

Electromagnetic Compatibility Society



Newsletter

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EDITOR: ROBERT D. GOLDBLUM

NOMINATIONS FOR BOARD OF DIRECTORS

Nominations are now being accepted for election of the EMC Society Board of Directors. In order to be nominated, a petition form, including a biographical summary, must be received by the nominating committee before June 1, 1985.

Petition forms and information can be obtained from:

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

Biographical summaries in the petition must not exceed one-half typewritten page, containing the following:

Education History
Work History
Technical Committee Service
IEEE/EMC Membership

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

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 of all disciplines to be concerned about EMC.

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.

Other scheduled events include a workshop on EMC, a reception, an awards banquet and an exhibit program represented by nearly 70 companies.

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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EDUCATION COMMITTEE NEWS

The Education Committee has prepared a questionnaire on EMC education and has distributed it to over 350 colleges and universities in the United States. The purpose of the questionnaire is to determine what EMC courses are presently being taught, and what help the EMC Society can provide in encouraging colleges and universities to include EMC in their academic curricula. It is hoped that the survey will provide a data base on the status of EMC education in the United States.

The Education Committee would like to revise and update its *Experiments and Demonstrations in Electromagnetic Compatibility* booklet. To do so we need comments and/or criticisms of the present booklet as well as the contributions of new experiments and demonstrations for inclusion in the revised edition. Over 250 copies of the existing booklets have been distributed, each asking for comments and criticisms. To date, no comments have been received, and no additional experiments contributed. Without feedback from society members and others, this project (like other worthwhile projects before it) will die for lack of support. If the overall project is to be successful, we must have comments and contributions from people other than those on the Education Committee. The following is a partial listing of some of the short courses and seminars on EMC related topics.

R & B Enterprises is offering courses on the following: *Grounding, Bonding & Shielding; Electromagnetic Pulse (EMP) Design and Test; Understanding and Applying MIL-STD-461B; Electrostatic Discharge (ESD) Control; Printed Circuit Board & Wiring Design for EMI Control; FCC Requirements and Testing for RF Devices (per parts 2,15, and 18; and EMI & EMP Test Workshops. (Commercial and Military).* Also being offered is a new two-week EMI Training Institute. For information call 215-825-1960.

Interference Control Technologies is offering courses on: *Grounding and Shielding; EMC Design and Measurement; TEMPEST-Design Control and Testing; ESD Control Design and Retrofit; EMI Diagnostics and Fixes; Introduction to EMI/RFI/EMC; Noise and EMI Control in Computers; MIL-STD-461/462 Testing Procedures; EMC Design of PCB's; EMC for Packaging Engineers; EMP/SGEMP-Design and Testing; Using Computers to Solve EMI; Grounding and EMI Control in Facilities; and EMC Design of Power Supplies.* For information call 703-347-0030.

The Center for Professional Advancement is offering a course on *Electromagnetic Compatibility Engineering*. For more information contact the Center at 201-238-1600.

EMXX and CKC is offering courses on: *Basic Grounding Bonding and Shielding; FCC/VDE Commercial Applications; Military Applications; ESD/RF Susceptibility; Product Safety; and a Hands-On Laboratory Workshop.* For information Call Jim Hill at 703-451-4619.

Henry Ott, Chairman, EMCS Room 1E-212A
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BOARD OF DIRECTORS' MEETING IN LOS ANGELES

The Board of Directors met for the first time in 1985 on Tuesday, January 22, at the Hilton and Tower Hotel next to the Los Angeles Airport. The meeting coincided with the Los Angeles EMC Regional Conference (REGICON) which was held the following day. The Board wants to thank the REGICON organizers for providing the meeting room and facilities. Fifteen of the 20 Board members were in attendance.

President Knowles brought the meeting to order at 1:27 p.m. and introduced several guests including Dr. Akao from the Tokyo EMC Chapter. Next was the announcement of the newly elected Board members whose terms end 12/31/87:

Len Carlson
Don Clark
Bob Haislmaier
George Kunkel
Chet Smith
Charlotte Tyson

We want to add our congratulations to our new Board members.

President Knowles asked for a moment of silence out of respect for "Sully" Sullivan who passed away. As you well know, Sully was a strong and active supporter of our Society as evidenced by his many contributions including past Society Chairman, General Chairman of the last two Washington, D.C. symposia, and his work on the Fellows Committee. We extend our deepest sympathies to his family.

Secretary Clark presented the minutes of the Tokyo Board Meeting and the Board approved them with minor editorial changes. In addition, the Board approved the San Antonio Board meeting minutes held last April. Approval was not possible at the Tokyo meeting since a quorum was not present.

The following were major items discussed:

1. Don Clark presented the treasurer's report which was approved. Neither Warren Kesselman nor Seymour Krevsky was able to attend the meeting. The projected year end net worth of the Society was \$164K based on IEEE reports dated October 31, 1984. This figure is consistent with that projected at mid-1984 and indicates that the Society is well within IEEE guidelines for solvency.

2. The report of the activities under the Director for Communication Services was presented by the various chairpersons present.

Dick Schulz presented his report on the Transactions. He noted that the rate for paper submissions so far for 1985 is about double that of 1984. Approximately 400 pages will be printed in 1985 which is the same as for 1984. Dick requested and received approval for publishing an updated version of the 1968 Transactions on Shielding. Gene Cory presented his

symposium reports. As reported in the last Newsletter, the 1984 San Antonio conference had about 750 full registrants and a net surplus of close to \$27,000. The 1984 Tokyo symposium report was presented by Tei Iki for Dr. Sato. Final attendance figures were 598 from 26 countries. The symposium is expected to break even. For 1985, Chet Smith (Chairman of the Boston Symposium) presented the details to date:

- 4 Parallel Sessions
- 79 Exhibit Spaces
- Remote video/audio monitoring of paper presentations
- Air discounts to Boston available
(Call Joe Berge 800-621-0852, ext. 121 for details)
- Accommodations reserved:
250 at Wakefield Hilton
(Symposium headquarters)
100 at Holiday Inn closeby
50 at Lord Wakefield nearby
- Possible bus from airport to Hilton
- Banquet Speaker: David Sumner, ARRL
- Spouse Program:
Tour of Boston, Quincy Market and
Boston Harbor,
Possible tour of cottages at Newport
and upper Cape Cod,
Tour of Gloucester, Salem, Rockport.

Contact Chet Smith for details (617) 271-7086.

Herb Mertel, 1987 Symposium Chairman, reported that the symposium officers were appointed for the September 16-18 1987 symposium at the Town & Country Motel. The week before, the CISPR Working Group meetings will be held at the Bahia Hotel several miles from the symposium site. The Board voted to support this meeting with a pledge of \$5,000. Many of the CISPR attendees will be attending the symposium.

There were no reports for the 1988 and 1990 international and 1989 national symposia. Professor Akao proposed to hold the 1989 International EMC Symposium in Japan. The Board agreed if the 1989 Boulder Symposium Committee agreed to dates and calling the Boulder Symposium national not international.

Finally, the Board formally approved holding the 1991 symposium in New Jersey. Don Heirman is general chairman. He is encouraging participation from the Philadelphia/New York/Long Island, and Mohawk Valley EMC membership to take an active role in supporting this symposium. Please contact Don for more details at (201) 834-3566.

(Continued . . .)

(Continued . . .)

Jim Hill reported that we are exchanging conference records with the Zurich, English and Japan symposia. He also reported on his forming an international EMC symposia Council open to international EMC organizations. The Council will promote the exchange of information on international symposia including dates, location, authors, call-for-papers, publicity, mailing lists, etc. This should help to avoid scheduling conflicts. A quarterly newsletter will be issued by Jim.

3. Ed Bronaugh presented the reports for technical services. Don Heirman's Standards Committee report indicated several significant activities including the following:

- a. Six Project Authorization Requests were approved by the IEEE Standards Board (IEEE STDs 139, 140, 187, 213, 299, P509).
- b. Revisions for STD 139, 187, and 299 were prepared; a second ballot for 187 distributed.
- c. IEEE STD 473-1984 (site surveys) finally cleared the IEEE Standards Office bottleneck and is near publication.
- d. Activity on STD 213/214, P626, and 263 was restarted and new working group chairmen appointed.
- e. A better balance of committee and working group participants in the following three areas were identified:
 - M - Manufacturer
 - U - User
 - G - General Interest

In addition, three meetings were held, a record number for the Standards Committee.

- a. January 17, 1984 in San Diego (Regional Symposium)
- b. April 25, 1984 in San Antonio (National EMC Symposium)
- c. October 15, 1984 in Tokyo (International EMC Symposium)

Don reported that there is still a need for volunteers for standards work. Call Don for more information at (201) 834-3566.

4. Hank Ott, Education Committee Chairman, reported that he has not received any further inputs to his committee's booklet, "Experiment and Demonstrations in EMC." He still would like to see more input in time to package the booklet for distribution in Boston this year. An EMC college survey to determine what EMC courses are being offered should be ready for mailing by April 1985. Finally, Ed Bronaugh noted that the EMCS technical committees under the guidance of Ed Skomal will be the papers review committee for the 1987 EMC symposium. Many technical committee members are also reviewing for the 1986 EMC symposium. The Technical Committees continue to urge that each symposium commit-

tee formally use their paper review services.

5. Fred Nichols, Membership Services Director, reported chapter membership and awards/fellow activities. The Japanese Chapter activities continue to be high with nine technical meetings held in 1984, as well as hosting the Tokyo symposium. The Board congratulated their success. The Washington, D.C./Northern Virginia Chapter celebrated its 25th anniversary. Jim Hill reported that an anniversary booklet was published. Our congratulations again! Finally, Bob Hofmann reported that two potential chapters are being planned for the Minneapolis-St. Paul area and for Detroit.

6. Society membership was reported at 2993 with 358 members in dues arrears. President Knowles also reported that Glen Dash was appointed as Chairman of the Constitution and Bylaws Committee.

7. Dr. Sato reported on the activities on Professional Services. A video tape on EMC problems prepared by NHK and Japan was presented. The Tokyo EMC Chapter advised NHK on the format. A copy of the tape in Beta-format was given to Hank Ott for review by his Education Committee.

8. President Knowles indicated that the Society needs a volunteer to serve as chairman of the IEEE PACE (Professional Activities Committee for Engineers). Anyone interested call Gene at 206-271-3396. Gene also is looking for a volunteer for EMCS representation on the TAB Committee on Man and Radiation (COMAR).

9. Bill Duff, Nominations Committee Chairman, presented the slate of nominees to serve as the officers of the Society for 1985. Elected by proclamation were:

President	Gene Knowles
Vice President	Chester Smith
Secretary	Don Clark
Treasurer	Len Carlson

Technical Directors

Communications Services	Bob Haislmaier
Member Services	Fred Nichols
Technical Services	Ed Bronaugh
Professional Services	Risaburo Sato

Congratulations to our newly-elected officers. We wish them a very successful year on you, our members, behalf.

10. President Knowles adjourned the meeting at 5:50 p.m. The next Board meeting will be in Philadelphia on May 29, 1985. For more details, contact the Secretary, Don Clark, at 404-894-3535.

11. Bill Duff is preparing a set of nominations for Board of Director elections for the coming year. Call Bill at 703-642-4049.

D. N. Heirman
Associate Editor
Board of Directors Activities

POINT AND COUNTERPOINT

WHAT'S TO BE DONE

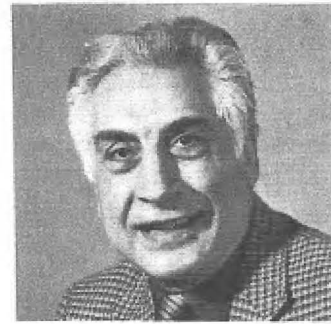
The EMC engineering society has been castigated and blamed for problems not necessarily of its making. That's no reason for much maligned EMC engineers to panic; it's not as dreadful as it sounds. But there's good reason for intense concern.

In July 1984, I participated in a Defense Department/Defense Nuclear Agency Conference on Nuclear Electromagnetic Pulse held in Baltimore, MD. During a paper prepared by an internationally noted EMP scientist, he said, "The measurement of electromagnetic field intensity using standard EMC techniques could not be relied on because those techniques were not based on first principles."

In March 1985, I participated in a Defense Department/National Bureau of Standards sponsored conference on "Microelectronic Electromagnetic Susceptibility" held in Gaithersburg, MD. At this VSHIC (Very High Speed Integrated Circuit) Research and Engineering Conference, I heard speakers and/or attendees say, "Don't saddle yourself with MIL-STD-461/462 design and test techniques; measurement of radiated electromagnetic fields inside of typical (non-anechoic, non mode-stirred) shielded enclosures are difficult to interpret; and, the inability of EMC engineers to quantify electromagnetic shielding effectiveness of structures (equipment cases, aircraft fuselage, building structures) is the major concern in establishing microelectronic/VSHIC susceptibility criteria."

The aforementioned statements did not go unchallenged. I caught up with the EMP scientist and asked what good purpose did he serve in criticizing EMC measurement techniques. He dwelt on the problem of radiated field intensity measurements inside of shielded enclosures associated with reflections, propagation modes antenna calibrations and types of fields. My response was: these factors are recognized but are not fully understood, nonetheless, the job of the EMC engineer is to make things work within defined constraints. Consequently, measurements must be interpreted and applied to the job at hand.

On the other hand, the statements at the microelectronic susceptibility conference were challenged from the floor during a panel discussion. Other factors were identified as having a major impact on establishing microelectronic susceptibility criteria; e.g., how to characterize microelectronic component or circuit upset and damage. Plainly speaking, it became clear to many conferees that the relationship between the various electromagnetic threats and microelectronic susceptibility had not been fully explored or understood, e.g., shielding limitations, 461/462 requirements, measurements



by Anthony G. Zimbalatti

of fields within complex structures like aircraft. The panel moderator's summary included the statement, "Perhaps the group spearheading the development of susceptibility criteria should be expanded to include EMC engineers and scientists having widely divergent EMC skills."

What's to be done about the aforementioned criticisms of EMC engineering? For example, since both of the conferences were sponsored by the Defense Department, should Defense convene a panel to identify EMC technology deficiencies and recommend corrective actions for those efforts whose successes are highly dependent on EMC? Or should the VSHIC panel be expanded as recommended above?

What matters is the EMC community needs to identify problem areas and proposed solutions. It's unfortunate that the EMC community has been unduly maligned. EMC engineers should stand tall - they have in large measure "made things work," particularly so, since they have had to engineer with tools not necessarily based on "first principles."

For the EMC Society such a state of affairs is bad. Do you have your criticisms of EMC? Can you identify EMC deficiencies? What do you think needs doing to correct the criticisms and improve the technology? We are listening.

WHAT'S IN A NAME

Based on the letters I have received, the final tally on changing the name of the EMC Society to the Electromagnetic Environmental Effects Society split about even 12 pro, 11 con. Dr. J. Corbin (Ohio) wrote as a private citizen in support of the name change and offered, "EMC is our goal, but our work is concerned with E³." Messrs. Bo Walgren (Sweden), Elden Wick (Ohio), David Engle (NY) and Joseph Banasiak, PE, (PA) supported the change and Mr. C. Swenson (NM) said no. Also, I have received about 30 verbal comments on the name change and these split about even.

My conclusion: as time fleets, organizations will replace EMC by E³ or EEE unless they are structured to serve a particular function say for example, lightning. I still prefer a better name than EEE, but have been unable to identify one. Perhaps, if our EMC Society were to review its charter in light of today's IEEE structure and future considerations, a name change may be forthcoming.

BOOK REVIEWS



by Jim Hill, The EMXX Corp.

We have just returned from Zurich where we attended the Sixth Symposium and Technical Exhibition on Electromagnetic Compatibility held at the main building of the Federal Institute of Technology. This symposium is held on odd years, alternating with the symposium in Wroclaw, Poland. Much credit for its smooth operation must be given to Prof. Dr. P. Leuthold, Symposium President, and Dr. T. Dvorak, Organizing Chairman, and their competent staff. Total attendance this year was 977. This included 170 exhibitor personnel of 43 exhibitors, 79 ladies, and 737 registrants from 32 countries. This represents a 50% increase over attendance and exhibitors in 1983. A unique feature of this symposium is that all papers and presentations are in English. In addition to the 116 papers on the program, there were six workshops and two discussion panels. While there had been consideration of moving this symposium around Europe, the plan now is to remain in Zurich at the Federal Institute of Technology for at least 1987 and 1989. We will be reviewing the Symposium Proceedings in our next issue and at the same time will provide a review of the 1984 IEEE EMC Symposium Proceedings.

For this issue we have a review of the Proceedings of the International Conference on EMC held at the University of Surrey last September and sponsored by the British IERE. This is a smaller meeting in attendance and in the number of papers presented. Our reviewer, Herman Garlan, includes a summary of some of the papers included in the Proceedings.

Just as we were going to press, Dick Schulz called to offer reviews of two new books dealing with nonsinusoidal waves. For those readers who have been thinking in terms of sinusoidal waves for so many years, these two books should offer a reasonable introduction and bridge over to this emerging technology.

PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC COMPATIBILITY sponsored by the Institution of Electronic and Radio Engineers, University of Surrey, U.K. September 18-21, 1984.

IERE Publication No. 60 published by IERE, 99 Gower St., London WC1 6AZ, U.K.

The proceedings are a compilation of the papers presented at this Conference. Some 40 papers were presented in nine sessions dealing with all aspects of EMC as can be seen from the session titles:

- Specifications and Test Methods
- Theoretical Studies
- Electromagnetic Environment
- Biological Hazards
- Case Studies
- Communications
- EMP and Lightning
- Coupling and Bonding

In the biological hazards session, the only paper presented at this session was not received in time to be included in this volume. A substantial number of papers were devoted to immunity testing. To name a few:

- Advantages of automation to EMC susceptibility testing
- Measurement of immunity of a hand-held radar speed meter (using a TEM cell)
- Computer-aided susceptibility testing

The reviewer would also call attention to the several case studies of interference problems. One paper showed that it was economically feasible to screen the room in which a computer system was located and what was required to achieve effective screening. In the case of a second computing system located in the upper story of a tall building with window walls, screening (including covering all the windows) was found not to be feasible, and the recommendation for controlling interference from external RF sources was to move the computing equipment to the basement of the building.

Another paper discussed the problem of protecting the computerized production control equipment in three steel plants from the EMI generated by the analysis equipment used in the on-line laboratories associated with the same production processes. A third paper described a system developed to protect the electrical systems in lighthouse from lightning.

In the session on communications, a paper was presented dealing with the cordless phone problem. This paper discusses the U.K. approach to this problem, and the different approach taken by the European Conference of the Postal and Telecommunications Administrations (CEPT). In the U.K., frequency allocations were made available similar to those in the U.S.A. CEPT, however, is recommending that cordless phones be operated in the 900 MHz band. The CEPT specification for the cordless phone is presented. The writer estimates that 900 MHz cordless phones will be in use in the European continent in 1987-88. A second paper in this session discussed the intermodulation interference probabilities in the cellular mobile radio RF bands.

On the whole the reviewer found this volume to contain a large number of well-prepared and well-presented papers. This volume should be a useful addition to any EMC library.

Reviewed by
Herman Garlan
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Annandale, VA 22003

**ANTENNAS AND WAVEGUIDES
FOR NONSINUSOIDAL WAVES**

by Henning F. Harmuth

*Department of Electrical Engineering
The Catholic University of America
Washington, D.C.*

*Published by Academic Press, Inc.
Orlando, Florida 32887*

Copyright 1984

Hardbound, 276 Pages, \$60.00

This new book tackles the most difficult technological problem associated with applications of electromagnetic waves with large relative bandwidth: antennas and waveguides. It presents, in large measure, original concepts and not overly mathematical theory concerning various antennas and waveguides for nonsinusoidal waves, as well as some experimental confirmation. This reviewer finds two of the concepts especially intriguing. First is the basic concept for the transmission of nonsinusoidal waves; although not original with the author, it is resurrected by him and well explained. Second is his original specific application to the transmission of nonsinusoidal waves through waveguides.

The first introductory chapter presents basic new concepts for nonsinusoidal waves in a manner that relates them well to conventional sinusoidal concepts by showing both the parallelism and the unique differences, including limitations on the use of Fourier analysis. Basic concepts are presented for nonsinusoidal waves as applied to specific topics: transmitters and receivers, spread-spectrum, pulse agility vs. frequency agility, absorbers, pulse reflection by a layered medium, impedance matching, and absorption of signals with small and large relative bandwidth.

A second chapter on radiators gets into the main topic. It starts with simple radiators for sinusoidal waves and then discusses modifications appropriate for nonsinusoidal waves. It includes nonsinusoidal radiators of the following types: large current, sheet, slot, large voltage, traveling-waves, and concludes with a survey of frequency-independent antennas. In doing so, some of the considerations discussed are: (a) time variation of antenna current, driving voltage, and radiated power; (b) efficiency of power and energy radiation.

The third chapter on sensors covers similar types of antennas. In doing so, some of the considerations discussed include: (a) time variation of the received voltage; (b) power, average powers, equivalent aperture; (c) power matching and distortion reduction. Significant experimental results are provided for a large-current radiator (a sheet antenna) and a closed loop sensor.

The next chapter leaves the realm of simple antennas for antenna arrays. Information is provided on beam-forming and those features of signals producing directional effects. Included is the time variation of electric and magnetic field strength as a function of azimuth angles. These considerations lead to array characteristics, such as: (a) peak amplitude, peak power, and energy patterns, (b) rise-time or slope patterns, (c) patterns of elevation angle, (d) monopulse

antenna patterns, and (e) nonsymmetric antenna patterns.

Another chapter tells how to take advantage of antenna outputs by signal processing techniques. These are concerned with noise suppression, slope processing and associated energy patterns, thermal noise, resolution angle, circuit implementation, pulse restoration, direction distortion in radar, and questions of symmetry.

The final chapter on waveguides is one that boggles the mind of anyone raised on a diet of sinusoidal functions. It shows how nonsinusoidal waves may be propagated through rectangular, cylindrical, and coaxial waveguides. It also discusses a rectangular cavity resonator, as well as duplexers and circulators.

In summary, this book is unique in presenting entirely new concepts concerning antennas and waveguides for nonsinusoidal waves. It is one that is likely to be a basic reference for years to come. Also, it is very readily readable; a real gem for those interested in new directions for the future.

Reviewed by: Richard B. Schulz Xerox Corporation, IPD
1301 Ridgeview Drive-MS 330 Lewisville, Texas 75067

**APPLICATIONS OF WALSH
AND RELATED FUNCTIONS**

K.G. Beauchamp

*University of Lancaster
Lancaster, England*

*Published by Academic Press, Inc.
Orlando, Florida 32887*

Copyright 1984

Hardbound, 308 Pages, \$55.00

The reader of this book review may wonder why I was elected for the job. I also wonder because Walsh functions are to me like food in a restaurant is to a passer-by. On the other hand, the tantalizing aromas caused me to enter the restaurant, and I gladly share with you the resulting unfamiliar meal.

Here is the menu: This book is a substantial update of the author's decade-old publication "Walsh Functions and Their Applications." Updating has been made necessary by extensive subsequent developments, particularly in two areas: Boolean logic analysis and nonsinusoidal communication. More generally, there has been a broadening in the range of applicability, together with a wider availability of different orthogonal transformations relevant to signal processing and communications. The book presents a broad treatment of the main lines of development with emphasis on understanding the principles involved. These explanations of the principles involved are, from my viewpoint, what help make the book outstanding and well worth the reader's investment. Further depth is made available by use of a considerable list of references at the end of each chapter.

The book has two major thrusts. The first is in the form of a tutorial on sequency theory (Chapters 1-3), giving the background essential for understanding the applications part which follows. Chapter 4 forms a bridging "hardware" chapter between the earlier theoretical chapters and the application chapters (5-8).

(Continued . . .)

Chapter 1 on Sequence Functions covers the topics of Orthogonality, the Walsh Function Series, the Haar Function Series, Mixed Functions Series, and Discrete Sampled Functions. The Walsh Functions series section includes the major series orderings of sequency, dyadic, and natural, and explains where each is applied to best advantage.

Chapter 2 on Transformation views orthogonal transformation as a practical tool for processing and analyzing signals and images, largely due to the widespread availability of digital techniques and computers. It notes that the underlying principle for the efficient implementation of the fast discrete transforms carried out on the digital computer is the reduction of the high degree of redundancy present in the transform matrix representation. Topics covered are the Discrete Walsh Transform, Fast Walsh Transform Algorithms, the Discrete Haar Transform, the Discrete Slant Transform, Shift-Invariant Transformation, Transform Conversion, and Two-Dimensional Transformation. This chapter contains several tables, including a comparison of Walsh and Fourier discrete series of length N , and fast Walsh transform algorithms. Comparisons between discrete Fourier and Walsh-related transforms abound. Several are:

- The Walsh transform proves considerably easier and faster to calculate by digital methods.
- The Fourier and Walsh transforms behave quite differently in response to a change in phase of the input signal.
- The behavior of transform products for Walsh Functions is determined from an *addition* relationship.
- For a sequency-ordered fast Walsh transform, the complete transform may be obtained in $N \log_2 N$ addition and subtraction operations rather than N^2 operations demanded by a direct method of calculation.

Another thing I learned is that all fast discrete transformations may be expressed in the form of a signal flow diagram whose principle is quite simple. Often included is one special common feature, a "butterfly" diagram which is a key to *in-place* algorithms in which memory storage for intermediate calculations is not needed.

Chapter 3 on Analysis and Processing emphasizes the differences between Fourier and Walsh Function techniques. One of the most pronounced areas of differences lies in the treatment of correlation between signals and autocorrelation. This is probably the least successful area for the application of sequency functions. On the other hand, the use of sequency functions in waveform synthesis favors their use over other methods. Under the first topic of Correlation and Convolution, the behavior of sequency functions is so different from sinusoidal functions that a different view is required of a series of time-lag values to that experienced in Fourier analysis. Both express a form of convolution theory, but, whereas the Fourier version implies arithmetic addition for the recursive time shift, the Walsh version requires the substitution of dyadic or modulo-2 addition. Accordingly, this process imparts a peculiar (but defined) behavior in time that has become known as the dyadic domain. The next section

on Spectral Analysis includes interesting comparisons of Walsh and Fourier spectra, as well as a table expanding on further characteristics of the discrete Walsh and Fourier Functions series.

A following section on Digital Filtering expands upon the suitability of sequency functions to describe jump discontinuities without the Gibbs phenomenon of sinusoidal functions. Techniques described here have been applied successfully to the recovery of geological data and in the enhancement of video images, as well as improvement in signal-to-noise ratio. The next section on Waveform Synthesis shows that a *dominant-term* concept is of value in speech synthesis and in compression of transmission data.

The transition Chapter 4 on Hardware Techniques shows that digital synthesis of commonly used waveforms for laboratory testing has a number of advantages over continuous generation; and the use of Walsh series confers an economy in constituent logic and operation over a wide frequency range. Other requirements for sequency generators are in the transmission by Walsh carriers, in real-time spectral measurement, sequency multiplexing and coding and in image processing. The pertinent sections are Walsh Function Generators, Transformation, and LSI Application.

The applications-oriented Chapter 5 on Signal Processing includes sections on Spectroscopy, Speech Processing, Medical Applications, Seismology, and Nonlinear Applications. Equipment and the principle characteristics for each equipment are discussed.

Chapter 6 on Image Processing covers the topics of Image Compression, Image Enhancement and Restoration, and Pattern Recognition. One technique for image compression was able to reduce an original density of 8 bits/pel down to a transmission rate of 2.4 bits/pel. On Image Enhancement, sequency transforms can be significant due to the match of these functions to the abrupt discontinuity sought for edges. For Pattern Recognition, two general approaches are used, one particularly appropriate for the identification and classification of rectangular structures, and another for complex patterns, such as the automatic recognition of written Chinese characters or ideograms (over 8000 separate characters).

Chapter 7 on Communications treats the subjects of Multiplexing, Coding, and Nonsinusoidal Electromagnetic Radiation. Coverage of these subjects is adequate for the purposes of the book. Extended coverage of the last subject may be obtained from another new book by H.F. Harmuth on "Antennas and Waveguides for Nonsinusoidal Waves," also reviewed in this issue of the EMC-S Newsletter.

The final Chapter 8 is on Logical Design and Analysis. Topics covered are Rademacher-Walsh ordering, Synthesis of Digital Networks, Minimization of Logic Functions, and Fault Diagnosis.

This book shows the author to be an excellent teacher who makes the subject interesting by presenting the salient features of each topic clearly. I found the book both interesting and educational, as well as inspirational to dig deeper by means of his references.

Reviewed by: Richard B. Schulz Xerox Corporation, IPD

CHAPTER CHATTER



by Charles F.W. Anderson

Once more, your Column Editor mounts his soapbox! Of the 24 chapters listed in Bob Hofmann's latest EMC Society directory, only **six** have provided inputs for this issue of the Newsletter. **Please** let me have reports of **any** activity at Chapter level. Even such items as participation by an EMCS member in a workshop or panel discussion is newsworthy, and will let your colleagues know what our multifaceted group is doing.

CENTRAL NEW ENGLAND

On March 14, the Chapter sponsored a meeting on the topic, "Improving Technical Presentations." The speaker was R.E. Kenyon, Analytical Systems Engineering Corp. The April meeting will feature the election of officers for the 85/86 term. A classified meeting on TEMPEST will be held at Chomerics on either May 15 or 21; clearances will have to be established, of course. Contact John Clarke, the Chapter Secretary/Treasurer for more details. His business phone is (617) 273-7181, and home phone is (617) 263-5226.

John reports that things are on schedule for the '85 Symposium with Chet Smith holding frequent meetings to coordinate activities.

CHICAGO

Chapter officers for 1985 are: Bob Hofmann (AT&T Bell Labs), Chairman; John Kincaid (Belden Tech Center), Vice-chairman; Don Sweeney (DLS Electronic Systems), Secretary; Len Farber (AT&T Bell Labs), Treasurer; and Robert Bard (Electronic Instrument Associates), Membership.

On March 5, the Chapter met at the Northrop DSD facility for a presentation and tour of the new Northrop anechoic chamber. Meetings are planned for April 2 and May 5, with the former being devoted to filtered connectors for commercial and military applications and Canadian EMC developments.

JAPAN

Our Far-East colleagues continue to feature presentations of highly interesting papers at their monthly research meetings. Recent topics include: use of implanted ferrite bodies for local hyperthermal RF treatment of tumors; microwave oven sealing by use of wavy floor structures; and scattering and excitation of EM waves by automobile bodies. The meetings are held at various locations, for example, Nagoya and Kyoto, as well as in the Tokyo area.

LOS ANGELES

The February meeting of the Chapter featured a presentation and demonstration of high-potential/high-frequency apparatus. Speakers were Bill Wysock (Professional Sound Systems) and Lowell Beezely (American Microwave Technology).

An overview of Tesla as an inventor was presented, plus a demonstration of one of the large Tesla coils which Bill Wysock's company designs and builds.

On March 21, Chris Kendall (CK Consultants) gave a talk on "Design Solutions for Achieving FCC Compliance." He discussed filtering, PC board layouts, shielding, connector choices and basic grounding, and isolation schemes. Analytical methods, based on Chris's EMC ad software, for aid in solving problems were also discussed.

NEW JERSEY COAST*

The February 19 meeting had as speaker Ta-Shing Chu (AT&T Bell Labs), whose topic was "Extrapolation of Point Rain-rate Distributions." This area is of special interest owing to the increasing use of systems operating in the regions above 10 GHz. Prediction schemes were presented, based on recent work at the AT&T Labs. Twelve members were present.

On March 19, Kent Johnson, also of AT&T Bell Labs, presented a talk on "Sixteen and Eight-channel Multiplexers for Cellular Systems." The multiplexers described use high-Q ceramic resonators as selective filters. Development history, design specs and design problems were discussed.

(Continued . . .)

On March 27 and 28, the Chapter sponsored a seminar/open-house at the Holmdel facility. Art Wall (FCC Office of Science & Technology) was the speaker on the 27th, addressing "FCC Authorization Testing Program." On the following morning, tours of the ATT-IS all-weather open area test site were conducted.

Congratulations are in order to John O'Neill, who was named IEEE Fellow. Presentation was at the NJ Coast Section Awards Banquet on March 8.

*Special thanks to Chapter Chairman Luke Schimpf, who provides meeting reports on IEEE L-31 forms!

SANTA CLARA VALLEY

Nice to hear from the Bay Area! Darryl Ray (ESL Inc.), the Chapter Secretary, reports that they are meeting on a monthly basis. Meeting topics have been as follows: September '84 - open discussion concerning planning for the 84/85 year. There were 21 attendees. October - Bill Parker (Genisco) presented the topic "Development of a Commercial Powerline Filter Test Standard." Attendance was 24. November - Paul Zahra (CK Consultants) discussed the definition and determination of broadband signals as related to FCC and VDE measurements. Thirty-three members were in attendance. December's topic was use of a personal computer to predict electromagnetic emissions, presented by Frantz Gizin (Rolm Corp). Forty-three attended. January '85 - Dr. Charles Suskind (UC - Berkeley) spoke on "Biological Effects of RF Energy." There were 26 attendees. February - Michael Austion (EMC Shielding) gave a presentation on mechanical approaches to use of EMI gaskets. Attendees numbered 38. All of the meetings were held at Ford Aerospace, Palo Alto.

SHORT PAPERS, ARTICLES, AND APPLICATION NOTES

By Edwin L. Bronaugh

We are still seeking papers to be printed in this department. We were happy with the initial response to this section and hope to continue this success.

Short papers, articles and application notes are an excellent and valuable source for supplying timely information to fellow engineers, managers, scientists, and technicians involved in EMC. Examples of features include: explanations of practical methods, and techniques that people

working with EMC can apply to their everyday work; clear, practical explanations of mathematically or physically compounded EMC-related theory, so that people without advanced degrees and/or extensive experience can understand; and narratives of practical experiences which can help fellow EMC personnel to avoid obstacles and problems.

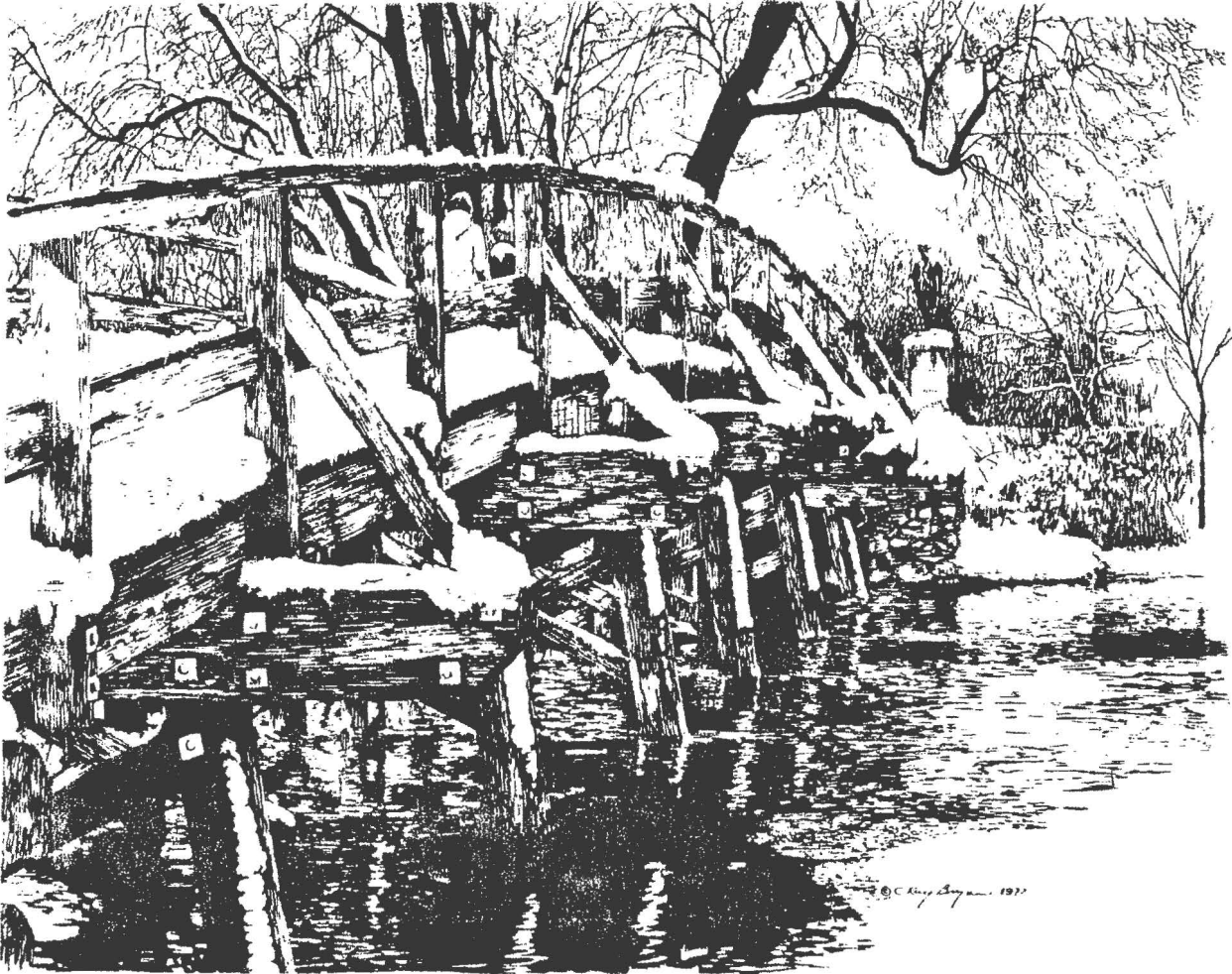
Please submit all items to Edwin L. Bronaugh, Electro-Metrics, 100 Church Street, Amsterdam, NY 12010.

EMC Society 25th Anniversary Medallion Available

In commemoration of the 25th anniversary and the 25th annual symposium of the EMC Society, a medallion was struck by the Franklin Mint. This German Silver medallion was given to each registrant at the symposium held in Washington, DC, August 23-25, 1983. The medallion is about the size of a silver dollar and has a brilliantly polished surface similar to that of a proof coin. There are still a few of the limited edition of 1000 available. Medallions can be ordered by sending a check for \$5.00 made out to the "IEEE EMC Society" to Jim Hill, 6706 Deland Drive, Springfield, VA 22152. The medallion will be shipped postpaid within the United States, Canada, and Mexico. To other countries add \$2.00 for postage.



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MELECON '85

The Mediterranean Electrotechnical Conference 1985 will be held on October 8, 9, and 10, 1985, in Madrid, Spain. Sponsored by the IEEE Region 8 and the IEEE Spanish Section, the Melecon '85 will cover various topics of interest with special emphasis on applications to the Mediterranean countries. The conference hopes to provide an opportunity for interaction among engineers and scientists in the following areas:

Bioengineering

Digital Signal Processing

Hardware Implementations

Radiocommunications

Solar Energy

Additional information can be obtained from Professor Antonio Luque, MELECON '85, Instituto Energia Solar, E.T.S.I. Telecomunicacion, UPM, Ciudad Universitaria, 28040-Madrid, Spain.

Proceeding of the Seventh International Wroclaw Symposium on EMC

The two volume set of the proceedings of this symposium are now available in the USA. The two volumes contain a total of 101 papers with 56 in English and 45 in Russian. A feature of the presentation is the abstract which follows each paper. The abstracts are in the language other than the language of the full paper. Translations of the Russian papers can be arranged with Dr. P. S. Excell of the University of Bradford, Bradford, West Yorkshire, BD7 1DP, U.K. (see Newsletter Issue No. 124 Book Review page) Copies of

this 1070 page proceeding are available from the EMXX Corp., 6706 Deland Drive, Springfield, VA 22152. Telephone (703) 451-4619. For shipment in the USA, Canada or Mexico send a check in the amount of \$30.00 made payable to the "IEEE EMC Society." For shipment to other countries add \$6.00 for additional postage. A few copies of the 1982 Sixth International Wroclaw Symposium Proceedings are still available on the same terms as the 1984 Seventh International Wroclaw Symposium Proceedings.

EMCABS

In this issue, we are publishing 24 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
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MELVIN J. JOHNSON

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

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

EMCABS:1-3-85

Broadband Electromagnetic Interference Testing Vehicles and Electrical Subsystems - Noncommunications
 Final Rept. on Test Operations Procedure
 Army Test & Evaluation Command, Aberdeen Proving Ground, MD.
 12 Oct. 83, 22p Rept. No. TOP-2-2-613
 Supersedes AD-775441.

ABSTRACT: Provides procedures for measuring frequencies and amplitudes of electromagnetic emissions from vehicles and vehicular equipment including noncommunication electrical subsystems, to determine whether these emissions will interfere with the vehicle's electronic and electromechanical equipment.

INDEX TERMS: broadband electromagnetic interference testing, vehicles, electrical subsystems

EMCABS:4-3-85

Design Note about a 75 KVA Quiet Power Distribution System

A.T. Visser

Fermi National Accelerator Lab., Batavia, IL

Contract AC02-76CH03000

Portions are illegible in microfiche products

5 Apr. 84, 8p FERMILAB/TM-1252

ABSTRACT: This note describes a 75KVA 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. (ERA citation 09:025880)

INDEX TERMS: 75KVA, quiet power distribution system

EMCABS:2-3-85

Investigation of Anti-Interference of a Welder Generator

F. Delaporte (Text in French)

Electricite de France, Chatou, Div. Instrumentation d'Exploitation

N83-35408/4 PCA03/MF A01

1982, 27p HP-236/82/12, P23K25

ABSTRACT: Electromagnetic interference on analog pressure sensors in nuclear reactor steam lines caused by an argon-arc welder generator was studied. The generator cables and electrode holders were screened. A filter was introduced into the main supply. The system was operated during startup tests on a reactor. Interference is brought within acceptable limits. Disturbances were recorded during the ignition of the argon torch, but these are reduced by a factor of three by additional protection.

INDEX TERMS: Anti-Interference, Welder Generator

EMCABS:5-3-85

Preliminary Study of the Behavioral and Biological Effects of High Intensity 60 Hz Electric Fields

C. S. Feldstone, J. J. Polonis, H. D. Smith, E. G. Gibson, and R. J. Spiegel

Southwest Research Institute, San Antonio, Texas

Contract AC01-78ET29212; Portions are illegible in microfiche products.

Jan 81, 652p DOE/ET/29212-T1

ABSTRACT: In response to concern over potential effects of high strength electric fields on living organisms, Southwest Research Institute (SwRI) has completed a preliminary research program (Phase 1) to develop techniques for conducting a major study (Phase 2) of the behavioral and biological effects of high strength 60 Hz electric fields on baboons. The result of the study should be either a clear indication that the highest field strength of practical interest (analogous to the highest strength that can be encountered by man under power lines) produces no deleterious effects or an indication of the lowest electric field strength which produces deleterious effects in the baboon. The generalization of results to man will be further aided by the development of models relating the physical effects of electric fields on man to the physical effects of electric fields on the baboon. (ERA citation 09:026120)

INDEX TERMS: Preliminary Study, Behavioral, Biological Effects, 60 Hz Electric Fields

EMCABS:3-3-85

Lightning Arresters for Domestic and Commercial Electrical Power Supplies

1976-August, 1984 (Citations from the Energy Data Base).

National Technical Information Service, Springfield, VA

Report for 1976-Aug. 84

Aug. 84, 152p; Supersedes PB83-871129. Prepared in cooperation with

Department of Energy, Washington, D.C.

ABSTRACT: This 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.)

INDEX TERMS: Lightning Arresters, Power Supplies, bibliography

EMCABS:6-3-85

Switching Transients in a Superconducting Coil

E. W. Owen, and D. W. Shimer

UCRL-89205, CONF-831203-156 Contract W-7405-ENG-48 10

Symposium on fusion engineering, Philadelphia, PA, USA 5 Dec. 1983

Portions are illegible in microfiche products.

ABSTRACT: 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 Yin-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 capacitance, and the amplitude on the coil current. For slower openings the dump resistor inductance and the current determine the amplitude of the voltage to ground at the terminals. Voltages to ground are less in the interior of the coil, where transients related to the parameters of the coil itself are observed. (ERA citation 09:032369)

INDEX TERMS: Switching Transients, Superconducting Coil

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Please send all corrections and changes to H. R. Hofmann.
 February 25, 1985

<p>Electrically Conductive Plastics Prepared in cooperation with the Department of Energy, Washington, D.C. National Technical Information Service, Springfield, VA. Report for 1976-Jul 83. Citations from the Energy, Washington D.C. Aug 84, 282p ABSTRACT: This bibliography contains citations concerning electrically conductive polymer technology and applications. Preparation, properties, and behavior of electrically conductive plastics under various irradiation conditions are considered. Solar cell and battery separator applications are included. (This updated bibliography contains 248 citations, none of which are new entries to the previous edition.) INDEX TERMS: Electrically Conductive Plastics, bibliography</p>	<p>EMCABS:7-3-85</p>	<p>Nuclear Electromagnetic Pulse (EMP) and Electric Power Systems P. R. Barnes, E. F. Vance, and H. W. Askins, Jr. Oak Ridge National Lab., TN Contract AC05-85OR21400 Apr. 84, 68p ORNL-6033 ABSTRACT: A nuclear detonation at high altitudes produces a transient electromagnetic pulse (EMP) of high-intensity electromagnetic fields. A single high-altitude burst can subject most of the continental United States to a strong EMP. These intense fields induce voltage and current transients in electrical conductors. Surges would be induced by EMP in transmission and distribution circuits, and in control and communication elements in electric power systems throughout the national grid. Such widespread disturbances could upset the stability of electrical energy systems and result in massive power failures. The extent and nature of EMP caused damages are not well known for utility electric power systems. Failures are likely to be associated with insulation damage and failures of low-voltage and solid-state components. It is concluded from a review of past studies that EMP may pose a serious threat to the nation's electrical energy supply. (ERA citation 09:026912) INDEX TERMS: EMP, Electric Power Systems</p>	<p>EMCABS:10-3-85</p>
<p>Electrically Conductive Plastics Supersedes PB83-868786. Prepared in cooperation with Department of Energy, Washington, D.C. National Technical Information Service, Springfield, VA Report for Aug. 83-Jul 84. Aug 84, 110p ABSTRACT: This bibliography contains citations concerning electrically conductive polymer technology and applications. Preparation, properties, and behavior of electrically conductive plastics under various irradiation conditions are considered. Solar cell and battery separator applications are included. (This updated bibliography contains 106 citations, all of which are new entries to the previous edition.) INDEX TERMS: Electrically Conductive Plastics, bibliography</p>	<p>EMCABS:8-3-85</p>	<p>Emv-Normen. Elnfuehrung in die Normen der Elektromagnetischen, Vertraglichkeit (Emv Norma: Introduction to the Norms of Electromagnetic Accommodation). R. Harms Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Unternehmensbereich Raumfahrt Text in German. Presented at Ate Conf., Esslingen, W. Germany, 20-21 Jun. 1983. 1983, 29p. MBB-UR-652-83-O ABSTRACT: Standards for electromagnetic measurements, measured by frequency range and radiation interference were 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: electromagnetic measurements, frequency range, radiation interference, comparison</p>	<p>EMCABS:11-3-85</p>
<p>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 Contract ncc5-600 1983, 11p NAS 1.15:84425, NASA-TM-84425 ABSTRACT: During Story 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: Correlated Measurements, UHF Radar Signatures, RF Radiation, Electric Field Changes, Lightning</p>	<p>EMCABS:9-3-85</p>	<p>Radio Interference Measurements on Contact Devices G. Illingworth ERA Technology Ltd., Leatherhead (England) Final Report May 31, 37p ERA-80-151R ABSTRACT: Thermostats and energy regulators can produce high levels of interference particularly when they are used to control inductive loads. The interference generated by such contact devices has been examined both in magnitude and characteristic nature for a number of loads, both resistive and inductive. The effect of various suppression measures has been determined and the details of the most efficacious circuits are provided with due attention being paid to the requirements of current national legislation and similar requirements. INDEX TERMS: Radio Interference Measurements, Contact Devices</p>	<p>EMCABS:12-3-85</p>

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H. R. Hofmann
February 25, 1985

EMCABS:13-3-85

EMCABS:16-3-85

Basic Considerations for Regional Heating in a Biological Body by Using an Electromagnetic Field.

Yonekazu Inagaki, Akihiro Kondo and Hiroshi Kawada

Faculty of Engineering, Gifu University

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

Vol. 84, No. 226, EMCJ 84-47, pp. 51-56.

ABSTRACT: A study is made on the attempt selectively to heat a tumor in a biological body by using an electromagnetic field of HF range. In the case of the electromagnetic wave irradiation, it was found that the increase of the conductivity of the local region is inadequate. By using HF dielectric heating, the conditions leading to selective heating of the tumor are confirmed. However, subcutaneous fat is heated more with dielectric heating. Experimental results are described on the effect of microwave irradiation on colitis germs. From these results, it is evident that heating rate is an important factor for hyperthermia.

INDEX TERMS: Regional Heating, Biological Body, Electromagnetic Field

An Analysis of Crosstalk Noise in Multi-wire Lines on Printed Board by Numerical Inversion of Laplace Transform

Satoshi Ichikawa

Kyoto University

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

Vol. 84, No. 226, EMCJ 84-44, pp. 33-38.

ABSTRACT: A numerical method to analyze the crosstalk noise in multi-wire lines on printed board is presented. The method is reduced to the analysis of multi-wire transmission lines with branches and junctions. General solutions of transmission line equations have arbitrary constants which are determined by solving the linear simultaneous equation given by terminal conditions. Numerical processing is carried out by numerical inversion of Laplace transform.

INDEX TERMS: Multi-wire transmission lines with branches and junctions Analysis, Crosstalk Noise, Multi-wire Lines, Printed, Board

EMCABS:14-3-85

EMCABS:17-3-85

An Estimation of Discontact Rates in Sliding Current-Collector Using Noise Currents

Akio Fukushima, Osamu Fujiwara and Yoshifumi Amemiya

Faculty of Engineering, Nagoya University

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

Vol. 84, No. 226, EMCJ 84-46, pp. 45-50.

ABSTRACT: This paper presents a new method for estimating the discontact rates in the sliding current-collector using the noise currents. The theoretical relationships between the discontact rates and the power spectrum of the noise currents are given. In order to verify quantitatively the above theory, we perform the computer simulation and the model experiment.

INDEX TERMS: Current-collector, discontact rate, noise current, theory, experiment

An Experiment of a Short Range Measurement System Using Spread Spectrum Technique

Satoshi Maruyama, Yasunori Iwanami and Tetsuo Ikeda

Nagoya Institute of Technology

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

Vol. 84, No. 226, EMCJ 84-41, pp. 13-19.

ABSTRACT: Measurement systems using spread spectrum technique performs well in the noisy environment and they are applicable to code division multiple system. The range resolution of these systems are usually equal to the length of one bit, because it's based on the correlation using bit synchronization. This report proposes a short range measurement system utilizing the slope of the correlation function of the maximal linear code, as an application of spread spectrum technique and shows the data of its basic experiment.

INDEX TERMS: Range measurement, spread spectrum

EMCABS:15-3-85

EMCABS:18-3-85

Scattering and Excitation of Electromagnetic Waves by Automobile Bodies

Yasumitsu Miyazaki

Toyohashi University of Technology

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

Vol. 84, No. 226, EMCJ 84-42, pp. 21-26.

ABSTRACT: In electromagnetic wave systems, such as mobile communication, satellite communication using microwaves and millimeter waves, and home electronic radio communication, effects and conditions of environments in the systems should be evaluated to construct communication systems with high reliabilities. Particularly, scattering of electromagnetic waves by automobile bodies and field distribution in and on the automobile bodies are important phenomena in the mobile communication. In this paper, electromagnetic scattering and excitation in automobile bodies are analyzed by using Green's dyadic.

INDEX TERMS: Mobile communication, automobile, scattering, Excitation, Electromagnetic Waves, Automobile Bodies

Inducing Localized Hyperthermia Using Ferromagnetic Implants with Low Curie Temperature

Hiroaki Kobayashi, and Yoshifumi Amemiya

Faculty of Engineering, Nagoya University

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

Vol. 84, No. 226, EMCJ 84-40, pp. 7-12.

ABSTRACT: One promising hyperthermic therapy technique in deep seated tumors is the use of ferromagnetic implants that can be inductively heated by a high frequency magnetic field. Ferromagnetic implants with low Curie temperature can direct heat to tumors and controlling tumor temperature. This paper describes the efficiency of power absorption versus temperature of alloys of Ni-Pd.

INDEX TERMS: Hyperthermia, Induction heating, Ferromagnetic implants, Curie temperature

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EMCABS:19-3-85

A Method for Statistically Measuring Movement of Insect Group
Exposed to Non-Uniform Electrostatic Fields and Experiments
Hiroshi Yokota, Osamu Fujiwara and Yoshifumi Amemiya
Faculty of Engineering, Nagoya University
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 84, No. 226, EMCJ 84-39, pp. 1-5.

ABSTRACT: This paper describes the movement of insect group exposed to the non-uniform electrostatic fields. A method is shown for statistically measuring the group movement of the insects. The experimental results on *Tenebrio* larvae are given, and the effects of the electrostatic fields on the larva movement are also discussed.

INDEX TERMS: Insect, group movement, exposure, electrostatic field, measurement method

EMCABS:22-3-85

Immunity of Twisted-Wire Pairs
Yoshio Kami, Risaburo Sato
Junior Tech. College of Electrocomm., Faculty of England, Tohokugakuin Univ.
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 84, No. 196, EMCJ 84-35, pp. 1-6.

ABSTRACT: Immunity of a twisted-wire pair above the perfectly conducting ground plane is developed. Line equations for externally excited two-wire lines are derived for balanced and unbalanced modes. By the use of equivalent representations for externally excited transmission lines, the effects of external electromagnetic fields to the twisted-wire are described; these effects decrease with decreasing twist-pitch for balanced mode, though no advantage for unbalanced mode.

INDEX TERMS: Twisted-wire pair, Line equations, Immunity

EMCABS:20-3-85

"1984 International Symposium on Electromagnetic Compatibility"
Yasuo Akao, Yoji Nagasawa and Tasuku Takagi, Tetsuo Ikeda, & Risaburo Sato
Nagoya Univ.; Tohoku Univ.; Nagoya Inst. of Tech; Tohokugakuin Univ.
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 84, No. 196, EMCJ 84-38, pp. 23-30.

ABSTRACT: 1984 International Symposium on Electromagnetic Compatibility was on Oct. 16-18 at Hotel Pacific, Tokyo, jointly sponsored by the Technical Group on EMC of the IECE, the IEE of Japan and the EMCS, the EMCS Tokyo chapter of the IEEE. Five hundred and twelve specialists from 23 countries attended this Symposium. Many discussions and exchange of information were made not only in the session rooms but also in the lobby outside. The first Symposium on EMC held in Japan was thought to be very successful. At the time, 31 companies exhibited many measuring equipments, parts, and materials relating to EMC.

INDEX TERMS: Report, 1984 International Symposium on Electromagnetic Compatibility, Tokyo

EMCABS:23-3-85

Effects of Long-Term Low-Level Radiofrequency Radiation
Exposure on Rats Vol. I Design, Facilities, & Procedures
Arthur W. Guy, Chung-Kwang Chou, Robert B. Johnson, & Lawrence L. Kunz
Washington Univ., Seattle, Bioelectromagnetics Research Lab
Final Report June 80-Dec. 82, Contract F33615-80-C0612
Sep. 83, 83p SR-18, SAM-TR-83-17

ABSTRACT: This is the first of a series of reports on the effects of long-term low-level RFR exposure on rats. The design, facilities, and procedures for exposing 100 experimental and 100 sham-exposed rats to 2450 MHz pulsed electromagnetic fields are described. The rats were exposed to 10 microsecond pulsed microwaves at 800 pps and 8 Hz modulation for 21 h per day for 25 months at an average power density of 480 microwatts/sq cm. The maximum specific absorption rate in rats was 0.4 W/kg. Reports on individual end-points are presented in subsequent reports.

INDEX TERMS: Effects, Long-Term Low-Level, RFR, exposure, rats

EMCABS:21-3-85

Analysis and Forecast of Interference from Overseas
Tomoaki Sato
NHK Fukuoka Broadcasting Station
Report of Technical Group on EMC, IECE and IEE of Japan
Vol. 84, No. 196, EMCJ 84-37, pp. 15-22.

ABSTRACT: The major cause of the interference occurring in the Kyushyu and the Sanin districts, by TV or FM broadcast wave from the southern part of Korea is described in this report. According to the analysis of meteorological data near the propagation path and to the observation of interference level at Dazaifu City in Fukuoka prefecture, reflection at refractive index boundaries is the main reason of the interference are also included.

INDEX TERMS: Analysis, Forecast, Overseas, interference, TV or FM broadcast, reflection, index boundaries

EMCABS:24-3-85

Human Reactions to Elf Electric and Magnetic Fields: An Annotated
Bibliography of Current Literature (3rd Edition)
J. Patrick Reilly
John Hopkins Univ. Laurel, MD Applied Physics Lab
Final report
Jul 83, 95p PPSP/JHU/PPSE-T-27 See also PB83-110718

ABSTRACT: The annotated bibliography lists current literature (since 1960) which applies to human reactions to electric and magnetic fields from 10 Hz to 100 Hz, with an emphasis on power frequency fields. This includes direct experimental work with humans, epidemiological studies, work which use animal studies to draw inferences about human reactions, studies concerning human dosimetry, and works which discuss means for human protection. This volume is an updated version of an earlier bibliography, first published in July 1981, and revised in a second edition in July 1982.

INDEX TERMS: Human Reactions, Elf Electric and Magnetic Fields, Bibliography

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