

Electromagnetic Compatibility Society



Newsletter

ISSUE NO. 100

WINTER 1979

EDITOR: ROBERT D. GOLDBLUM

SAMA STANDARD ON ELECTROMAGNETIC SUSCEPTIBILITY OF PROCESS CONTROL INSTRUMENTATION ISSUED

The Process Measurement & Control Section of SAMA (Scientific Apparatus Makers Association) has published PMC33.1-1978, "Electromagnetic Susceptibility of Process Control Instrumentation." This voluntary industry standard is a guide to establish a common reference for evaluating the performance of industrial process control instrumentation when subjected to electromagnetic fields such as generated from radio transceivers (walkie-talkies), or any other device that will generate continuous wave radiated electromagnetic energy. A classification of environments for anticipated electromagnetic fields and the definition of test methods for evaluating the instrumentation when used in these electromagnetic environments is developed in this standard.

Single copies of the standard are available from the PMC Office, 370 Lexington Ave., New York, NY 10017, at \$2.00 per copy. Quotations for bulk orders are available. A complete list of PMC Standards is available on request.

SAMA is a national trade association representing over 200 of the leading manufacturers and distributors of industrial and scientific instruments, laboratory chemicals, diagnostic products, and other materials with clinical, industrial and educational applications.

RESULTS OF THE AD COM ELECTION BALLOT

A ballot for the election of six AdCom members of the Electromagnetic Compatibility Society was issued on August 18, 1978. The returned ballots have been counted, and the following members have been elected for a three-year term, beginning on January 1, 1979:

Vernon L. Chartier	Hank Knoller
Douglas W. Robertson	Fred J. Nichols
Harold A. Gauper, Jr.	William H. Parker

A QUESTION

????

"Which Transactions or Symposium Record paper has been referenced most often?"

If you have an answer, or even an opinion, please tell Tom Herring, Rte. 2, Box 71, Burton, WA 98013.

SYMPOSIUM ON WALSH FUNCTIONS IN THE PLANNING?

(See Page)

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EDUCATION COMMITTEE NEWS

The spring 1979 schedule of seminars in EMC and Telecommunications by Don White Consultants, Inc. is available. It contains descriptions of the short courses and seminars which that organization offers. Also included are descriptions of the growing EMC encyclopedia being written by experts in the field and published by the Don White group. If you need a copy, contact Don White Consultants, Inc., 703-347-0030.

The US DOT/FDA and Florida Institute of Technology will sponsor a "Workshop on Grounding and Lightning Protection" in Melbourne, Florida on March 6-8, 1978. For information, contact Mr. R. Cosel, 305-723-3701, Ext. 215.

George Washington University has three upcoming course offerings: "Lightning Protection," January 11-12, 1979, "Electromagnetic Compatibility," March 12-16, 1979, and "Spread Spectrum Communication Systems," March 26-30, 1979. Contact George Washington University, 800-424-9773 for information.

Ed Skomal's book, "Man-Made Radio Noise," has been released and is available from Hayden Publishing Company.

The IEEE short course on Industrial EMC has been completed. Present planning includes offering the course in Minneapolis area in spring of 1979. Check with Vince Giardina of the IEEE at 201-981-0060 if your chapter would like to offer the course.

Work is moving along on the EMC college course. Correspondence with Dr. Richard Schwartz of Michigan Technological University indicates that he is willing to help in the endeavor. Dr. Schwartz is head of the EE Department at Michigan Tech and has contributed to several EMC technical publications in the past.

If you have information of an educational nature, please send it to me or call at 612-574-4970.

Ken Exworthy
Chairman
Education Committee

LOGO CONTEST RESULTS

Our congratulations and a check for \$10.00 goes to Mr. B. Schenker of Sunnyvale, CA, winner of the EMCS Newsletter logo contest. Mr. Schenker submitted two masthead entries which appeared on Page 11 of our Fall Issue. Although the voting was light, Masthead No. 1 was the clear winner. If you forget what Masthead No. 1 looked like, we are using it on the cover of this issue.

EMC SOCIETY HAS FOUR NEW FELLOWS

The IEEE Board of Directors, at its meeting in Puerto Rico, December 9-10, 1978, has named four members of the EMC Society to be elevated to the grade of FELLOW as of January 1, 1979. Their names and the accompanying citations are as follows:

Thomas Walter Doeppner - for leadership in the furtherance of electromagnetic compatibility in the design, development, and operation of military telecommunications systems

George Hubert Hagn - for contributions to spectrum management and electromagnetic compatibility

James Stewart Hill - for leadership in promoting the international exchange of electromagnetic compatibility technology and for contributions in the field of measurement of the electromagnetic environment

Merrill Nathaniel Lustgarten - for contributions and outstanding leadership in electromagnetic compatibility technology, including co-site analysis, EMC Figure of Merit, performance degradation of radar operators, and RF propagation modeling

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1979 IEEE INTERNATIONAL SYMPOSIUM

ON

ELECTROMAGNETIC COMPATIBILITY

October 9-11, 1979 • Town & Country Hotel

P.O. Box 17510 • San Diego, CA • 92117



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CALL FOR PAPERS

As we enter the decade of the 1980's, EMC technology will have a greater effect than in any preceding decade on new products, new developments, and new techniques. Authors are invited to submit papers on the current state of EMC technology and related disciplines. Original, unpublished papers will be considered in the following areas. Papers in other EMC areas may also be considered.

EMC Product Areas

Aerospace
Automobiles
Bio-Medical
Communication Systems
Computers
Consumer Products
Defense Programs
Power Systems
Transportation Systems

EMC Technological Areas

Analysis
Design Techniques
Fiber Optics
Hazards
Instrumentation
Lightning
Materials
Spectrum Management
Standards

Prospective authors should submit both a 35-50 word abstract and a 500-750 word summary (up to six illustrations) that clearly explain their contribution, its originality, and its relevance to the EMC discipline. For anonymity of review, please identify author(s) only on the cover sheet.

Upon acceptance, authors will receive forms and instructions for preparing materials to be printed in the Symposium Record. Selected technical papers will be presented in poster session. If poster session presentation is desired, please indicate on the abstract/summary submitted.

AUTHORS' SCHEDULE

Abstract and Summary (3 copies required) Deadline: 2-1-79
Notification of Acceptance By: 4-1-79
Full Photo-Ready Manuscript Deadline: 6-1-79

Submit Abstracts/Summaries to:

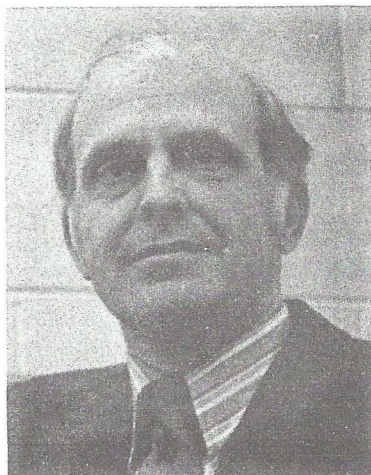
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EMC PERSONALITY PROFILES

by William G. Duff



JACK E. BRIDGES

June 1, 1961 was an important date for Jack Bridges because that was the time he joined Armor Research Foundation, now IIT Research Institute, as a manager in the section concerned with radio-frequency interference. His initial activities were principally picking up the pieces left by Herb Sachs and Stan Cohn as they moved out East to form the Electromagnetic Compatibility Analysis Center. Over the next few years, the IITRI Chicago group became highly involved in non-linear scattering and electromagnetic pulse work, in addition to the usual hardware-type RFI problems involving EM hazards to ordnance, electromagnetic shielding, grounding and cable problems.

Eventually, however, the technical side won out over the management side, and Jack transferred to the senior staff leaving management of the section in the very capable hands of Jim Krystansky. Here, his broad interests allowed him to develop (without worrying about who gets the next raise) programs in the automatic checkout area, interference proof communications systems, and even some weather radar problems. About seven years ago, Jack began looking into the problems associated with high-level effects of electromagnetic waveforms on people and biological systems. This included effects of high-level fields on people with implanted cardiac pacemakers and the effects of electric fields from power lines. Recently, he has been concerned with direct shock hazards of 60 Hertz power as well.

Always anxious to convert a problem, such as high-level RFI into a benefit, Jack recently has considered ways of utilizing (rather than fighting) high-level electromagnetic fields, especially to solve critical problem areas. An example of this interest recently surfaced in a paper published at the 11th Oil Shale Symposium at the Colorado School of Mines where Jack discussed a new method of recovering shale oil by means of dielectric heating the oil shale in place. Underlying all of these more recent activities has been a strong continuing interest in numerous radio-frequency and EMP problems.

Prior to joining IIT Research Institute, Mr. Bridges has had experience in applied electronic research both in a technical and supervisory capacity. Specific highlights include the development of a cross-correlation receiver system which exhibited improved adjacent-channel interference and thermal-noise performance. System design experience included the conceptual development of an encoding and decoding privacy system for subscription television which was successfully field-tested and used by Zenith Radio for many years. His earliest initiation into the real world began with, after leaving an academic teaching job at Iowa State, a position with Andrew Corp. to design VHF and UHF transmitting and receiving antennas. Jack's academic background includes a B.S. and M.S.(E.E.) from the Univ. of Colorado, with active service in the Navy between the two degrees.

Mr. Bridges is currently a member of G-EMC and AD-COM, the EMC Standards Committee, CIGRE Study Committee 36 on Interference, ANSI C-63. Past activities include chairman of the GMC Standards Committee, chairman of the 9th Tri-Service Conference on Electromagnetic Compatibility, papers chairman for the 1972 Symposium on Electromagnetic Compatibility. Past professional activity included participation in the IEEE Professional Group on Broadcast and TV Receivers.

Mr. Bridges received the Browder J. Thompson Memorial Prize Award in 1956 for his paper published in the September, 1954 issue of the Proceedings of the IRE titled, "Detection of Television Signals in Thermal Noise." He received the Fellow Award of the IEEE in 1974; and he was awarded the Certificate of Appreciation in 1976 and the Certificate of Achievement in 1972 from the Group on Electromagnetic Compatibility. He is also a member of Eta Kappa Nu, Tau Beta Pi, and Sigma Xi.

Mr. Bridges has published some 45 different papers and is a principal contributor to six books or handbooks. He has some 27 issued patents, and the last two deal with a new process of recovering oil from oil shale and tar sand deposits.

ROBERT C. SPRAGUE

WINNER 1978 EIA MEDAL OF HONOR

In an unprecedented move, during its 54th Annual Fall Conference, the Electronic Industries Association, for the second time, voted the EIA Medal of Honor, the industry's highest award, to Robert C. Sprague, Sr., founder of the Sprague Electric Company, North Adams, Massachusetts. Mr. Sprague is being honored again for his extraordinary service to the Association and the industry since receiving the award for the first time 25 years ago. Presentation will take place during EIA's Spring Meeting in Washington, D.C. Most notably, Mr. Sprague recently initiated industry efforts which led to a dramatic revision of the Customs Penalty Laws removing onerous and unfair penalty provisions.

Mr. Sprague's electronics career nearly spans the industry's own modern history. In 1926, he founded the Sprague Electric Company (originally the Sprague Specialties Company). Long active in industry affairs, Mr. Sprague has been a member of the Association's Board of Governors since 1943 and from 1950-54 was EIA President and Board Chairman. Mr. Sprague, educated at Hotchkiss, the U.S. Naval Academy, the U.S. Naval Post-Graduate School, and the Massachusetts Institute of Technology, is a fellow of the American Institute of Electrical and Electronic Engineers.

IEEE U. S. MEMBER OPINION SURVEY NOW AVAILABLE

A detailed analysis of the U.S. Member Opinion Survey, conducted by the Survey Task Force of the United States Activities Board of The Institute of Electrical and Electronics Engineers, Inc., IEEE, has just been published and now is available from the IEEE Service Center in Piscataway, New Jersey. The volume is listed as No. UH0133-9 and is \$5 for members and \$10 for non-members.

The tabulations indicate how IEEE leaders feel about controversial issues as compared with the general membership, what engineering managers or power engineering specialists think about regularly scheduled overtime, how both younger engineers and experienced practitioners desire project assignment rotation to remain versatile and valuable.

One unexpected response was the wish, expressed by nearly every subgroup, urging employers to encourage their employees to attend local IEEE meetings.

Answers to 53 questions were related to member characteristics such as geography, primary technical specialty, age, degree, years of volunteer service to the Institute, occupational category, income, registration status, etc. There is a profile highlight of Institute leaders, those who served the longest period of time.

CONSULTANTS

A recent government study on consultants has shown that it was paying at least 18,000 people, who do not work for it, at least \$50 million to tell how things ought to be. The White House decided that a lot of money was being paid a lot of people for advice. The government was especially irked to discover there was no common definition as to what a consultant is, or does. It varies from agency to agency. The Office of Management and Budget is cracking down on consultants, and promises to be taking names from here on out. "It is safe to assume," an OMB official said, "that we found some abuse" in the use of consultants.

IEEE CODE OF ETHICS FOR ENGINEERS

PREAMBLE

Engineers affect the quality of life for all people in our complex technological society. In the pursuit of their profession, therefore it is vital that engineers conduct their work in an ethical manner so that they merit the confidence of colleagues, employers, clients and the public. This IEEE Code of Ethics is a standard of professional conduct for engineers.

ARTICLE I

Engineers shall maintain high standards of diligence, creativity and productivity, and shall:

1. Accept responsibility for their actions;
2. Be honest and realistic in stating claims or estimates from available data;
3. Undertake engineering tasks and accept responsibility only if qualified by training or experience, or after full disclosure to their employers or clients of pertinent qualifications;
4. Maintain their professional skills at the level of the state of the art, and recognize the importance of current events in their work;
5. Advance the integrity and prestige of the engineering profession by practicing in a dignified manner and for adequate compensation.

ARTICLE II

Engineers shall, in their work:

1. Treat fairly all colleagues and co-workers, regardless of race, religion, sex, age or national origin;
2. Report, publish and disseminate freely information to others, subject to legal and proprietary restraints;
3. Encourage colleagues and co-workers to act in accord with this Code and support them when they do so;
4. Seek, accept and offer honest criticism of work, and properly credit the contributions of others;
5. Support and participate in the activities of their professional societies;
6. Assist colleagues and co-workers in their professional development.

ARTICLE III

Engineers shall, in their relations with employers and clients:

1. Act as faithful agents or trustees for their employers or clients in professional and business matters, provided such actions conform with other parts of this Code;
2. Keep information on the business affairs or technical processes of an employer or client in confidence while employed, and later, until such information is properly released, provided such actions conform with other parts of this Code;
3. Inform their employers, clients, professional societies or public agencies or private agencies of which they are members or to which they may make presentations, of any circumstance that could lead to a conflict of interest;
4. Neither give nor accept, directly or indirectly, any gift, payment or service of more than nominal value to or from those having business relationships with their employers or clients;
5. Assist and advise their employers or clients in anticipating the possible consequences, direct and indirect, immediate or remote, of the projects, work or plans of which they have knowledge.

ARTICLE IV

Engineers shall, in fulfilling their responsibilities to the community:

1. Protect the safety, health and welfare of the public and speak out against abuses in these areas affecting the public interest;
2. Contribute professional advice, as appropriate, to civic, charitable or other non-profit organizations;
3. Seek to extend public knowledge and appreciation of the engineering profession and its achievements.

Book Reviews



by Jim Hill, EMXX Corporation

We always are pleased to receive book reviews from volunteers. In this issue, we are doubly pleased. We have a review of the new ARRL manual on RFI by a very active HAM, one well known to the readers of this newsletter, Charlie Anderson, our Chapter Chatter Editor. Charlie is particularly well qualified for this review. He has been an active participant in the ARRL for many years and has been engaged in the RFI test and measurement side of the EMC technology.

Charlie's review aroused my interest enough to go out and buy a copy. I found the TVI Complaint Case History on pages 18 and 19 most interesting. This is a case in which the neighbor who was receiving interference from the HAM was not satisfied by the commendable efforts made by the HAM. He complained to the FCC and was not satisfied with the investigation and explanation made by the FCC engineers. His next step was to write to his Congressman, who, in turn, demanded a reinvestigation by the FCC. This resulted in a return visit by the two FCC engineers with a load of sophisticated instrumentation and a very thorough investigation was made of all of the HAM gear. The HAM was again given a clean bill of health. This illustrates how difficult it is to demonstrate to and convince some people that interference is not an illegal operation of the interferor. It also illustrates how effective a letter to a Congressman or Senator can be in getting action from a government agency.

The second volunteer reviewer is Fred Matos, who chose to review a book looking into the future developments in telecommunications. Fred, as a research engineer at ECAC, has been active in this field and is well qualified to comment on the analysis and predictions made by the book's author, James Martin. We have not yet seen this book, but we intend to get a copy so that we can see what is being forecast for telecommunications developments in the next two decades. Will there be direct thought transference or transmission? Will there be the discovery of a new physical "medium" which now is unknown? What will become obsolete and what will survive in this rapidly developing technology?

"Radio Frequency Interference"

BY

Lowry, DeMaw, Rusgrove and Steiman
The American Radio Relay League
Newington, CT 1978

64 pages, illustrated, paper-bound
Price \$3.00

Charles F. W. Anderson, Reviewer

This long-awaited - and, urgently needed - publication is aimed not only at amateur radio operators, but also at Citizens' Band operators, electronics technicians who work on home entertainment systems and owners of such equipment as well. The chapter headings give a good indication of the orientation of the book:

1. RFI: Problem or Opportunity?
2. Coexistence in an RFI-Filled World
3. Citizens' Band Interference
4. Interference from Transmitters
5. Interference from Electrical Devices and Powerlines
6. How to Identify and Resolve Radio-TV Interference Problems
(A reprint of the FCC's publication of the same title)

Two appendixes are devoted to listings of recent (1970-76) articles on RFI/TVI which appeared in QST magazine, and of over 60 consumer electronics manufacturers who have indicated how their organizations may be contacted for assistance with RFI or TVI problems encountered with their products.

Chapter One, as its title suggests, is an introduction to RFI matters, covering some basic considerations. Among these are: What is RFI?; What can be done about it; Lists of typical sources and victims; Historical background information (it's not new - QST for August 1925 had an article on it); Assessment of the tremendous growth in the number of RFI/TVI complaints; and a discussion of the attempts which have realistic legislation enacted by the Congress to require that some measure of protection against external RF fields be incorporated in consumer electronic devices by the manufacturers thereof.

In Chapter Two, approaches which the amateur operator should take in dealing with RFI/TVI complaints are discussed. Primary emphasis (and rightly so, in your reviewer's opinion) is on the public relations aspects of handling interference situations. A model letter to be sent by the owner of the affected equipment to the manufacturer is included, as is a sample form to be used by the transmitter operator involved for providing information of RFI/TVI complaints to the ARRL for expansion of the data base which the League's RFI Task Group has accumulated. Procedures to be followed if the FCC enters the picture are presented, together with those portions of the FCC Amateur Radio Service Rules and Regulations pertaining to RFI. Also, a considerable discussion of the organization and operations of local RFI/TVI committees is included. Strong emphasis is placed on diplomacy in dealing with complaints.

Chapter Three mentions some of the precautions which CBers should take to assure that their transceivers are adequately clean with regard to spurious emissions. Specific mention is made of interference due to illegal CB operations, such as use of power and antennas which are in violation of the FCC Rules and Regulations. In addition, the differences between the Amateur Radio Service and CB radio are pointed up. Public relations aspects are discussed here, as in the preceding Chapter. The final paragraph emphasizes that the complainant "should select the course of action to follow"; and that if the CB operator has followed the suggested approaches, he or she will have more that fulfilled his or her responsibilities and duties.

The fourth chapter gets down to technical specifics. Powerline and control lead filtering are discussed in some depth. Much more detail is devoted to output networks and low-pass filtering as means of reducing spurious emissions from transmitters. Shielding of equipment cases is treated, with suggestions on how to accomplish such modifications. The other part of the problem, susceptibility of affected equipments is covered in this chapter. Information on fabrication and installation high-pass filters and wave traps for TV receiver antenna inputs is given. Methods of bypassing and filtering for reduction of vulnerability of hi-fi and other consumer electronic devices are detailed. An excellent TVI troubleshooting flow chart is a feature of the chapter.

Chapter Five is similar in its objective to Chapter Four. It is devoted to methods of dealing with interference from such

items as electric motors, dimmers - and TV sets and microprocessors/microcomputers.

Chapter Six, as indicated above, is the FCC's own manual on how to deal with interference problems. Examples of methods which the affected equipment owner can use in reducing interference are presented, together with suggestions for more sophisticated remedies to be implemented by properly qualified service technicians. Guidelines for operators of transmitting equipments are included as well.

A few criticisms and suggestions for future revisions of this manual are in order. Emphasis is placed on use of "water-pipe ground" connections without mention of the fact that in many homes, particularly of recent construction, plastic piping is used extensively. Therefore, there may be no low-conductance path between a readily accessible metallic cold water pipe and earth ground. In addition, no mention is made that a "ground" lead may be a rather effective antenna (Marconi-type) over wider frequency ranges with resultant enhancement of adverse RF effects. The material relating to electric fences also does not discuss resonances or methods for determining or swamping such effects. Shielding of hi-fi non-metallic cabinets is stated to be important in reduction of interference effects, but no mention is made of the low-cost, easily applied carbon-loaded conductive paints for such usage. Bypassing of speaker and other hi-fi set leads is among the remedies suggested for interference reduction; however, not indicated are benefits which may be realized by using capacitors of proper values to be self-resonant with their lead lengths. A table or graph showing such information would have been a useful feature. The treatment of powerline filtering makes no mention of the significance of such factors as filter input/output impedances or of the possibility of filter "ringing" and its effects. Finally, the excellent work done - and being done - by ARRL's own RFI Task Group was not, in this reviewer's opinion, given adequate recognition.

In summary, a fine, certain-to-be-useful book with wide appeal, not only within the amateur radio community, but to many other sectors of the increasingly numerous users of electromagnetic energy in its ever-widening applications. (Obtainable at most radio, electronic stores which handle amateur radio equipment, or directly from ARRL, 225 Main St., Newington, CT 06111.)

"Future Developments in Telecommunications"

BY

James Martin

Prentice Hall, Englewood Cliffs, NJ, 2nd Edition
Price \$34.95

Fred Matos, Reviewer

This book is a major revision of the first edition that appeared in 1971 and is part of the James Martin authored books on computer systems and telecommunications. And, at the rate technological changes are occurring, Martin immediately should begin work on the 3rd edition if he has not done so already.

The book is written in a light easy-to-read style such that for the communications specialist, it can even serve as escape reading in place of a novel or magazine. It has an ample number of photographs, graphs and tables all nicely complementing the text. Judicious use is also made of printing in red which contributes to the overall aesthetic appeal of the total package of 668 pages.

It is organized into 33 chapters which the author divides into three parts, namely: Telecommunications and Its Uses; Synthesis; and, Technology. He indicates that a reader with a technical background can read the first two parts while more detailed technical discussion is saved for Part III on technology. The "more detailed technical discussion" referred to is still relaxed technically and equations appear only in one chapter, that on packet radio where queuing is discussed.

Martin covers the gamut of modern telecommunications systems in a thorough manner. He covers such areas as video telephones, cable television, packet radio (one of his favorites), packet switching, communications satellites, and fiber optics. Equitable treatment is given to communications of both the wire (defined here as a physical connection) and the radio species. Many new uses of telecommunications made possible by such systems are presented. Emphasized are such uses as electronic mail, electronic funds transfer, personal communications and computers in various exotic applications.

Although many modern systems and applications are discussed, the history of the various systems also is examined by the author. This is often done in the introductory parts to a subject which is not a new approach but it is done in a style so well blended that one can only be more appreciative of the blood, sweat and tears of the early communications pioneers. The historical material provides a foundation to explain the paths taken to arrive at the present day status which then is used as a springboard for the future developments.

One of the most fascinating chapters is the one on a future scenario. In this chapter, the author looks in turn at the late 1970's, early 1980's, late 1980's, early

1990's and late 1990's. He envisions teleconferencing, computer terminals in everyone's pocket and large digital wall screens among other things. Societal changes are envisioned and here the author relates the increased dependence on telecommunications as an effect of fuel shortages. This part of the scenario is more palatable than the scenarios of some others, notably that envisioned by Toffler

in "Future Shock" of a few years ago. One further comment that Martin makes in this context is that 1984 comes and goes without anything similar to Orwell's predictions coming to pass, at least not in North America.

It is tempting to elaborate further on the future scenarios envisioned by Martin. But, to do so would be closely akin to revealing who-did-it in a review of a murder mystery. One should buy the book and read it to enjoy it. Any more information here on the scenarios would ruin the possible enjoyment of future readers.

Communications engineers, managers, planners and administrators will undoubtedly make up most of the readership of the book although the computer community may take interest since a convergence between the two is inevitable. It would most likely be helpful as a beginning tutorial aid to those with a specialized communications interest, e.g., satellites, who desire some basic understanding of other areas of communications such as wire communications.

Those concerned with technology forecasting and assessments, corporate planners and chief executive officers also would be expected to find interests in the book and it should be required reading for some. After all, the book is about changes and to remain viable, firms in the telecommunications industry must become increasingly adaptive lest they go the way of the buggy whip and steam locomotive manufacturers.

Serious criticisms of the book are difficult to make. The role of the radio amateurs in future developments is omitted, although Martin does mention the computer hobbyist as an analogy. The role of the HAMS in developing some current techniques, e.g., slow scan television over poor quality channels, is not mentioned. The price may be an initial deterrent, but the cost per page of 5.14¢ is in line or below other books of similar type.

Taking all things together, it is an excellent work and should be read by many of us. Only time will tell how Martin does as a soothsayer. Thanks a lot, Jim, for a job well done.

The reviewer is with the IIT Research Institute at the Department of Defense Electromagnetic Compatibility Analysis Center, Annapolis, MD 21402. The statements made by the reviewer are personal observations and do not reflect the views of these organizations.



We are publishing 12 abstracts in this issue. The question continues to arise, "How does one obtain a copy of the abstracted article?" The answer to this question was proposed in a past issue of the Newsletter, No. 96, Winter 1978. While we believe this answer to be adequate for people in the USA, and, perhaps, Canada, we have had no feedback from anyone who has tried it. We do see that obtaining copies of abstracted articles may be a serious problem for many of our readers who reside outside the USA. We are looking for solutions to this problem and we would like to hear from any of you who have a suggestion for a solution. One suggestion which we have received is to include the zip code of the author in the abstract heading. This we will try to do along with more careful checking of the abstract heading to make sure the heading is complete. We have had a few NTIS and DDC documents for which the source and order number were missing. These will be corrected in the next issue.

The current EMCABS Committee is listed below:

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NEW SOCIETY PLANS TO FOCUS ON BIOLOGICAL EFFECTS OF RF

Organizers of the Bioelectromagnetics Society, a new group formed to promote research on the interaction of electromagnetic and acoustic energy with biological systems, say they will confine their efforts mainly to the laboratory, and avoid any connection with consumer groups and manufacturers. "The purpose of the society is to fill a void that has existed for a long time," explained Dr. Edward Alpen, President of the society, and a Professor of Medical Physics at the University of California, Berkeley. "We needed to have a group of people and a peer review journal (dedicated) to this field."

The society plans to publish a technical journal several times a year (the first is scheduled for the summer of 1979), distribute a newsletter written by Thomas C. Rozzell (previously distributed by the Office of Naval Research), hold an annual scientific meeting, sponsor symposia and workshops, and publish an annual membership directory. The group opened membership at the International Microwave Symposium, held in Ottawa this past June. The organizers expect the new society to grow as large as 2,000 members. "The microwave field rep-

resents the largest fraction of our potential membership," cites Alpen, "but that is certainly not all. Other fields such as visible light, magnetic field effects, radio-frequency effects, laser, and even UV also will be represented."

The membership probably will be principally North American, although it is open to all countries. Individual members, with whatever funding they receive, will conduct the research. The group may lobby for scientific purposes and support of research, but according to Alpen, it doesn't "propose to become an action-oriented group to lobby for exposure standards or health protection of workers."

The society is managed by a board of directors and officers representing biological, physical, and engineering sciences. Membership in the society is open to persons who have made scientific contributions to the fields of electromagnetic or acoustical-biological interactions by independent research, or who have rendered some special service to these areas which is considered equivalent to such contributions. There are various levels of membership.

For additional information and an application, write to: Bioelectromagnetics Society, P. O. Box 3651, Arlington, VA 22203.

METERLESS MONITORING OF RADIATION NOW IN SIGHT
(NEWS)

Peliotis, Steven
Western Editor
MICROWAVES

Vol. 16, No. 8., August 1977, pp 10-12

ABSTRACT: The possibility that non-ionizing radiation may be hazardous spawns the need for an effective radiation monitor that can be inexpensively mass produced in large quantities. With this in mind, Dr. Glenn Fanslow and Dr. D. T. Stephenson of Iowa State University have developed a novel, entirely passive device to monitor non-ionizing radiation. The approach takes advantage of the temperature-dependent light scattering properties of cholesteric liquid crystals - the substance used in passive digital thermometers.

ACCESSION NO.
EMCAES 11-78-01

INDEX TERMS: radiation, monitoring, non-ionizing, passive

DEFINE DYNAMIC RANGE FOR BETTER SPECTRUM ANALYSIS

Engelson, Morris
Tektronix, Inc., Beaverton, OR
MICROWAVES

Vol. 16, No. 8, August 1977, pp 62-68

ABSTRACT: Dynamic range basically expresses the range of amplitude levels that can be displayed together for measurement or analysis. Dynamic range is deeper than the value quoted by most data sheets. Definitions vary with measurement tasks, and may consider resolution shape factor and bandwidth, noise and sensitivity specifications.

ACCESSION NO.
EMCAES 11-78-02

INDEX TERMS: dynamic range, spectrum analysis, definition

SPACELAB: MAKING SATCOM AFFORDABLE

Durrani, Dr. S. H., Allen, C. C. and Hoji, T. T.
NASA, Greenbelt, MD, General Electric Co., Valley Forge, PA,
MSN-Microwave System News /AIL, Div. of Cutler-Hammer, Melville, NY

Vol. 7, No. 12, December 1, 1977, pp 57-67
ABSTRACT: An experiment with adaptive, phased-array antennas in space could drastically reduce the cost of Satcom and lead to the use of hundreds of thousands of inexpensive mobile terminals. Automatic beamforming and steering will be used to acquire and track desired signals, while automatic beamshaping will be used to suppress interference for reception and to increase isolation between beams for transmission. Another important property of a phased-array is its inherent capability to spatially disperse intermodulation (IM) products generated in a non-linear transmitter amplifier when multiple frequencies are being transmitted.

ACCESSION NO.
EMCAES 11-78-03

INDEX TERMS: Satcom, phased-array, antenna, beamforming, intermodulation, spatial dispersion, Spacelab

CONSIDER A SINGLE DIODE TO STUDY MIXER INTERMOD

Cheadle, Daniel L.
Watkins-Johnson Co., Palo Alto, CA
MICROWAVES

Vol. 16, No. 12, December 1977, pp 162-171

ABSTRACT: An accurate profile of the diode's conduction cycle is the key to analyzing third-order distortion. Sixth-order equations result, but a computer program plows through to find the best suppression method.

ACCESSION NO.
EMCAES 11-78-04

INDEX TERMS: intermodulation, third-order distortion, mixer, diode, computer program, suppression

DIELECTRIC RESONATORS ADD Q TO MIC FILTERS

Dydyk, Michael
Motorola, Inc., Scottsdale, AZ
MICROWAVES

Vol. 16, No. 12, December 1977, pp 150-160

ABSTRACT: Microwave integrated circuits have created a need for small, high-Q resonators in filter designs. Dielectric disk resonators meet that need. Applying the knowledge about the behavior of dielectric resonators in free space, and in conducting enclosures to the design of dielectric resonators for microstrip is not a straightforward task. The close proximity of substrates and ground planes to the resonator significantly shifts the resonator's frequency and Q. It is possible to design MIC filters using high-Q dielectric resonators by carefully examining all the resonator effects - frequency, unloaded Q, spurious response, etc., - and combining these results in a set of filter design equations.

ACCESSION NO.
EMCAES 11-78-05

INDEX TERMS: microwave, filter, dielectric resonator, design, microwave integrated circuit

X-BAND LIMITERS FOR FM/CW RADAR

Stitzer, S. N. and Goldie, H.
Westinghouse Electric Corp., Baltimore, MD
MICROWAVE JOURNAL

Vol. 20, No. 12, December 1977, pp 35-38, 57

ABSTRACT: A three-stage YIG tuned limiter for an X-band FM/CW radar is described. Providing a limited output power under 5mW at a transmitter power of 30 W with 2:1 antenna/SWR, the frequency-selective limiter simultaneously passes echo signal returns with an insertion loss less than 2 dB. The paper discusses the theory of multiple stage selectivity, the design of YIG resonator structures, and the determination of absolute power handling capacity. The three-stage is described in detail along with discussions of the front-end subsystem performance including consideration of IM products.

ACCESSION NO.
EMCAES 11-78-06

INDEX TERMS: limiters, intermodulation, selectivity, radar

Mangulis, V.
RCA Corp., Moorestown, NJ
MICROWAVE JOURNAL

Vol. 20, No. 9, September 1977, pp 72-76

ABSTRACT: It is shown that a simple approximation for the diffracted field in the shadow also gives a good representation of the field outside the shadow for large cylinders with the electric field vector parallel to the axis of the cylinder.

ACCESSION NO.
EMCAES 11-78-07

INDEX TERMS: cylinder, diffraction, approximation, EM Fields

RESHAPED SUBREFLECTORS REDUCE ANTENNA SIDELOBES

Parekh, Sharad V. and Cook, James H.
Scientific-Atlanta, Inc., Atlanta, GA
MICROWAVES

Vol. 16, No. 5, May 1977, pp 170-173

ABSTRACT: The main and secondary reflectors of dual-reflector, high-efficiency earth station antennas are generally shaped to achieve uniform field amplitude and phase distributions across the secondary aperture. Edge diffraction from the main reflector edge and spillover beyond this edge caused by the sub-reflector edge diffraction may substantially increase the level of some of the sidelobes. In order to achieve an acceptable tradeoff between far-out sidelobe levels and gain an amplitude field taper across the secondary aperture is required. A modified subreflector will do the trick.

ACCESSION NO.
EMCAES 11-78-08

INDEX TERMS: Antenna, subreflector, sidelobes, diffraction, taper

LOW-COST DETECTOR DESIGN IS IDEAL FOR RF MONITORS

Karp, Arthur
Stanford Research Institute, Menlo Park, CA
MICROWAVES

Vol. 16, No. 3, March 1977, pp 58-59

ABSTRACT: The detector is made by combining and carefully trimming the pigtails of two inexpensive axial-lead diodes. Bandwidth is modest, but it is possible to achieve 200 mV/mW sensitivity.

ACCESSION NO.
EMCAES 11-78-09

INDEX TERMS: Rf monitor, detector, diode

BASIC COMPUTER ALGORITHM SPOTS SPURIOUS RESPONSES

Meixner, Raymond P.
Naval Research Laboratory, Washington, D.C.
MICROWAVES

Vol. 16, No. 3, March 1977, pp 42-46

ABSTRACT: BASIC program considers mixer and filter specs to predict spurious responses. A design example compares single-ended, single-balanced and double-balanced mixer performance in a superhet receiver.

ACCESSION NO.
EMCAES 11-78-10

INDEX TERMS: Spurious response, mixer, computer program

THIN FILM MIXERS TEAM UP TO BLOCK OUT IMAGE NOISE

Cochrane, James B. and Marki, Ferenc A.
Watkins-Johnson Co., Palo Alto, CA
MICROWAVES

Vol. 16, No. 3, March 1977, pp 34-40, 84

ABSTRACT: Thin film manufacturing techniques permit mixer pairs to be closely matched. Image can be easily separated from signal in a channelizer assembly, while intermod products are remixed for lower loss.

ACCESSION NO.
EMCAES 11-78-11

INDEX TERMS: Receiver, mixer, image, intermodulation

SOVIETS ARE STUDYING MICROWAVE EFFECTS ON HEALTH
(NEWS/WASHINGTON)

Harris, Paul
Washington Editor
MICROWAVES

Vol. 16, No. 1, January 1977, p 18

ABSTRACT: News item summarizing a classified report on Soviet Union research on low level microwave radiation effects. Report claims Soviet researchers have found that people exposed to low-level microwave radiation "experience more neurological, cardiovascular and hemodynamic disturbances than do their unexposed counterparts". It also defines another malady known as "microwave hearing". Other areas studied by the Soviets include changes in body chemistry and brain functions, including heart seizure from microwave radiation.

ACCESSION NO.
EMCAES 11-78-12

INDEX TERMS: Microwave radiation, low-level effects

RULEMAKING BEGUN ON OVERALL REVISION OF PART 18 GOVERNING ISM EQUIPMENT

The FCC has issued a Notice of Proposed Rulemaking to revise Part 18 governing the interference potential of microwave ovens, industrial heaters and similar equipment coming under the heading of Industrial, Scientific and Medical (ISM) equipment. This proceeding was initiated by an inquiry in which the FCC invited the public to participate in the formulation of new and updated technical specifications for ISM equipment, in the development of more detailed measurement procedures than those now in the rules, and in determining how best to apply the marketing rules to manufacturers and sellers of ISM equipment.

Briefly, the proposed revisions seek to make the following changes:

- Reduce the level of permitted emissions by ISM equipment to reduce general spectrum pollution;
- Extend, simplify and clarify the equipment authorization requirements for ISM equipment;
- Make special provisions for large, complex or unique ISM equipment by establishing a new equipment authorization procedure, ISM-Registration, and
- Provide more detailed and specific measurement procedures by issuing a series of Office of Chief Engineer (OCE) Bulletins.

ISM equipment is a general term referring to equipment that generates and uses RF energy to perform some work other than communications, such as cooking in microwave ovens.

The FCC noted that Part 18, essentially unchanged since it was adopted in 1948, permits operation of ISM equipment without an individual license, provided the equipment complies with both the technical and administrative requirements in Part 18, and provided further that it does not cause harmful interference to radio communications.

This regulatory approach will not change, the FCC said. It added that Part 18 permits unlimited radiation for any emission from ISM equipment that lies within the seven bands allocated for that purpose - 13.56, 27.12, 40.68, 915, 2450, 5800 and 24125 MHz. With the exception of 915 MHz, these bands are both national and international allocations. ISM emissions that lie outside these bands are required to be limited to 10 microvolts per meter measured at one mile for industrial heaters, and 25 microvolts per meter measured at 1,000 feet for medical diathermy and miscellaneous ISM equipment.

The Commission said that Part 18 was not satisfactory for governing the interference potential of ISM equipment to protect current and future radio communication needs.

The following is a list of the more important reasons for revising Part 18, the FCC noted:

- ISM equipment is considered to be the largest source of man-made radio noise;
- Current limits are inadequate to protect future communication needs, and ISM limits are out of line with limits for other equipment;
- Requests for tighter limits have been made;
- Current ISM specifications are more liberal than those imposed by other administrations;
- Responsibility for compliance requires clarification;
- Current test procedures are inadequate;
- Current equipment classifications are difficult to apply.

The rules proposed would delete the present rules in Part 18 and establish new technical specifications modelled after the international standards for ISM equipment recommended by CISPR. The allowable field strength for emissions outside the ISM bands vary from 900 mV/m to 30 mV/m (depending on frequency) measured at a distance of 30 meters. Emissions above 1000 MHz will be limited to 1500 mV/m at 3 meters. In addition, the equipment will be subject to a limit on the RF energy fed into the power line. For commercial equipment, the limit varies from 10 to 1 millivolts, depending on frequency. For consumer ISM equipment, the limit is from 10 to 20 dB lower.

The FCC also proposed that all ISM equipment, with one exception, be certificated (after testing on a test site) under the procedures in Part 2 as a prerequisite for shipment or sale. The exception deals with complex, usually one-of-a-kind, equipment which must be assembled on site. Such equipment will require ISM-Registration and may be tested at the site of operation. ISM-Registration will apply only to the installation at which the measurements were made. If a second, identical equipment is fabricated and installed, a separate ISM-Registration will be required.

The rulemaking includes examples of emissions from ISM equipment, proposed rules and test procedures. The test procedures are in the final stages of preparation and will be released as soon as practical. A public notice will announce their release.

NOTES FROM SEQUENCY UNION



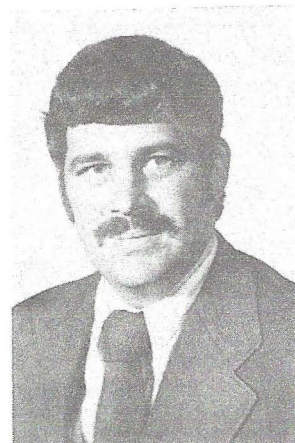
IEEE INTERNATIONAL SYMPOSIUM OF WALSH FUNCTIONS?

Is the time drawing near when an international meeting on the applications of nonsinusoidal functions in science and engineering would be beneficial? Are there really enough new results to warrant a worldwide solicitation of papers or would such a call produce modern summaries of previously known results and applications? Would a new symposium help dispel the lingering stigma of Walsh functions as a set of interesting solutions still looking for some problems? Is it worthwhile to rehash the material presented in the symposia held during the first part of the 70s? These are some of the questions several researchers who work in this area have been asking privately. I would like to initiate a public discussion of these matters.

Clearly the goals of any new meeting would include the exchange of new results and the stimulation of new research directions. But an equally important function is to provide a collection of new material on which new approaches may be based. The general feeling, beginning in 1975, was that the applications of Walsh and related functions should grow naturally from within the individual application areas, e.g., radar, speech encoding, probability. Has that really happened? Has the existing technical base been sufficient to spark the new applications, or have the proposed approaches not been appropriate? Will a new symposium have an insignificant impact?

The question contained in the title suggests that the IEEE might sponsor a new meeting on Walsh functions (implicitly including all related nonsinusoidal functions as well). The IEEE is a loose confederation of disparate technical groups and no overall technical structure exists for handling special technical topics except from within the Groups, Societies or Councils. The Sequency Union is currently affiliated with the IEEE Electromagnetic Compatibility Society. However, there has always been a concern by all involved that the relationship is strained. These feelings are similar to ones between factions inside other IEEE societies. Take for example the wire group and the theory committee in the Communications Society; there is a gap of interest between the algebraic coding theorists and the researchers in stochastic processes within the Information Theory Group. The list can be extended.

BY
G. ROBERT REDINBO



The Sequency Union has organized and sponsored sessions at EMC Symposia but the single session did not have a large enough draw by itself to attract people from great distances and there was little interest by the usual symposia attendees. Although the sessions were of direct benefit to the participants, their contents did not receive wide publicity among Walsh function researchers.

I feel strongly that if an international meeting on nonsinusoidal functions is appropriate, it should be organized within the EMC Society. That Society regularly publishes papers in this technical area in its Transactions. This continuing support marks a significant commitment. I further suggest that any meeting be held in conjunction with one of the regularly scheduled EMC Symposia. This not only provides for economy of scale in the financial aspects, but the cross fertilization of ideas will remove some of the strain between divergent groups. In addition the proceedings for both technical programs will be available through the normal IEEE Conference Publications channels. The actual program could be separated into two parts for organizational purposes, but each would be clearly identified with EMC. This identification would publicize again the strong ties between the Sequency Union and EMC.

Once enough public interest for a new international meeting has been established, the individuals with the greatest interest and energy can form a Steering Committee to begin the initial planning. This group should not be viewed as the final committee because the actual Symposium Committee needs a strong contingent from the meeting locality. The major task of any steering group is to organize a very tough Program Committee to screen the paper submissions so that the most effective program is developed. The final act of the Steering Committee would be to make a formal proposal to the EMC Adcom. From my personal experience, holding a symposium in combination with a regular EMC Symposium presents a minimal risk for everyone. Publicity for the call for papers would quickly indicate the expected level of success of the new part of the program.

Envision a symposium with two parallel sessions opposite the normal three EMC sessions. Over a three day period the total of six sessions could support about 70 technical papers. As indicated above, I strongly recommend holding these sessions at the same place and time as one of the EMC Symposia. Therefore, I have inquired about the tentative schedule of future EMC sites. The 1980 one is to be held in Baltimore in the first week of October at the Hilton at Dockside. There

is still enough time to organize a Walsh Symposium for 1980 at that location. Just to keep some options open I have asked the 1980 EMC Symposium Committee to tentatively reserve two more meeting rooms at the Hilton. The hotel will hold them for a few months but a definite decision must be made by early Spring.

The 1981 site is Boulder, Colorado, in August San Francisco is the tentative choice for October 1982 while Washington is the 1983 October prospect. None of the hotels for these future meetings has been selected. The Sequency Union could influence the exact facility choices. The EMC Symposium attracts about 400 while the estimated Walsh Symposium attendance can be set at 150 for planning purposes. Thus two meeting rooms each seating about 100 would be adequate.

Let us hear your reaction to the desirability and feasibility of holding an international meeting concerned with the applications of nonsinusoidal functions. Without a definitive response there can be no further planning. Possibly doing nothing is the proper course for the Sequency Union to pursue. Please address both your public and private comments to me. (My address is inside the front cover; my telephone is 518-270-6324).

IEEE CALLS FOR ENGINEER TRADE WAGE DIFFERENTIAL

The Board of Directors of the IEEE approved a far reaching resolution which calls for industry and government to pay their engineers more than they pay their nonprofessional supporting personnel. The action follows, but goes further than a recent similar action of the National Society of Professional Engineers which limits its recommendation to cover civil service employees only. The action was initiated by a resolution of an IEEE Portland, Oregon Section. In that area, there is reported dissatisfaction with wage patterns at the Bonneville Power Administration, in which graduate engineer employees frequently receive lower total remuneration than do electricians, technicians and other non-professionals who perform duties in support of the engineers.

The specific language of the resolution states in part, "Each employer, including all agencies of government, should establish engineer compensation schedules in accordance with certain criteria including: Compensation for a graduate engineer with four years satisfactory experience in the practice of engineering or a registered professional engineer should normally exceed the compensation provided for crafts, trade, and technician positions supportive or considered supportive of engineering practice." Among those actively supporting the resolution was IEEE Executive Vice President, C. Lester Hogan. Dr. Hogan, who is Vice Chairman of the Board of Fairchild Camera and Instrument Corp., said that the matter was "clearly one of principle on which IEEE's voice should be heard."

MORE POLLUTION: ELECTROMAGNETIC

A toaster that plays music, a truck that brakes when a CB radio transmits and a heart pacemaker that goes awry are symptoms of what may become one of the nation's most perplexing environmental problems in the 1980s - electromagnetic pollution. This is the plethora of radio waves and other energy radiated from the burgeoning number of electronic products and components in our homes, offices, factories, and vehicles.

Experts say the electronics revolution is only in its infancy and as engineers apply solid-state circuitry and the mini-computers known as microprocessors to more and more jobs, their unintended consequences may become more serious.

The big problem is interference. Signals from one device can disrupt another. Another possible problem may be biological effects that might be caused in some cases by the non-ionizing types of electromagnetic radiation usually considered harmless. Natural electromagnetic waves have been around as long as the Earth has, but the amount of man-made electromagnetic waves in the environment was relatively slight until after World War II. The increase since then has been dramatic.

The above has been excerpted from a UPI article which appeared in the Philadelphia, PA Bulletin, Sunday, November 19, 1978.

◆◆ MEETINGS & EVENTS ◆◆

CALL FOR PAPERS

A symposium dealing with electrical overstress (EOS) and electrostatic discharge (ESD) effects on solid state microelectronics is being sponsored by IITRI-Reliability Analysis Center. Emphasis is placed on expansion of the technical data base to eliminate production waste and premature failure as a result of electrical overstress.

The 1979 symposium will pay special attention to the reliability problems associated with electrostatic discharge during processing, packaging, handling and testing, and design steps which can be implemented to reduce the ESD hazard. Although papers are especially solicited in this area; work in all areas pertaining to electrical overstress effects on semiconductor devices will be included in the program.

The paper should deal with work in the following or related areas:

TESTING

- ESD Simulation Equipment
- Test Methods & Procedures
- Standards
- Static Monitoring
- Screening Methods
- Susceptibility Levels

ELECTRICAL OVERSTRESS

- Lightning
- EMI/EMP
- Other Sources

The deadline for submission of abstracts is March 21, 1979. Prospective authors are requested to notify the program chairman before February 16, 1979 of their intention to submit an abstract and the topics to be discussed. Authors must submit a 50 word descriptive abstract and a 300-500 word summary appropriate to describe a 20-minute paper.

Forward abstract and summaries to:

EOS/ESD Technical Program Co-Chairman
Whitson J. Kirk, Jr.
Bendix Corporation
Dept. 846, Mail Code MF39
P. O. Box 1159
Kansas City, MO 64141
Tel.: 816-997-4986

A limited number of papers reflecting late news of important developments will be considered on a space available basis. Please call the TECHNICAL PROGRAM CHAIRMAN to discuss the details of your late news paper as soon as you can.

For registration and general conference information, contact:

Mr. Roy Walker
1979 EOS/ESD Symposium
IITRI/RAC
RADC/RBRAC, Griffiss AFB, NY 13441
Tel.: 315-330-4151

EMC SYMPOSIUM AND EXHIBITION

ROTTERDAM, MAY 1-3, 1979

The Third International Symposium and Technical Exhibition on Electromagnetic Compatibility will be held in Rotterdam, The Netherlands, May 1-3, 1979.

After two successful presentations of this biennial event (Montreux 1975 and 1977), the forthcoming conference again will deal with problems of the interaction of electromagnetic energy with electronic and biological systems, with the immunity of electronic systems to interference as well as with their compatibility as regards electromagnetic environment.

The Symposium is held under the auspices of the Director-General of the Dutch Post and Telecommunications authorities Drs Ph. Leenman. It is organized by the Netherlands National Electrotechnical Committee of the IEC (NEC) in cooperation with the Institute of High Frequency Electronics of the Federal Institute of Technology, Zurich, Switzerland. The conference also has the support of the URSI, CISPR, EUREL, IEEE Region 8, SAE AE-4, of the Polish Association of Electrical Engineers (SEP) and of the IEEE EMC. The date of the Symposium has been chosen in coordination with the CISPR meetings at The Hague which shall begin on May 4th.

The Keynote Address, "Key Scientific Notes in EMC for 1979," will be delivered by Mr. G. H. Hagn, Chairman of the URSI Commission E - Electromagnetic Noise and Interference. Thereafter, in three parallel groups, 35 papers will be delivered in the sessions: Magnetic Fields, Biological Effects, Spectrum Management I, II, Electromagnetic Fields, Immunity and Susceptibility. These will take place on Tuesday, May 1st.

On Wednesday, May 2nd, the sessions, Nuclear Electromagnetic Pulse, I, II, Shielding, Predicting RFI Effects in Integrated Circuits, Communications and Cables, and a special URSI session, Modeling and Measuring Noise and Interference, with 42 papers will follow.

On the last day of the Symposium 43 papers will be delivered on Effects of NEMP and Lightning, EMI Effects of Power Lines and Systems, Measuring Methods and Production Testing, Frequency Analysis, Synchronisation and Filtering, Ignition and Gas Discharge Noise, together with a session "Late Papers."

Highlights of the program featuring 120 papers will be the NEMP session, which will bring an overview of the approaches to the survivability problem in various countries, the session on RFI in integrated circuits reporting on newest development in this field and the URSI session. The session on spectrum management will feature, among other important contributions, a lecture by Mr. Kirby, Director of the CCIR, on the impact of new technologies on spectrum utilization. There also will be an interesting session on lightning effects reporting on contemporary protective measures and testing, including artificially triggered lightning.

As usual, workshops providing ample time for discussion with prominent experts will be organized parallel to the sessions on EMC Diagnostics, Applications of Programmable Calculators, EMI/RFI Shielding, and on RFI Measuring Techniques.

The full text of the 120 papers will be available in the 600-page Proceedings: "Electromagnetic Compatibility 1979." The Technical Exhibition will include modern measuring systems, shielding and special technologies from the USA, England, Germany, Netherlands and Switzerland.

CONFERENCE ACTIVITIES

All 1978 conference records now will be available on microfiche. Also, a newly designed brochure on conference publications was mailed out recently to IEEE members having appropriate technical interests as determined by their Technical Interest Profiles. For further information, contact Conference Activities Manager, Richard Jerril at 212-644-7895.

LATEST NEWS ON THE GROUP TRAVEL PLAN TO THE ROTTERDAM EMC SYMPOSIUM MAY 1-3, 1979

We are forming a group to travel to the Rotterdam Symposium. This will allow us to take advantage of special group rates for air travel and hotel accommodations. Since we will be there during the tulip festivals, which run from April 15th to May 15th in Holland, we are including a second week in the tour so that we can visit the tulip fields and other attractions in Holland and the surrounding countries. We will have an option of using a rental car or a Eurail pass to get around during the second week.

Cost of the tour is \$766 per person, with two people sharing a hotel room and rental car, or \$786 per person for two people sharing a hotel room and using the Eurail pass. If you will be traveling alone, there is an additional "single supplement" for the rental car plan of \$242 or with the Eurail pass the single supplement is \$50. For full details about the itinerary, meals, hotel, and sight seeing tour, fill in and return the coupon below. A brochure with complete details will be available about the time you are reading this. To those who already have requested the brochure, we have mailed them to you as soon as they were received from the printer.

JIM HILL
6706 Deland Drive
Springfield, VA 22152

Dear Jim;

Please put my name on your mailing list for detailed description of the EMC Group trip to the Rotterdam Symposium and illustrated brochures on Rotterdam and Holland.

I would prefer to travel on -

KLM____ TWA____

Name (print)_____

Company_____

Street_____

City_____ State____ Zip_____

Phone NO. _____

ERIC HERZ NEW GENERAL MANAGER OF IEEE

Eric Herz of San Diego, California, Senior Project Engineer of the General Dynamics Convair Division, has been named General Manager of the IEEE. He will assume this new post January 1, 1979, succeeding Dr. Richard M. Emberson, who plans to retire in 1979.

Dr. Ivan A. Getting, President of IEEE, announced the appointment of Mr. Herz and commented: "I am very pleased in the acceptance by Eric Herz of the position of General Manager of IEEE. Eric has had a broad experience in all the activities of the Institute. He, therefore, brings to the position mature judgment. His technical and management capabilities have been demonstrated and the membership of IEEE can look to the future with confidence."

Mr. Herz has been active in many IEEE regional and technical affairs and, at present, is Vice President for Technical Activities of the Institute, having served as Division III Director in 1976-77. He also has been a member of the Board of Directors of IEEE from 1976 to the present.

He has served on many IEEE committees and boards, including those concerned with energy, computing, finance, and nominations and appointments. He was a San Diego Section Chairman and officer of Region 6 and was President of the IEEE Aerospace and Electronic Systems Society. He has chaired or participated in the management of conferences on the ocean environment, telecommunications, biomedical engineering, and human factors in electronics, and has published eight Conference Records and Proceedings.

A graduate of the Polytechnic Institute of New York in 1952 with a bachelor's degree in electrical engineering, Mr. Herz also has pursued graduate studies at Adelphi College, UCLA, and Pepperdine University.

He first worked at the Sperry Gyroscope Company on the development of radio navigation system predecessors to LORAN-C. He has been affiliated with the General Dynamics Convair Division since 1957. He has been engineering supervisor of the company's telemetry data processing stations and telemetry test equipment, where he developed the industry's first capability to process rapidly large quantities of telemetered information initially used for Atlas and Centaur rockets.

In 1966 he became the engineering manager for a new digital range measuring and communication system called RMS-2. After its completion, he participated in space shuttle studies with primary responsibilities in avionics fault tolerance, checkout, performance monitoring, and instrumentation.

Since 1974 he has been active in technical and program direction of cruise missiles and this year was selected as product manager for support equipment of the Air-Launched Cruise Missile competition and fly-off.

Incumbent General Manager Richard M. Emberson will continue on the IEEE staff as Consultant until his retirement in 1979.

SERVICE CONTRACT

The September issue of *The Institute* contains an open letter from Dr. Bruno O. Weinschel, Vice President, Professional Affairs, outlining the present status on "Wage Busting."

Basically, the IEEE intends to watch closely the enforcement of the Office of Federal Procurement Policy Letter No. 78-2 to assure fair and proper compensation for professional employees. NASA, DOD, and GSA have amended their procurement regulations to implement the OFPP Letter. However, constant vigilance is necessary.

Individual members can help in the IEEE effort by passing along information concerning solicitations and contract awards calling for professional services. If reductions in professional compensation are proposed by incumbent or prospective contractors, IEEE should be informed promptly.

MEMBERSHIP GROWTH CONTINUES

Total IEEE Membership and Society/Group Membership continues well ahead of last year, indicating increasing interest in IEEE and a strong membership promotion program. As of August 31, IEEE membership stood at 177,928, ahead of last year by 6840, or 3.99%. Student membership, at 22,469, is 7.01% ahead of last year.

Society/Group memberships are 9,983 ahead of 1977 for an increase of 6.01%. Computer Society membership alone has increased by 6672 members, accounting for two-thirds of this growth. Out of 155,459 higher grade members, 88,228 (or 54.2%) hold an average of 1.7 Group/Society memberships each. Out of 22,469 Student members, 12,024 (or 53.5%) hold an average of 2.1 Society/Group memberships each.

BARDEN DEBATES JAVITS-WILLIAMS BILL

Robert Barden, Vice Chairman of IEEE's Pension Task Force, represented engineers' concerns on pension reform in a one-hour nationally televised broadcast August 16th. Appearing on NBC's *America Alive*, Mr. Barden questioned Senators Jacob Javits (R-NY) and Harrison Williams (D-NJ) on S. 3017, a bill to amend the 1974 Employee Retirement Income Security Act (ERISA). The bill incorporates limited pension reform for employed workers, and other major ERISA changes. The broadcast linked Mr. Barden, in New York, with both Senators in NBC's Washington, DC studio. Also in the Washington studio was pension expert Karen Ferguson of the Pension Rights Center, a consumer-advocate group.

"Engineers are mobile--they constantly chase defense contracts around the country," IEEE's Barden stated. "What, if anything, can S. 3017 do to alleviate this problem and ensure that engineers and other mobile employees receive some kind of pension compensation?"

Responding to the question, Sen. Javits noted that he recognized the "particular problem of engineers" and promised relief.

"I was there," Mr. Barden says, "to point out the particular problems with mobile professions."

Although IEEE's Pension Task Force considers the Javits-Williams bill to be inadequate (see *THE INSTITUTE*, June, p. 1), Mr. Barden, interviewed following the broadcast, stated that he hoped modifications could be made when the legislation reached committee hearings. "Hopefully, it was introduced to stimulate discussion such as this," he says.

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NOMINATIONS FOR IEEE BOARDS AND COMMITTEES

The Nominations and Appointments Committee is soliciting nominations for candidates for appointment to IEEE Standing Committees and Boards. Talented and energetic persons from which qualified candidates can be called for service roles in IEEE activities are sought.

Nominations should be sent through Sections, Groups or Societies to Staff Secretary, Nominations and Appointments Committee, IEEE Headquarters, 345 E. 47th St., New York, NY 10017 before April 1, 1979

IEEE CALLS FOR ENGINEER - TRADE WAGE DIFFERENTIAL

The Board of Directors has approved a far reaching resolution which calls for industry and government to pay their engineers more than they pay their nonprofessional supporting personnel. The action follows, but goes farther than a recent similar action of the National Society of Professional Engineers which limits its recommendation to cover civil service employees only.

The specific language of the resolution states in part, "Each employer, including all agencies of government, should establish engineer compensation schedules in accordance with certain criteria, including: compensation for a graduate engineer with four years satisfactory experience in the practice of engineering or a registered professional engineer should normally exceed the compensation provided for crafts, trade, and technician positions supportive or considered supportive of engineering practice."

IEEE SELECTS CONGRESSIONAL FELLOWS FOR 1979

David Charles Lewis of Annandale, VA, and Ian Arthur Whyte of Pittsburgh, PA have been selected for the two Congressional Fellowships awarded each year by the IEEE. The Congressional Science-Engineering Fellow Program, in which IEEE has participated since 1973, places engineers and scientists with Congressional staffs for terms of approximately one year in length. The Program strives to make practical contributions to the more effective use of technical knowledge in government. It also endeavors to educate the participating societies regarding the public policy process and the value of government interaction.

The Program is unique from other Congressionally-related fellowship efforts in that its Fellows are designated as free agents, not representatives of the cooperating societies. Each Fellow is personally responsible for selecting an assignment from a list of available positions; the individual societies are not involved in this process. This "freedom from influence" is an inherent factor in the Program. Announcement of the positions chosen by the IEEE Fellows will be made at a later date.

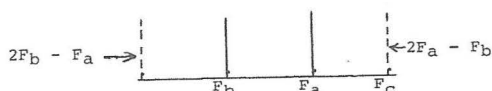
FIGURES DON'T LINE... RECEIVER-PRODUCED INTERMOD

by A.K. "Kenny" Guthrie

The question read like this: "I have three 75 MHz links in parallel...must have been drunk or stupid when I applied for the third frequency...ended up with three channels spaced 80 kHz apart! How many microvolts can appear at a receiver before it becomes non-linear and produces IM?"

The answer, reproduced below, outlines an approach which may be news to some of our readers. You can, of course, plug-in your own numbers. I'm conveniently ignoring the possibility that the receiver front end may provide a little attenuation at the spacing mentioned. Instead, the treatment assumes that all of the signals are well within the multi-frequency switching range of the receiver (where there is little or no attenuation).

The desired information can be deduced from the IM specification of the receiver. For the receiver in question, the IM spec is 60 dB and the k2 dB SINAD Sensitivity is 0.25 uV (-149 dBW). This means: Two signals, one and two channels respectively removed from the receiver's operating frequency, each 60 dB above -149 dBW, will produce a signal equal in level to that of an on-channel signal at -149 dBW. We'll talk about the product: $2F_a - F_b = F_c$, where F_a and F_b are frequencies of the off-channel signals, and F_c is the frequency of the third-order product to which the receiver is tuned. The frequency spectrum is as follows:



The power relationship is:

$$2P_a + P_b - F = P_c \quad (\text{Eq. 1})$$

Where: P_a , P_b and P_c are the powers at Frequencies A, b and c, respectively, expressed in dB above a consistent reference, and F is a "fudge factor" required to make practice coincide with theory!

By the very definition of the Receiver IM specification: the "consistent reference" is the receiver's 12 dB SINAD sensitivity, $P_a = P_b$ = the IM specification in dB, and P_c = zero. This established F as three

times the receiver IM specification. For the receiver in question, and with all powers expressed in dB over the 12 dB SINAD Sensitivity of -149 dBW:

$$2P_a + P_b - F = 0 \quad (\text{Eq. 1A})$$

$$2(60) + 60 - 180 = 0 \quad (\text{Eq. 1B})$$

This is the performance at the precise levels at which IM performance is specified. Assuming the unlikely possibility that these precise levels might exist in a practical situation, what can be done about it?

If we assume receiver threshold to be -10dB from 12 dB SINAD, reduction of the equivalent power of the product by -10dB (to -159 dBW in this example) will make the problem go away, for practical purposes. This demands that input to the receiver be reduced (by space or filtering) at one frequency, the other or both. There are a number of approaches which will do the job:

- Reduce power at Freq A by .5 dB. (This is the adjacent channel.)
- Reduce power at Freq B by 10 dB. (This is the alternate channel.)
- Reduce power at both by 3.33 dB, or
- Reduce by any combination which yields a 10 dB drop in product level.

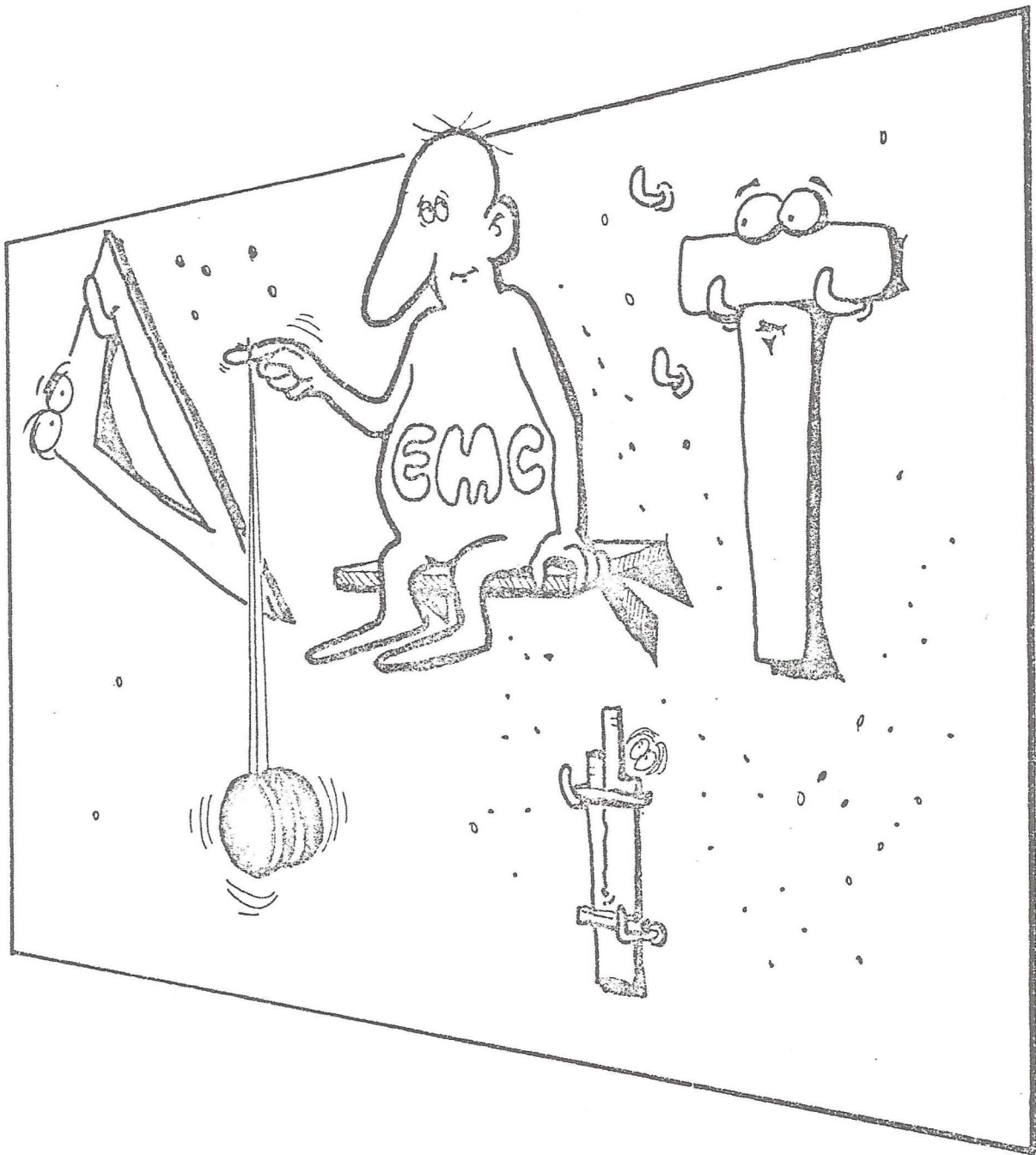
If, in this example, neither signal is above -92.3 dBW (3.33 dB below -89 dBW), you won't know you have an IM product. If one of the signals does exceed -92.3 dBW, you will have a product problem unless the other is sufficiently "down.")

In the real world, you don't start with equal signals at the adjacent and alternate channels. Enter Equation 1 with the actual levels (expressed in dB above 12 dB SINAD), and let F = 3-times the receiver's IM "spec."

If the result exceeds receiver threshold:

- Reduce one or both signals by space or filtering, or
- Get a receiver with better IM performance, or
- Hide the problem with Tone Squelch.

(From IEEE VTS Newsletter)



PREDICTION IS A DESIGN TOOL

INSTITUTIONAL LISTINGS

The IEEE Electromagnetic Compatibility Society is grateful for the assistance given by the firms listed below and invites application for Institutional Listings from other firms interested in the electromagnetic compatibility field.

SERVICE DIVISION, AMERICAN ELECTRONICS LABS., INC., Richardson Rd., Montgomeryville, PA 18936
EMI/EMC, shield, enc. consult. test. & anal.; Scrn. rm. (incl. for large veh.); Comp. instr. for Mil. EMI test.

ALITECH, Los Angeles Operation, 5340 Alla Road, Los Angeles, CA 90066
Computer operated/automatic/manual EMI test system, EMI meters, antennas, and components.

SPECTRUM CONTROL Inc., 152 E. Main St., Fairview, PA 16415
Telephone (814) 474-5593 Telex 510/699-6848

EMC test and consulting VDE, CISPR, MIL 461, FCC. Mfr. RF, filters, RFI capacitors, chips, variable caps—in stock at HALLMARK

ELECTRO-METRICS, Division of Penril Corp., 100 Church St., Amsterdam, NY 12010
EMI meters and automated systems incl., calculator/computer-based; 20 Hz-40 GHz *MIL-STD/CISPR/VDE/SAE/FCC.

ELECTROMAGNETICS, INC., 6056 W. Jefferson Blvd., Los Angeles, CA 90016
Telephone (213) 870-9383.

RF shielded enclosures, modular, prefabricated & all welded. RFI/EMI power line filters; signal line filters.

EMERSON & CUMING, INC., Canton, MA—Gardena, CA—Northbrook, IL.

Eccoshield RF shielded chambers—Eccoshield EMI/RFI gaskets and materials—Eccosorb anechoic chambers.

METEX ELECTRONIC SHIELDING GROUP, A Unit of Metex Corporation, 970 New Durham Road, Edison, NJ 08817
EMI/RFI, EMP & EMC Shielding Materials, Custom-Engineered Conductive Components, and Coatings.

CENTRALAB/USCC, 4561 Colorado Blvd., Los Angeles, CA 90039
EMI/RFI Filters, Monolithic Ceramic Capacitor (Chips).

TECKNIT, INC., 320 N. Nopal St., Santa Barbara, CA 93103
EMI/RFI Shielding Products, Conductive Components, Textiles, Coatings, Adhesives, and EMC Windows.

HONEYWELL, ANNAPOLIS OPERATION, P. O. BOX 391, Annapolis, MD 21404
Telephone (301) 224-4500

EMI/EMC/TEMPEST, R & D, Test and Analysis, Communication and Digital Design

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