

## **1985 IEEE INTERNATIONAL** SYMPOSIUM ON EMC

The 1985 IEEE International Symposium on EMC will be held August 20-22, 1985, at the Colonial Hilton, Wakefield, MA. This year's theme, "EMC-A Universal Goal," was chosen to stress the need for engineers in all disciplines to be concerned about EMC. As Dr. Chester L. Smith, symposium chairman, stated, "...the theme is that EMC is no longer the province of a relatively small group of specialists in interference and compatibility. EMC is a serious issue affecting the whole of society worldwide."

Technical sessions to be given include: EMI Transients/ Impulsive Disturbances; Electromagnetic Shielding; Antennas and Propagation; Measurement Technology; Anechoic Chambers/Open-Site Measurements; Communications Systems; Electrostatic Discharge; Cables/Transmission Lines; Nonlinear Effects; Electromagnetic Pulse; Electromagnetic Environments; Computers/Data Transmission Systems; Test Site Measurement; Systems EMC; EMI Standards and Requirements; Enclosures/TEM Cells; and Lightning. Speakers include Dr. James Mulligan and Mr. David Sumner. Dr. Mulligan, the keynote speaker, is a former president of the IEEE. Mr. Sumner, Executive Vice President of the American Radio Relay League (ARRL), will discuss the efforts of ARRL and others to stem the tide of local federal government regulations.

Other scheduled events include a workshop on EMC, a reception, an awards banquet and an exhibit program in which nearly 70 companies will participate.

Questions on registration should be directed to Arthur Murphy, Registration Chairman, P.O. Box 83, Newtown Upper Falls, MA 02164. Phone: (617) 449-2000 ext. 3641.

Additional symposium information is available by contacting Dr. Chester L. Smith, General Chairman, P.O. Box 536, Bedford, MA 01730. Phone: (617) 271-7086.

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#### NEWSLETTER STAFF EDITOR

## EDUCATION COMMITTEE NEWS

The EMC Society Education Committee will hold a meeting during the EMC Symposium in Boston. The meeting will be held on Tuesday, August 20, 1985, from 8:00 am to 9:30 am at the Hilton in Wakefield, Massachusetts. This is just prior to the Plenary session on the first morning of the symposium. Anyone interested in EMC education is invited to attend.

There will also be an EMC Education Panel Discussion as part of the symposium. It is Session 4B and will be held from 8:00 am to 12:00 pm on Thursday, August 22, 1985. The chairman of the session will be Dr. Clayton Paul of the University of Kentucky. Panelists will be from industry, academia, and the military.

Responses to the Education Committee's EMC questionnaire sent to colleges and universities has been very good. Over 80 replies have been received to date. The results of the questionnaire will be the topic of a future newsletter column.

The following is a partial listing of some of the short courses and seminars on EMC-related topics being offered this fall. Due to the large number of offerings, individual course locations and dates have not been included.

R & B Enterprises is offering courses on the following: Grounding, Bonding & Shielding; Electromagnetic Pulse Design and Test; Understanding and Applying MIL-STD-461B/461C; Electrostatic Discharge (ESD) Control; Printed Circuit Board & Wiring Design for EMI Control; FCC Requirements and Test, For information call 215-825-1960.

George Washington University has short courses on *Electro-magnetic Interference and Control* and on *Grounding, Bonding, and Shielding.* For information call the university at 800-424-9773.

TKC is offering seminars on *Digital Design For Interference* Specifications and *PCB Layout For Minimizing Emissions*. For information call 813-544-2594.

Interference Control Technologies is offering courses on: Grounding and Shielding; EMC Design and Measurement; TEMPEST-Design Control and Testing; EMI Diagnostics and Fixes; Noise and EMI Control in Computers; MIL-STD-461/462 Testing Procedures; EMC for Packaging Engineers; and, Grounding and EMI Control in Facilities. For information call 703-347-0030.

> Henry Ott Chairman, EMCS Education Committee AT&T Bell Laboratories Room 1E-212A Whippany, NJ 07981 201-386-6660

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# **BOARD OF DIRECTORS' MEETING IN PHILADELPHIA**

The second 1985 Board of Directors' meeting was held on Wednesday, May 29th, at the Four Seasons Hotel in downtown Philadelphia. The meeting was held with other IEEE activities, such as meetings of the Technical Activities Board (TAB) and Regional Activities Board (RAB). Fifteen of the 20 board members were present.

President Knowles brought the meeting to order at 1:30 p.m., and introduced several guests who were present. The Secretary, Don Clark, presented the Minutes of the Los Angeles meeting and the Board approved them with minor editorial changes. The following major items were discussed.

1. Treasurer Len Carlson presented his report based on data available as of February 28, 1985. Our Society's current net worth is \$234K with loans of \$3K and \$1K outstanding to the 1985 and 1986 symposium organizing committees, respectively. His report was approved as presented.

2. Bob Haislmaier, Technical Director for Communications Services, introduced several of his chairpersons who gave their reports. Bob Goldblum, Newsletter Editor, indicated that with 12 associate editors, our Newsletter was enjoying a very active participation by our Society members. He announced that Herb Mertel was replacing Dick Schulz as associate editor for standards. The Board also discussed the length of short technical articles which are being reviewed by Ed Bronaugh. The Board suggested that the length be left up to the discretion of the editor. Dick Schulz, Transactions Editor, reported that the page count estimates for the year are still on track and that no papers are held in queue awaiting publication. He indicated that Ed Bronaugh replaced Bud Taggart as standards editor and Jim Toler took the place of Don Miller as editor for EMC hazards papers. Dick also indicated support of several IEEE Press books which are planned on EMC topics such as "Area Spectrum Management." Jim Hill reported that he plans to prepare a brief quarterly advisory mailing on international symposia. The mailing would provide dates, symposium announcements, and conference proceedings information. This is intended to help symposium planners avoid date conflicts and to foster additional communications among each sponsoring organization.

Next Gene Cory presented a brief summary of future symposium activity. Chet Smith gave an update of the Boston activities this August. The Spring 1985 Newsletter contains detailed information regarding travel and hotels. 92 exhibit booths are taken. A closed-circuit TV will be available outside each session room and near the exhibit area to allow monitoring of papers without the need to climb over people stacked in the back of the session rooms. Contact Chet for any further details at (617) 271-7086. There were no problems reported for the 1986 (San Diego) and 1987 (Atlanta) symposia. The Seattle committee (1988) indicated 135 exhibit booths will be available. For 1989, the national symposium was transferred from Boulder to Denver which can better accommodate the size of the conference. The hotel was changed for the 1990 symposium to the Washington, D.C. Hilton at Dupont Circle. Gene introduced Ed Norris who serves on his symposium planning committee as exhibits chairman. Mike Hart, and Terry Cantine also are working with Ed to assess the needs of exhibitors at future symposia. Ed reported that he has circulated a questionnaire to potential exhibitors asking what their booth needs are, and provided a package of pertinent information of future symposia. He reports a potential of well over 300 exhibitors in the next few years. For further information, contact Ed or Gene. Gene can be reached on (512) 684-5111, x 2711.

3. Ed Bronaugh, Technical Director for Technical Services. reported that he has received a year-end report from Ed Skomal who chairs the technical activities committee. This committee oversees the operation of our seven technical committees. His report indicated that five of the seven committees "... have remained aggressively committed to and engaged in the resolution of EMC technical issues, the assembly and dissemination of expert advice, the development of EMC standards, and the education of the engineering community." He further reported that Board action should be taken to resolve the degree of these committees' participation in future EMC symposia. For more information, contact Ed at (213) 648-7024. Don Heirman presented his Standards Committee Report. The committee now meets three times a year with the next meeting at the Boston Symposium on Tuesday, August 20, between 5:15 and 6:30 p.m. Don indicated that volunteers are needed especially in four areas:

- a. Vehicular Noise Measurements (STD 263)
- b. Backshell Connectors (PAR 478)
- c. Shielding Transfer Impedance (PAR 482)
- d. Signal Grounding (PAR 626)

Contact Don for further information at (201) 834-3566. Hank Ott, Education Committee Chairman, reported that 350 questionnaires were distributed to universities and colleges. The questionnaire is to assess the interest and activity in EMC at the college level. The "Experiments and Demonstrations in EMC" booklet will be available at Boston. A renewed interest in video tapes on EMC was indicated with support given by Dan Weinberg and Bob Haislmaier. The Board approved the distribution of a video tape on ISM Measurements, which was produced by IBM. IEEE will be asked to distribute the tape. For more information, call Hank at (201) 386-6660.

4. Fred Nichols, Technical Director for Member Services, reported considerable chapter activity. Bob Hofmann indicated that he has a current list of officers. The Board suggested that each chapter be contacted to get a list of future meeting dates so that Board Members can attend these meetings in conjunction with business travel plans. A list of EMC

#### (Continued. . . .)

Chapters which are joint with other societies will also be prepared. Other topics discussed were the free Society memberships being offered for all IEEE members who attend the Boston symposium and sign up at the IEEE booth. The Board spent considerable time in reviewing nominations for EMCS Annual Awards. This year there were many nominees and the selection process took considerable time. The awardees will be recognized at the Boston Symposium Awards Banquet on Wednesday evening, August 21st.

5. Sal Gentile, filling in for Dr. Sato who is the Technical Director for Professional Services, indicated that Mike Hart has agreed to chair the inter-society relations committee. Ernie Freeman has agreed to keep the employment analysis program going at each symposium. The President indicated that volunteers are requested to reactivate the Public Relations Committee. If interested, call Gene at (206) 773-1577.

6. President Knowles introduced Irv Engelson, IEEE Headquarters, who helped clarify how our Society can support the 1986 national delegation meetings for CISPR. Since this support was multi-national, it was concluded that funds could be used to support the clerical and administrative expenses for the meeting which will be held in San Diego the week before our 1986 Symposium.

7. Under new business, Gene Knowles described a request received from Dr. Osepchuk of the IEEE Environmental Quality Council. The request was for the EMCS to take the lead in defining and clarifying technical goals and actions for a Housing and Urban Development Task to describe possible EM Environmental hazards and excessive exposures. The Board felt that they should cooperate with the Council but wanted more specific recommendations before proceeding. Bob Brook (SSIT liaison representative) is spearheading the coordination of this effort. For more details, call Bob at (516) 595-3136. Dan Hollehan was named new COMAR chairman in a related activity.

8. President Knowles adjourned the meeting at 5 p.m. The next Board meeting will be at the Wakefield Hilton in Wakefield, Mass., on Monday, August 19, 1985. For more details, contact Don Clark at (404) 894-3535.

Don Heirman Associate Editor Board of Directors Activities

FU	TURE EMC-S SYMPOSIA SCHEDULE
1986	<ul> <li>San Diego, CA; September 16-18</li> <li>Town &amp; Country Hotel</li> <li>Herbert K. Mertel</li> <li>619/578-1480</li> </ul>
1987	<ul> <li>Atlanta, GA; August 24-27</li> <li>Marriott Downtown</li> <li>Hugh W. Denny</li> <li>404/894-3535</li> </ul>
1988	<ul> <li>Seattle, Washington; August 2-4</li> <li>Westin Hotel</li> <li>Donald A. Weber</li> <li>206/575-5781</li> </ul>
1989	<ul> <li>International</li> <li>Japan</li> <li>Dr. Akao &amp; Sato</li> <li>National</li> <li>Denver, CO</li> <li>John Adams</li> <li>303/497-3328</li> </ul>
1990	<ul> <li>Washington, D.C.; August 28-30</li> <li>Washington, Hilton</li> <li>Thomas W. Doeppner</li> </ul>
1991	New Jersey

# **BOOK REVIEWS**

Chapter

1.

In this issue we are fortunate in having two more book reviews by Dick Schulz. The first of these deals with special mathematical functions as a tool in engineering analysis and in their application involving boundary-value problems. The second review by Dick Schulz is on a book dealing with the properties of foods and agricultural products in relation to electromagnetic energy across the broad spectrum from radio frequency to light frequencies.

The third book review is by Tom Parker. It is an update of the book that was published in 1980 at a time when the authorization requirements for computer devices had not been finalized. Tom Parker's review explains this in detail.

# G

by Jim Hill, The EMXX Corp.

#### SPECIAL FUNCTIONS FOR ENGINEERS AND APPLIED MATHEMATICIANS

by

Larry C. Andrews University of Central Florida Published by: Macmillan Publishing Company New York, New York 10022 Copyright 1985 Hardbound, 357 Pages, \$32.50

As the title suggests, this book is aimed directly at working engineers, applied mathematicians, and applied scientists as well as advanced undergraduate and graduate students in engineering, mathematics, and the physical sciences. It provides a solid understanding of the basic properties of special mathematical functions for use in engineering analysis.

This text provides a clear and concise survey of the frequently used special functions and explores their key properties in detail. Andrews introduces many of the special functions by the generating function method, and then obtains the governing differential equation as one of the significant properties associated with the particular function. Rather than attempting to cover all special functions, he focuses on the most applicable functions whose properties can be easily extended to other functions. For example, an entire chapter concentrates on the Legendre polynomials and related functions. while the other orthogonal polynomial sets, including Hermite, Laguerre, Chebyshev, Gegenbauer, and Jacobi polynomials, are treated together. Andrews uses abundant exercises and problems to illuminate applications throughout the volume, and he devotes a complete chapter to applications involving boundary-value problems. This systematic, easy-to-follow survey offers useful material on the major functions.

Each chapter is composed of 3 to 9 sections, including an introduction. The introduction normally provides some historical background on the subject of the chapter and indicates the practical areas of application. Material is developed in other sections in such a way that its relationship to other material in the book is clearly presented. At the end of each section, exercises are set out for the student, and a limited number of answers are provided at the back of the book. A listing of chapters and the functions discussed are provided below:

- Introductory
- 2. Gamma, beta, incomplete gamma, digamma, polygamma functions

**Functions** 

- 3. Error functions, exponential integral elliptic integral
- 4. Legendre: polynomials, series, series convergence, functions of the second kind, associated functions
- 5. Polynomials: Hermite, Laguerre, generalized sets
- 6. Bessel functions: first kind, integral, series, second and third kinds, differential equations, modified functions, other Bessel functions, asymptotic formulas
- Boundary-value problems: spherical domains (Legendre); circular and cylindrical domains (Bessel)
- 8. Hypergeometric function: F(a; b; c; x), relation to other functions, summing series
- Confluent hypergeometric function: M(a; c; x) and U(a; c; x), relation to other functions, Whittaker functions
- 10. Generalized hypergeometric functions: set of  ${}_{p}F_{q}$ , other generalizations

The subjects above are generally treated exceptionally well. One concern this reviewer had was that, in developing a solution to a boundary-value problem, the standard method of separation of variables was used without noting that this leads to a particular solution, but not to a general solution. Indeed, the particular solution it leads to is relatively unusable for electronics engineers working with the propagation of nonsinusoidal signals. (A generalized solution is discussed in another book recently reviewed "Antennas and Waveguides for Nonsinusoidal Waves" by H. F. Harmuth.) Despite this one observation, the book is overwhelmingly well written and instructive, I consider it a valuable addition to my library.

> Richard B. Schulz Xerox Corporation, IPD 1301 Ridgeview Drive — MS 330 Lewisville, Texas 75067

#### ELECTROMAGNETIC RADIATION PROPERTIES OF FOODS AND AGRICULTURAL PRODUCTS

by Nuri N. Mohsenin Food Physics Information Systems State College, Pennsylvania Published by: Gordon and Breach, Science Publishers, Inc. New York, New York 10016 Copyright 1984 Hardbound, 673 Pages, \$99.00

The title of this book would be less misleading if the word "Radiation" had been omitted. Although some radiation properties are included, most of the book deals with reflection, absorption, and transmission of electromagnetic energy from a source other than the food or agricultural product of concern. Aside from this flaw, this well-illustrated book is a compendium of, and reference for, a wide variety of electromagnetic techniques to determine the quality and related characteristics of a wide variety of foods and agricultural products. It also presents a wealth of data resulting from application of the techniques.

Not only are the techniques well presented, but the data obtained are clearly identified with significant physical characteristics of foods and related products. A major portion of the electromagnetic energy discussed falls in the visible and infrared spectrum. However, significant portions are devoted to microwaves and radiowaves, as well as to high-energy nuclear radiation. Each section of the book examines the applicable physical principles, measurement techniques, and data on food and agricultural products — in that order.

Chapter 1 is on Some Basic Concepts of Electromagnetic Radiation including reflectance, transmittance, absorptivity, and emissivity. The major concentration is in the optical portion of the spectrum.

From this point, Chapter 2 presents Basic Instruments for Measurement of Optical Properties. A small selection of such instruments includes collimators, monochromators, integrating spheres, photo tubes and solid-state detectors.

The third chapter is on Applications of Radiation in the Visible Spectrum. It is concerned with appropriate usage of instrumentation to get desired data. In particular, it covers measurements of spectral transmittance and reflectance for fruits, vegetables, nuts, grains, seeds, meats, poultry, dairy products, and other plant and animal materials. It also covers some basic principles of holographic methods and applications to food materials.

The next two chapters concern (1) Color and Its Measurement, and (2) Sorting for Color and Appearance. In this latter chapter, "radiation" is appropriate for sorting by delayed light emission. That is, after a product has been illuminated, it may, in turn, emit descriptive light for several seconds after the illumination. This characteristic is utilized extensively. Chapter 6 covers Near-Infrared and Infrared Radiation Applications: It consists basically of three parts: (1) component analysis, such as water in seeds and fat in meats, (2) quality detection, such as bruising and discoloration in apples, and (3) infrared drying.

A new subject area on Applications of High-Energy Radiation is covered by Chapter 7. Among other subjects, it includes beta bookscattering, neutron scattering, gamma radiation, and irradiation by x-rays.

More familiar territory for EMC engineers is Chapter 8 on Related Concepts of Microwaves, Radio Waves, and Electric Currents. Typical topics are resistivity/conductivity, dielectric polarisation properties and electrostatic properties. These concepts are applied in Chapter 9 on Measurement of Electrical Properties of Foods and Agricultural Products, including applications to grains and seeds, fruits, vegetables, nuts, and other plant materials, as well as to animal products.

The final Chapter 10 on Applications of Electrical Properties covers determinations of water content, microwave and dielectric heating, quality evaluation and quality control, and electrical treatment of seeds.

Not to be overlooked is a 54-page Appendix chuck full of tables and graphs additional to those in the main text. The book is extensively referenced and well indexed for both subject matter and cited authors. If you are at all interested in the technological implications for processing, preservation, quality evaluation, and quality control of foods and agricultural products, this compendium is a "must" for you.

> Richard B. Schulz Xerox Corporation, IPD 1301 Ridgeview Drive — MS 330 Lewisville, Texas 75067

#### A GUIDE TO F.C.C. EQUIPMENT AUTHORIZATIONS

Updated and Revised Second Edition by W.K. Roberts, Chris Kendall, and James Hill Published by: The EMXX Corporation 6706 Deland Drive, Springfield, VA 22152 Copyright 1985 Softbound, 190 Pages, \$79.50

This book was written for anyone who must deal with the FCC to obtain equipment authorizations. It provides a thorough step by step explanation of how to proceed in making an application and contains complete information on the FCC programs, procedures, publications, standards and specifications, and required test facilities and equipment.

As anyone who has ever made a presentation to the FCC for an equipment authorization knows, the procedural matters are often more confusing than the technical requirements. The new second edition is very concisely organized to present this information in easy to use tables for the numerous FCC equipment authorization programs. This completely revised edition of the book presents two new equipment authorization programs recently implemented by the FCC: Notification and Verification. Equipment in these two categories includes aviation and marine receivers, microwave and broadcast equipment, amateur receivers, land mobile receivers, experimental radio service transmitters and receivers, computing devices, and cordless telephone receivers.

Along with the name and address of the person at the FCC responsible for a particular authorization program is a brief explanation of the internal FCC organization. Of particular interest is the description of how to obtain FCC rules, their costs, and descriptions of their contents. Detailed also is a list of FCC publications which deal with equipment authorizations, measurement procedures, application forms, and the references to applicable ANSI, EIA, IEC, and IEEE test and radiation standards.

Those already familiar with the military EMC requirements will find a clear explanation of the specific differences between FCC and military test requirements.

Of recent importance to manufacturers of electronic data processing equipment are the new FCC rules governing digital computing devices. This section is extensively covered with explanations of the classes, labeling requirements, and user's manual information. Also, the complete "how to" of submitting for FCC Part 15 personal computer and TV interface authorization is presented in detail.

To assist manufacturers to better understand the RF interference threat posed by their equipment, a brief section is included which summarizes the basic transmission modes of radio frequency with regard to antennas, enclosures, power cords and lines, and basic measurement procedures.

A brief mathematical model is presented to determine the attenuation between transmitting and receiving antennas with an explanation regarding the FCC test methodology and rationale for performing site calibrations. Again, using the tabular approach, a very clear summary presents the important tests, distances, and facilities required based upon the equipment category and applicable test standard.

The sections on Test Facilities Requirements and Design of the Test Site are a must for every lab. It is likely to provide new information even to senior personnel. Always in view is the complete perspective of the various agency standards to permit designing one test site to accommodate the total set of requirements.

Within the EMC industry controversy arises regarding the use of tuned receivers vs. spectrum analyzers. The second edition presents an insightful review to permit the test engineer to determine which equipment type would be most suitable for a given measurement, with a clear preference shown for the modern digital spectrum analyzer.

As a consumer advocate, this book also presents an excellent review of the proper questions to ask a prospective FCC, CISPR, and VDE test laboratory regarding capabilities of the facility, qualifications of the engineering staff, test methodology, traceability of equipment calibration, and FCC site filing status. It is obvious the authors wish to convey the message "buyer beware."

The authors point out the need for a very knowledgeable, thorough, and meticulous engineering staff to oversee the test lab. In the long run, the manufacturer is ultimately responsible for the results. If a lab is basically rubber stamping the results or letting the equipment "slip through," the manufacturer should be aware that *an eventual FCC audit could result in fines, not for the lab, but for the manufacturer.* Clearly as the industry matures, only the well equipped, professionally staffed, and efficient laboratories will survive.

The important issue of quality control is reviewed. The FCC intends that on a statistical basis, equipment must continue to demonstrate compliance throughout the manufacturing life. The FCC will therefore be performing post grant audits on equipment. For quality control testing it would be wise to choose a number of test samples based upon the actual test margins. The greater the margin, the more likely the average sample will comply.

A section is presented on site attenuation measurements. This is a thorough presentation, including the rationale, physical model, and mathematical development. The appendix provides a step by step procedure, adapted from OST-55, to permit the reader to perform an accurate site calibration. These procedures have a big advantage over many appearing in other publications; they work. They have been thoroughly debugged and modified over the years by Chris Kendall's labs while performing various calibrations for clients.

Following the site calibration is a neat step by step procedure for calibrating dipole antennas involving the actual balun losses. Included is the development of the model for the ideal half wave dipole antenna to permit calculating the antenna factors. For those adventurous souls wishing to build their own antennas, a complete set of construction plans is provided to permit fabrication of an excellent set of tunable dipole antennas. From personal experience, these antennas have proven to be superior to many other commercial offerings, at a fraction of the cost.

There is a complete guide to suggested test equipment based upon intended use, with the approximate cost, and names and addresses of typical manufacturers. For a company contemplating setting up a test lab, this section with the cost estimates, is a must.

For the novice or the pro, or anyone wishing to gain insight into the inner workings of the FCC, determine the real compliance issues, perform suitable measurements, or make effective presentations to the FCC, this book is invaluable.

> Thomas H. Parker Director of Engineering Elliott Associated Laboratories, Inc. 897 Independence Ave., Suite 3C Mountain View, CA 94043

# EMC PERSONALITY PROFILES



by William G. Duff



#### **Terry Cantine**

Terry Cantine recently joined EMC Shielding as National Sales Manager. In this capacity, she is responsible for the management of the outside representative sales force and the sales and applications engineering staff. EMC Shielding, a relatively new company to the EMC community, is experiencing a rapid growth at the end of its first year in business, as it strives to supply its vast array of EMI/RFI shielding materials to the ever-growing number of customers requiring assistance in certifying their products to meet FCC and MIL-SPEC requirements. EMC Shielding is another of the American-operating companies part of Unitech PLC, a \$200 million dollar UK company.

Terry has been a member of the EMC community participating in IEEE activities since 1975, when she was National Sales Coordinator at Electro-Metrics in Amsterdam, New York. Since moving to Southern California, Terry has worked as Sales Manager-for LectroMagnetics, Inc., and for Eaton Corporation's Electronic Instrumentation Division as Administrative Sales Manager for the EMC product line.

Terry has been actively involved in the IEEE EMC Society both at the national and local chapter levels. She recently served as Chairman for the IEEE Regicon in Los Angeles, January 1985. This was a very successful symposia with a well-rounded technical program. Attendance exceeded 500. She is a member of the EMC-S Symposium Exhibit Committee, recently formed to act as advisors to the Chairman of the IEEE International Symposium. Members are strategically located throughout the country and visit proposed sites of symposiums to determine if it will meet all the needs of the show.

Terry has served as Publicity Chairman of the Los Angeles IEEE EMC chapter and will continue in this capacity for the '85-'86 year. She has also agreed to serve as Exhibits Chairman for the '86 Regicon to be held at the Grand Hotel in Anaheim, CA, February 6, 1986.

Born in Amsterdam, New York, Terry received an Associate Business degree from Fulmont Community College, and graduated from the Cornell University Women in Business and Government Program at SUNY, Albany, New York. She attended St. Rose University's business program prior to moving to California. Terry is presently enrolled in the Professional Designation in International Business Management at UCLA.

# CHAPTER CHATTER



by Charles F.W. Anderson

Lots of good items this issue! Old Chapters revitalizing and another new one, Atlanta! On May 9, the (revitalized) Chapter sponsored a meeting at which Lebrecht von Necker (Rohde & Schwarz, Munich) spoke on the topic "VDE/CISPR Testing Using Automatic Test Methods." There were 14 attendees. Chapter officers (through '86) are: Hugh Denny, Chairman; Bob Hammack, Vice-Chairman; and Bob Mullen, Secretary. 1987 Symposium planning is well underway and a preliminary "Interest Show" has been held. Bob Hammack is also the Treasurer for the Georgia Engineering Foundation, which establishes scholarships using contributions from its member societies, including the Atlanta Section of IEEE. Thanks to Bob Hammack for this report, and good to hear that one of our Chapters is back in action!

Al Gross, who is forming an EMC chapter in Phoenix and northern Arizona, reports that he has signed a new member from Jerome, Arizona. Herold Harrington lives and works in Jerome, a northern Arizona "ghost town" now being restored. Gross reports that although Harrington lives in a "ghost town," he hopes to be active in the new chapter. (This information was supplied by Bob Hofmann. Thanks, Bob.)

#### **CENTRAL NEW ENGLAND**

The Chapter is quite busy with Symposium preparations. In addition to Chet Smith (the Honcho), some of the tasks are: Publicity and Record — Bob Berkovits & John Clarke; Video Arrangements — Len Long; Registration — Art Murphy.

The March meeting was a joint session with the Professional Communications Society Chapter. R.E. Kenyon, Analytical Systems Engineering Corp. (ASEC), spoke on "Improving Technical Presentations." S.A. Millar (also of ASEC) gave a talk entitled, "Frequency Management, the Hard Way." Both talks were reported as very informative. There were 15 attendees. On May 21, the Chapter sponsored a meeting at which Eric Carlson (Chomerics, Woburn) discussed "Corrosion Effects Related to EMI." There were 27 in attendance. Also at the May meeting, the following Chapter officers were elected for the '85/'86 term: Chairman — Bob Berkovits; Vice-Chairman — Art Murphy; Secretary/Treasurer — John Clarke; Program Vice-Chairman — Len Long. Thanks to John Clarke for the above.

#### CHICAGO

The Chapter held a meeting on April 2, which was sponsored by Chomerics. The topic was "Slaying the EMC Dragon — A Discussion on EMC Topics with Specifics on Shielding Technology." On May 7, a meeting was held at the Amphenol Products headquarters, sponsored by that organization. Tom Whitley of Amphenol, Canada, spoke on "Reducing Conducted Line Noise — A Discussion on Filtered Connectors," and also presented some information on Canadian EMC developments. Thanks to Bob Hofmann for the above inputs.

#### LITTLETON

On June 18, the Chapter met at the Martin Marietta Aerospace Lakewood Offices. There were two speakers, Gary Head and Brian Millspaugh. Gary Head discussed "IC ESD Protection." Brian Millspaugh presented an ESD test equipment demonstration.

#### LOS ANGELES

On April 16, the Chapter held a joint meeting with the LA Instrumentation and Measurement Society Chapter. Ray Howland (Howland Co., Atlanta) addressed the meeting. His subject was "Calibration of Antenna/Propagation Test Systems and Facilities.

#### **NEW JERSEY COAST**

On April 16, the Chapter's meeting had Stuart Meyer (E.F. Johnson Co.) as the speaker. His topic was "Land Mobile Radio from the '20s through the '80s." He covered the development of land-mobile radio from the primitive police radio systems of the late 1920's, through the VHF low-UHF era, concluding with the modern 800-MHz trunking, cellular, air-to-ground service, and satellite-aided systems. There were 28 IEEE-member attendees, plus two guests. The Chapter's May 21 meeting was addressed by

#### (Continued. . . .)

Prof. Robert McIntosh (University of Massachusetts Electrical and Computer Engineering Dept.), who is president of the Antennas and Propagation Society. He spoke on "The Feasibility of Measuring Ocean Surface Currents from Satellite Platforms." (All of the above news via Lew Schimpf, who sends me copies of the Chapter Newsletter.)

#### SAN DIEGO

The Chapter met on May 15 to hear Lebrecht von Necker (Rohde & Schwarz) present the same topic which he discussed at the Atlanta Chapter's meeting a few days earlier, and at the Santa Clara Valley Chapter's gathering the previous evening (see below).

#### SANTA CLARA VALLEY

The Chapter met on March 12 to hear Dr. Hriar Cabayan (Lawrence Livermore Laboratories) speak on "Electromagnetic Pulse and Highpower Microwave Interaction with Systems." He covered the propagation of very intense electromagnetic fields, their interaction and coupling with systems, and the types of damage they may cause to solid-state devices. There were 32 attendees. The April meeting was held at the Ford Aerospace facility in Palo Alto. Dean Bailey (H-P, Santa Rosa) presented a discussion on the use of spectrum analyzers for EMI measurements, including radiated measurements in high ambients. His presentation included hardware and circuits useful for preselection, and enhancements in measurement speed. There were 29 attendees, 25 of whom were IEEE members. As mentioned above, Lebrecht von Necker's extended tour had him presenting his VDE/CISPR testing talk to the Chapter on May 14. Both Rohde & Schwarz and Polarad EMI test equipment items were demonstrated. There were 4I in attendance. At the meeting, the '85/'86 officers were elected as follows: Chairman — Dave Hanttula (Ridge Computers); Vice-Chairman — Jim Duckett (Apple Computer); Secretary — Gary Pettit (Tandem Computers); Treasurer — Darryl Ray (ECS Inc.), to whom your Column Editor is indebted for the above reports.

#### SEATTLE

The Chapter is again active it's good to report. In November, a meeting was called to reorganize the Chapter and elect officers. Del Black was elected Chairman and Lars Jorgensen, Secretary. There were 18 attendees. In February, the Chapter met to hear Art Wall discuss the latest FCC requirements, A good turnout, 72, of which 29 were IEEE members with 43 guests. The May 8 meeting featured a panel discussion on EMC committees. Participants were: Eldon Hughes (EIA); Lars Jorgensen (SAE); K. Kalanquin (RTCA) and Herb Mertel (ANSI/CISPR/VDE). There were 21 attendees of which five were guests. Thanks, Lars for providing the above reports.

#### токуо

Our Far Eastern Chapter continues its monthly Research Meetings. There were three papers presented at the March meeting, four at the April meeting, and five at the May gathering. Among the topics were the following: switching regulator suppression; electroconductive paints; estimation of lightning stroke return currents; a computer program for estimating noise levels on PC boards (called NESSY); open-site measurement refinements; and, a report on the Wroclaw and Zürich symposiums. My thanks to Professor Nagasawa for keeping us posted on the activities in Japan.

#### **TWIN CITIES**

Last, but far from least, we have another new Chapter. Formed on January 22, its officers are: Dan Hoolihan (Amador) as Chairman; Ed Finegan (Sperry) as Vice-Chairman; and Bob Schlentz (3M) as Secretary/Treasurer. They were elected at the organizational meeting on February 12. On February 28, the first technical meeting was held at the 3M Center. Lynn Landin (IBM) spoke on the topic "Use of the IBM PC as an Instrument Controller for EMC Testing." There were 15 attendees. Another meeting was held on April 18 at the Lightning & Transients Research Institute. John Robb's talk was titled "Lightning, Transients and Electromagnetic Pollution." The meeting was a joint one with the Institute of Environmental Sciences, with 40 people in attendance. Thanks to Dan Hoolihan for the report, and here's to the success of our newest Chapter!

# SHORT PAPERS, ARTICLES, AND APPLICATION NOTES

In this issue, we are publishing an article titled, "Measurement of the LISN Impedance," by Donald H. Chapman. This is a needed article because it brings up a very important problem which we, in the EMC community, usually "sweep under the rug" by assuming that it doesn't exist. That problem is the lack of conformance of the actual LISN impedance to the design requirements. I suspect that if all LISN's currently in use or available for sale were carefully checked, we would be dismayed by the few that actually conform to the standard curves found in MP-4, IEEE-213, ANSI C63.4, CISPR-16 and the several military standards. A second important feature of this article is that it suggests methods for measurement of LISN impedance. This, in itself, would be a good topic for a paper or article. And last, but certainly not least, is what the author really wanted to tell us about - a construction technique to cause the LISN impedance to be within the allowable bounds throughout the required frequency range.

## "MEASUREMENT OF THE LISN IMPEDANCE"

by Donald H. Chapman AT&T Bell Laboratories Naperville, Illinois 60566

#### ABSTRACT

When performing conducted emission measurements in the range of 450 kHz to 30 MHz, the use of a Line Impedance Stabilization Network (LISN), which will provide the desired 47.6 ohm +/-20%, is essential. The three commercial LISNs which we used initially would not perform this function due to a resonance at 11 MHz in which the impedance dropped to 16 ohms. The following article describes the procedures used to measure the impedance of the LISNs and the modifications which were made to correct their common deficiency.

#### 1. FCC RULES

The Federal Communications Commission (FCC) in measurement procedures MP-4 "FCC Measurement of Radio Noise Emissions from Computing Devices," states that conducted emissions should be performed using a LISN with a characteristic impedance of about 47.6 ohms +/-20% above 1 MHz and a decreasing impedance below 1 MHz. The 47.6 ohms is developed by the 50 ohms of the spectrum analyzer or radio noise meter or 50 ohms termination in parallel with a 1000 ohms resistor (see Figure 1).

#### 2. DESCRIPTION OF LISN

The case of the commercial LISNs, which we use, is made of aluminum and measures  $21'' \log x 8''$  high x 8'' wide. The outer structure is actually two pieces, one is the bottom and 2 ends, the second piece is the top and both sides. The inductor



by Edwin L. Bronaugh

is constructed of a 5" diameter 12" long phenolic tube with 6 gauge wire wrapped around the tube. The inductor is located closer to the bottom and to one side within the metal box.



Figure 1. Circuit Diagram of LISN to Provide 50 Ohms Impedance for the 0.45-30 MHz Frequency Range.

#### 3. THE MEASUREMENTS

#### 3.1 Initial Measurements

The initial measurements indicated a resonance at 11 MHz in which the impedance dropped to 16 ohms. Removal of the top and side piece resulted in an increase of characteristic impedance of the LISN to 33 ohms at 11 MHz, which is still below the FCC limit of 47.6 ohms +/-20%. It was felt that with the increase in impedance when the top and sides were removed, that there was capacitive coupling between the inductor and the metal box. The rivets were removed from the coil holding bracket and a 2 x 4 was placed under the coil to reduce the coupling. A decrease in the overall impedance of the LISN resulted with an average impedance of about 35 ohms.

The inductor was screwed back in place and a piece of absorbing cloth (carbon fiber cloth) was placed around the

entire inductor which eliminated the 11 MHz resonance point, but the average impedance was about 42 ohms. Next, the amount of cloth was reduced so that it only covered half of the inductor. This resulted in an average impedance of about 45 ohms from 1 MHz to 30 MHz. The top and side cover piece was replaced and measurements were performed from 0.45 MHz to 30 MHz. The replacement of the top and side piece did not alter the impedance of the LISN. The carbon fiber cloth modification was made to all three LISNs.

#### 3.2 Final Measurements

The measurements were performed every 0.5 MHz from 1 to 30 MHz using a Hewlett-Packard (HP) 4191A RF Impedance Analyzer. Since the HP 4191A will not measure below 1 MHz, at 500 kHz and at 750 kHz, an HP 4815A RF vector impedance meter was used. The impedance was also measured at 450 kHz using an HP 8662A synthesized signal generator, an Ailtech current probe serial number 1808 and an HP 4303C true RMS voltmeter, since the HP 4815A doesn't work below 500 kHz. In all cases, a Tektronix termination model 011-0099-00 was used to terminate the LISN. (See Figure 2 for the results and Figure 3 for the test setups.)



Figure 2. Graph of the Input Impedance of the LISN from 0.45-30 MHz.

The 50  $\mu$ H LISN which was modified was compared with a 5  $\mu$ H LISN we also owned, in the frequency range of 10 to 30 MHz which is in the range where the 5  $\mu$ H LISN needs no correction factors. The results indicated that the power received at the spectrum analyzer was the same when using the same noise source or equipment under test (EUT). The absorbing cloth was removed from a second pair of 50  $\mu$ H LISNs, and they were used to compare the received power levels to the spectrum analyzer below 10 MHz, since the impedance of the LISN was within specifications in this frequency range. The results indicated that the absorbing cloth has no effect on the received power level.

In addition to the resonance problem, measurement errors may be introduced by attaching an AC line cord to facilitate connection from the LISN to the EUT. The LISN only provides terminal lugs for connection to the EUT. Since most equipment tested has a standard three prong AC plug, a short length of cord and receptacle was attached to the LISN



Figure 3. Test Set-up for the LISN Impedance Measurement.

to provide ease of connection. It was noted that measurement levels varied as much as 6dB depending on the length of the added cord. To minimize the variable effects of the added line cord, each line cord was made as short as possible for the final measurements. This seemed to provide the most consistent results.

#### 4. SUMMARY

The advantage of using the 50  $\mu$ H LISNs with the absorbing cloth is that it allows us to make conducted measurements from 450 kHz to 30 MHz without having to change LISN's or add any correction to the received signal. This was only possible after the corrections were made to the LISN. Without the corrections, the results of the test performed were not reliable or accurate.

**Donald Chapman** has worked at AT&T Bell Laboratories, Naperville, Illinois for five years in the electromagnetic compatibility procedures and test group. He has an associate of science degree in electronic engineering technology, and is presently working on a bachelor of science degree in computer science. His duties in the EMC group have consisted of EMC testing of equipment and writing programs to automate data collection and test set-up of the testing equipment. He has jointly presented a paper with Len Farber at the '84 IEEE convention in San Antonio on the use of an absorberlined shielded enclosure for calibrating antennas.

# INSTITUTION OF ELECTRONIC AND RADIO ENGINEERS

The Fifth International Conference on Electromagnetic Compatibility Call for Papers

The need for EMC between systems and also with the environment is now well known. Nevertheless, there are many problems still to be solved particularly in the light of advancing technology and the ever-increasing complexity of electrical and electronic systems. There is also an increasing awareness of the biological effects of electromagnetic radiation. EMC is therefore very much a 'live' subject.

EMC considerations affect all stages of system development from design to in-service operation. In recent years, although there have been significant advances in EMC aspects of project control, design requirements, interface control, testing and quality assurance, EMC problems continue to become more evident to a wider section of society, and more and more people are becoming affected.

The aim of this fifth biennial Conference is to bring together the many workers involved with this and related subjects to act as a forum for the exchange of views on problems, methods of analysis and solutions, through the medium of original technical papers and discussions. In addition, the Organizing Committee is taking steps to organize a Tutorial Day and, as with previous Conferences in this series, there will be an associated exhibition.

Papers on all aspects of EMC, including EMP, Lightning, System Security and Electrostatics are invited. For guidance, a non-exclusive range of subjects is offered:

Case Studies

 Education and Training
 Equipment Protection, Installation and Operation
 EMC and Information Technology
 EMC in Medical Equipment
 Fundamental Studies on Environment, Coupling, Components and Materials
 High Density Circuit Technology
 Instrumentation and Measurement
 Low Frequency and Power Systems Processor Based Systems Radio Frequency and Low Frequency Hazards and Biological Interactions Regulations, Standards and Specifications Spectrum Use and Management Vehicle EMC

A synopsis of not more than 300 words will enable the Committee to assess the scope of the proposed paper, and should be sent to The Conference Secretariat, Institution of Electronic and Radio Engineers, 99 Gower Street, London WC1E 6AZ.

Synopses should be submitted as soon as possible but not later than 1st November 1985. Where appropriate, the necessary military or commercial clearances must be gained by authors prior to submission.

Final papers, which will be published in a conference document, should not exceed 8 sides of 248 mm x 343 mm sheet including diagrams. A typical page of typed text is approximately 700 words. Papers will be required in their final form by 1st March 1986.

Authors will be invited to make oral presentations of their papers and it is the Committee's intention that these presentations should be used to update the work which their papers describe and to give detailed explanations of selected features of their contribution. Therefore, authors will be specifically requested not to read their written papers in full. The conference will be conducted in English and no translation facilities will be available.

Further information and registration forms for the conference will be available in due course from:

The Conference Secretariat Institution of Electronic and Radio Engineers 99 Gower Street, London WC1E 6AZ Telephone: 01-388 3071

# **INTER-SOCIETY ACTIVITIES**

SAE COMMITTEE AE-4 ON ELECTROMAGNETIC COMPATIBILITY will meet at the Colonial Hilton Hotel on August 19th. All SAE Committee meetings are open to interested individuals at no charge. The committee welcomes participation from all attendees.

Two documents are currently out for review and are sure to be discussed at this meeting. They are:

Proposed ARP — Flight Line Grounding and Bonding of Aircraft (Sponsored by Subcommittee AE-N)

Proposed ARP 1870 -

Aerospace Equipment Electrical Bonding and Grounding for Electromagnetic Compatibility and Safety

(Sponsored by Subcommittee AE-4J)

At the last AE-4 Committee meeting in Albuquerque (March 26-27), Duane Awerkamp was elected National Chairman. Mr. Awerkamp's position will become effective at the August 19th national meeting in Wakefield, MA. Duane may be contacted as follows:

Duane R. Awerkamp — M/S-11760 Motorola, Inc. 8201 McDowell St.



by Walt McKerchar

Scottsdale, AZ 85252 Phone: 602-949-3138

**THE dB SOCIETY** will hold its annual international banquet on August 20th, starting at 8:00 P.M. The dB hospitality suite will be open at nonconflicting hours during the IEEE Symposium. Locations of the functions will be announced during the Symposium. All activities are for members only.

This year, the dB Society will assist the IEEE Symposium Committee by acting as greeters during registration...look for the ribbons with the distinctive dB logo.

## 1984 YOUNG EMC ENGINEER OF THE YEAR

L. Gilda Haskins, a senior member of the IEEE EMC Society, was chosen as the 1984 Young EMC Engineer of the Year, an award presented at a special IEEE banquet in San Jose, California, this past December. Gilda, whose Personality Profile appeared in this newsletter's Summer 1984 edition, has been an IEEE member for over seven years, serving on both the EMC Society Board of Directors and the Philadelphia EMC Chapter. She also has been active with the dB Society for four years.

Having spent several years with SEMCOR, Inc. as a manager of the engineering department, Gilda recently started her own firm, Haskins Associates. Her experience includes: work on  $E^3$  databases for electrical/electronic equipment installed in naval airborne systems; implementation of EMC programs in the Navy; participation in missile programs to ensure their non-vulnerability to electromagnetic radiation; and, work on the testing and evaluation of missile systems.

We congratulate Gilda for her award.



Left to right: Dr. Richard J. Gowen, 1984, IEEE President; L. Gilda Haskins, 1984 EMC Young Engineer Award recipient; Eugene D. Knowles, 1985 President, EMC Society.



Historic North Bridge, Concord, Massachusetts



#### IEEE 1985 INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

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Registration Dr. Arthur W. Murphy 617-449-2000 ext. 3641 Symposium Chairman Dr. Chester L. Smith 617-217-7086

> **Exhibits** Joseph E. Butler, Jr. 617-369-4400 ext. 2597

## 7th ANNUAL EOS/ESD SYMPOSIUM

The 7th Annual Electrical Overstress/Electrostatic Discharge (EOS/ESD) Symposium will be held September 10-12, 1985, at the Radisson South Hotel, Minneapolis, MN. Sponsored by the EOS/ESD Association and the IIT Research Institute, the symposium will feature workshops and five sessions on EOS/ESD and related areas. Sessions to be given are as follows:

Session 1:	Factory Control Issues
Session 2:	ESD Protection Devices
Session 3:	Devices' Failure and Stress Modeling
Session 4:	Evaluating Materials, Circuit Boards and Taping Operations

Session 5:

Testing and Failure Analysis

Workshop sessions include: The Care and Feeding of a Static Safe Work Station; ESD Standards; On-Chip Protection; and, ESD and Dust Control by Air Ionization.

For further information, contact Michael E. Martin, Publicity Chairman, 3M/Static Control Systems Division, 2111 West Braker Lane, Bldg. 501, P.O. Box 2963, Austin, TX 78769-2963. Phone: (512) 834-3117.

# **EMCABS**

In this issue, we are publishing 33 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, Ford Aerospace Textron

- E.L. Bronaugh, Electro-Metrics/Penril Corp.
- R.N. Hokkanen, Harris Corporation
- R. Jacobson, Sperry Flight System
- S. Kuniyoshi, Naval Sea Systems Command
- D.R. Kerns, Southwest Research Institute
- R.B. Schulz, Xerox Corp./Off. Products Div.
- R.M. Showers, University of Pennsylvania



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.

Switching Transients in a Superconducting Coil. E.W. Owen, and D.W. Shimer 10 Symposium on Fusion Engineering, Philadelphia, PA, USA, 5 Dec 1983. 18 Nov 83, 7p, UCRL-89205, CONF-831203-156, Contract W-7405-ENG-48. Portions are illegible in microfiche products. <b>ABSTRACT:</b> A study is made of the transients caused by the fast dump of large superconducting coils. Theoretical analysis, computer simulation, and actual measurements are used. Theoretical analysis can only be applied to the simplest of models. In the computer simulations, two models are used, one in which the coil is divided into 10 segments and another in which a single coil is employed. The circuit breaker that interrupts the current to the power supply, causing a fast dump, is represented by a time and current dependent conductance. Actual measurements are limited to measurements made incidental to performance tests on the MFTF Ying-yang coils. It is found that the breaker opening time is the critical factor in determining the size and shape of the transient. Instantaneous opening of the breaker causes a lightly damped transient with large amplitude voltages to ground. Increasing the opening time causes the transient to become a monopulse of decreasing amplitude. The voltages at the external terminals are determined by the parameters of the external circuit. For fast opening times the frequency depends on the dump resistor inductance, the circuit capaci- tance, and the amplitude of the voltage to ground at the terminals. Voltages to ground are less in the current determine the amplitude of the voltage to ground at the terminals. Voltages to ground are less in the current determine the amplitude of the uparameters of the coil itself are observed. (ERA citation 09-032369) INDEX TERMS: Switching Transients, Superconducting Coil, Study EMCABS: 2-7-85 Electrically Conductive Plastics, 1976-July, 1983. (Citations from the Energy Data Base.) Aug 84, 282p, Rept. for 1976-Jul 83. ABSTRACT: This bibliography contains citations concerm		EMCABS: 47-85 Design Note About a 75 KVA Quiet Power Distribution System. A.T. Visser Fermi National Accelerator Lab., Batavia, IL FERMILAB/TM-1252 Contract AC02-76CH03000 5 Apr 84, 8p. Portions are illegible in microfiche products. ABSTRACT: This note describes a 75 KVA quiet power distribution system for X 653 in neutrino Lab D. It is fed from the regular AC distribution which exists in the building, and it has no standby power. Its purpose is to remove electrical disturbances which are present on the regular AC distribution. (ER A citation 09:025880) INDEX TERMS: Design Note, 75 KVA, Quiet Power Distribution System	
			EMCABS: 5-7-85
		<ul> <li>Lightning Arresters for Domestic and Commercial Electrical Power Supplies</li> <li>1976-August, 1984 (Citations from the Energy Data Base).</li> <li>Rept. for 1976-Aug 84. Supersedes PB83-871129. Prepared in cooperation</li> <li>with Department of Energy, Washington, DC.</li> <li>National Technical Information Service, Springfield, VA.</li> <li>Aug 84, 152p.</li> <li>ABSTRACT: The bibliography contains citations concerning design, materials, construction, and testing of various types of lightning arresters for domestic and commercial electric power supplies. Topics include lightning arresters for structures and water, as well as lightning connectors. (This updated bibliography contains 199 citations, 24 of which are new entries to the previous edition.)</li> <li>INDEX TERMS: Bibliography, Lightning Arresters, Power Supplies</li> </ul>	
	EMCABS: 3-7-85		EMCABS: 6-7-85
Electrically Conductive Plastics. August, 1983-July, 1984. (Citations from the Energy Data Base.) National Technical Information Service, Springfield, VA. Supersedes PB83- 868786. Prepared in cooperation with the Department of Energy, Washington. DC. Aug 84, 110p. Rept. for Aug 83-Jul 84. <b>ABSTRACT:</b> This bibliography contains citations concerning electrically conduction and applications. Preparation, properties, and behavior of electrically conductive irradiation conditions are considered. Solar cell and battery separator applic updated bibliography contains 106 citations, all of which are new entries to the <b>INDEX TERMS:</b> Bibliography, electrically conductive polymer	luctive polymer technology tive plastics under various cations are included. (This e previous edition.)	<ul> <li>Electromagnetic Compatibility in Aerospace Vehicles.</li> <li>O.B.M. Pietersen</li> <li>National Aerospace Lab., Amsterdam (Netherlands)</li> <li>Presented at Nerg Symp. Of Electromagnetic Compatibility, Deift, 4 Nov 1982.</li> <li>1 Nov 83, 10p NLR-MP-83002-U</li> <li>ABSTRACT: Electromagnetic compatibility in aerospace vehicles requires car the generally high-packing density of electronic equipment aboard aircraft or shardness, and the required reliability margins. The practical- and computer-air to arrive at an undisturbed living together of electronic systems aboard these INDEX TERMS: Electromagnetic Compatibility, Aerospace Vehicles</li> </ul>	eful consideration because of pacecraft, the complex cable ded methods which are in use vehicles are reviewed.

# CALENDAR

	1985
July 22-24	<ul> <li>1985 Conference on Nuclear and Space Radiation Effects</li> <li>Hyatt Regency, Monterey, CA</li> <li>Contact: K. F. Galloway</li> <li>National Bureau of Standards</li> <li>301-921-3541</li> </ul>
July 25-26	<ul> <li>1985 Annual Hardened Electronics and</li> <li>Radiation Technical Conference</li> <li>Naval Postgraduate School, Monterey, CA</li> <li>Contact: William A. Seidler</li> <li>JAYCOR</li> <li>619-453-6580</li> </ul>
August 20-22	1985 IEEE International Symposium on EMC Hilton at Colonial, Wakefield, MA Contact: Dr. Chester Smith 617-271-7086
September 10-12	7th Annual EOS/ESD Symposium Radisson South Hotel, Minneapolis, MN Contact: Michael E. Martin 3M/Static Control Syst. Div. 512-834-3117
October 8-10	MELECON '85 Madrid, Spain Contact: Prof. Luque, MELECON '85 Instituto Energia Solar E.T.S.I. Telecommunicacion, UPM 28040-Madrid, Spain 1986
May 19-24	1986 Nuclear EMP Meeting (NEM '86) Univ. of New Mexico, Albuquerque, NM Contact: C. W. Jones Dikewood 1613 University Blvd., N.E. Albuquerque, NM 87102
June 24-26	8th International Wroclaw Symposium Technical University, Wroclaw, Poland Contact: Dr. W. Waszkis Box 2141 51-645 Wroclaw, Poland Telex: 0712118 ilw pl

	EMCABS: 7-7-85	Lightning Simulator Circuit Parameters and Performance for Severe-Threat, High-Action-Integral Testing.	EMCABS: 10-7-85
Description d'un Laboratoire de Compatibilité Electromagnetique (Description of an Electromagnetic Compatibility Laboratory). B. Rosenau Societé Nationale Industrielle Aierspatiale, Les Mureaux (France) Text in French 1984, 21p SNIAS-832-422-103 ABSTRACT: The need for fast, accurate, and reproducible tests for electromagnetic interference in airborne/spaceborne equipment and materials is discussed. Test procedures for electromagnetic interference generated and absorbed by susceptible equipment are reviewed. Methods of signal analysis and plans for test facility are described. INDEX TERMS: Tests, Electromagnetic Interference, Airborne/Spaceborne Equipment		<ul> <li>R.A. White</li> <li>Sandia National Labs, Albuquerque, NM</li> <li>Contract AC04-76DP00789; International Conference on Lightning and Static</li> <li>Electricity, Orlando, FL, USA, 22 Jun 1984.</li> <li>1984, 14p SAND-83-2254C, CONF-8406100-2</li> <li>ABSTRACT: The lightning simulator at Sandia National Laboratories (SNL) has been used to subject a number of DOE and military test items to severe levels of simulated lightning. This paper discusses some example circuits and circuit parameters related to tests made with this crow-barred Marx-generator-type simulator. Examples of fast-rising, high-peak, long-duration simulated lightning currents that have been produced into full-size test items are presented. Peak currents up to 250 kA with 1 μs rise times and action values up to greater than 6 x 10 exp 6 A exp 2 S have been injected into various test systems. (ERA citation 09-026751)</li> <li>INDEX TERMS: Lightning Simulator, Circuit Parameters</li> </ul>	
Electromagnetic Compatibility in Spacecraft and Space Instruments.	EMCABS: 8-7-85		EMCABS: 11-7-85
Electromagnetic Compatibility in Spacecraft and Space Instruments. J.E. Foster Science and Engineering Research Council, Chilton (England). Rutherford Appleton Lab. c1984, 40p RAL-84-035 ABSTRACT: The achievement of a satisfactory level of electromagnetic compatibility between the electrical units of a space system has been an important element of the space program. After discussing some general principles which relate directly to that objective, an attempt is made in this note to set down some broad guidelines which can be applied at the design stage of a space project. Brief reference is also made to test equipment and some simple procedures which can be used for diagnostic purposes. Some measurements which could form part of an electromagnetic compatibility test program are discussed. (Copyright © Science and Engineering Research Council 1984.) INDEX TERMS: Electromagnetic Compatibility, Spacecraft, Space Instruments		<ul> <li>La Compatabilité Electromagnetique (Electromagnetic Compatibility).</li> <li>A. Charoy</li> <li>Establissements Merlin et Gerin, Grenoble (France)</li> <li>Text in French</li> <li>Mar 83, I8p CAHIERS-TECHNIQUES-120</li> <li>ABSTRACT: The influence of common types of electromagnetic interference (EMI) on systems performance is outlined. Sources of EMI are indicated, civilian and military EMC standards are listed, and remedies against EMI are suggested.</li> <li>INDEX TERMS: Electromagnetic Interference (EMI), Systems Performance</li> </ul>	
Ground Ring for Shielded Cable	EMCABS: 9-7-85		EMCABS: 12-7-85
<ul> <li>G.G. Deel</li> <li>Department of the Navy, Washington, DC</li> <li>Patent, Filed 17 June 82, patented 1 May 84, 4p AD-DO11 135/1, PAT- APPL-6-389 191; Supersedes PAT-APPL-6-389 191</li> <li>This Government-owned invention available for US licensing and, possibly, for foreign licensing. Copy of patent available: Commissioner of Patents, Washington, DC 20231</li> <li>ABSTRACT: The device uses a grounding ring, having both an outer and an inner ring element combination which is placed about a shielded cable to be grounded. The inner ring has a multitude of grounding spike: cammed to move in a radially inward direction in response to rotation of the outer ring, and pierce any oute insulation and the metal shielding sufficiently to make good electrical contact with the cable shielding abou its circumferences.</li> <li>INDEX TERMS: Ground Ring, Shielded Cable</li> </ul>		<ul> <li>Radio Interference Characteristics of Switch Mode Power Supply Units.</li> <li>G. Illingworth</li> <li>ERA Technology Ltd., Leatherhead (England)</li> <li>Final report</li> <li>Jan 82, 64p ERA-81-14R</li> <li>ABSTRACT: The nature of the interference source in two commercially av supplies rated at 15V, 4A and 5V, 10A was investigated. The report conce appearing at the main supply terminals. Suppression circuits were developed current radio interference limits.</li> <li>INDEX TERMS: Interference Source, Power Supplies</li> </ul>	ailable switch mode power intrates on the interference to achieve compliance with



THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

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# **Congressional Fellowships**

### A CONGRESSIONAL INTERNSHIP FOR MEMBERS OF IEEE

**PROGRAM:** Electrical and Electronics Engineers and Allied Scientists are competitively selected to serve a one-year term on the personal staff of individual Senators or Representatives or on the professional staff of Congressional Committees. The program includes an orientation session with other Science-Engineering Fellows sponsored by the American Association for the Advancement of Science (AAAS).

**PURPOSE:** To make practical contributions to more effective use of scientific and technical knowledge in government, to educate the scientific communities regarding the public policy process, and to broaden the perspective of both the scientific and governmental communities regarding the value of such science-government interaction.

**CRITERIA:** Fellows shall be selected based on technical competence, on ability to serve in a public environment and on evidence of service to the Institute and the profession. Specifically *excluded* as selection criteria shall be age, sex, creed, race, ethnic background, and partisan political affiliations. However, the Fellow must be a U.S. citizen at the time of selection and must have been in the IEEE at Member grade or higher for at least four years. Additional criteria may be established by the selection committee.

**AWARDS:** IEEE plans to award two Congressional Fellowships for the 1986-1987 term. Additional funding sources may permit expansion of awards.

**APPLICATION:** Further information and application forms can be obtained by calling W. Thomas Suttle (202) 785-0017 at the IEEE Washington; D.C. Office or by writing:

Secretary, Congressional Fellows Program The Institute of Electrical and Electronics Engineers, Inc. 1111 Nineteenth St., N.W. Suite 608 Washington, D.C. 20036

Applications must be postmarked no later than March 31, 1986 to be eligible for consideration.

			and the second	
Upset Susceptibility Study Employing Circuit Analysis and Digital Simulation V.A. Carreno	EMCABS: 13-7-85	Direct Measurements of Interfacial Contact Resistance, End Contact Resistance, and Interfacial Contact Layer Uniformity.	EMCABS: 16-7-85	
National Aeronautics and Space Administration, Hampton, VA, Langley		S.J. Proctor, L.W. Linholm, and J.A. Mazer		
Research Center June 84, 25p NAS 1.15:85822, NASA-TM-85822		National Bureau of Standards, Washington, DC		
<b>ABSTRACT:</b> This paper describes an approach to predicting the susceptibility	of digital systems to signal	Final report		
disturbances. Electrical disturbances on a digital system's input and output lines c	can be induced by activities	Nov 83, 8p; Pub. in IEEE Transactions on Electron Devices ED-30, nll p153	5-	
and conditions including static electricity, lightning, discharge, electromagneti	c interference (EMI) and	1542 Nov 83		
electromagnetic pulsation (EMP). The electrical signal disturbances employed f	for the susceptibility study	ABSTRACT: A four-terminal microelectronic test structure and test method	are described for electrically	
were limited to nondestructive levels, i.e., the system does not sustain partial or	total physical damage and	determining the degree of uniformity of the interfacial layer in metal-semicondu	ctor contacts and for directly	
reset and/or reload will bring the system to an operational status. The front-end tr	ansition from the electrical	measuring the interfacial contact resistance. A two-dimensional resistor networ	k model is used to obtain the	
disturbances to the equivalent digital signals was accomplished by computer-a	aided circuit analysis. The	relationship between the specific contact resistance and the measured interfacial contact resistance for		
Super-Sceptre (system for circuit evaluation of transient radiation effects) Progra	am was used. Gate models	contacts with a uniform interfacial layer. A new six-terminal test structure is used for the direct measurement		
were developed according to manufacturers' performance specifications and p	parameters resulting from	of end contact resistance and the subsequent determination of front contact resistance. A methodology is		
construction processes, characteristic of the technology. Digital simulation at th	e gate and functional level	of end contact resistance and the subsequent determination of non-contact resistance. A microdology is		
was employed to determine the impact of the abnormal signals on system perfo	ormance, and to study the	described for reducing the effects of both contact-window mask misalignment and parasitic resistance		
propagation characteristics of these signals through the system architecture. Exam	ple results are included for	associated with nicse measurements. Weasurement results are given for 50.5	70 AT 1.570 St and 10070 AT	
an intel 8080 processor configuration.		INDEX TEDME. Migraelectronic Test Structure Test Method Uniformity	Metal-semiconductor Con-	
INDEX TERMS: Susceptibility, Digital Systems, Signal Disturbances		INDEA TERMS: Microelectrollic rest Structure, rest Method, Onionialy	, Metal-semiconductor con-	
Sparking Protection for METE-B Neutral Beam Power Supplies		tacts, Contact Resistance		
DR Cummings Lawrence Livermore National Lab CA				
Contract W 7405 ENG 49 10 Summarium on Eurice Engineering	EMCABS: 14-7-85	Computer Programs for Electromagnetic Coupling between a Conducting	EMCABS: 17-7-85	
Contract w-7405-ENO-46 10. Symposium on Fusion Engineering,		Body and an Aperture in an Infinite Conducting Plane.		
renducto 20 Nov 82 6n UCP1 80281 CONE 821202 154		S.W. Hsi and R.F. Harrington		
APSTPACT: This paper describes the ungrade of METE P Neutral Poor P	ower Supplies for enarking	Syracuse Univ., NY Dept. of Electrical and Computer Engineering	1	
Abstract: This paper describes the upgrade of MITTF-B redutal beam F	ower Supplies for sparking	Technical report, Contract N00014-76-C-0225	1	
to sporking. The bot deak bouses the series tetrade are and filoment surpli	supplies must be insensitive	Mar 84, 47p Rept No. SYRU/DECE/TR-84/4		
to sparking. The not deck houses the series teriode, are and manient suppli-	es, and controls. Hot deck	ABSTRACT: Computer programs for the analysis of electromagnetic coupling between a thin straight		
shicking has been upgraded and a continuous sheld around the arc, mament,	gradient grid, and control	conducting wire and an aperture in an infinite conducting plane are briefly described and listed in this report.		
cables now extends from the not deck, through the core shudder, to the source. The	ne snield carries accelerating	The aperture is of arbitrary shape and size. The wire is of infinite length (with or without loads) or finite		
current and connects only to the source. Shielded source cables go through an out	ter duct which now connects	length. The excitation is either a plane wave incident from the opposite side of the wire or TEM voltages		
to a ground plane under the hot deck. This hybrid transmission line is the low	inductance path for sparks	applied on the wire. The current distributions in the aperture and on the wire are computed. In addition, for		
discharging the stray capacitance of the hot deck and isolation transformers, rec	ducing coupling to building	the case of TEM voltage excitation, the power transmitted through the aperture is computed. For the case of		
steel. Parallel dc current return cables inside the duct lower inductance to reduce i	nductive turn-off transients.	plane wave excitation, this document evaluates an equivalent circuit of the aperture for the transmission line		
MOVs to ground further limit surges in the remote power supply return. Sing	le point grounding is at the	made on on infinitely long wire or an arbitrarily loaded wire	reare for the transmission me	
source. No control or rectifier components have been damaged nor are there any	known malfunctions due to	NDEV TEDMS. Computer Dearrants Applying Electromagnetic Count	ing	
sparking up to 80 kV output. (ERA citation 09:032376)		INDEA TERMIS: Computer Programs, Analysis, Electromagnetic Coupr	ing	
INDEX TERMS: MFTF-B Neutral Beam Power Supplies, Sparking Protect	ction			
UV Laser Triggering of Crowbars Used in the Sandia Lightning Simulator.	EMCABS: 15-7-85		EMCABS: 18-7-85	
M.J. Landry, and W.P. Brigham				
Sandia National Lab, Albuquerque, NM			L	
Contract AC04-76DP00789; International Conference on Lightning and Static	2			
Electricity, Orlando, FL, USA, 22 June 1984; Portions are illegible in				
microfiche products.		Input Filter Compensation for Switching Regulators.		
1984, 13p SAND-83-2306C, CONF-8406100-1		F.C. Lee		
ABSTRACT: We have applied the techniques of ir and uv laser-triggered sw	vitching of gaps to crowbar	Virginia Polytechnic Institute and State Univ. Blacksburg		
switching two Marx generators, delivering greater than or equal to 250 to 50 kA i	n small and large impedance	Final Report, Contract NAG3-220		
loads. Crowbar switching delays of 0.08 to 0.28 µs were observed if the laser radi	ation arrived in the crowbar	1984, 368p NAS 1.26:173557, NASA-CR-173557		
gap when its voltage was $44\%$ of its maximum applied voltage or at 23 to $68\%$	of its self-break voltage We	ABSTRACT: Problems caused by input filter interaction and conventional inp	out filter design techniques are	
have successfully triggered a 5.0 cm crowbar can with $35 \text{ m L}$ of lambda = 240 nm	radiation when filled with 20	discussed. The concept of feedforward control is modeled with an input	filter and a buck regulator.	
nsig of SE sub 6 Electrodes have operated with 40 Coulombs of charge for 4	7 shots without detrimental	Experimental measurement and comparison to the analytical predictions are c	arried out. Transient response	
surface damage (FRA citation 00:026671)	, shots without uctimental	and the use of feedforward loop to stabilize the regulator system are described.	Other possible applications for	
INDEX TERMS: is and uv I ager triggered Switching Crowber Switching	Mary Concretory	feedforward control are included.		
THE EXTENSION I AND UV, LASET-TIREFIED SWITCHING, CLOWDAI SWITCHING	s, main ocherators	INDEX TERMS: Input Filter Compensation, Switching Regulators		
			1	

## **1986 NUCLEAR EMP MEETING**

The permanent NEM Committee announced that a committee has been formed in the Albuquerque, New Mexico area to host the fifth biennial conference. The 1986 Nuclear EMP Meeting (NEM 1986) will be held at the University of New Mexico on May 19-24, 1986.

The symposium will focus on EMP effects technology and its interrelationship with all other electromagnetic protection disciplines including EMC, EMI, and Lightning. Papers submitted should address the following broad subject areas such as:

- EM Environments and Coupling Phenomenology
- Simulation and Measurement Techniques
- Numerical and Statistical Analysis Techniques
- EM Hardness Assurance and Maintenance
- Integrated EM Protection
- Related Lightning, EMC, EMI Studies
- Consistent EM Standards and Specifications
- Related Education and Training

Special sessions are being organized to address the following topics: EMP effects on power systems, lightning, SEM analysis of transient data, EM specifications and standards, and microcomputer applications.

Each abstract submitted must be accompanied by a letter from the authors stating that the abstract and content of the proposed presentation have been approved for public dissemination by the cognizant sponsoring agency.

Authors are requested to submit a one-page abstract, original plus five copies, by December 6, 1985, to: C.W. Jones, NEM '86 Technical Program Committee, DIKEWOOD, Division of Kaman Sciences Corp., 1613 University Blvd., N.E., Albuquerque, NM 87102.

Abstracts with related information should be typed singlespaced on a single 21.5 cm x 28 cm page with the typed portion not to exceed 15 cm x 23 cm. Title of the paper and author(s) name(s) and affiliation, including complete address, should begin 2 cm from the top of the page and left margin should be 4 cm. This single page shall include all reference and other material the author deems appropriate in camera-ready form. Notice of acceptance or rejection will be mailed to the principal author by February 7, 1986 along with information related to the paper presentation.

## 8th INT'L WROCLAW EMC SYMPOSIUM CALL FOR PAPERS

The 8th International Wroclaw Symposium on EMC will be held June 24-26, 1986, at the Technical University in Wroclaw, Poland. The symposium is a biennial event open to all scientists and engineers throughout the world, focusing on all aspects of EMC theory and practice.

A call for papers has been issued for original, unpublished papers. Suggested topics include, but are not limited to, the following:

- Systems EMC
- Equipment EMC
- Spectrum utilization
- Bioeffects of EM radiation
- Radiation hazards
- EM noise sources

- Measurement technology and spectrum monitoring
- Antennas and propagation
- EMC standards
- ESD, Lightning, and EMP
- EMC aspects of new concepts
- Computer-aided EMC analysis and design

Authors should submit five copies of a 50-75 word abstract and 500-700 word summary by August 15, 1985. Notification of acceptance will be made by October 15, 1985. All materials should be sent to EMC Symposium, Box 2141, 51-645 Wroclaw 12, Poland. Additional symposium information is available by contacting Dr. W. Waszkis, EMC Symposium, Box 2141, 51-645 Wroclaw 12, Poland. Telex: 0712118 ilw pl.

EMCABS: 19-7-85 Review of the Air Chemistry and Relevant Parameters for the Modeling of the Nuclear Induced Lightning. A.W. Ali Naval Research Lab., Washington, DC Interim report Apr-Oct 83; Contracts MIPR-83-659, MIPR-84-601 May 84, 50p NRL-MR-5341, SBI-AD-E000 577 ABSTRACT: A review of the relevant processes for the modeling of NIL and their rate coefficients is given. These include the attachment rates, the ionization frequency, the electron temperature, the various recombi- nations and thermal processes. INDEX TERMS: Modeling, NIL		Reduced Domestic Satellite Orbital Spacings at 4/6 GHz. George L. Sharp Federal Communications Commission, Washington, DC, Office of Science and Technology May 83, 161p FCC/OST/R83-2 ABSTRACT: This report examines the technical basis for satellite orbit spacing-intersystem interference. This is a highly technical subject and this report deals with it through several complex mathematical analyses of intersystems isolation and signal interactions. As such, this report is addressed to the rather small community of communications engineers that concerns itself with intersystem interference. This report includes compilations of equations, U.S. domestic satellite system characteristics, and signal parameters that are important in interference analysis and system design. Also included are two computer programs that implement intersystem interference models. This report documents the interference analysis that formed the basis of the FCC's proposal in CC Doc. 81-704 to reduce U.S. domestic satellite orbital spacings to 2 degrees. This docket is still in process; thus, this should be considered an interim report insofar as that docket is concerned. Further analysis incorporating the comments on Doc. 81-704 and the later satellite system fillings are currently underway. INDEX TERMS: Satellite Orbit, Intersystem Interference	
Data and Results of a Laboratory Investigation of Microprocessor Upset Caused by Simulated Lightning-Induced Analog Transients. C.M. Belcastro National Aeronautics and Space Adm, Hampton, VA, Langley Research Ctr June 84, 28p NAS 1.15:85821, NASA-TM-85821 ABSTRACT: A methodology was developed to assess the upset susceptibility/reliability of a computer system onboard an aircraft flying through a lightning environment. Upset error modes in a general purpose microprocessor are studied. The upset tests involved the random input of analog transients which model lightning induced signals onto interface lines of an 8080 based microcomputer from which upset error data was recorded. The program code on the microprocessor during tests is designed to exercise all of the machine cycles and memory addressing techniques implemented in the 8080 central processing unit. A statistical analysis is presented in which possible correlations are established between the probability of upset occur- rence and transient signal inputs during specific processing states and operations. A stochastic upset susceptibility model for the 8080 microprocessor is presented. The susceptibility of this microprocessor is upset, once analog transients have entered the system, and determined analytically by calculating the state probabilities of the stochastic model.		EMCABS: 23-7-85 Radiation Hardening of Electronic Circuits. 1975-September, 1983 (Citations from the International Information Service for the Physics and Engineering Communities Data Base). National Technical Information Service, Springfield, VA Report for 1975-Sep 83; Supersedes PB83-855361 ABSTRACT: This bibliography contains citations concerning the hardening of electronic circuits to radia- tion damage. The basis for hardening lies in circuit design and reducing system susceptibility, rather than to shielding. Citations on shielding have been excluded, as have references to single devices, such as semiconduc- tor devices. Electronic circuits include integrated circuits, logic circuits, memory circuits, and microprocessor circuits. Applications for hardened electronic circuits include nuclear power plant environments, space environment, and military applications. (This updated bibliography contains 220 citations, 13 of which are new entries to the previous edition.) INDEX TERMS: Bibliography, Hardening, Radiation Damage	
Digital Communication Systems: Interference, 1970-June, 1983 (Citations from the Engineering Index Data Base). National Technical Information Service, Springfield, VA Report for 1970-June 83 June 83, 298P; Supersedes PB82-873811 ABSTRACT: This bibliography contains citations concerning interference ana tion systems. Topics include digital and radio transmission systems, signal inter rate, phase shift keying, and pulse code modulation. Interference and noise in environments, error probability, error rate monitoring techniques, pulse and telephone, and mobile radio systems are discussed. (This updated bibliography of which are new entries to the previous edition.) INDEX TERMS: Bibliography, Interference Analysis, Digital Communicat	EMCABS: 21-7-85	Uncertainties in Extracting Radiation Parameters for an Unknown Interference Source Based on Power and Phase Measurements. Mark T. Ma and Galen H. Koepka National Bureau of Standards, Washington, DC, National Engineering Technical note June 83, 51p NBS-TN-1064 ABSTRACT: A method for determining the radiation characteristics of a lea been reported in a previous publication (1), in which the unintentional, electric modeled by two vectors representing a combination of equivalent electric and m report presents the mathematical anlaysis of the uncertainties in the final, experimental data are degraded by the background noise and measurement i INDEX TERMS: Radiation Characteristics, Leaking Interference Source	EMCABS: 24-7-85 sking interference source has ally small leakage source was hagnetic dipole moments. The , extracted results when the naccuracies.

# **INVITATION TO AUTHORS**

#### Publishing Books with the IEEE Press

#### General

The expanded IEEE Press stands ready to publish quality books on all subjects of importance and interest to the IEEE membership and the profession. Book proposals from societies, other IEEE entities, and individuals are encouraged.

Besides serving the information needs of the profession, the IEEE Press is organized to contribute financially to the Institute and its Societies and, at the same time, to offer financial returns to authors and editors at least comparable to those of other publishers.

A decision to publish a proposed book is based, in part, on the endorsement and sponsorship of the Society or Societies in which its subject matter falls. All proposals are carefully reviewed, and quality, need, and marketability are taken into consideration.

Brief descriptions follow of the types of books published, the organization of the Press, book sponsorship, the business and financial arrangements, and the procedures for proposing a book.

#### **Types of Books**

Various categories of books, organized into series, are published or planned. These include the Selected Reprint Series (a prominent feature of the past book program), the Tutorial Book Series, and a series based on journal special issues. Other categories are original professional and reference books, compendia, and bibliographies.

These categories span a spectrum of levels of involvement of authors/editors. At one end of the spectrum are the books of selected reprints, which consist of collections of papers that originally appeared in various publications at various times, with limited introductory and transitional material provided by the editors. At the other end are specially written books requiring major investments of effort and time by the authors. In between are books that contain varying combinations of reprinted and authored material.

#### Organization of the Press

The IEEE Press is guided by a structure of volunteers, whose charge is to assure that it operates for the benefit of the Institute, its Societies, and the membership. Much of the actual operation is carried out by editorial, marketing, and business staff at the IEEE.

The head of the volunteer structure is the Editor-in-Chief who is appointed by the Board of Directors, and who serves the reports to the Publications Board. He is assisted by editors of book series, as needed, and by an Editorial Board appointed by the Publications Board. Series Editors set up their own advisory committees for planning and reviewing purposes, as warranted.

#### **Book Sponsorship**

The idea for a book often, though not always, originates within the Society (or other IEEE entity, such as the Educational Activities Board or the History Committee) most closely identified with the subject of the book. When proposed by an individual, the endorsement of the appropriate Society is sought. After an entity proposes or endorses a volume that is accepted for publication by the Press, that entity becomes the sponsor of the book. As such, it shares financially in the success of the book, as described below.

#### **Business and Financial Arrangements**

Ground rules have been established: (1) to achieve a straightforward business operation of the Press, (2) to provide financial incentives to book sponsors and authors/editors, and (3) to accommodate a wide range of book types. Highlights are given in the following paragraphs.

*Funding:* The costs and financial risk for books are borne by the Press.

*Book Pricing:* A list price is set for each book that is aimed at optimizing revenue from nonmember sources. A member price is based on a discount (20% to 40%) from the list price. Discounts are available for bulk purchases.

*Reprint Fees:* A fee of \$5 per page is paid on book publication to the IEEE publications from which material is reprinted. This payment allows the original IEEE publishing entity to benefit from reuse of its material.

*Royalty Payments:* An incentive payment based on net income is paid in the form of a royalty. This royalty is divided between the book sponsor (usually a Society) and the author or editor of a book. For 1983, the scale is as given below. Percentages are of net sales income.

8% of the first \$10K 10% of the next \$10K 12% of the next \$10K 14% of the next \$10K 16% of the next \$10K 18% of the next \$10K 20% of the next \$10K 24% of the next \$10K 24% of the next \$10K 26% of the next \$10K 30% of the next \$10K

The dollar amounts are adjusted each year, according to the Consumer Price Index, for new books published. Once set for a given book, the dollar amounts do not change. Payments are made for five full years at the end of each fiscal year.

It should be emphasized that these royalty figures represent

(Continued . . . )

EMCABS: 25-7-85 Teletext-Related Interference Observed on WETA-TV, Washington, DC R.A. Haller Federal Communications Commission, Washington, DC, Office of Science and Technology Technical memo May 83, 26p FCC/OST/TM-83-2 ABSTRACT: As a result of several reports of a buzzing sound in the audio channel of WETA-TV, Channel 26, Washington, DC., a study was conducted to determine the cause. Initial indications were that the buzz was more pronounced after the signal was processed by a video modulator such as in a video cassette recorder or cable television converter. Because teletext information was being transmitted, the teletext was naturally first suspected of being the cause of the problem. The WETA signal had excessive incidental carrier phase modulation at a highly distorted horizontal sync pulse when the original measurements were made. INDEX TERMS: Telctext, Interference		Metal-Insulator-Metal Junctions as Surface Sources of Intermodulation. T.G. Shands and J.A. Woody Georgia Institute of Tech., Atlanta, Engineering Experiment Station Final technical report, Sep 80-Nov 82; Contract F30602-81-C-0268 Feb 83, 90p RADC-TR-83-31 ABSTRACT: This program was performed to investigate metal-insulator-metal (MIM) junctions as surface sources of intermodulation (IM) on Command, Control, Communications, and Intelligence (C3) aircraft. The IM levels generated by MIM junctions were evaluated for various material and physical parameters of the junctions as well as electromagnetic properties of the applied signals. A total of 57 test samples were fabricated to be representative of MIM junctions found on aircraft. The IM levels of these junctions were measurement scheme. Models were developed which describe the IM behavior as a function of some of the parameters. These parameters include input power, temperature, pressure, material and construction of the MIM junction. The changes due to other parameters were smaller than the variability of the data for a single test sample. In order to verify the model, two additional test samples were constructed, measured, and compared to predicted values. (Author) INDEX TERMS: Junctions, Surface Sources of Intermodulation (IM)	
Interference Cancelling Transmitter. Frank S. Gutleber Department of the Army, Washington, DC This Government-owned invention available for U.S. licensing and, possibly, for foreign licensing. Copy of application available NTIS. Filed 25 Jul 83, 12p AD-D010 406/7 <b>ABSTRACT:</b> An interference cancelling transmitter is configured which provides bility (EMC) among different communications apparatus in the same area as pro intercept (LP) in a dense communications environment where secure communica users. This is accomplished by means of a communications transmitter coupled configuration comprised of an omnidirectional antenna and a notch antenna havins small angular beamwidth. RF power is fed equally thereto so that the radiated pow same but the phase is mutually inverted (180 deg.) so that a cancellation of the rad directions of space except over the angular region where the null of the notch anten be varied in direction and results in a relatively narrow pencil-like radiation pat predetermined receiver. (Author) <b>INDEX TERMS:</b> Interference Cancelling Transmitter, Low Probability of In-	EMCABS: 26-7-85 s electromagnetic compati- viding a low probability of tions are required between to a transmitting antenna ng a single deep null over a ter from each antenna is the adiated power occurs in all nna is located. The null can ttern being radiated to the ntercept (LP)	Radio Interference Measurements on Contact Devices. G. Illingworth ERA Technology Ltd., Leatherhead (England) Final Report May 81, 37p ERA-80-151R ABSTRACT: Thermostats and energy regulators can produce high levels of in they are used to control inductive loads. The interference generated by suc examined both in magnitude and characteristic nature for a number of loads, The effect of various suppression measures has been determined and the details o are provided with due attention being paid to the requirements of current nat requirements. INDEX TERMS: Radio Interference Measurements, Contact Devices	EMCABS: 29-7-85 terference particularly when h contact devices has been both resistive and inductive. f the most efficacious circuits ional legislation and similar
<ul> <li>Fields, Currents and Charges on Obstacles in a Parallel-Plate Simulator at Selected Frequencies and with Pulse Excitation.</li> <li>T.T. Wu, M. Krook, R.W.P. King, H.M. Shen, and R. Bansal Harvard Univ., Cambridge, MA. Gordon McKay Lab.</li> <li>Final report, Contract F29601-81-K-0010</li> <li>Aug 83, 56p AFWL-TR-83-45</li> <li>ABSTRACT: This final report summarizes the results of a two-year study perform to determine the properties of the Harvard model simulator at selected free excitation. The continuous-wave (CW) study is completed with measurements at inovel series apron device is developed to improve the performance in this frequene begins with a theoretical and experimental investigation of the Harvard parallel unexpected complications which require further study. Each feature is examined in of the many parasitic pulses are determined. Methods for eliminating the under along with a new experimental technique to reduce the systematic interference and the current in the time domain. (Author)</li> <li>INDEX TERMS: Fields and Currents and Charges, Obstacles, Parallel-Plate</li> </ul>	EMCABS: 27-7-85 med at Harvard University quencies and under pulse intermediate frequencies; a ney range. The pulse study el-plate simulators exhibit, ndividually and the sources sired pulses are presented, id a new theory to solve for e Simulator	Nuclear Electromagnetic Pulse (EMP) and Electric Power Systems. P.R. Barnes, E.F. Vance, and H.W. Askins, Jr. Oak Ridge National Lab., TN. Apr 84, 68p ORNL-8033, Contract AC05-84OR21400 ABSTRACT: A nuclear detonation at high altitudes produces a transient elec high-intensity electromagnetic fields. A single high-altitude burst can subject m States to a strong EMP. These intense fields induce voltage and current transie Surges would be induced by EMP in transmission and distribution circuits and tion elements in electric power systems throughout the national grid. Such wi upset the stability of electrical energy systems and result in massive power failur EMP-caused damages are not well known for utility electric power system associated with insulation damage and failures of low-voltage and solid-state from a review of past studies the EMP may pose a serious threat to the nation's el citation 09:026912) INDEX TERMS: Nuclear Electromagnetic Pulse, Electric Power Systems	EMCABS: 30-7-85 tromagnetic pulse (EMP) of ost of the continental United ents in electrical conductors. I in control and communica- despread disturbances could res. The extent and nature of is. Failures are likely to be components. It is concluded ectrical energy supply. (ERA

#### (Continued . . . )

the total payment, which is divided between the sponsor of the book and its editor/author. How these royalty payments are apportioned depends on the kind of book, with the author getting the major portion for a specially written book, on the one hand, and the sponsoring entity getting the major portion in the case of a collection of reprints, on the other hand. (Examples: for an authored book 4/5 of the royalties to the author, 1/5 to the sponsor; for reprint book, 1/5 of the royalties to the editor, 4/5 to the sponsor.) As pointed out above, many books will fall between these two extremes of the spectrum. In general, the individual author/editor gets the larger share of the royalty dollar the greater his or her investment of time and effort.

#### **Proposing a Book**

Individuals and Societies are encouraged to submit proposals for IEEE Press books. This facilitates their review if proposals are submitted in a standard format. Special proposal forms are available for Books of Selected Reprints and also for Tutorial Books. Blank forms, or guidelines for proposing books of other types, should be requested from the Managing Editors, IEEE Press, 345 East 47 Street, New York, NY 10017. Completed proposals should be submitted to the same address. Telephone queries to the Managing Editor are welcome (212-705-7557).

Individuals proposing a book should seek the endorsement of the Society (or Societies) whose technical interests cover the subject of the book. They are encouraged to obtain this endorsement prior to submitting the proposal to the Press, although the proposal can be submitted in parallel to the Press and to the appropriate Society for simultaneous consideration when saving time is important.

#### Summary

The IEEE Press is operated to serve the information needs of

the profession and, at the same time, to make a financial contribution to the Institute and its Societies. It accomplishes this by publishing books of high quality and marketability. Authors and editors benefit from the success of books by sharing incentive royalties with book sponsors.

Book proposals from Societies, from other IEEE entities, and from individuals are welcome. Publication decisions are reached by the Editors and Editorial Board of the Press after careful review.

The format of a proposal varies depending on the type of book. Proposal guidelines and forms are available from the Managing Editor of the IEEE Press.

Two features that make the new IEEE Press different are:

(1) There is now provision for financial return to authors, editors, and Societies; and,

(2) We have expanded the kinds of books we will publish within our objective of service to the profession.

Books of selected reprints will continue. This series will be under the editorship of M. Granger Morgan of Carnegie-Mellon University. The IEEE Press plans to develop other kinds of books and series along the following lines:

Tutorial books;

Combined and reprint collections;

Book editions of special issues of the Transactions or the Proceedings;

In general, knowledge organized to be useful for lifelong continuing education of those in our profession; and,

Books relating to the history or the historical development of aspects of electrical engineering.

Contact M. E. Valkenburg, Editor-in-Chief, 602-626-2345.

## IEEE Standard Dictionary of Electrical and Electronics Terms

Five years in the making, this extensively revised Second Edition of the IEEE Standard Dictionary contains 896 pages, 20,254 entries, over 7,000 new and revised terms, plus 10,000 acronyms with their identifications. It is the most comprehensive dictionary in its field.

Compiled and edited by authorities in 31 fields of electrical/ electronics specialization, this up-to-date dictionary is an indispensable reference for engineers and scientists, students and teachers. Each definition is an official standard of the IEEE. The dictionary also incorporates American National Standard definitions, plus standard definitions of the International Electrotechnical Commission. Designated ANS1/ IEEE Std. 100-1977, the Dictionary has been approved as an American National Standard.

Prices: Nonmembers \$37.50; IEEE Members \$33.75. Contact: IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. Telephone No. (201) 981-0060. EMCABS: 31-7-85

Correlated Measurements of UHF Radar Signatures, RF Radiation and Electric Field Changes from Lightning

D.M. Levine and V. Mazur

National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.

1983, 11p NAS 1.15:84425, NASA-TM-84425

**ABSTRACT:** During Storm Hazards - 82, simultaneous measurements are made of radar echoes, fast and slow field changes and RF radiation from lightning. Radio frequency radiation and radar echoes are also obtained during periods when the research aircraft is struck by lightning. These data are presently used to better understand the electrical processes which occur during strikes to the aircraft. Preliminary conclusions verify that the events recorded aboard the aircraft occurred during lightning, but also indicate that they occur with surprising frequency very early in the flash.

INDEX TERMS: UHF Radar Signatures, RF Radiation, Electric Field Changes, Lightning

Emv-Normen. Einfuehrung in die Normen der Elektromagnetischen Vertraeglichkeit (Emv Norms: Introduction to the Norms of Electromagnetic Accommodation).

R. Harms

Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.)

Unternehmensbereich Raumfahrt.

Presented at Ate Conf., Esslingen, West Germany, 20-21 June 1983.

3 1983, 29p MBB-UR-652-83-0

ABSTRACT: Standards for electromagnetic measurements, measured by frequency range and radiation interference are compared. Different measuring methods were tested. It is found that most cases of correction value measurement yield results can be converted. All valuable standards originate in manual measurements. Signal identification methods are not yet automated. The present instrument technique which has built in processors and connected computers, still need software changes and the tolerance characteristics still have to be defined.

INDEX TERMS: Standards, Electromagnetic Measurements, Comparison

EMCABS: 33-7-85

EMCABS: 32-7-85

Diffraction of an Electromagnetic Plane Wave by a Right-angled Wedge.

Kazuo Aoki and Juniaki Yoshidomi

Faculty of Engineering, Kyushu University

Report of Technical Group on EMC, IECE and IEE of Japan

Vol. 84, No. 226, EMCJ 84-43. pp. 27-32

**ABSTRACT:** We have introduced the Wiener-Hopf equations for the diffraction problem of an electromagnetic plane wave by a right-angled dielectric and conductive wedges, respectively. It is, however, yet remained to solve these equations. We have investigated numerically the convergence of the eigenfunction expansion of the total field by the conductive wedge and revealed the relation. N=10+1.6Kop. (N: number of modes required to calculate the field with the accuracy of more than four significant digits, Ko= $2\pi/\lambda$ , P: distance to the field point from the apex).

INDEX TERMS: Wiener-Hopf Equations, Diffraction, Electromagnetic Plane Wave

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