an electroencephalograph EEG examination room and a coronary ward were also tested. The measurement results are discussed with respect to the existing RFI environment and EMI radiated and conducted limits specified by the Federal Communications Commission (FCC) and the Federal Drug Administration (FDA).</p> <p><b>INDEX TERMS:</b> EMI measurements, fluorescent lamps and solid-state ballasts</p>	<p><b>EMCABS:25-12-83</b></p>	<p>EMC Predictions Program; Programmer's Reference for Protective Margins Plotting Routine  Vincent J. LaGrotteria and Nancy K. Sulinski  NAVAL Underwater Systems Center, Newport Rhode Island/New London, Connecticut  NUSC Technical Memorandum 821134  16 September 1982</p> <p><b>ABSTRACT:</b> The EMC Predictions Program computes the protective margins between equipment emitters and susceptors within a submarine compartment. This report is concerned with the portion of the program that displays the result of the computations in a graphic form as a plot of frequency (in hertz or kilohertz) vs. protective margin (in decibels). The plot can be displayed on a semi-logarithmic scale or on a linear scale. Options are included for displaying all five frequency decades at once of a given emitter-susceptor pair or for a plot of a single decade of data for the pair.</p> <p><b>INDEX TERMS:</b> EMC predictions program, protective margins plotting routine</p>	<p><b>EMCABS:28-12-83</b></p>
<p>EMI Data Base; User's Guide to Digitizing, Storing and Retrieving Measured Data  Nancy K. Sulinski  Naval Underwater Systems Center, Newport, Rhode Island/New London, Connecticut  NUSC Technical Memorandum 821139  27 September 1982</p> <p><b>ABSTRACT:</b> The EMI Data Base resides on a Hewlett Packard (HP) 7906 hard disk controlled by the HP 9845 computer. Entering data into the EMI data base can be a tedious process especially when x and y values for 200 data points are involved. Thus, a system has been developed to reduce the effect required to enter data into the measured data sets of the data base by utilizing the HP 9874A digitizer with the HP 9845 computer. Transferring magnetic field data from graphic form to the EMI data base has been set up as a two-step process to minimize the possibility of data base corruption. The first step involves digitizing the data and putting it on a mass storage medium. The second step is to transfer the stored data to the data base. Retrieving the data from the data base to produce a plot is a third step which is also included in this memorandum.</p> <p><b>INDEX TERMS:</b> EMI data base, digitizing, storing and retrieving measured data</p>	<p><b>EMCABS:26-12-83</b></p>	<p>RFI Shielding of Enclosures  May, Nigel  Imhof-Bedco  Electronic Engineering  Vol 55, No. 677; May 1983; pg. 77, 78</p> <p><b>ABSTRACT:</b> The considerations in the design and selection of an electronic equipment enclosure are discussed. A brief overview of European and United States RFI regulations is given.</p> <p><b>INDEX TERMS:</b> RFI, shielding, enclosures</p>	<p><b>EMCABS:29-12-83</b></p>
<p>Cable Grounding for the Control of EMI  Edward F. Vance  Fort Worth, Texas 76140  EMC Technology and Interference Control News  Vol. 2 No. 1; Jan-March 1983; pp. 54-53</p> <p><b>ABSTRACT:</b> A new look at cable shields reveals some former grounding practices may cause more problems than they cure. It is concluded that for interference control, cable shields should be closed, whether or not they are grounded. The idea of grounding cable shields can lead to unfortunate compromises in the overall shield protecting sensitive circuits from sources outside the shields. Similarly, it is noted that grounding one side of a twisted pair can negate most of the common-mode rejection benefit of balanced circuits realizable from using twisted pairs. Balanced grounding schemes are necessary if the interference rejection benefits of grounded balanced circuits are to be realized.</p> <p><b>INDEX TERMS:</b> Cable grounding, cable shields, grounded balanced circuits</p>	<p><b>EMCABS:27-12-83</b></p>	<p>Instrumentation and Test Methods of an Automated Radiated Susceptibility System  Michael W. Howard  Product Engineering Center, Waterloo, Iowa 50704  EMC Technology  Vol. 2, No. 3; July-Sept. 1983; pp. 17-25</p> <p><b>ABSTRACT:</b> This article describes the instrumentation and test methods of an automated system for performing radiated susceptibility tests from 14 kHz to 1000 MHz. In particular, it addresses the effectiveness of the automated system in the evaluation of the electronic circuit for its susceptibility to RF. Practical applications of, including hardware and software used for the system, test methods for automated susceptibility fields, and system calibration are given.</p> <p><b>INDEX TERMS:</b> Instrumentation, automated EMC test, radiated susceptibility</p>	<p><b>EMCABS:30-12-83</b></p>

## 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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