IEEE

Electromagnetic Compatibility Society Newsletter

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NOMINATIONS FOR BOARD OF DIRECTORS

Nominations now are being accepted for election of the EMC Society Board of Directors. In order to be nominated, a petition form, including biography summary, must be received by the nominating committee before June 15, 1983.

Petition forms and information can be obtained from:

Gene Knowles
Nomination Chairman
BE&C Engineers, Inc.
625 Andover Park West
Tukwila, WA 98188-3374
Phone: (206) 575-5280
M/S 9A-01

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

Education History
Work History
Technical Committee Service
IEEE/EMC Membership

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

STANDARD METRIC PRACTICE APPROVED BY ANSI

The American National Standards Institute (ANSI) has approved a new Standard Metric Practice. This revised document, the first American National Standard Metric Practice approved since 1976, now is being considered for adoption by the US Department of Defense. New information on impact, pressure and vacuum, dimensionless quantities, and symbols for use in systems of limited character sets have been added, as well as conversion factors for temperature interval.

The new document recognizes the unit for dose equivalent (the sievert), the use of "L" for liter, and the use of "μ" with liter. The definition of candela and the section on torque and work have been revised. The treatments of radian, steradian, Celsius temperature, and the International Practice Temperature Scale have been updated to conform with the new international recommendations. Other modifications have been made to: clarify some points, update references, and improve the table of conversion factors.

American National Standard Metric Practice, ANSI/IEEE 268-1982, is published by the Institute of Electrical and Electronics Engineers, Inc. (IEEE), and may be purchased from the IEEE or American National Standards Institute (ANSI). The standard is priced at $5.00 and may be ordered from the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854 or ANSI, 1430 Broadway, New York, NY 10018.

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Second-class postage paid at New York, NY and additional mailing offices.

EDUCATION COMMITTEE NEWS

Several short courses on EMC related topics are scheduled for the spring and summer of this year.

Reliability Sciences, Inc. is presenting a series of 3-day courses on *Electrostatic Discharge Control.* These will be on May 16-18 in Chicago, June 6-8 in Washington, DC, and July 20-22 in Los Angeles. For more information, call 703-979-1414.

Mc-Graw Hill Seminar Center is presenting a course on *Controlling Electromagnetic Interference* on May 12-13 in Boston. The seminar leader is Ernest R. Freeman. For more information, contact McGraw-Hill at 212-687-0243.

Don White Consultants will be offering *Grounding and Shielding* in Los Angeles on May 3-6, in Toronto on June 21-24, and in Boulder on July 19-22. *Interference Control: An Introduction to EMI-RFI-EMC* is scheduled for San Jose on June 28-30 and in Boston on August 9-11. *TEMPEST-Design, Control and Testing* will be offered May 16-20 in Washington, DC and on August 15-19 in Sunnyvale. *EMP-Design and Measurement for Control of Susceptibility* will be given on June 14-16 in Albuquerque. A course on *Electrostatic Discharge Control* will be offered in Washington, DC on August 22-23. *EMI Control in Electronic Data Processing Equipment* will be presented on July 12-15 in Boston. For more information, call 703-347-0030.

R & B Enterprises has announced a series of one and two-day seminars to be given in May in Chicago and Boston. The seminars are: *Interpretation and Testing per FCC Computer Requirements (Part 15, Subpart J); EMI Control Design for Computing Devices; Grounding, Bonding and Shielding;* and *Printed Circuit Board and Wiring Design for EMI Control.* R & B's hands-on EMI training, 2-day Workshop is being offered May 16-17 and June 13-14 at their suburban Philadelphia facilities. The Workshop provides a combination of classroom instruction and laboratory demonstration of FCC tests, panel and cable shielding tests, susceptibility tests and selected military tests. Students may bring their products and are encouraged to submit areas of special interest in advance. Call 215-828-6236 for actual dates of seminars, additional information, or for a copy of the seminar brochure.

The Center for Professional Advancement is sponsoring a 4-day course on *Electromagnetic Compatibility Engineering* to be given in Amsterdam on July 4-7. The instructors will be Henry Ott and Don Heirman. For more information, call 201-249-1400 in the USA or 020/72.30.50 in Amsterdam.

In order to be included in the newsletter, information on courses and seminars must reach me by December 1 for the winter issue, March 1 for the spring issue, June 1 for the summer issue, and September 1 for the fall issue.

Henry Ott
Chairman, EMCS
Education Committee
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NEWSLETTER STAFF

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CHAPTER CHATTER

by Charles F.W. Anderson

CENTRAL NEW ENGLAND

At the Chapter's February 9th meeting, the following were nominated for officers for the 1983-84 term:

Chairman:	L. E. Long, U.S. DoT/TSC - Cambridge
Vice Chairman:	A. W. Murphy, GTE Sylvania - Needham
Secretary/Treasurer:	J. M. Clarke, USAF/ESD - Bedford

Len Long is Program Manager on a rail transit EMI program at DoT/TSC. At the same meeting, he was one of the speakers addressing the topic "EMI Engineering for Advanced Rail Transit Applications." Dr. Ross Holmstrom, of the Univ. of Lowell and Dot/ESC, was the other. They described a program comprising analysis and modeling of EMI produced by advanced propulsion systems which includes susceptibility of control circuitry. Past and current activities were discussed, as related to a number of new rail transit systems in the U.S. There were 11 attendees. Tony Genova of Chomerics hosted dinner at the MIT Faculty Club prior to the meeting. Plans are to have a meeting in April or May covering updated information on lightning effects.

Thanks to John Clarke for his input, which formed the basis for the above.

CENTRAL TEXAS

Last May, the Chapter elected Bob Hunter as Chairman, O.L. Jouffray as Vice Chairman and Mel Johnson as Treasurer. However, because of his impending retirement, Oke Jouffray in January requested that an early replacement be named for him. Mel Johnson was nominated to take Oke's spot; and Rich Marcotte, of Data Point - San Antonio, was nominated for the Treasurer's job. The Chapter held a meeting last July at which Lothar Ott discussed EMI testing at the VDE Test Station in Offenbach, West Germany. Their December meeting was held at Data General's Austin facility with Roger McAleenan of Hewlett-Packard as the speaker. His topic was "Automated EME Measurements Using the HP Model 8568A Spectrum Analyzer with Quasipeak Adapter." In October, Bill Cory (VP at SwRI) was the speaker at a meeting held at the Alamo Coors Corp. in San Antonio. He described the SwRI program, which is in progress, to evaluate effects of HV 60Hz fields on large animals. He also presented details of the new exposure facility which will be used for on-going evaluations through 1986. At the same meeting, Mel Johnson demonstrated a new field-measuring technique.

Plans for the '84 EMC Symposium are going forward under Mel Johnson, the Conference Chairman.

The above was extracted from the Central Texas Section's fine newsletter, The Analog.

CHICAGO

Bob Hofmann reports that the Chapter held a meeting on March 15th at the CORCOM Libertyville facility. The program included a demonstration of filter modeling on an Apple computer, a screenroom demonstration, a visit to the environmental test laboratory and a description of CORCOM's QA program. Bob presented a brief description of the EMC facilities at Dayton T. Brown - Long Island, and Bell Labs - Chester, N.J.

LOS ANGELES

On February 17th, Al Whittlesey of JPL - Pasadena presented a talk on "Spacecraft Charging Design Considerations for Galileo near Jupiter." His presentation covered the effects of spacecraft charging on scientific measurements in space. Results of a charging analysis on the Galileo spacecraft made using the NASCAP computer code were given, as well as descriptions of design modifications made on the basis of the study.

NEW JERSEY COAST

Highlight of the Chapter's Christmas Party was the presentation of a plaque to Warren Kesselman, which cited his many contributions to the Chapter and his election to Fellow grade. Warren also won the featured door prize - a Timex/Sinclair 1000 personal computer!

The Chapter's February 15th meeting featured Don Heirman, who presented "A Basic All-Weather Open-Field EMI Test Site." He described a cost-effective, simple design, which is capable of giving credible radiated emission measurement data and can be constructed quickly. Would you believe for only about 60 kilobucks!

On April 26th, the meeting will have Dr. George Brucker of RCA's David Sarnoff Research Center speaking on design and validation techniques for EMP radiation hardening of LSI devices.

Thanks to Seymour Krevsky for providing the copy of the EMC/VT Newsletter which contained the above information.

SAN DIEGO

At a meeting on February 9th, Bruce Harlacher, Group Leader of the Electromagnetics Test Group at IRT, presented a talk on the topic "Nuclear Electromagnetic Pulse Testing." He covered the nature of the EMP environment produced by high-altitude nuclear events, the role of testing in hardening military electronic systems, typical categories of tests, and types of test facilities and equipment employed. A tour of the IRT EMP laboratory test facilities and demonstration followed.

The Chapter's March 9th meeting featured Bill Johnson (General Manager at Electromagnetic Technology, Inc. - San Diego) who discussed the U.S. Marine Corps E^3 Program. His presentation included EMI problems associated with amphibious landing force operations and close air support of combat deployments.

TOKYO

Professor Tasuku Takagi of Tohoku University has assumed responsibility for sending us the lists of papers presented at the EMC Research Meetings. Ten papers were presented at the January 25th meeting. Topics included microwave power absorption by insects, a low-noise switching power supply and results of tests of a roadside inductive diffusion cable installation. My sincere appreciation to Professor Takagi for furnishing us the lists.

PAPERS PRESENTED AT THE RESEARCH MEETING ON EMC JAPAN

January 25, 1983, Osaka

1. "Absorption Characteristics of Insect Exposed to Standing-Wave Fields," by Osamu FUJIWARA, Yoshiyuki GOTOH, Yoshifumi AMEMIYA, Faculty of Engineering, Nagoya University. Report of Technical Group on EMC, IECE and IEE of Japan, Vol. 82, No. 238, EMCJ 82-65, pp. 1-8

   ABSTRACT: This paper describes microwave power absorption in an insect due to the standing-wave irradiation in free space. A method is presented to obtain the heating potential and total absorbed power in the dielectric sphere having the same electrical characteristics as those of insects. Numerical calculations on the pupae of Tenebrio molitor, which has often been used to investigate the microwave biological effects, are given in the frequency range of 1-20 GHz, and the results also are discussed with respect to the exposure locations.

2. "Introduction to Swell Wave Observation by Pulse Radar," by Yoshizo HAGINO, Toshio SHIMIZU, Tatuo MATUNO, Hitoshi TAKAYAMA, Ikuo NAKAZAWA, Japan Radio Co., Ltd.; Masatuna KOGA, Japan Foundation for Shipbuilding. Report of Technical Group on EMC, IECE and IEE of Japan, Vol. 82, No. 238, EMCJ 82-66, pp. 9-15

   ABSTRACT: We observed the waves with a conventional X band radar under typhoon condition. Received radar echoes were digitalized and recorded, then analyzed by several methods. Wave length, propagation direction and velocity were attained by 2 dimensional Fourier analysis and pattern comparison. It would be possible to calculate the wave height by these parameters and spectrum analysis. These calculated wave heights were proportional to the data by the Meteorological Observatory. Three dimensional direct Fourier Bessel Transformation of radar echo signals on polar coordinated, wave height radar equations in cases of mirror effect and shadow length are introduced.

3. "HF Radio Wave Environment Over Kokubunji, Tokyo," by Toshichika ANDO, Rikio MAEDA, Tetsuo TAKEUCHI, Teruo KOSEKI Radio Research Laboratories. Report of Technical Group on EMC, IECE and IEE of Japan, Vol. 82, No. 238, EMCJ 82-67, pp. 17-23

   ABSTRACT: The HF radio wave environment within the ionosphere is formed mainly by solar or terrestrial artificial and natural radio sources. An equipment adaptive to the usual ionosonde which is conducted in HF band every 15 min. routinely has been designed so as to enable the reception of interference outside the time interval to receive the observed wave. Using this equipment, successive variation in signals and interferences was measured and the HF radio wave environment there was observed. This report presents the construction of the modified ionosonde and some interpretations for the observational results.

4. "Dielectric Constant and Wave Absorption of Concrete at X-band Frequency," by Yasutaka SHIMIZU, Tokyo Institute of Technology. Report of Technical Group on EMC, IECE and IEE of Japan, Vol. 82, No. 238, EMCJ 82-71, pp. 47-53

5. "Occurrence Region of Showering Arc in Breaking Silver Contacts and Relationship Between Its Region and Radio Noise," by Keiichi UCHIMURA, Teizo AIDA, Faculty of Engineering, Kumamoto University. Report of Technical Group on EMC, IECE and IEE of Japan, Vol 82, No. 238, EMCJ 82-72, pp. 55-61

   ABSTRACT: First, an occurrence region of showering arc in breaking silver contacts was made clear in this paper. In this region, the spectra of voltage waveforms of showering arc and the radio noise E (dB) caused by this arc were measured.

   Next, from the results of measurements, it was found that:

   1) As the dielectric breakdown voltage V_B increases, E (dB) increases.
   2) Generally, the damped oscillation appears just after the dielectric breakdown, and this oscillation is one of the main reasons of radio noise.

6. "Electromagnetic Field in the Lossy Sphere Exposed in the Near Field of a $\lambda/2$ Dipole Antenna," by Yoshifumi AMEMIYA, Shinji UEBAYASHI, Faculty of Engineering, Nagoya University. Report of Technical Engineering Group on EMC, IECE and IEE of Japan, Vol. 82, No. 238, EMCJ 82-73, pp. 63-68

   ABSTRACT: The calculated values of power absorbed in a simulated human head exposed in the near field of portable radio transmitters are presented. A head is simulated by a homogeneous lossy sphere, and $\lambda/2$ dipole antenna is substituted for the 10cm radius sphere exposed in the field of 1.0W antenna power. The heating potential is 2 to 6 times higher than that exposed in the plane wave with power density of $1mW/cm^2$ (the American National Standard Safety Level) at the nearest face of the sphere to the antenna.

7. "Test Results on Electro-Magnetic Field of Roadside Radio Diffusion Cable," by Takao KADOWAKI, Public Works Research Institute, Ministry of Construction; Kunihiko OKAMOTO, Koichi NAKATANI, Hitachi Cable Ltd.; Akira MORISHITA, Matsushita Comm. Industrial Co., Ltd. Report of Technical Group on EMC, IECE and IEE of Japan, Vol. 82, No. 238, EMCJ 82-74, pp. 69-76

   ABSTRACT: In our previous articles, we proposed the delay type inductive diffusion cable for roadside vehicle radio communication, in which the electromagnetic fields are limited in its neighborhood and do not interfere with remote radio equipment. In 1980, this cable was installed experimentally in our national route No. 17, and has attracted public attention as a new roadside information system which can be expected to attain more popular application in Japan. In this report, the detailed measurement is made for this type cable installed in the test course of the public works research institute.

ELECTRONIC UNEMPLOYMENT RISING

The U.S. Labor Department has reported that unemployment in the electronics industry jumped from 7.1 per cent in May to 13.1 per cent in November, 1982.

If the rate of increase continues, the industry in the next month or two could exceed the previous record unemployment rate of 14.9 per cent set in May, 1975.

The electronics industry jobless rate in November, 1981 was 8.2 per cent. In October of last year, the rate was 12.2 per cent.

DEMONSTRATION LICENSES IN THE BUSINESS RADIO SERVICE

The Private Radio Bureau, through its Licensing Division, has issued licenses to radio equipment manufacturers, communications sales organizations, and others for the purpose of demonstrating equipment, conducting propagation studies, and performing field strength surveys. These licenses normally were granted in the Business Radio Service to utilize itinerant-use frequencies. Licensees also were authorized to conduct these activities on frequencies assigned for their regular day-to-day business communications. In addition, these entities usually were able to obtain licenses in the Experimental Radio Service, governed by Part 5 of the Rules, for these purposes.

Licensees advised the FCC that the limitations imposed upon the itinerant-use frequencies were somewhat restrictive for this type of operation. Also, the procedures to be followed in the Experimental Radio Service were burdensome; therefore, to alleviate these problems, the Licensing Division now will accept applications and grant licenses in the Business Radio Service to cover one or more bands of frequencies available to the Private Land Mobile Radio Services governed by Part 90 of the Rules (25-50; 72-76; 150-174; 450-470; 470-512; 806-821/851-866; and 929-930 MHz).

The grants will be made subject to special conditions. Demonstrations or surveys pursuant to such licenses must be completed within a two week period. Any frequency allocated for use in a Part 90 radio service may be used, provided that the technical limitations applicable to regular use of that frequency are observed. Also, there are areas where bands of frequencies cannot be assigned, e.g., in zones where prior coordination with Canada is required. The 470-512 MHz band will be authorized only in those areas where the frequencies are available on a regular basis in the rules. Further, portions of the 806-821/851-866 MHz bands are not available in the border areas of Canada and Mexico.

Licensees of this type of authorization should be aware of all of the technical limitations imposed upon bands of frequencies and all special limitations applicable to discrete frequencies contained in the various subparts of Part 90 of the Rules.

The prospective licensees (those for whom the demonstration or survey is performed) must prepare and file a complete application, which includes establishing eligibility and compliance with the frequency coordination procedures, if required. A valid license must be obtained from the Commission prior to operating radio equipment on a regular basis.

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TECHNOLOGY-ALERTING INDEX

This index lists recent manuscripts received (but, not yet accepted) for publication in the EMC Transactions. New indexing symbols are included to indicate the subjects treated. For details on the meaning of these symbols, refer to the editorial "Coding Scheme for a Technology-Alerting Index" which appeared in the May 1982 issue of the EMC Transactions. Draft copies of the manuscripts may be available, upon request, from participating authors.

J10d 82-56 Scattering and Pattern Perturbation by a Conducting Tubular Cylinder of Finite Length—Z. Mao and D. K. Chang, Dept. of Electrical and Computer Engineering, Syracuse University, Syracuse, NY 13210. (315) 423-2655. 17d, 17j.

A2i 82-58 An Artificial Network for Conducted Emission Noise Measurement of Japanese Compact Passenger Vehicles—S. Yamamoto and O. Ozeki, Toyota Central Research and Development Laboratories, Inc.; 41-1, Aza Yokomichi, Oaza Nagekute, Nagekute-Cho; Aichi-gun, Aichi-ken, 480-11, Japan. (05616)2-6111. A3f, H25k.

I7d 83-1 Angular Resolution with Sinusoidal Waveforms—S. H. Leong, Naval Surface Weapons Center (Code F-42), Dahlgren, VA 22448. (703) 663-8126. H15k.

J10d 83-2 Radar Cross Section of General Three-Dimensional Scatterers—A. Taflove and K. Umashankar, IIT Research Institute, 10 W. 35th St., Chicago, IL 60616. (312) 567-4490.

A8c 83-3 An Investigation of the Parallel-Plate EMP Simulator With Single-Pulse Excitation—H. M. Shen, R. W. P. King, and T. T. Wu, Gordon McKay Laboratory, Harvard University, Oxford St., Cambridge, MA 02138. (617) 495-4468. A8f.

A2e 83-4 Design of Absorber-Lined Chambers for EMC Measurements Using a Geometrical Optics Approach—S. R. Mishra, Division of Electrical Engineering, National Research Council of Canada, Montreal Road, Ottawa, Canada; and T. J. F. Parlasek, Department of Electrical Engineering, McGill University, Montreal, Canada. F4f, F4i.

O99d 83-5 Introduction to Bridge Functions—Dr. L. Zhihua and Dr. Qishan, Electrical Engineering, Beijing Institute of Aeronautics and Astronautics, Beijing, China.

N1d 83-6 Theoretical and Experimental Evaluation of Power Absorption in Elongated Biological Objects at and Beyond Resonance—A. Lakhtakia and M. F. Iskander, Department of Electrical Engineering, The University of Utah, Salt Lake City, UT 84112. N1f.

D1e 83-7 A Simple Model for Weakly Coupled Lossy Transmission Lines of Finite Length—R. G. Olsen, Electrical Engineering Department, Washington State University, Pullman, WA 99164-2210. D1d.

EMC STANDARDS ACTIVITIES

This short column brings to your attention the status of new EMC Standards, two from the American National Standards Institute (ANSI) and three from the SAE.

STANDARD	STATUS
ANSI	
C95.1-1982	Electromagnetic Radiation with Respect to Personnel, Safety Level of. This new standard which establishes RF RADHAZ levels as a function of frequency is still in the publication chain and has not yet been mailed.
C63.12 (Draft)	Recommended Practice on Procedures for Control of System Electromagnetic Compatibility. This draft document, dated 20 July 1979, has been subject to trial use and now is being balloted for approval as an American National Standard.
SAE	
J1407-Aug. 82	Vehicle Electromagnetic Radiated Susceptibility Testing Using a Large TEM Cell. This new document now is available from SAE.
J11136	Electromagnetic Susceptibility Test Procedures for Vehicle Components (except aircraft). This revision of the "a" version is presently in the balloting process.
J1338-June 81	Open-Field Whole-Vehicle Radiated Susceptibility 10 kHz to 18 GHz, Electric Field. This standard has been in existence for over one year, but is listed here for those who may have missed earlier notification.

Book Reviews

by Jim Hill, EMXX Corporation.

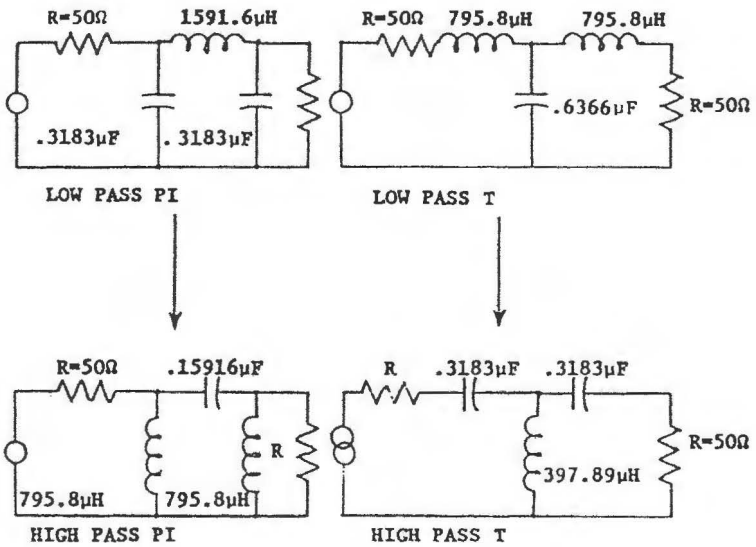
In this issue, we are fortunate to have three reviews plus corrections for a book reviewed in EMCS Newsletter No. 116.

We are indebted to Bill Duff for a review of a book on electromagnetic fields by Prof. Clayton Paul and his collaborator, Syed A. Nasser. Bill Moyer of Martin Marietta Denver is responsible for the other two reviews. One of these is the review of a filter design handbook which purports to give the average inexperienced engineer an ability to design filters of almost any kind. Bill gives his opinion of how well the author accomplishes his goal. The third book reviewed was written to educate the public on the source of radio interference and as an aid to the neophyte EMC engineer in solving these problems. Some of the case histories make interesting reading.

Now and again, we receive comments from our readers and we welcome this feedback. Recently, Ed Wetherhold of Honeywell called to tell us of errors in the filter chapter of "Electromagnetic Compatibility Design Guide" by Freeman and Sachs which was reviewed by A. H. Sullivan, Jr. in the last issue of this newsletter. Ed had noted these errors in the original NAVAIR edition of the book and had called them to the attention of the editors. The corrections were somehow lost and did not get back to Freeman and Sachs who were very responsive and have made arrangements to make these corrections in later editions. Owners of the book are urged to make the following corrections:

Relative to our book titled "Electromagnetic Compatibility Design Guide", the following has been brought to our attention by Ed Wetherhold:

- Equations 8.2 and 8.3 should read
  $|IL| = 10 \log (1 + F^2)$
- Figure 8-21 should be as shown below:



Owners of this book are urged to make these corrections. We will pick them up in later editions.

Ernie Freeman & Herb Sachs

"Introduction to Electromagnetic Fields"
by
Clayton R. Paul and Syed A. Nasar
Published by McGraw-Hill Book Co.
Copyright 1982
Hardbound $29.95
Reviewed by William G. Duff
Atlantic Research Co.

The subject of electromagnetic fields is one of the most important topics in electrical engineering in general, and in the special areas of electromagnetic interference (EMI) and electromagnetic compatibility (EMC). In particular, electromagnetic fields often play a major role in determining whether a particular configuration of a potentially interfering emitter and potentially susceptible receptor will result in EMI or EMC. Many of the major mechanisms of coupling between culprit emitters and victim receptors involve electromagnetic field interactions. Examples of coupling mechanisms involving electromagnetic field interactions include: antenna-to-antenna, wire-to-wire, field-to-wire, case radiation, case penetration, etc. In order to be able to understand and assess potential EMI situations and to recommend and design fixes to ensure EMC, it is necessary to have an understanding of the fundamentals of electromagnetic fields. This book provides a good introduction to the basic understanding of electromagnetic fields.

The subject of electromagnetic fields is inherently difficult because the quantities of interest are functions of both time and spatial parameters. In order to solve most electromagnetic field problems, it is necessary to visualize and understand governing equations. This book provides a clear explanation of the fundamental principles and concepts which, in turn, makes the subject matter interesting and helps to motivate the reader to assimilate the material. The book presents the important concepts with a minimum of detail so that the reader can distinguish the "forest from the trees."

A review of the literature shows that there are a number of excellent books that cover static fields in considerable detail, but do not give sufficient coverage of time varying fields. Likewise, there are a number of books that cover the topic of time varying fields in considerably more detail and sophistication than is required for an overall introduction and basic understanding of the subject. As a result, the subject of electromagnetic fields has, perhaps, been viewed as being more difficult than is really necessary for a fundamental understanding. This book is excellent in bridging the gap between the existing references that cover static fields in detail or cover time varying fields in more detail than is required for a basic understanding of the subject.

This book presumes that the reader has been introduced to the basic standard field concepts such as Coulomb's law and Gauss' law through standard elementary physics courses. Consequently, the discussion of static field concepts is minimized so that the more important topics of time varying fields and the engineering applications (uniform plane waves, transmission lines, waveguides and antennas) can be covered in sufficient depth.

Chapter 1 provides an introduction and motivational survey, and Chapter 2 presents all of the necessary vector algebra and vector calculus tools and concepts. Chapter 3 contains the static electric field concepts (Coulomb's law, electric field, Gauss' law, potential, energy, capacitance, and mechanical forces). Chapter 4 presents the static magnetic field concepts (the Biot-Savart law, Ampere's law, energy, inductance, mechanical forces, and magnetic circuits). Relatively brief discussions of material properties are included in Chapters 3 and 4.

Chapter 5 begins the discussion of time-varying field concepts by introducing and discussing Maxwell's equations, the boundary conditions, Poynting vector, and the important sinusoidal, steady-state solution technique. Chapter 6 begins the discussion of the applications and implications of Maxwell's equations from an engineering standpoint. The concept of electromagnetic waves is discussed in considerable detail so that this fundamental concept will be firmly understood when it recurs later. Reflection and transmission of uniform plane waves, as well as polarization of these waves, also are discussed.

Chapter 7 contains a discussion of wave propagation on transmission lines. Both transient and sinusoidal, steady-state behavior are discussed. The emphasis is on fundamental principles, and the Smith chart and its applications are discussed in detail in Appendix C. Chapter 8 presents a discussion of rectangular waveguides, which, although brief, covers the essential points.

The topic of antennas is covered in Chapter 9 in somewhat more detail than is customary in a text aimed at this level. The Hertzian dipole and the long linear dipole are discussed in somewhat standard manner, as is the topic of linear arrays. Antenna directivity and gain also are discussed. Coupling between two antennas is considered, and the important concepts of reciprocity, with regard to impedance and pattern for an antenna in either a transmitting or receiving mode, are derived. The Friis transmission equation also is derived.

Chapter 10 contains the traditional techniques for solution of static field problems for which simple, closed-form solutions are not obtainable. Solution techniques for Laplace's and Poisson's equations, as well as numerical methods (finite-difference and method of moments) and analog and graphical methods, are discussed.

This book is a must in any reference list or library that deals with the subject of electromagnetic fields.

"Electronic Filter Design Handbook"

by

Arthur B. Williams

Published by McGraw-Hill Book Co.

Copyright 1981

$37.50

Reviewed by W. E. Moyer

Martin Marietta Aerospace

Denver, Colorado

According to the author's preface, the book is intended to provide practical, in-depth data "so that the average engineer can design almost any type of filter with no prior experience." Design of both active and passive filters is accomplished by using normalized numerical tables in conjunction with time and frequency domain response curves for a variety of filters. While the book cannot really be used as a stand-alone guide to filter design, it does contain numerous references to standard treatments of filter design and theory, and will be useful as a reference book of practical design techniques for the practicing filter designer or as a supplemental textbook for a college-level filter design course.

Chapter One consists of a brief introduction to modern network theory and discusses whether to choose an active or passive filter design (frequency limitations, size, economics of manufacture and ease of adjustment).

Chapter Two deals with selection of the response characteristics desired for low-pass, high-pass, band-pass and band-reject filters. The technique used is to transform the required response to a normalized low-pass specification with a cutoff frequency of 1 radian/second. By comparing the required normalized response to selected categories of normalized response curves, a satisfactory low-pass filter may be determined and the tabulated normalized component values of the chosen filter transformed to give the final design. Attenuation characteristics, group delay characteristics, impulse response and step-response curves are provided for Butterworth, Chebyshev, Linear Phase, Transitional, Synchronously tuned and Elliptic-function type filters. The advantages and limitations of each type of filter are discussed, with numerous sample calculations presented.

Chapter Three covers LC and active low-pass filter design in considerable detail, with examples of frequency and impedance scaling. Topics discussed include duality, reciprocity, designing for unequal termination impedances, effects of dissipation and minimum acceptable Q of reactive circuit elements for a given filter response. Several examples of elliptic-function design are presented.

Chapter Four deals with LC and active high-pass filter design, with examples of elliptic-function filter designs presented.

Chapter Five covers LC and active band-pass filter design of both wide-band and narrow-band filters. Wide-band filters (defined as filters where the ratio of upper cutoff frequency to lower cutoff frequency is greater than 2) are treated as a cascade of low-pass and high-pass filters. Step-by-step procedures for conversion of normalized low-pass tabulated values to band-pass values are presented with numerous examples for various types of filters (Butterworth, Chebyshev, Synchronously tuned, Elliptic-function, etc.).

Chapter Six deals with LC and active band-reject filter design, with emphasis on elliptic-function band-reject filters and null networks (resonant traps). Examples are presented of Chebyshev and elliptic-function band-reject filter, and null network design.

Chapter Seven covers design of time-domain response networks, including all-pass transfer networks (delay lines), delay equalizer sections, wide-band phase shift networks and adjustable delay and amplitude equalizer networks. There are numerous examples of network design presented.

Chapter Eight presents several refinements in LC circuit design, including the use of tapped inductors to reduce resonating capacitance values, designing with parasitic capacitances, filter tuning methods and techniques for measuring filter insertion loss, input impedance, return loss, time-domain characteristics and the Q of inductors.

Chapter Nine deals with design of magnetic components. Basic principles of magnetic circuit design, laminated inductor, toroidal coil, ferrite cores, high-frequency coil design and transformer design techniques are presented.

Chapter Ten deals with the topic of component selection for LC and active filters. Differences in construction and electrical characteristics of different types of capacitors, resistors and operational amplifiers and the effects of these differences in component characteristics on the overall filter characteristics are discussed. This information will aid the designer in selecting the proper components for a given filter application.

Chapter Eleven is a brief introduction to digital filter design.

Chapter Twelve consists of the normalized filter design tables which were used in the previous chapters of the book. The following normalized (order 2 to order 10) filter design tables are presented:

Butterworth LC and Active Low Pass Filters

Butterworth Uniform and Dissipation Network

Butterworth Lossy-L Network

0.01-dB, 0.1-dB, 0.25-dB, 0.5-dB and 1-dB Chebyshev LC and Active Low-Pass Filters

0.1-dB, 0.25-dB, 0.5-dB and 1-dB Chebyshev Uniform Dissipation Network

Bessel LC and Active Low Pass Filters

Linear Phase with Equi-ripple Error of 0.05° and 0.05° LC and Active Low-Pass Filters

Transitional Gaussian to 6dB and to 12dB LC and Active Low-Pass Filters

Elliptic-Function LC and Active Low-Pass Filters

In summary, the book is a good filter design cookbook, with many worked-out examples, tables, graphs and relatively sophisticated design techniques presented. The book's major weakness is its lack of either sufficient theoretical justification (derivations) or explicit references for many of the design techniques, equations, and data presented. (A case in point is Figure 3-8, Minimum Q requirements for low-pass filters, which gives the required Q for different orders of the different types of filters. This figure appears as if by magic,with no indication as to which of the many references to Chapter Three it was derived from, or to the tolerances on the curve with regard to derating of filter response for variation in Q.) In spite of this weakness, the book will be a useful addition to the reference shelf of those involved in filter design and/or analysis.

"Interference Handbook"
by
William R. Nelson
Published by Radio Publications Inc.
Box 149, Wilton, CT 06897
Copyright 1981
$8.95
Reviewed by W. E. Moyer
Martin Marietta Aerospace

From the Foreword:

Welcome to the Wonderful World of Interference!

Bill Nelson, the author of this Handbook, has been involved with the interference problems of radio amateurs, CB operators and users of home entertainment devices for the past sixteen years as the Amateur Radio Representative of the Southern California Edison Company. He's been a detective, investigator and mediator for thousands of interference problems encountered in the Southern California area.

The knowledge gained in his work is incorporated in this Handbook. The stories he tells are true, as he either has been involved in them or has learned about them from other RFI investigators.

"The purpose of this Handbook is to help others locate and resolve interference problems of every type. Sources of interference are described along with the methods used to locate them. Suppression circuits for interfering devices are discussed in detail, as well as protection techniques for home entertainment equipment."

The book is a combination of brief case histories of RFI problems, and standard practices for location of the source and cure of commercial (radio, TV) RFI problems. Experienced EMC engineers will find the case histories presented to be interesting and, possibly, educational. Neophytes will find this book to be an excellent introduction to the "nuts and bolts" aspects of RFI problems and cures.

The following is a brief chapter-by-chapter summary of the contents of the book: Chapter One is an introduction to the subject of RFI in general. Chapter Two discusses spark discharge interference from such sources as electric motors, thermostats, electric blankets, automobiles, kitchen appliances, etc. Chapter Three discusses electrostatic discharge (ESD) as a source of interference. Chpater Four discusses how to perform an RFI investigation, describes the radio equipment needed and presents several brief case histories. Chapter Five deals with sources of powerline interference, their location and cure. Chapter Six discusses how the power companies locate power line RFI. This chapter is intended to provide an overview of the subject to power company personnel. Chapters Seven and Nine are aimed at Amateur Radio operators and deal with such specialized topics as noise reducing bridges for nearby radios and TVs. Chapter Eight deals with RFI from inadvertent non-linear (rectifiers) - what the author calls self-inflicted RFI. Chapters Ten and Twelve discuss simple cures for RFI in home entertainment equipment and automotive vehicles. Chapter Eleven is a brief discussion on the nature and importance of grounds and grounding. Chapter Thirteen is a list of information resources available to help solve commercial RFI problems. Included is an RFI assistance list, originally published by ARRL, which lists names, addresses and phone numbers that consumers can contact when seeking help in eliminating interference problems.

In summary, the book should prove to be a good introduction for novice engineers and technicians, as well as a useful book for the lay public in understanding and, possibly, curing home RFI problems.

First EMCS/BOD Meeting 1983

The first meeting of the EMCS Board of Directors was called to order by President Bill Duff at 1 P.M. on Thursday, January 20, 1983 at SOUTHCON in Atlanta, Georgia. Thirteen of the 21 Board members were present, in addition to two Society standing committee chairmen. A special thanks to these Board members who made the meeting during a severe ice storm that hit Atlanta during the meeting.

The following are the highlights of the meeting:

1. Election of Officers for 1983. After receiving no further nominations from the floor, the Board approved the slate of officers submitted by W. E. Cory, Chairman of the Nominations Committee. Only the vice-president position was contested. A secret ballot was used to determine the successful candidate between Gene Knowles and Bill Parker. All other positions were unanimously elected. The results are as follows:

President:	William G. Duff
Vice-President:	William H. Parker
Secretary:	Leslie A. Wall, Jr.
Treasurer:	Warren A. Kesselman

Technical Directors also elected were:

Communications Services:	Chester L. Smith
Member Services:	Fred J. Nichols
Professional Services:	B. L. Carlson
Technical Services:	Ralph M. Showers

In addition, Ed Bronaugh was appointed as Assistant Technical Director for Technical Services.

Due to by-law restrictions on consecutive terms of office for elected Board members, Leonard Thomas and Dick Schulz were ineligible to serve their recently elected 3-year term. President Duff appointed, and the Board approved, Bill Parker and Jerry Capraro to fill the unexpired terms through December 31, 1985.

Congratulations to all the elected and appointed new Board members and officers.

2. The Treasurer's report shows that the projected net worth of the Society is $164,000 as of the end of 1982. That represents a surplus of about $34,000 over last year's balance. These numbers will change slightly when the final costs for the 1982 Symposium are received. $70,000 remains in various higher interest paying investment options offered by the Institute.

3. Dick Schulz's report indicated that the special Silver Anniversary Issue of the EMCS Transactions will be ready to hand out at the EMC Symposium in August. Regular mailings to members will follow shortly thereafter. Key topics will include the Society history, its envisioned future and a complete index of subject and authors of all symposium authors to date. Also included is a similar index of authors/subjects for the past Transactions.

4. Future Symposia were discussed. The 1982 symposium at the Hyatt Regency next to National Airport in Crystal City, Arlington, Virginia, just across the Potomac from Washington, DC, is being well received. The dates are 23-25 August, with the Board of Directors meeting on the 22nd. There are virtually no exhibit booths left and an attendance of 1,000 is expected. The paper response has been unusually high and, in fact, the technical program committee has turned away papers that did not measure up to the committee standards. To accommodate the crush, there will be 3 to 4 parallel technical sessions each day, with workshops held during the day and evening periods. All-in-all, now is the time to make plans and budget requests for the symposium. April 24-26, 1984 is San Antonio for our next national symposium at the Hyatt Regency. Mel Johnson (512-684-5111) reports that the call for papers will be out shortly. Since this is Fiesta Week, now is not too early to reserve a room, even before receipt of the advance program information. Just indicate that the reservations are for the EMC Symposium. On October 16-18, 1984, our International Symposium in Tokyo will be held. Special trip packages are being put together for reduced costs air fare and hotel rates. For more information, write to the US contact, Tei Iki, Sony Corp., 1650 W. Bernardo Drive, San Diego, CA 92127. The future symposia will be addressed in the next newsletter.

5. Jim Hill's report shows that the Zurich EMC Symposium to be held on March 8-10, 1983 will be well attended. The author attended the Symposium and reported that well over 500 attended the well organized and operated symposium. There were 103 papers, 5 workshops, 28 exhibitors, and 511 registered attendees.

6. The status of the EMCS Standards Committee work was reviewed by Don Heirman, Chairman. Completed activity includes reaffirmation of IEEE Standard 376 on Measurement of Impulse Strength and Impulse Bandwidth and IEEE Standard 475 on Measurement Procedures for Field Disturbance Sensors. The remaining standards listed in the last Newsletter by Dick Schulz are still active, with the possible exception of P478, 482, and 509 due to the lack of need and coverage by other standards in the SAE. A long discussion ensued about the slow pace of standards activity and the lack of timely responses by the working groups. The Board agreed in principle that some significant change is needed to increase the productivity and eliminate roadblocks. The chairman will have a proposal for restructuring the entire standards committee operation to be more in line with other standards organization by the next meeting on May 4 in San Jose. A possible source for volunteers was retired members and candidates recommended by each Board member (one candidate per Board member was requested). Any comments, proposals, or interest in Standards work, please contact Don Heirman on 201-834-3566 (new telephone number). By the way, Don is now with American Bell, Mail Stop 2E-514, Holmdel, NJ 07733.

7. Ralph Showers reported that there is a request that a formal charter for each of the 7 EMCS Technical Committees (one inactive) be incorporated in the Society's by-laws after review and acceptance by each committee. Those desiring a copy of the charter can contact Herb Mertel on 714--578-1444. The technical committees involved and their chairpersons are indicated in Figure 1.

8. Chapter activities were summarized briefly by Charlie Anderson. Of particular interest was the revitalization of the Chicago Chapter which has 150 names on their mailing list and over 30 attended the first meeting in October 1982. Bob Hofmann, Chairman, reports that at least one other meeting will be held this year. Unfortunately, the petition for Chapter status for the proposed Orange County (CA) chapter has been lost. Action is being taken to correct that problem. President Duff also has received an indication of interest in forming chapters in France and Switzerland.

9. Jim Toler and Don Clark reported that they still are receiving society membership rebate requests from the Santa Clara symposium. To avoid such a prolonged response, Jim is preparing a policy that will be put into effect at our Washington Symposium in August. The Board voted and approved a two-tier symposium cost structure for the Washington Symposium. For full registrants, non-IEEE members, the rate will be increased by the cost of IEEE membership dues. The EMCS then will pay those non-IEEE members who qualify for membership and sign up at the conference the $7.00 Society fee. In this way, all qualified non-EMCS/IEEE attendees will become EMCS members. Pass the word! Jim also reported that 40 more letters were sent to those with dues in arrears. The possibility of sending out letters to IEEE members who indicated EMC on their Technical Interest Profile also was discussed and a cost effective plan is being formulated.

10. Jim Toler also indicated that the nominees for IEEE awards are due, starting in June 1983. (The Field awards were due on 1 April 1983.) The IEEE Medal of Honor, major annual medals, and Service awards are among such awards. All nominations for these awards are due by 1 June 1983. Since each award has its own requirements, Jim asked that those interested in nominating should contact him soon on 404-894-3964.

11. Jim Hill volunteered to serve as chairman of an ad hoc committee to process EMCS Fellow candidacy paperwork. Contact Jim on 703-451-4619.

12. Hugh Denny (404-894-3535) presented several suggested changes to our Society's by-laws and constitution. In addition to the change of the Society's field of interest, other changes include a new absentee voting policy for Board matters, adding Chapter chairpersons as voting members of the Board, and limiting terms of office for elected Board officers and technical directors. These changes were tabled until the next meeting to allow the Board to in-depth review the impact of these proposed changes.

13. Gene Knowles accepted chairmanship of the Nominations Committee for the next 3-year term for the Board of Directors. Six positions are available starting 1 January 1984. Contact Gene on 206-575-5280.

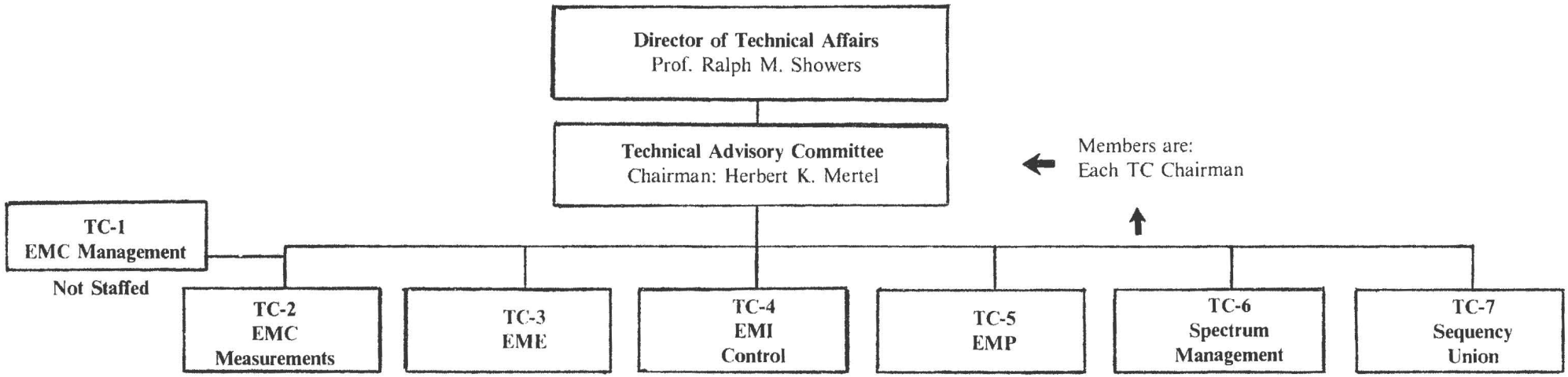
14. A report by Bob Brook on the activity of the Society on Social Implications of Technology was presented. The SSIT is looking for items that might be EMCS oriented and would be of interest to SSIT readers. Bob presented several areas of possible interest, including Radiation hazards, RF immunity specifications, and other emission related problems. Please contact Bob if you have interests in this area. He can be reached on 516-595-3136.

15. Bill Duff discussed the results of the recent TAB meeting he attended. Items receiving considerable attention included the 100th anniversary of the Institute, Membership Development, and problems with professional management of IEEE symposia by third parties. Bill also urged that all committee appointments for this calendar year be made by the committee chairpersons. The by-laws explicitly provide for terms of committee membership which should be followed.

The meeting adjourned at 4:45 P.M. and all tried to make it to the airport in the ice. Some of us even made it home that night - others had to spend the night in the airport or make their way back to a hotel. The next meeting will be held at the Test and Measurement Exposition in San Jose on Wednesday, 4 May 1983.

IEEE EMC Society

Organization of Technical Advisory Committee



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SANTA ANA 1982

PROPAGATION CONSIDERATIONS FOR FREQUENCY COORDINATION

By
Tom Rubinstein
Communications Editor
V.T. Society Newsletter

I would like to state at the outset that I realize that frequency coordination is a controversial subject. Since, however, we plan to stick to technical considerations, we don't expect to ruffle many feathers.

Let us start with what appears to be a bold statement: A PROPERLY PERFORMED FIELD SURVEY IS MORE ACCURATE THAN A PROPERLY PERFORMED PAPER SURVEY. The key is, of course, in the term "PROPERLY PERFORMED." Clearly, a properly performed paper survey is superior to a haphazardly performed field survey. To come to any real conclusion, we must define the considerations required to determine whether either general type of survey is properly performed. Before we do that, however, I would like to justify my original statement.

Why is a properly performed field-survey more accurate than a properly performed paper suvey? For one thing, every propagation calculation algorithm with which I am acquainted is based upon two-dimensional data; i.e., distance and height. What about clearance from nearby objects a short distance from the path? It is impossible to do enough radials to consider all obstructions on a two-dimensional basis, and no algorithms treat them on a three-dimensional basis. This is probably due to the difficulty involved in pulling three-dimensional data from topographic maps. That notwithstanding, one important parameter is ignored in performing propagation calculations.

Let us now look at the sheer number of methods of propagation calculations. The last time I counted, I found 162 articles on the subject. Granted, perhaps a third of these articles treat special situations such as dense foliage, knife edge refraction, and the like. Another third or so are updates of previously published algorithms, and not really new algorithms as such. This leaves us with perhaps fifty different methods of calculating propagation parameters. Can they all be right? To answer that question, let us look at three of the more popular methods.

Bullington's method[1] was based upon signal strength measurements made in the 54 to 216 MHz range using 30 foot high antennas. It is appropriate for calculating point-to-point links in the aforementioned frequency range. Is it appropriate for mobiles? Our experience has been favorable. Is it appropriate beyond 216 MHz? Our experience has shown it to be reasonably accurate at 450 MHz, but poor at 800 MHz. An additional problem area is the case where shadowing exists between high antennas which are closely spaced. Bullington's algorithms do not treat the foregoing case.

The Okumura[2] algorithm was based upon base-to-mobile signal strength measurements in the 150 to 1500 MHz range. The algorithm was put together with base-to-mobile communications in mind and, therefore, cannot be used for point-to-point paths. A number of Okumura's correction factors are based upon the nature of the terrain in the vicinity of the mobile. Another difficulty with Okumura's method is the case where the base station antenna is below average terrain in a particular direction. This can happen in the case of sloping terrain. Okumura gives no instructions for handling this case. In general, however, Okumura's method is excellent for predicting base-to-mobile communication reliability in the frequency range for which it was designed.

The Longley-Rice[3] method was based upon measurements made in the 20-1000 MHz range. It is completely computerized and is too complicated for hand calculation. It is essentially a set of subprograms for which the user must supply his own cover program to meet his particular needs. A number of main programs have been published in the literature. The main difficulties with Longley-Rice are the following:

- Large program; requires mainframe computer,
- Requires a main program,
- Area model does not treat the case where terrain roughness varies.

The foregoing was not intended to be an exhaustive analysis of the available methods of propagation prediction or even of those presented, but rather an illustration that each method has its drawbacks and there is no "universal" method.

Assuming that the engineer is tasked with performing a paper survey, let us examine what parameters determine whether it is properly performed. First, the engineer must choose an appropriate model; e.g., he would not choose Bullington for a mountain top to mountain top path. The model must be properly applied. Appropriate intermediate parameters (e.g., height above average terrain) must be calculated and used to determine correction factors. Radials must be taken at frequent enough intervals and in appropriate directions, considering the topography of the particular area. Statistics must be applied to make a prediction about signal reliability. More about statistics later.

Similarly, an engineer may be tasked with performing a field survey. He must choose a topographically representative, yet random, group of test points over which to perform his survey. The number of points must be sufficient to provide the desired level of confidence in the results of the survey. Pre- and post-calibrations must be performed and it must be verified that the test setup remains calibrated under expected variations in voltage and temperature. Data reduction must be done carefully and consistently. Some methods of surveying provide signal strength statistics others do not. More on statistics later.

So what does all of this have to do with frequency coordination? It is obvious that signal strength is the paramount concern in making frequency assignments. We can apply these methods to find our answers. It is generally agreed that it is not possible to find a channel with no co-channel users in any major metropolitan area. The best we can do is to use coded squelch to minimize "nuisance interference" and to design for a system in which the probability that each of the co-channel neighbors captures his neighbors' signals within his own service area exceeds some predetermined value.

Regardless of the method used to determine median signal strength, statistical methods must be applied to determine the probability of attaining a particular capture radio based upon the relative median signal strengths. A number of articles[4-6] have discussed the statistical distributions of radio signals. Assuming that the desired and undesired signals are statistically independent, it should not be difficult to determine the ratio of median desired to undesired signals to achieve any given capture ratio with any given reliability.

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2. Okumura, Y., E. Ohmori, T. Kowano, & K. Fukuda, "Field Strength and its Variability in VHF & UHF Land-Mobile Radio Service", *Rev. Elect. Commun. Lab.*, Vol. 16: pp. 825-873, Sept., 1968.
3. Longley, A.G. & P.L. Rice, "Prediction of Tropospheric Radio Transmission Loss over Irregular Terrain. A Computer Method — 1968", *ESSA Research Laboratories*. ERL 79-ITS67, 1968.
4. Hansen, F. & F.I. Meno, "Mobile Radio Fading — Rayleigh and Log-Normal Superimposed", *IEEE Trans Veh Tech*, Vol. VT-26: Nov. 1977, pp. 332-335.
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6. O'Kelly, P.D.; I.S. Scales, J.K. Sin, "Low Cost Processor Controlled Field Strength Measurement System for 850 MHz Coverage Evaluation, *32 IEEE Veh Tech Conf Record*, May 1982, pp. 111-115.

SATELLITE COMPENDIUM PUBLISHED BY IEEE PRESS

The publication of the book **Compendium of Communication and Broadcast Satellites: 1958 to 1980** has been announced by the IEEE Press. This volume, edited by Martin P. Brown, Jr., was assembled by the Communication and Broadcast Satellite Systems Committee of the IEEE Aerospace and Electronics Systems Society.

The satellite is playing a major and increasingly vital role in modern communications and broadcasting throughout the world. This unique reference volume brings together data on satellites used for these purposes in a uniform format: a full-page picture of each satellite, with a human figure shown for size comparison; a block diagram of the communications payload; a frequency plan showing the bands utilized; a listing of major transmission parameters; date launched and designed lifetime. This material was carefully assembled by a group of 25 experts from the United States, Canada, Western Europe, and Japan. An introductory overview section provides some general data on frequency allocations, satellite stabilization, launch sites and dates, and the satellite family tree. This is followed by the satellite descriptions themselves, categorized by type of satellite: international, international/domestic, regional, domestic, military, experimental, and amateur. A bibliography of over 40 pages completes the information provided in this useful volume.

PATENT RIGHTS FOR EMPLOYED INVENTORS

The Patent Task Force moved to center stage when a House Judiciary subcommittee held hearings on a bill to set Federal standards for employee pre-invention assignment agreements. The bill (H.R. 4732) is the employed inventors' bill-of-rights, sponsored by Rep. Robert Kastenmeier, who chairs the Subcommittee on Courts & Civil Liberties and the Administration of Justice. Two other members, Reps. Jack Brooks and Barney Frank, are co-sponsors.

IEEE was represented at the hearing by the Chairman of the patents task force, Robert Frank. Enactment of the legislation will help to provide an increased incentive for employed engineers to invent, bring new products to market, and enhance the economy. Enactment also will remove the constraints imposed by unduly restrictive pre-invention assignment agreements, an essential step in halting the decline of innovation relative to that of other industrialized countries.

Kastenmeier's belief in the importance of patent rights for employed inventors is demonstrated by his decision to hold hearings. His personal dedication and perseverance will be needed if the legislation is to move forward. There are several other items of patent legislation confronting the Congress, the ones with the widest application being those that permit large corporations to obtain patent rights on inventions arising from Federal R&D contracts. One such bill is S. 1657 (sponsored by Sen. Jack Schmitt) which has been approved by the Senate Commerce Committee and is expected to be considered soon by the Senate.

The Administration supports the Schmitt bill and the companion House bill, the Research & Development Utilization Act (H.R. 4564). In an outreach effort, Administration representatives have contacted IEEE to try to find common cause. Working through the White House Office of Science & Technology Policy, the Administration requested a meeting with IEEE in late June to gain support for H.R. 4564. The OSTP reasons that the "big business" bill will gain greater House support (including that of Kastenmeier) if it contains some provision relating to rights for employed inventors.

OSTP also was instrumental in setting up a meeting of the Patent Task Force with the Commissioner of Patents and Trademarks.

Call for Papers

The 7th Wroclaw International Symposium and Exhibition on Electromagnetic Compatibility will be held on June 26-28, 1984.

TOPICS: EM environment; propagation, antennas; immunity; suppression techniques; shielding and grounding; spectrum management; EMI in micro-electronics; nuclear EMP; biological effects of RF radiation; EMC computer programs; EMC standards.

Prospective authors are invited to send one-page abstract (3 copies) to:

EMC Symposium
Box 2141
51-645 Wroclaw 12
Poland

Authors Schedule:

Deadline for abstracts	August 15, 1983
Confirmation and authors' kits	October 15, 1983
Deadline for papers	February 15, 1984

AMERICAN NATIONAL STANDARD METRIC PRACTICE

A revised standard, ANSI/IEEE Std. 268-1982, updating the 1979 version, has been issued. It is noted that a new system of measurement, the International System of Units (SI) is being adopted throughout the world. This system is a modern version of the MKSA (meter, kilogram, second, ampere) system and its details are published and controlled by an international treaty organization.

A great many modifications have been made to the earlier standard in this revision. This is a reference document for general use and not in the special category of nuclear standards which usually appear in these pages. However, it should be noted, for example, that DOD recognizes its importance and it is being reviewed for adoption.

A copy may be obtained for $5.00 by writing: IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854.

EMCABS

MELVIN J. JOHNSON

In this issue, we are publishing 36 abstracts. These are abstracts on various EMC topics. We plan to continue publishing abstracts of papers from previous EMC Symposia and from other conferences. The EMCABS committee is composed of the members listed below. By way of introduction to the community, they are listed with their company affiliations.

L.F. Babcock, Bell Aerospace Textron
E.L. Bronaugh, Electro-Metrics/Penril Corp.
R.N. Hokkanen, Naval Training Equipment Center
R. Jacobson, Sperry Flight System
D.R. Kerns, Southwest Research Institute
S. Kuniyoshi, Naval Sea Systems Command
R.B. Schulz, IITRI/ECAC
R.M. Showers, University of Pennsylvania

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EMCABS 1-3-83

Congress Finally Puts Its Stamp On Goldwater RFI Legislation
Microwaves
Vol. 21, No. 11; October 1982; P 39
ABSTRACT: Two bills are viewed by amateur radio and land mobile operators as the first step in curing RFI problems encountered when HF and VHF transmitters interfere with television and home entertainment equipment.
INDEX TERMS: FCC, TV, CB, Standards, Amateur Radio, Land Mobile, HF, VHF

EMCABS 2-3-83

ANSI Radiation Standard Finally Hits the Streets
Microwaves
Vol. 21, No. 11; October 1982; P 37-39
ABSTRACT: ANSI C95.1-1982, "Safety Levels with Respect to RF Electromagnetic Fields (300 KHz to 100 GHz)," may be obtained from the American National Standards Institute, 1430 Broadway, New York, NY 10018. (212) 354-3300.
INDEX TERMS: Radiation Hazard, Biological Effects, Field Strength, Medical, Standard

EMCABS 3-3-83

Shielding Techniques Tackle EMI Excesses
Peter Grant
Tecknit, Cranford, NJ
Microwaves
Vol. 21, No. 11; October 1982; P 91-118
ABSTRACT: In the design of an effective shielding enclosure, EMI gaskets are often called upon to provide the final measure of attenuation. The last part in this series of articles explores different ways to utilize shielding gaskets.
INDEX TERMS: Shielding, EMI Gaskets, Seams, Electrical Bonds, Fastener Spacing

EMCABS 4-3-83

Many Factors Complicate EM Susceptibilty Tests
R. J. Richards
Instruments for Industry, Inc., Farmingdale, NY
Microwaves
Vol. 21, No. 9; September 1982; P 87-93
ABSTRACT: Testing for EM effects presents problems for test engineers. Test standards, enclosure types, sources and radiators must all be considered before reliable results can be expected.
INDEX TERMS: EMI Tests, Susceptibility, Crawford Cell, TEM Cel, Facilities

EMCABS 5-3-83

Measurement Techniques Establish Shielding Values
Peter Grant
Tecknit, Cranford, NJ
Microwaves
Vol. 21, No. 9; September 1982; P 97-99
ABSTRACT: Precise testing methods can determine effective shielding values. Once established, a material's SE characteristics should be documented in a procurement specification.
INDEX TERMS: Measurement, Shielding, Attenuation, MIL-STD-285, Transfer Impedance, Test Fixture

EMCABS 6-3-83

Shielding Analysis Aids Material Selection
Peter Grant
Tecknit, Cranford, NJ
Microwaves
Vol. 21, No. 8; August 1982; P 83-91
ABSTRACT: Careful evaluation of a system's shielding requirements leads to the proper shielding materials for removing unwanted noise from transmitters and receivers.
INDEX TERMS: Shielding, RF Gaskets, Galvanic Action, Vents, Windows

EMCABS 7-3-83

RF/Coaxial Connectors Meet Growing Application Demands
Paul Fulton
AMP Inc., Harrisburg, PA
Electronic Products
Vol. 25, No. 8; 17 November 1982; P 77-80
ABSTRACT: Stricter shielding requirements and IC development have created new performance standards and termination schemes for coaxial connectors.
INDEX TERMS: FCC Docket 20780, Coaxial Connectors, Cables, Shielding

EMCABS 8-3-83

Know RF-Emission Regulations Pertaining to Your Designs
Mike Head
Corcom, Inc.
EDN
Vol. 26, No. 16; 19 August 1982; P 149-154
ABSTRACT: The electronic products whose design you oversee must do more than operate efficiently and dependably. They must also meet strict RF radiation standards. This article provides a management overview of the various specifications applying to radiation emitted from electronic equipment including Canadian and European standards.
INDEX TERMS: Standards, FCC, VDE, UL, CSA, RF Emission, Commercial Equipment, Industrial Equipment

EMCABS 9-3-83

Design Active Elliptic Filters with a Four Function Calculator
Arthur D. Delagrange
Dept. of the Navy
EDN
Vol. 27, No. 5; 3 March 1982; P 135-138
ABSTRACT: Although they achieve high performance, active elliptic filters are unfortunately difficult to design — a task simplified by the methods described in this article. It explains how to calculate a passive elliptic filter's elements and convert those values into an active filter design using only a four function calculator.
INDEX TERMS: Active Filters, Elliptic Filters, Filter Design

EMCABS 10-3-83

Automatic Frequency Domain Analysis Using a Microwave Frequency Counter
Shmuel Shalem
EIP Microwave, Inc.
MSN
Vol. 11, No. 11; November 1981; P 54-59
ABSTRACT: A low cost measurement technique operates under GPIB control and provides highly accurate measurements of both frequency and power.
INDEX TERMS: Spectrum Analysis, Frequency Domain, Microwave, Frequency Counter

EMCABS 11-3-83

Microwave Device Transient-Power Failure Mechanisms Yield to Computer Analysis
J. S. Smith, N. Kusnezov
Lockheed Missiles and Space Corp.
MSN
Vol. 12, No. 3; March 1982; P 67-84
ABSTRACT: Microwave device vulnerability to power transients has been very difficult to quantify. Recent improvements in computer analysis can now be used to reveal the secrets of a power/temperature relationship that ultimately causes device destruction.
INDEX TERMS: Microwave, Microcircuits, Transients, EMP, ESD, Power Transients, Computer Analysis

EMCABS 12-3-83

Shielding Materials and Designs Simplify EMC
Frank Weghorn
Associate Editor
Electronic Products
Vol. 25, No. 3; 23 July 1982; P 67-69
ABSTRACT: A high degree of shielding effectiveness can theoretically be achieved by using a metal enclosure with the necessary conductivity, permeability, reflection loss, and absorption loss characteristics, but real world operation requires discontinuities in the enclosure. Seams, joints, and cabling holes all constitute areas of potential emission which must be shielded.
INDEX TERMS: Shielding, Apertures, Gaskets, Attenuation, Conductive Elastomers, Plastic Housings, Windows

EMCABS 13-3-83

System Packaging
Tom Ormond
Senior Editor
EDN
Vol. 27, No. 3; 3 February 1982; P 112-122
ABSTRACT: Today's system-packaging products are designed to do more than make your design look good. Manufacturers of these components help you address four critical requirements.
* Mechanical Requirements
* EMI and RFI
* Heat Removal
* User Requirements

INDEX TERMS: Packaging, Housing, Shielding, CSA, VDE, FCC, Cooling, Vendors

EMCABS 14-3-83

Protect Your Plant Against Lightning
Ralph H. Lee
Lee Electrical Eng. Inc., Wilmington, Del.
Instruments and Control Systems
Vol. 55, No. 2; February 1982; P 31-34
ABSTRACT: One of the problems facing industry is damage to equipment and buildings from lightning strokes. In hazardous conditions this could cause explosions or fires destroying or damaging a plant. Early in 1920, F. W. Peek conducted artificial lightning stroke tests in which he found conical protection angles of 64 to 76 degrees having protective ratios of 2 to 4. These values were adopted in the U.S. Lightning Protection Code, NFPA #78.

INDEX TERMS: Lighting Protection, NFPA #78, Buildings, Current Wave Form, Air Terminals

EMCABS 15-3-83

What Systems Engineers Should Know About EMI
Jerry Bogar, P. Dobrogowski
AMP, Inc., Harrisburg, PA
Instruments and Control Systems
Vol. 55, No. 6; June 1982; P 53-57
ABSTRACT: The FCC mandate makes EMC a major design objective. By EMC we mean developing a product that can operate in its chosen environment without emitting interference that exceeds the FCC limits.

INDEX TERMS: EMI Design, FCC Rules, Digital Circuit Design, Filtering, EMI Limits, Grounding, Testing

EMCABS 16-3-83

Emitter/Susceptor Profiles Predict Proper Shielding
Peter Grant
Technit, Cranford, NJ
Microwaves
Vol. 21, No. 7; July 1982; P 79-86
ABSTRACT: Effective shielding can be gained in many ways, including the careful design of equipment enclosures and the use of gasket materials. EMI profiles help decide the proper shielding techniques.

INDEX TERMS: EMI Shielding, Apertures, Grills, Mesh Screen, Windows, Wave-Guide-Below-Cut-Off, Finishes, Seams, MIL-STD-461

EMCABS 17-3-83

Power Line Analyzer Solves Problem Aboard Space Shuttle
Instruments and Control Systems
Vol. 55, No. 4; April 1982; P 62
ABSTRACT: The Dranetz Engineering Labs Series 606 is a microprocessor-based instrument that monitors a wide range of power line disturbances affecting sensitive electronic instruments. It stores, analyzes, classifies, and prints out quantitative data on power line faults.

INDEX TERMS: Power Line, Transients, Surges, Voltage Monitor

EMCABS 18-3-83

Shielding Circuits in Plastic Enclosures
Andreas Bibl
John Fluke Mfg. Co., Everett, WA
Electronic Products
Vol. 24, No. 2; 30 June 1981; P 51-52
ABSTRACT: Although plastics have become commonplace in packaging, they do have some disadvantages — most notably, their inability to provide EMI/RFI shielding. But some very simple techniques can minimize both electromagnetic radiation and susceptibility.

INDEX TERMS: Plastic Enclosures, Shielding, Flame Spraying, Plazma Spraying, Metal Coatings

EMCABS 19-3-83

Choosing the Best Transient Suppressor
C. S. Molee
Victory Engineering Corp., Springfield, NJ
Electronic Products
Vol. 24, No. 5; September 1981; P 99-100
ABSTRACT: The susceptibility of modern solid state circuits has made the elimination of power line transients imperative, but this involves a number of not-so-obvious tradeoffs.
INDEX TERMS: Transients, Suppression, Varistor, Zener, Capacitor, Spark Gap

EMCABS 20-3-83

FCC Lassoes Computer EMI with Design and Manufacturing Specs.
P. Dobrogowski, Eric Vander Heyden
AMP Inc., Harrisburg, PA
Electronics
Vol. 55, No. 5, 10 March 1982, P 126-132
ABSTRACT: The rapid spread of personal computers is wreaking havoc with nearby television and radio reception. Determined to control this nuisance, the FCC on Sept. 19, 1980 adopted a set of regulations of which both the buyer and the designer of these machines need to be aware.
INDEX TERMS: FCC, Computer EMI, Regulation, Suppression, Grounding, Shielding, EMI Specification.

EMCABS 21-3-83

Radiated Power Method Protects Personnel
George J. Monser
Ratheon Co., Goleta, CA
Microwaves
Vol. 21, No. 1, January 1982, P 74-75
ABSTRACT: Technician safety is the key consideration of this peak-sampling method for measuring effective radiated power. The procedure produces a typical error of +/-1 dB.
INDEX TERMS: Radiated Power, Measurement, Field Strength, Safety, Radiation Hazard.

EMCABS 22-3-83

Shielding Barriers Block Electromagnetic Waves.
Peter Grant
Technit, Cranford, NJ
Microwaves
Vol. 21, No. 6; June 1982; P 97-102
ABSTRACT: Electromagnetic interference can hinder a system's performanee by causing unwanted noise. This first in a five-part series examines how signals are attenuated through absorption, reflection and rereflection.
INDEX TERMS: Shield Attenuation, Reflection, E. Field, H. Field Schelkunoff, Plane Waves.

EMCABS 23-3-83

Setting Radiation Standards: A Highly Charged Issue
Barry E. Manz
Associate Editor News
Microwaves
Vol. 21; No. 6; June 1982; P 27-30
ABSTRACT: There may be as many opinions concerning potential danger from non-ionizing radiation as there are papers on the subject. In this emotionally charged environment, tempers flare, and more and more questions are raised concerning the repeatability of controversial studies. Some studies report no damage caused by high levels of radiation. Others report extensive damage caused by very low levels.
INDEX TERMS: RF Radiation, Limits, Radiation Hazard, Safety, ANSI, Field Strength

EMCABS 24-3-83

Computing Scattering Amplitudes for Arbitrary Cylinders Under Incident Plane Waves
Samuel P. Marin
Mathematics Department, General Motors Research Laboratories, Warren, MI
IEEE Transactions on Antennas and Propagation
Vol. AP-30, No. 6, November 1982 P 1045-1052
ABSTRACT: A numerical method to compute scattering amplitudes for time harmonic waves scattered from finite cylinders with arbitrary uniform cross section is described. A nonlocal boundary condition is used to develop a variational formulation of the scattering problem. The finite element method is applied to determine approximations to the near field. Scattering amplitudes are then determined by means of an integral representation obtained from Green's formula and properties of the nonlocal boundary operator. Computational results are presented to illustrate the method's application.
INDEX TERMS: Finite Element Method, Scattered Fields, Computation, Nonlocal Boundary Condition.

EMCABS 25-3-83

How to Choose Cable Shielding for EMI Reduction
Albert R. Martin
Wire and Cable Division, Raychem Corporation
Naval Engineers Journal
Vol..94 Oct. 1982, No.5 P. 46-51

ABSTRACT: Cable shields are evaluated in terms of their surface transfer impedance. The relation between surface transfer impedance and shielding effectiveness is made clear. Then the critical transfer impedance is derived from known radiated field and conducted susceptibility levels. Finally the critical transfer impedance is applied for the system under consideration in conjunction with a library of surface transfer impedance curves for various cable shield designs to construct an adequate shield which protects the system from the imposed EMI threat.

INDEX TERMS: Cable Shields, EMI Reduction, Surface Transfer Impedance.

EMCABS 26-3-83

Numerical Algorithm Based on the Mode-Matching Method with a Singular-Smoothing Procedure for Analyzing Edge-Type Scattering Problems
Yoichi Okuno* and Kamenosuke Yasuura**
*Faculty of Engineering, Kumamoto University, Kumamoto, 860, Japan and **Faculty of Engineering, Kyushu University, Fukuoka, 812, Japan
IEEE Transactions on Antennas and Propagation
Vol. AP-30, No. 4, July 1982 P 580-587

ABSTRACT: An effective numerical method for analyzing edge-type scattering problems is presented with its analytical foundations. The general theory is applied to an arbitrarily shaped two-dimensional scatterer with an edge point, convergence of the approximate solutions is proven, and an algorithm for numerical computation is derived. The algorithm is employed for the resolution of the problem of a rectangular cylinder. Numerical data on the speed of the convergence show the validity and the efficiency of this method. Some examples for far-field patterns and back scattering cross sections as functions of the wave-number are given.

INDEX TERMS: Mode-Matching method, Edge-Type Scattering.

EMCABS 27-3-83

Scattering of Plane Electromagnetic Waves by a Grating of Conducting Cylinders Embedded in a Dielectric Slab over a Ground Plane
Hassan A. Kalhor* and Mohammad Ilyas**
*Dept. of Electrical Engineering, Shiraz University, Shiraz, Iran and ** The Electrical Engineering Department, Queen's University, Kingston, Ontario, Canada
IEEE Transactions on Antennas and Propagation
Vol. AP-30, No. 4, July 1982 P 576-579

ABSTRACT: The problem of scattering of electromagnetic waves by periodic conducting cylinders embedded in a dielectric slab backed by a plane reflector has been of great interest. A numerical integral equation technique is presented for the analysis of this problem. The solution of the integral equation yields the induced surface currents on the cylinders from which the powers in various reflected modes are calculated. Results are compared against the limited numerical results available in the literature and indicate excellent agreement.

INDEX TERMS: Plan Wave Scattering, Dielectric Slabs.

EMCABS 28-3-83

A New Expression for the Scattering of a Gaussian Beam by a Conducting Cylinder
Shogo Kozaki
Department of Electrical Engineering, Gumma University, Kiryu, 376, Japan
IEEE Transactions on Antennas and Propagation
Vol. AP-30, No. 5, September 1982 P 881-887

ABSTRACT: The scattering of a Gaussian beam with phase distribution by a conducting cylinder is analyzed for the H and E waves. A simpler expression than in conventional analysis is successfully obtained by using a new method of solution. The expression of the beam is represented as a product of a well-known scattering of a plane wave and a weighting function. This analysis is still valid for the case where the diameter of the cylinder is comparable or equal to the beamwidth. The Poynting vector and the amplitude of the total Gaussian beam near the cylinder are sketched in two-dimensional space. The amplitude and phase of the total beam are compared with experimental results. The surface current distribution and scattering patterns are also described.

INDEX TERMS: Gaussian Beam Scattering, Conducting Cylinder.

EMCABS 29-3-83

Technique for Correlating Radiated Noise with Individual Spark Events in an Automotive Ignition System
Wayne J. Johnson
Research Staff, Physics Department, Ford Motor Company, P.O. Box 2053, Dearborn, MI
IEEE Transactions of Vehicular Technology
Vol. VT-27, No. 3, August 1978 P 138-141

ABSTRACT: A technique is described for obtaining synchronization signals from an engine's ignition system without significantly modifying the far field radio frequency interference (RFI) produced by the engine. These signals are used to view the output of an RFI receiver as a function of time, allowing for a correlation between RFI and individual arcing events in the ignition sequence. Examples of real time and statistical data obtained with the technique are given..

INDEX TERMS: RF Interference, Automotive Ignition System.

EMCABS 30-3-83

Ignition Noise of Foreign and Domestic Vehicles in Use in the United States
Richard A. Shepherd and James C. Gaddie
SRI International, 333 Ravenwood Ave., Menlo Park, CA
IEEE Transactions on Vehicular Technology
Vol. VT-29, No. 3, August 1980 P 338-345

ABSTRACT: Electromagnetic noise from the ignition systems of more than 11,000 individual vehicles in service in the United States in mid-1977 was measured at 50 and 153 MHz. Very little difference was found between the noise of U.S. domestic and foreign vehicles. Older vehicle groups are noisier than new vehicle groups, a fact which may be accounted for by either of two causes: a) some vehicles in a group become noisier with age, b) newer vehicles may have improved noise suppression systems. Measurements made in a single year will not show which effect predominates. We found the greatest noise differences between vehicle types (cars, trucks, and so on).

INDEX TERMS: Ignition Noise, Automobile Ignition Interference.

EMCABS 31-3-83

Scattering from Wires and Open Circular Cylinders of Finite Length Using Entire Domain Galerkin Expansions
Louis N. Medgyesi-Mitschang*, and Cornel Eftimiu**
*McDonnell Douglas Research Laboratories, St. Louis, MO and **Dept. ofPhysics,University of Missouri, St. Louis, MO
IEEE Transactions on Antennas and Propagation
Vol. AP-30, No. 4, July 1982 P 628-636
ABSTRACT: Electromagnetic (EM) scattering by finite-length, perfectly conducting open cylinders (i.e., ducts or tubes) with circular cross sections is considered. The case of a straight wire, viewed as a thin cylinder, is examined in this context. The salient features of this study are a) use of the electric field integral equation (EFIE) as a starting point, b) solution of this equation by the Galerkin method, and c) representation of the axial variation of the currents on the scatterer by an entire domain (Fourier series) expansion. Edge modes are considered in the expansion set and their effect is examined. The open cylinder backscatter cross section is computed as a function of aspect angle for various radii and lengths and is compared with measured data.
INDEX TERMS: EM Scattering, Galerkin Method, Finite Circular Cylinder.

EMCABS 32-3-83

Sweeping Out the Trash: Eliminating RFI From the Radio Shack TRS-80, Model I
Lew McCoy & Fred Treasure
CQ
Vol. 38 No. 12, Dec. 1982 P 42-44
ABSTRACT: The RFI problems of the TRS-80 Model I as they relate to the amateur radio operator are discussed. A design is provided for reducing the RFI produced by the unit.
INDEX TERMS: RFI, TRS-80, Amateur Radio

EMCABS 33-3-83

A Computer Program for Calculating Effective Interference to TV Service (Computer Program TVINT)
Harry K. Wong
Federal Communications Commission, Washington, D.C. Office of Science & Technology
Technical memo PB82-250911, PC A05/MF A01
July 82, 85 p FCC/OST/TM-82-2
ABSTRACT: This report describes a computer program developed by the Propagation Analysis Branch of the calculation of interference to TV service. The report introduces the concept of 'effective interference', which is defined as the joint probability of service and interference, integrated over the area of interest. The program will also perform standard interference calculations, wherein interference contours are based on 50% probability of interference. The program can be used in an interactive mode with user options to calculate the location of any desired service or interference contour, the size of any service or interference area and the net 'effective interference' within any service area. The user also has options to include the effects of receiver filters, receiving antenna cross polarization and front-to-back ratios and terrain roughness. The report includes values for desired-to-undesired ratios and other input parameters for calculating adjacent channel and co-channel TV to TV interference for all bands, and FM interference to TV channel 6 service.
INDEX TERMS: Computer Program, Effective Interference, TV Services

EMCABS 34-3-83

Field Tests of 216 to 220 MHz Transmitters for Compatibility with Television Channels 13 and 10
H. Davis
Federal Communications Commission, Washington, D.C., Office of Science & Technology
Technical memo
June 82, 25 p, FCC/OST/TM-82-4
ABSTRACT: Limited field tests of potential interference to television Channels 13 and 10 were conducted in response to a memorandum entitled, 'Inland Waterways Communications Service'. These tests indicated that it would be inadvisable to permit arbitrary placement of 50 watt transmitters at frequencies from 216-220 MHz in service areas of Channels 13 and 10. However, the data shows the promise of allocating 216 to 220 MHz to an Inland Waterways Communications Service on a basis of non-interference to other services. The tests also tend to confirm predictions based on propagation data and laboratory measurements of television receiver performance. Four television receivers were observed at various locations in the service area of two television stations at Baltimore, MD: Channel 13 & 11, the latter being used to simulate the 'half IF beat' phenomenon to Channel 10. The interference signal transmitter was located at a distance of 100 meters from the television receiving system.Estimates of effects on television were based on five transmitter powers: 1 watt, 3 watts, 10 watts, 25 watts, and 50 watts.
INDEX TERMS: TV Interference, Field Tests, 216-220 MHz

EMCABS 35-3-83

Nonionizing Electromagnetic Radiation: Biological Effects. 1976-September, 1982 (Citations from the Energy Data Base).
Prepared in cooperation with the Dept. of Energy, Washington, D.C.
National Technical Information Service, Springfield, VA
Rept. for 1976-Sept. 1982
Sept. 1982, 327 p. PB 82-874199 PC N01/MF N01
ABSTRACT: The bibliography contains citations concerning the biological effects of nonionizing electromagnetic radiation. Electromagnetic energy absorption and radiation effects to humans, animals, and insects under various conditions are discussed. Radiation dosemetry, safety measures, and safety standards are included. Behavioral effects of microwave are presented. (Contains 312 citations fully indexed and including a title list.)
INDEX TERMS: Bibliography, Biological Effects, Nonionizing, Electromagnetic Radiation

EMCABS 36-3-83

Blocking Feed-Through for Coaxial Cable (Patent)
Robert F. Howarth
Dept. of the Navy, Washington, D.C.
Filed 3 April 1980, patented May 11, 1982, 5 p, AD-D009 593/5, PAT-APPL-6-136 858 Supercedes PAR-APPL-6-136 858, AD-D007 170
Patent-4 329 540 Not available NTIS, Available for U.S. licensing & possibly, for foreign licensing. Copy of patent available Commissioner of Patents, Washington, DC 20231, $0.50
ABSTRACT: A coaxial cable is fed through a wall without introducing electrical reflections or otherwise compromising the cable's electrical integrity. A cylindrically-shaped housing having a cavity is inserted though an opening in the wall and is locked in place while an o-ring seals the juncture. A curable adhesive compound fills the cavity and adhesively engages the length of cable shielding and the inner wall of the cavity. After the compound cures, a watertight interconnection and penetration of the wall is formed without compromising the cable's electrical integrity.
INDEX TERMS: Coaxial Cable, Blocking Feed-Through

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