

IEEE

ELECTROMAGNETIC COMPATIBILITY GROUP



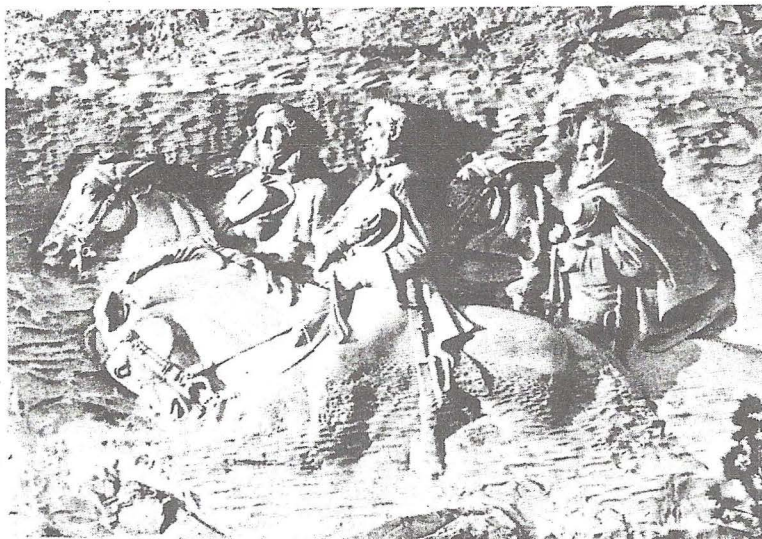
NEWSLETTER

ISSUE NO. 97

SPRING 1978

EDITOR: ROBERT D. GOLDBLUM

ATLANTA '78



EMC — 20 YEARS AND STILL EXPANDING 1978 IEEE INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

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ATLANTA, GA. 30357

JUNE 20, 21 & 22
SHERATON-BILTMORE
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IEEE ELECTROMAGNETIC COMPATIBILITY GROUP NEWSLETTER is published quarterly by the EMC Group of the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, N.Y. 10017. Sent automatically and without additional cost to each member of the EMC Group.

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EMC/EMI MEASUREMENT SEMINAR

On 5 May 1978 the New Jersey Coast Chapter will hold a two hour seminar on EMC/EMI measurement techniques and instrumentation. The seminar, which will be held between 8:30 and 10:30 AM at the Hexagon at Fort Monmouth, will be presented by M.L. Crawford of the Electromagnetics Division of the National Bureau of Standards in Boulder, Colorado. The topics to be covered include:

1. National Developments in EMC/EMI Testing
2. Need for a National Test Standard
3. Extent of Measurement Problems Using Present Facilities and Techniques
4. NBS R&D Effort with Test Chambers and Measurement Probes
5. Practical Examples of the Use of State-of-the-Art Test Facilities

Mr. Crawford is an acknowledged expert on these topics and is the prime developer of TEM transmission radiated emission and susceptibility measurement cells. One of these TEM cells bears his name--Crawford Cell.

We anticipate a good turnout for this seminar and suggest that you contact Paul Major on (210) 544-4605 if you plan to attend. Space will be limited. There will be no charge or fee for attendance. However, to process visitor paperwork, we would like to know if you will be attending. Warren Kesselman will be the point-of-contact at the lobby checkin.

EMC SYMPOSIUM IN WROCLAW, POLAND

EMC is cooperating with the Association of Polish Electrical Engineers and the Wroclaw Technical University to organize an EMC Symposium in Wroclaw Poland on September 13-15, 1978. A call for papers has gone out and paper summaries have been received. A preliminary program will be issued in April 1978. The official languages of the Symposium are English and Russian. Simultaneous interpretation will be provided.

The EMC Society would like to have a good representation in Wroclaw. Wroclaw is the scientific and cultural center of the southwest region of Poland. It is modern in accommodations yet picturesque in its medieval attractions. The International Affairs Committee of the EMC Society is organizing a group to make the trip to Wroclaw. With a group of 15 we can take advantage of special fare schedules and rates on accommodations. Even with less than 15 we can get an appreciable reduction in airline fares. For a copy of the Wroclaw Symposium program and for more information on the group travel to Wroclaw write or call Jim Hill, 6706 Deland Drive, Springfield, VA 22152. Phone (703) 451-4619.

1978 IEEE INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

The Atlanta Electromagnetic Compatibility Chapter is hosting the 1978 IEEE International Symposium on Electromagnetic Compatibility, June 20-22, 1978 at the Atlanta Sheraton-Biltmore Hotel. This will be the 20th anniversary symposium for the IEEE Electromagnetic Compatibility Group.

Approximately 80 technical papers covering a large number of topics of interest within the EMC discipline will be presented at the symposium. The technical program will also include a special session on specifications and standards and a poster session. A published proceedings containing copies of all the technical papers presented will be distributed at the symposium. Manufacturers and distributors will exhibit a variety of EMC related instrumentation, components, and materials.

In addition to the technical program, a variety of social events for attendees and their spouses are planned, including a dinner-outing at Stone Mountain Park and an awards luncheon. Approximately 400 attendees are expected.

For further information, contact Mr. J.C. Toler at 404/894-3964.

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IEEE BOARD IMPLEMENTS ETHICS AND MEMBER CONDUCT PROCEDURES

The Board of Directors of the IEEE adopted policies and procedures to censure members for violations of the IEEE code of ethics, constitution, and bylaws and to protect members who may have jeopardized their employment by adhering to same. Under these procedures, an IEEE member can be expelled, suspended, or censured for cause. This may be conduct which is a "violation" of the constitution, bylaws, or code of ethics of IEEE, "or other materially unprofessional conduct."

On the other hand, if adherence to the IEEE code of ethics injures a member's economic status, a complaint can be submitted to the Member Conduct Committee. This committee, after screening the complaint, will report to the Institute's Executive Committee which can "offer support to the member as appropriate to the circumstances." The role of the Member Conduct Committee has been defined carefully by the Institute's Board of Directors.

Complaints against an IEEE member must be in the form of notarized affidavits containing specific information. The Member Conduct Committee has to prepare a preliminary report within 90 days. If, after investigation, a majority of the Committee finds the complaint non-frivolous and well founded, it will proceed, and the IEEE member to be charged with a complaint must be notified at least 60 days in advance of any hearing on the matter.

A mechanism is established for selection of a Hearing Board to be chosen from a list of IEEE members picked by the Board of Directors in advance of any complaint. The Hearing Board will come up with a recommendation which is acted upon by the Board of Directors. A recommendation of expulsion or suspension requires the affirmative vote of two-thirds of the Hearing Board's members. A "censure" finding requires the affirmative vote of its majority. As adopted by the Board of Directors, the procedures provide that no action against a member may be taken without review and approval of the entire Board. The Board may accept the recommendation of the Hearing Board or may lessen the severity of the action; it cannot increase the penalty.

The Board of Directors indicated that "in those circumstances where the Member Conduct Committee will be required, during the course of its investigation, to contact an employer or other non-members of IEEE, the Committee shall obtain a letter from the IEEE member waiving and releasing any claims which the member may have against IEEE arising out of its investigation and subsequent action, if any. In the event it is necessary to contact an employer the Chairman of the Member Conduct Committee

will transmit a letter to such employer disclaiming any intent or purpose to function as a union, labor organization or a collective bargaining representative." In all cases, the hearings will be held in executive session. Only after final Board action may results be published, and then only as directed by the Board.

GROUNDING & LIGHTNING PROTECTION WORKSHOP

The 1978 FAA/Georgia Tech Workshop on Grounding and Lightning Protection will be held at the Georgia Institute of Technology in Atlanta, Georgia on May 2-4, 1978. Sponsored by the FAA, Georgia Tech and the Atlanta EMC Chapter of the IEEE, the workshop seeks to increase the understanding of the principles and practices of grounding and lightning protection.

Registration for the workshop is free but must be submitted by April 14, 1978 to the Department of Continuing Education, Georgia Tech, Atlanta, Georgia 30332. For additional information, contact either R.R. Barkalow, FAA at (202) 426-3497, or H.W. Denny, Georgia Tech, at (404) 894-3533.

DB BUNCH AWARD

The dB Society has voted unanimously to award its Traveling Trophy to the Aeronautical Systems Division, AFSC for their "Outstanding International Contribution to the Field of Electromagnetic Compatibility (EMC)."

Similar to the "Old Crows", the dB Society is a fraternity of eminently qualified engineers devoted to "excellence in the field of EMC". Its charter fosters the conservation of the electromagnetic spectrum, promotes the introduction of young engineers into the EMC field, and provides financial assistance to engineering students in pursuit of studies aimed at the conservation of the electromagnetic spectrum.

The Traveling Trophy is awarded yearly to an outstanding individual, company or professional organization for technical contribution to EMC endeavors. The IEEE was the 1977 recipient of the award.

CHAPTER CHATTER

by Charles F. W. Anderson



Albuquerque (Joint AP-S/S-MTT/G-EMC Chapter)

Arriving just a little too late for the Winter issue, their Activity Report for 1977 was most comprehensive, indeed. Most of the meetings have been reported previously; but a listing of the topics indicates the breadth of technical interest within this Chapter:

<u>Month</u>	<u>Speaker</u>	<u>Topic</u>
Jan.	Prof. Raj Mittra; U. of Illinois	Now You Too Can Learn to Use the GTD for Fun and Profit
Mar.	Prof. Clayborne Taylor; Mississippi State University	A study of the Charge Induced on an Aircraft in an EMP Simulator Facility
Apr.	Prof. Tai Tsun Wu; Harvard University	Gauge Transform- ations in Elec- tromagnetic Theory
May 2	Dr. Fred Sterzer; RCA Laboratories	Microwave Solid- state Devices
May 26	Dr. Yahya Rahmat- Sami; Univ. of Illinois	Electromagnetic Pulse (EMP) Penetrations through Apertures
Aug.	Prof. K.F. Casey; Kansas State Univ	Electromagnetic Shielding by Advanced Comp- osite Materials
Nov.	Prof. Kenneth Mei; U. of Calif.- Berkley	The Anatomy of the Unimoment Method

The Chapter also sponsored a Mini-symposium in March which was devoted to Prony Method topics.

They closed the year with a social meeting New Year's Eve party at the home of Dr. Juinn You, who is the Joint Chapter Chairman for 1978.

In addition to Dr. Yu, the officers include: Larry D. Scott as Vice-Chairman, J. Phillip Castillo as Secretary, Robert L. Hutchins as Treasurer, and Dr. Carl Baum, Past Chairman as an ex-officio member of the Executive Committee.

Phil Castillo reports that the Chapter started their 1978 activities with Dr. Baum as the speaker, whose topic was "The Singularity Expansion Method". A no-host dinner at the Montana Mining Company restaurant preceded the meeting. Dr. Baum is Conference Chairman of NEM 1978 (Nuclear EMP Meeting) and has recently become Co-Chairman of the Joint Technical Committee on Nuclear Electromagnetic Pulse for AP-S and G-EMC.

Atlanta

On January 18th, the Atlanta Chapter, in conjunction with MTT/AP and EMB, sponsored a meeting at which the speaker was Dr. John Osepchuk, the widely-known expert on biological effects of rf radiation. His topic was "Biological Effects of Micro-waves". The meeting was held at Electro-magnetic Sciences Atlanta Technology Park facility, with a social gathering preceding the speaker's presentation.

Gene Knowles' Chapter Newsletter includes announcements of meetings of other Society/Group Chapters with topics of interest to G-EMC members.

New Jersey Coast

My old Chapter's activities continue to amaze me! Their January meeting featured John W. Fisher, of Bell Labs-Whippany, speaking on "New Copyright Law". His presentation included a general overview of the new copyright law and a discussion of its potential impact on scientists and engineers. The Chapter took a breather in February to get ready for the Spring series of meetings and other events. On March 16th, the Chapter's Standards Working Group met at Bell Labs-Holmdel to

"continued"

organize their efforts in reviewing and establishing positions with regard to a number of IEEE standards.

Planning for the Tenth Anniversary Dinner in April is well in hand. Over 100 invitations have been sent out. ADCOM President Jackie Janoski plans to attend, as does the Chapter's first technical program speaker, Robert Titus of ECAC. Look for a full story on the affair in the next issue. The NJ Coast Section Executive Committee approved the proposed merger between the Vehicular Technology Society and G-EMC Chapters, with the merger becoming effective in May, after approval by IEEE Headquarters.

The remainder of the Chapter's activities through June include:

- * April 20th Technical luncheon, with Karl Weiler of AEL Inc. speaking on "EMI Effects on Minature Microwave Receivers".
- * May 5th Special Seminar (at ECOM-Hexagon), featuring Mike Crawford of NBS discussing "EMC/EMI Measurements".
- * May 11th Field Trip to the Ford Plant in Mahwah NJ, to hear Fred Bauer of Ford's Car Engineering Group talk about "Getting the Glitches Out - The Automotive Manufacturers' Look at EMC".
- * May 18th Technical Luncheon, at which Jack Moe of General Dynamics will speak on "AAvionics EMI".
- * June 15th Technical Luncheon, with the topic "EMC/Spectrum Management at Ft. Monmouth" being presented by Sam Segner of ECOM.

NO NEWS FROM OTHER CHAPTERS! ANYBODY OUT THERE?

- Deadline for next issue: Inputs to me not later than 15 JUNE, please!
C.F.W. Anderson, 1716 Reppard Rd.,
Orlando, FL 32803

EDUCATION COMMITTEE NEWS REPORT

The idea for producing a college level course was given another boost by John Wilhelm of the IEEE. He offered the co-sponsorship of the Education Activities Board and the specific help of Vince Giardina from the Continuing Education office of the IEEE. Dr. Kubina of Concordia University is evaluating responses of his colleagues to the idea. He feels a graduate level course would be most appropriate.

Tom Herring is doing much of the spadework in finding background material. He needs help. His present goal is to find 100 papers which illustrate basic EMC principles. If any of you readers have candidate material

Tom Herring is doing much of the spadework in finding background material. He needs help. His present goal is to find 100 papers which illustrate basic EMC principles. If any of you readers have candidate material, please send titles or a copy to Tom Herring, Route 2 Box 71, Burton, Washington 98013. Thank you for any help you can send.

The plan to provide early warning of educational opportunities has not worked out well in practice. Seemingly, the organizations producing short courses do not, themselves, make firm plans until very near their announcement date. This does not help a manager in budgeting, which was the main purpose. Another organization has recognized the need of this service, however. Technology Advancement Centers, Inc. of East Brunswick, New Jersey will be producing six editions a year of short course listings in the science and engineering field. Perhaps your company would be interested in subscribing (cost is \$48 per year).

At present only one of the three organizations originally planning to produce short courses at the symposium in Atlanta is still going ahead. This is a one day session in industrial EMC. Watch for the formal announcement. It could add more ammunition for those of you on short travel funds with some convincin' to do. Kenneth W. Exworthy, Chairman, G-EMC Education Committee



by
G. R. Redinbo

Instant Fourier Transforms

A new concept in Fourier transforms has recently been introduced by Dr. J.E. Gibbs, a well-known inventive and creative early worker in the area of Walsh functions and dyadic derivatives. The basic definition and properties of the "instant" transform appeared in an article in Electronics Letters, March 3, 1977. The thrust of the new approach is radically different in its viewpoint but startlingly simple in its applicability.

The new transform is designed for transforming functions whose range is the binary field. This is the major point of departure from the usual approach where the functions take values in the complex numbers or an appropriate subset. Binary-valued functions arise naturally in digital processing systems. For example, the data which are represented by binary words may be viewed as parallel strings of binary-valued functions. The width of the parallel group is the word length in the machine. Therefore a technique for transforming individual strings is sufficient. Another application for the instant Fourier transform is in the design of logic circuits for realizing Boolean functions.

The brief article cited above is outlined here. The algebra of binary strings of length 2^n is defined and a functional basis for it is developed. A pseudo inner product on the algebra is given and it is shown that the above basis is a complete orthogonal set with respect to this product. The formal definition of the new transform involves members of the basis and the pseudo inner product. Several properties of the transform are stated and an implementation approach needing only simple logic gates is detailed. The final transform output is determined only one clock delay after the last component enters the device; hence the descriptor "instant" is appropriate.

Dr. Gibbs, who is still with the National Physical Laboratory, England, has developed a general theory for these type of Fourier transforms. The instant transform is a special case. His theoretical work with the dyadic field, viewed as a function space, has been extensive as his notes for a recent seminar at the Royal Signals and Radar Establishment clearly attest. Again, Dr. Gibbs has pointed a new direction which holds great potential.

Walsh Function Papers Sought

The 1979 IEEE International Conference on Acoustics, Speech and Signal Processing will be held April 2-4 in Washington, D.C. There is an overlap of interests between the SeQUENCY Union and the IEEE ASSP Society and good papers in the common areas are solicited. No special session will be assigned to nonsinusoidal functions and papers will be integrated into the three day program according to topic.

The conference is devoted to the areas of: General Signal Processing (spectral analysis, filter design, software and systems, hardware and architecture, structures and quantization, multidimensional processing, high speed algorithms, general transforms, etc.); Speech Processing (analysis, wideband and narrowband speech communication and evaluation, aids for the handicapped, automatic recognition/understanding of continuous speech, automatic speech segmentation and phoneme recognition, speech production and synthesis); Underwater Acoustics, Seismic Signals and Radar (hardware, theory and experimentation, detection and localization, adaptive filtering and beamforming, simulation); Psychoacoustics and Electroacoustics (noise and measurements).

Prospective authors are invited to submit titles and 100-word abstracts. The continuing standing ASSP technical committees select the final program. The schedule for authors is:

- Submission of two copies of a one-page summary which contains a 100-word abstract, author(s) name(s), address(es), affiliation(s) and telephone number(s); 12 September 1978.
- Notification of acceptance; 31 October 1978.
- Photo-ready paper (nominal four-page); 22 December 1978.
- Meeting (average presentation time 10-12 minutes); 2-4 April 1979.

The papers should be submitted directly to me at the address on the inside front cover.

IEEE JEWELRY

Members of the IEEE's "professional fraternity" of engineers are entitled to wear the IEEE emblem in the form of a label/tie-tac pin or gold filled tie bar. Both pins and tie bars have polished emblems in contrasting colors. Distinguished Life Member, Group/Society President, and Section Chairman pins and tie bars also are available. The IEEE emblem also is mounted on a ring, with the emblem in relief. The ring varies in color according to status. Contact the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854.

NEM 1978

Reference the first and second calls for papers concerning conference details, abstracts, etc., for the 1978 Nuclear EMP (electromagnetic pulse) Meeting, 6-8 June 1978. This notice will serve to update attendees concerning some special features of the conference.

1. Special plenary session and banquet.

On Wednesday afternoon, 7 June 1978, there will be a plenary session of distinguished review papers. These invited papers will be both technical and historical, and will express viewpoints of various portions of the EMP community involving potentially: environment, systems interaction, national programs and policies, the role of theory and experiment, academia and electromagnetic theory, etc. This will be followed Wednesday evening by a banquet and associated banquet address.

2. Special Joint Issue on the Nuclear Electromagnetic Pulse.

The Special Joint Issue on the Nuclear Electromagnetic Pulse (IEEE Trans. Antennas and Propagation, January 1978, and IEEE Trans. Electromagnetic Compatibility, February 1978) is currently being distributed. NEM 1978 has obtained some copies of this important special issue; these will be available at the conference.

3. Joint Technical Committee on the Nuclear Electromagnetic Pulse

As an outgrowth of the Special Joint Issue on the Nuclear Electromagnetic Pulse, the Electromagnetic Compatibility Group and the Antennas and Propagation Society of the IEEE have established a Joint Technical Committee on the Nuclear Electromagnetic Pulse. This is co-chaired by Ed Vance for G-EMC and Carl Baum for AP-S. This committee provides a voice for the EMP community in the professional societies; it will have

a broadly based membership for this purpose. On Tuesday, 6 June 1978, this committee will have a meeting at the NEM 1978 conference after the afternoon sessions. Interested persons are welcome to attend. Various current and future activities will be discussed.

EMP NOTES

The following EMP related notes recently have been published and distributed.

Sensor and Simulation Note 225, "Dynamic Analysis of a Loaded Conical Antenna Over A Ground Plane," Donald Wilton, Univ. of Miss., August 1976.

Sensor and Simulation Note 223, ERRATA, "Modes on a Finite-Width, Parallel-Plate Simulator II; Wide Plates," Lennart Marin, Dikewood Corp., September 1977.

Theoretical Note 204, "The Treatment of Electron Scattering and Approximate Methods Used for Specifying High-Altitude EMP Sources," Capt. J. F. Morgan and Capt. G. R. Knutson, AFWL, September 1973.

Interaction Note 218, "On Some Simple, Numerically Efficient Techniques for Handling Electric-Field Integral Equations," D. R. Wilton and C. M. Butler, Univ. of Miss., January 1975.

Interaction Note 310, "Calculation of the Equivalent Capacitance of a Rib Near a Single-Wire Transmission-Line," S. Coen and T. K. Liu, F. M. Tesche, SAT, February 1977.

Interaction Note 315, "EMP Penetration Through Advanced Composite Skin Panels," K. F. Casey, EMtec, Inc., December 1976.

Interaction Note 322, "Numerical Results for Multiconductor Transmission-Line Networks," C. E. Baum, AFWL, T. K. Liu, F. M. Tesche, S. K. Chang, SAI, September 1977.

Copies of these notes may be obtained directly from the author, from the Defense Documents Center, Cameron Station, Alexandria, VA 22134, or from the note series editor, Dr. Carl Baum, Air Force Weapons Laboratory (EL), Kirtland AFB, NM 87117.

In addition, these notes are available at many universities and companies doing research in EMP and electromagnetic theory.

The EMP note series actively solicits contributed papers in this area for publication. For such contributions, contact Dr. Baum for particulars.



BOOK REVIEWS



by Jim Hill, EMXX Corporation

In this issue we present two reviews of books that were fresh off the press late in 1977. They are almost identical in size, each is just over $\frac{1}{2}$ inch thick in its hardbound cover.

Dr. Raff, author of "Microwave System Engineering Principles", is a U.S. National Science Foundation Program Manager and Adjunct Professor of Electrical Engineering at George Washington University, Washington, D.C. He has used this book as a textbook in some of the courses he teaches there. I think you will find it a worthwhile addition to your library. It is well written with a crisp conciseness.

The second book is authored by Donald M. Jansky, a recognized authority in his subject, "Spectrum Management Techniques". He is Assistant Director for Government Communications at the Office of Telecommunications Policy, Washington, D.C. as I write this review. A reorganization plan which will be implemented by an Executive Order, probably before you read this, will transfer this office and Mr. Jansky to the Department of Commerce.

To my knowledge this is the first time that a book on Spectrum Management has been published and it is fortunate that it has come from an author with experience and authority such as that of Mr. Jansky. I must confess that the review of this book is not all my own.

"Microwave System Engineering Principles"

BY

Samuel J. Raff

120 pages, illustrated, Cloth bound, \$7.50

Published December 1977

Publisher, Pergamon Press, Maxwell House
Fairview Park, Elmsford, N.Y. 10523

This is a book of nuggets, principles, and the "big picture". Most scientists and engineers working in the field of microwaves are specialists in information theory, antennas, circuits, propagation, detection, reliability, or some equally localized field. They know their field

of specialization in much greater depth than the author has used. It is the coverage of subjects outside their speciality which is intended to be of primary value to them, in broadening their horizons and providing the key principles and relationships which guide the disciplines which interface with theirs. However, the sections dealing with their speciality may also be of value because the approach is generally different from the usual one, and the diversity in point of view may provide fresh insights.

The author has developed the key formulas and principles with a minimum of mathematics from concepts that are intuitively obvious. The numbers, formulae, and relationships which are of adequate significance to the field to warrant memorizing or ready reference are indicated by the symbol "m" in the right hand margin and listed in Appendix A. Even if you don't choose to memorize them this system aids in reference and retrieval of important formulas.

The book was compiled from notes developed during eight years of teaching a graduate course on the subject and was used as a text. Thus it has been student tested. Appendix F contains a number of problems, grouped to be used on a chapter by chapter basis. The problems are designed to illustrate practical applications of the text material.

The parts of this book of most interest and value to the EMC engineer will be the chapters on Thermal Noise, Antennas, Propagation and Transmission Lines, and Reflection and Refraction. This is not to downgrade the chapters on statistics and Its Applications, Signal Processing and Detection, and Some System Characteristics which also contain much potentially useful materials. Additional plus values for the book include a list of 40 references, a table of symbols used throughout the book, and a subject index.

Some readers may find the condensed type and close line spacing hard to read. It was apparently set up by typewriter using an elite type face with single line spacing. When reduced down to a 6 by 9 $\frac{1}{2}$ inch size page it is too crowded for easy reading. In spite of this shortcoming your reviewer recommends this book as a worthwhile reference in this field of interest.

"Spectrum Management Techniques"

BY

Donald M. Jansky

192 pages, illustrated, 1977, Cloth bound \$25.00

Publ. by Don White Consultants, Inc.

656 Quince Orchard Rd. Suite 410

Gaithersburg, Md. 20760

This is volume II in the Multi-Volume EMC Encyclopedia Series published by Don White. It fills an existing void for publications in this field. The author, well qualified in the spectrum management field, is with the Office of the President, Office of Telecommunication policy, which has recently been reorganized into the Department of Commerce.

During the last several decades, the demand for radio frequencies to carry out a variety of information transfer services has grown exponentially. The potential for congesting the air waves has grown commensurately. The management techniques and methods which have been developed to insure that these increasing number of radio systems are capable of performing their intended functions have grown more sophisticated. This book is concerned with the breadth and depth of modern spectrum management techniques. These techniques have been developed and applied both domestically and internationally, and have taken on a variety of forms. Also, they are applicable in the operational, planning, and technical aspects of spectrum management. In addition there have been a considerable number of pioneering efforts at developing and applying a new generation of analytical techniques and measuring monitoring methods to improve the effective utilization of the electromagnetic spectrum.

The thrust of the book is apparently directed to a readership not employed in spectrum management or those relatively new to the discipline. Personnel in spectrum management in Foreign countries may find it very beneficial in that it provides the side-by-side (government and non-government) illustrations that may help others to see how spectrum management is conducted in the United States.

The book is organized into six chapters;

- (1) Structure and Development of Spectrum Management
- (2) Operational Methods of Spectrum Management
- (3) Planning Techniques
- (4) Spectrum Standards
- (5) Radio Propagation, Measurement and Monitoring
- (6) Analysis Techniques

The book is largely a collection of things that were heretofore located in many other publications, although one would not call it an anthology. Functions of the OTP, ITU and FCC are described with heavy emphasis on the OTP, the author's bailiwick. Notably lacking is any discussion of spectrum management techniques within foreign countries. The techniques used in each of the 162 ITU nations would be an impossible task but some discussion of Canada, Great Britain, France, Japan, the Soviet Union, and some third world countries would be illustrative and interesting as would a discussion of some of the organizations such as the European Broadcasting Union, European Space Agency, CEPT, ICAO, IMCO, INTELSAT, International Amateur Radio Union, and the ICUAF (Radio Astronomy), and their respective activities in spectrum management.

Also overlooked is a discussion of the role that industrial and lobby organizations play in the US spectrum management. A brief discussion of organizations such as the Electronics Industries Association (EIZ), the National Association of Broadcasters (NAB) and the Association of Maximum Service Telecasters (AMST) could easily have been included.

The role of the IEEE itself and its professional groups and societies deserved some mention. Some kudos could have been given to the IEEE for co-sponsorship (with the EIA) of the Joint Technical Advisory Committee and to the pullication of its report "Spectrum Engineering - A Key to Progress" which appeared in 1967 and is now considered a classic in the field.

That the FCC is slighted is apparent in the discussion of data bases in Chapter 2 where very little attention is given to the FCC data base activities. In comparison, the Government Master File maintained by the Office of Telecommunications (OT) is discussed in great length. In addition, very little discussion is afforded to the actual activities of the 13 FCC monitoring stations. The author treats the FCC enforcement function by simply listing the various responsibilities of the Enforcement Division of the Field Operations Bureau. The actual field enforcement activities employed to carry out these responsibilities is not discussed. On the other hand, the single OT monitoring vehicle is discussed in great detail in Chapter 5. The monitoring and enforcement of satellite activities is not discussed even though the FCC monitoring stations are procuring satellite earth terminals.

"continued"

The discussion on data bases in Chapter 2 also omits data bases maintained by private industry. Firms such as the Spectrum and Frequency Engineering (SAFE) division of Collins/Rockwell, and COMPUCON are known to have specialized automated data bases of terrestrial common carrier and private microwave systems, and satellite earth terminals. The author makes no reference whatsoever to the spectrum management activities and techniques of the US military services or the data bases maintained for such. The Joint Frequency Panel (JFP) of the Military Communications-Electronics Board (MCEB) is the central activity and a discussion of the JFP/MCEB organization, mission and charter should have been included.

It would have been very interesting to see a thorough treatment of advanced technology and its role in spectrum management. More specifically, discussions about new technologies (and new applications of old technologies), such as lasers, spread spectrum modulation techniques, adaptive antenna systems, interference cancellation devices, companding, surface acoustic wave devices, packet radio, fiber optics, and improved design UHF TV receivers, would have made for some fascinating reading.

Mechanically, the book would benefit from improvement in some of its printing since some of the diagrams (particularly the FCC organization chart) are blurred and difficult to read. The sections and paragraphs of the book are numbered in the multidecimal point style, (e.g. 4.4.2.2), much like those often found in the actual OTP and FCC rules and regulations that the author discusses. The references are bordering on the inadequate in that the report numbers are usually omitted.

Finally, and despite all of the criticisms presented herein, the author must be commended on collecting some of the myriad scattered pieces that comprise spectrum management into one book. Most of the criticism presented herein focusses on the author's "omissions" rather than "commissions", and perhaps some omissions were deliberate in order to keep down the size of the book. To really do a thorough treatment would probably require 10 books, not the single one that we have before us.

EMCABS



EDWIN (ED) L. BRONUAGH

EMCABS

In this issue we are publishing 12 abstracts. In the next issue, we hope to publish a large number of abstracts, many of which are on Bonding and Grounding. These are in the review process at this time.

If any of you have ideas or suggestions for improvement of the EMCABS, please contact one of the below listed EMCABS Committee Members. We are particularly interested in further suggestions that we can pass along to our readers on retrieval of abstracted articles.

The EMCABS Committee is listed below:

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R.B. Schulz	R.M. Showers

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DON'T LET POWER FAILURES PLAGUE YOUR SYSTEM

Rex Teets
Deltec Corp.

INSTRUMENTS & CONTROL SYSTEMS

Vol. 50, No. 1, January 1977, Pages 19-23

ABSTRACT:

Consider the impact when power line transients or interruptions inject erroneous data into a system.

When electric lights dim momentarily, a power fluctuation lasting for about half a second has occurred; but frequently, fluctuations lasting from three to 30 milliseconds are caused by utility company switching, circuit breakers tripping, or fuses blowing.

INDEX TERMS: Uninterruptable Power Supply, Power Line Transients

CONTROLLING POTENTIAL STATIC CHARGE PROBLEMS

Phil Kohlhaas

3M Nuclear Products

ELECTRONIC PACKAGING AND PRODUCTION

January, 1977, Pages 71-73

ABSTRACT:

One of the easiest and most economical--but often overlooked--methods of lowering semiconductor reject rates is simply to provide protection against electrostatic discharge.

INDEX TERMS: MOS, Static Charge, Susceptibility, Conductive Clothing, Grounding, Discharge

COMMUNICATING WITH LIGHT

Allen B. Kasiewicz
Bunker Ramo

ELECTRONIC PRODUCTS

November 1976, Pages 29-42

ABSTRACT:

Transmission of information via fiber optic systems offers advantages over coaxial cable or twisted wire pairs. Among the most significant are the complete electrical ground isolation between transmitter and receiver, the elimination of ground loops and common ground shifts in electronic circuits, and immunity to electromagnetic interference.

INDEX TERMS: Fiber Optics, Ground Loops, Noise Rejection, Cross Talk

ACCESSION NO.

EMCABS 12-77-15

SWITCH TO CONDUCTIVE POLYOLEFIN PCB RACKS ELIMINATES CMOS/FET FAILURES DUE TO STATIC ELECTRICITY

INSULATION/CIRCUITS

January 1977, Pages 25-26.

ABSTRACT:

Polyethylene racks tend to develop localized buildups of static electricity during board assembly, and if a board with CMOS/FET components came into contact with a static-charged rack, the result invariably was component failure.

INDEX TERMS: Static Electricity, Conductive Plastic, CMOS/FET, Grounding

COMPONENTS AND PREPARATION PROCEDURES FOR FIBER

OPTIC TRANSMISSION

Ronald L. McCartney

ITT Cannon

INSULATION/CIRCUITS

November 1976, Pages 21-23

ABSTRACT:

The advantages of fiber optic communication networks over conventional twisted pair or coaxial transmission systems are their inherent non-conductive and non-inductive nature affording EMI/EMP protection, their wide bandwidth, and their potential for small levels of crosstalk.

INDEX TERMS: Fiber Optics, EMP, Crosstalk, Isolation, Ground Loops

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ACCESSION NO.

EMCABS 12-77-16

ACCESSION NO.

EMCABS 12-77-18

ACCESSION NO.

EMCABS 12-77-20

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CONTROLLING POTENTIAL STATIC CHARGE PROBLEMS

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ACCESSION NO.

EMCABS 12-77-21

Phil Kohlhaas

3M Nuclear Products

ELECTRONIC PACKAGING AND PRODUCTION

January, 1977, Pages 71-73

ABSTRACT:

One of the easiest and most economical--but often overlooked--methods of lowering semiconductor reject rates is simply to provide protection against electrostatic discharge.

ACCESSION NO.

EMCABS 12-77-22

INDEX TERMS: Static Electricity, Conductive Plastic, CMOS/FET, Grounding

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EMCABS 12-77-23

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ACCESSION NO.

EMCABS 12-77-24

INDEX TERMS: Fiber Optics, EMP, Crosstalk, Isolation, Ground Loops

INDEX TERMS: Fiber Optics, Ground Loops, Noise Rejection, Cross Talk

Grounding, Bonding and Shielding Bibliography - 1930-1971

N.A.

FAA-RD-76-145 (Available thru NTIS), January 1976

ABSTRACT:

As a result of a literature search carried out in conjunction with an extensive effort concerning grounding, bonding and shielding, a bibliography was compiled. The bibliography, covering the period 1930 to 1971, is contained in this report. (Includes international sources.)

ACCESSION NO.

EMCABS 12-77-25

Grounding, Bonding and Shielding Bibliography - 1971-1975

N. A.

FAA-RD-76-177 (Available thru NTIS), September 1976

ABSTRACT:

As a result of a literature search carried out in conjunction with an extensive effort concerning grounding, bonding and shielding, a bibliography was compiled. The bibliography, covering the period 1971 to 1975, is contained in this report. (Includes international sources.)

ACCESSION NO.

EMCABS 12-77-26

INDEX TERMS:

Grounding, Bonding, Shielding

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ELECTROSTATICS AND THE ARCTIC ENVIRONMENT

Electrostatic energy has plagued the explosives and pyrotechnics industry since its earliest days. This industry is now alone in this respect. A few very pertinent observations have been made that make working in spite of electrostatic problems possible:

(1) humidity above 50% reduces static effects, (2) grounding and bonding produces uniform potentials, (3) human characteristics are reasonably well known, (4) cotton clothing produces less static charge than synthetics, (5) moving, sliding, pouring or stirring conductive materials produces less charge than on insulating materials. Knowing all of these basic rules and understanding these reasonably well allows some leeway with the use of explosives if we know how sensitive these materials are. In the Arctic environment where, for all practical purposes, humidity does not exist; personnel are dressed in modern, synthetic uniforms; grounds are several feet below snow, ice and permafrost; it's a "new ball game."

Blowing snow or ice constitutes an electrostatic generator just as does blowing sand. Under general storm conditions, some uniformity of electric field probably exists under which objects and humans reach an equilibrium potential. However, the wash of a helicopter propels snow across the Arctic surface leaving a charge excess or deficiency immediately under it. An isolated mass of charge constitutes a concentration of potential energy. People could be considered in the same light. Persons in the Arctic are well insulated from earth. Instead of the earth we think of in normal surroundings, Arctic conditions result in a number of electrically isolated persons, vehicles, buildings and other objects. Each has capacitance, potential, and charge. Upon contact, a potential difference results in a current flow limited only by resistance and inductances in the objects and contact.

A small study limited to three persons; small, medium and large; two uniforms, and three temperatures 40°F, 0°F and -40°F was performed. Tests were conducted in walk-in chambers. The object was to determine the human equivalent circuit under simulated Arctic conditions, and then to expose the M52AlB3 conductive-mix electric primer to the simulated circuit in order to assess the potential hazard. The subject output had to be measured with as good a duplicate of the primer that could be ascertained. Primers were in three groups that could be represented by 30K, 300K and 1000K ohms.

The test traces were interesting and consisted of minor excursions on the main exponential decay. The subject was in sub-zero uniform, holding a tool in his gloved hand. The minor excursions give some hints as to what may be happening. We theorize that the simulator, the charge zone closest to the gloved hand discharges until the potential in that zone is reduced below some value at which the next charge zone donates its charge. This process continues, each time draining charge from a larger zone, until all available charge is dissipated. The sharp spikes between each minor excursion could indicate arcing on the fabric surface combined with the effects of circuit inductance. These spikes may be of considerable importance in electrostatic initiation of explosives.

Using a switching circuit and the values of capacitance previously determined, Bruceton tests were made at three temperatures on three lots of primers sorted according to initial resistance. The threshold level was sought by this method. A point-in-voltage was chosen which represented a very low probability of firing using the human equivalent circuit. Trials were made until an item fired or until 50 items failed to fire. This level was defined as the threshold. One problem arose in that threshold tests resulted in some firing at levels below those predicted in the quantal tests; and this is a serious problem. A review of conditions for tests showed serious moisture and frosting problems that were largely dependent upon ambient relative humidity. Each shot required a manual loading of the new cartridge case. While the test sample was temperature conditioned, entrance ports needed to be opened to reload after each exposure. "Snow" and condensation resulted. Most testing allowed the capacitor and switching circuits to become moist or ice covered.

The conclusions that result from this work are:

- Human capacitance averages 50 and 13 picofarads for 40°F uniform and sub-zero uniform, respectively.
- Persons in Arctic uniform can easily generate 6000 volts.
- Bruceton or quantal testing must be under carefully controlled environment to produce meaningful results.
- Electrical energy transfer efficiency increases with increasing initial voltage.
- The primer provides considerable electrostatic protection by virtue of its construction.
- Voltages on humans approaching 1000 volts must be viewed as potentially hazardous to the primer.

"continued"

Several precautions have become evident as a result of this work:

- Testing for electrostatic effects under Arctic conditions should be carried out in a walk-in chamber or in the Arctic to avoid the effects of condensation and moisture.
- With capacitance around 20 pf and very high resistance, physical effects such as object proximity become important.
- Human discharges are not identical to a simple lumped circuit. More sophisticated circuitry is needed.

Excerpted from "Electrostatics and the Arctic Environment," by Charles T. Davey, Paper 17 in Proceedings of the Ninth Symposium on Explosives and Pyrotechnics, September 1976. Order Proceedings (32 papers on 576 double pages) from E.E. (Ted) Hannum, The Franklin Institute, Philadelphia, PA 19103, \$40, prepaid.

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Telephone (814) 474-5593 Telex 510/699-6848.

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